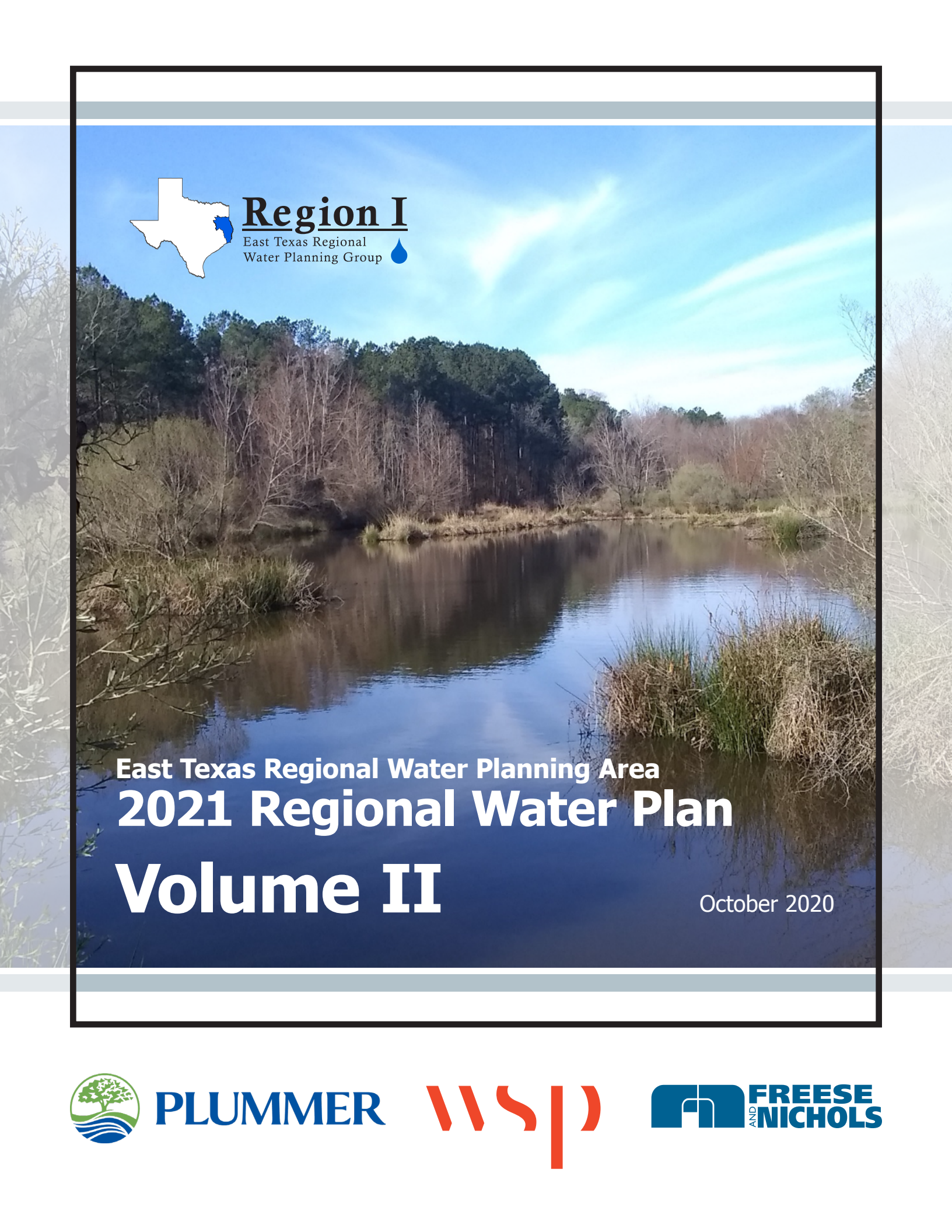
Region I
East Texas Regional
Water Planning Group
East Texas Regional Water Planning Area
2021 Regional Water Plan
Volume II
October 2020
PLUMMER
WSP
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Volume II

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List of Appendices

Appendix ES-A

Required 2022 Regional Water Planning Application Web Interface Reports

The following appendix includes 25 reports that are generated by the TWDB Data Web Interface known as the DB22. Below is a Table of Contents of the reports.

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Region I Water User Group (WUG) Population

	WUG POPULATION					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
BRUSHY CREEK WSC	2,118	2,187	2,213	2,213	2,213	2,213
FRANKSTON	1,263	1,305	1,320	1,320	1,320	1,320
FRANKSTON RURAL WSC	1,295	1,338	1,354	1,354	1,354	1,354
NECHES WSC	1,515	1,564	1,582	1,582	1,582	1,582
NORWOOD WSC	814	820	829	829	829	829
PALESTINE	9,726	10,045	10,162	10,162	10,162	10,162
SLOCUM WSC	2,187	2,258	2,284	2,284	2,284	2,284
WALSTON SPRINGS WSC	2,581	2,666	2,698	2,698	2,698	2,698
COUNTY-OTHER	615	643	653	653	653	653
NECHES BASIN TOTAL	**22,114**	**22,826**	**23,095**	**23,095**	**23,095**	**23,095**
ANDERSON COUNTY CEDAR CREEK WSC	1,015	1,049	1,060	1,060	1,060	1,060
B B S WSC*	1,345	1,388	1,405	1,405	1,405	1,405
B C Y WSC	1,901	1,901	1,901	1,901	1,901	1,901
BRUSHY CREEK WSC	1,243	1,283	1,298	1,298	1,298	1,298
ELKHART	1,431	1,478	1,496	1,496	1,496	1,496
FOUR PINES WSC	3,596	3,713	3,756	3,756	3,756	3,756
NORWOOD WSC	60	60	61	61	61	61
PALESTINE	9,228	9,531	9,641	9,641	9,641	9,641
PLEASANT SPRINGS WSC	974	1,007	1,018	1,018	1,018	1,018
SLOCUM WSC	230	238	240	240	240	240
TDCJ BETO GURNEY & POWLEDGE UNITS	3,598	3,716	3,759	3,759	3,759	3,759
TDCJ COFFIELD MICHAEL	5,132	5,300	5,361	5,361	5,361	5,361
THE CONSOLIDATED WSC*	1,140	1,178	1,191	1,191	1,191	1,191
TUCKER WSC	1,160	1,198	1,211	1,211	1,211	1,211
WALSTON SPRINGS WSC	1,030	1,064	1,076	1,076	1,076	1,076
COUNTY-OTHER	5,819	6,087	6,177	6,177	6,177	6,177
TRINITY BASIN TOTAL	**38,902**	**40,191**	**40,651**	**40,651**	**40,651**	**40,651**
ANDERSON COUNTY TOTAL	**61,016**	**63,017**	**63,746**	**63,746**	**63,746**	**63,746**
ANGELINA WSC	3,000	3,210	3,386	3,547	3,690	3,818
CENTRAL WCID OF ANGELINA COUNTY	7,323	7,835	8,265	8,658	9,009	9,320
DIBOLL	5,646	6,041	6,372	6,675	6,946	7,186
FOUR WAY SUD	5,596	5,987	6,316	6,616	6,885	7,122
HUDSON WSC	9,588	10,259	10,823	11,337	11,797	12,204
HUNTINGTON	2,504	2,680	2,826	2,961	3,081	3,188
LUFKIN	43,626	46,679	49,241	51,580	53,673	55,526
M & M WSC	3,325	3,558	3,753	3,932	4,091	4,232
POLLOK-REDTOWN WSC	1,658	1,778	1,880	1,977	2,066	2,148
REDLAND WSC	2,624	2,808	2,961	3,102	3,228	3,340
UPPER JASPER COUNTY WATER AUTHORITY	91	92	93	93	93	93
WOODLAWN WSC	1,828	1,956	2,064	2,162	2,249	2,327
ZAVALLA	835	893	943	987	1,028	1,063
COUNTY-OTHER	5,672	6,072	6,406	6,705	6,972	7,205
NECHES BASIN TOTAL	**93,316**	**99,848**	**105,329**	**110,332**	**114,808**	**118,772**
ANGELINA COUNTY TOTAL	**93,316**	**99,848**	**105,329**	**110,332**	**114,808**	**118,772**
AFTON GROVE WSC	1,237	1,357	1,474	1,614	1,761	1,919
ALTO	1,275	1,398	1,519	1,663	1,814	1,977
ALTO RURAL WSC	3,272	3,588	3,898	4,267	4,655	5,074
BLACKJACK WSC	778	853	927	1,014	1,107	1,206

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Region I Water User Group (WUG) Population

	WUG POPULATION					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
BULLARD	58	63	69	76	82	89
CRAFT TURNEY WSC	5,215	5,717	6,211	6,800	7,417	8,086
GUM CREEK WSC	1,311	1,437	1,561	1,709	1,865	2,033
JACKSONVILLE	18,083	19,830	21,543	23,585	25,726	28,041
NEW SUMMERFIELD	1,238	1,358	1,475	1,614	1,761	1,919
NORTH CHEROKEE WSC	4,900	5,375	5,839	6,391	6,973	7,599
POLLOK-REDTOWN WSC	144	154	163	171	179	186
RUSK	6,204	6,804	7,391	8,091	8,826	9,620
RUSK RURAL WSC	2,969	3,255	3,537	3,872	4,223	4,603
SOUTH RUSK COUNTY WSC	63	70	77	85	92	100
SOUTHERN UTILITIES*	4,165	4,497	4,847	5,240	5,670	6,148
TROUP	77	85	92	101	109	119
WELLS	879	963	1,046	1,146	1,249	1,362
WEST JACKSONVILLE WSC	1,126	1,234	1,341	1,468	1,601	1,745
WRIGHT CITY WSC	601	659	716	784	855	932
COUNTY-OTHER	2,039	2,308	2,551	2,869	3,183	3,511
NECHES BASIN TOTAL	**55,634**	**61,005**	**66,277**	**72,560**	**79,148**	**86,269**
CHEROKEE COUNTY TOTAL	**55,634**	**61,005**	**66,277**	**72,560**	**79,148**	**86,269**
HARDIN COUNTY WCID 1	1,421	1,528	1,605	1,661	1,706	1,739
KOUNTZE	2,135	2,141	2,145	2,148	2,151	2,153
LUMBERTON MUD	28,586	31,985	34,397	36,192	37,592	38,619
NORTH HARDIN WSC	7,821	8,344	8,716	8,991	9,206	9,367
SILSBEE	7,162	7,320	7,434	7,517	7,583	7,633
SOUR LAKE	1,920	2,021	2,093	2,147	2,189	2,219
WEST HARDIN WSC*	3,491	3,510	3,523	3,531	3,539	3,545
WILDWOOD POA	806	843	869	887	902	913
COUNTY-OTHER	5,900	6,044	6,148	6,207	6,248	6,301
NECHES BASIN TOTAL	**59,242**	**63,736**	**66,930**	**69,281**	**71,116**	**72,489**
LAKE LIVINGSTON WSC*	100	112	125	138	152	166
WEST HARDIN WSC*	46	46	46	47	47	47
COUNTY-OTHER	89	92	93	94	95	96
TRINITY BASIN TOTAL	**235**	**250**	**264**	**279**	**294**	**309**
HARDIN COUNTY TOTAL	**59,477**	**63,986**	**67,194**	**69,560**	**71,410**	**72,798**
ATHENS*	274	294	311	333	352	371
BERRYVILLE	1,097	1,201	1,287	1,401	1,500	1,596
BETHEL ASH WSC*	3,154	3,565	3,908	4,362	4,753	5,133
BROWNSBORO	1,368	1,665	1,915	2,243	2,527	2,803
BRUSHY CREEK WSC	917	985	1,041	1,116	1,181	1,243
CHANDLER	3,704	4,510	5,181	6,067	6,833	7,574
EDOM WSC*	204	223	238	254	274	296
FRANKSTON	44	67	86	111	133	154
LEAGUEVILLE WSC	2,023	2,159	2,330	2,533	3,184	4,044
MOORE STATION WSC	1,430	1,526	1,647	1,789	2,250	2,858
MURCHISON	603	604	606	608	611	612
R P M WSC*	630	752	854	988	1,104	1,216
VIRGINIA HILL WSC*	1,722	1,976	2,190	2,470	2,711	2,946

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Region I Water User Group (WUG) Population

	WUG POPULATION					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
COUNTY-OTHER*	7,634	7,117	6,583	5,924	4,535	2,798
NECHES BASIN TOTAL	**24,804**	**26,644**	**28,177**	**30,199**	**31,948**	**33,644**
HENDERSON COUNTY TOTAL	**24,804**	**26,644**	**28,177**	**30,199**	**31,948**	**33,644**
GRAPELAND	597	600	601	601	601	601
PENNINGTON WSC*	310	311	311	311	311	311
THE CONSOLIDATED WSC*	2,865	2,885	2,886	2,886	2,886	2,886
COUNTY-OTHER	723	706	705	705	705	705
NECHES BASIN TOTAL	**4,495**	**4,502**	**4,503**	**4,503**	**4,503**	**4,503**
CROCKETT	7,073	7,105	7,105	7,105	7,105	7,105
GRAPELAND	922	927	927	927	927	927
LOVELADY	684	693	693	693	693	693
PENNINGTON WSC*	558	561	561	561	561	561
TDCJ EASTHAM UNIT	2,460	2,460	2,460	2,460	2,460	2,460
THE CONSOLIDATED WSC*	7,818	7,874	7,874	7,874	7,874	7,874
COUNTY-OTHER	141	138	137	137	137	137
TRINITY BASIN TOTAL	**19,656**	**19,758**	**19,757**	**19,757**	**19,757**	**19,757**
HOUSTON COUNTY TOTAL	**24,151**	**24,260**	**24,260**	**24,260**	**24,260**	**24,260**
BROOKELAND FWSD	335	337	338	338	338	338
JASPER	9,059	9,259	9,297	9,297	9,297	9,297
RAYBURN COUNTRY MUD	1,703	1,741	1,748	1,748	1,748	1,748
RURAL WSC	1,029	1,052	1,056	1,056	1,056	1,056
SOUTH JASPER COUNTY WSC	412	421	423	423	423	423
UPPER JASPER COUNTY WATER AUTHORITY	1,209	1,240	1,249	1,252	1,256	1,258
COUNTY-OTHER	8,318	8,502	8,535	8,533	8,530	8,528
NECHES BASIN TOTAL	**22,065**	**22,552**	**22,646**	**22,647**	**22,648**	**22,648**
JASPER COUNTY WCID 1	2,730	2,791	2,802	2,802	2,802	2,802
KIRBYVILLE	2,218	2,267	2,276	2,276	2,276	2,276
MAURICEVILLE SUD	429	439	440	440	440	440
SOUTH JASPER COUNTY WSC	1,179	1,205	1,210	1,210	1,210	1,210
UPPER JASPER COUNTY WATER AUTHORITY	464	476	479	480	482	483
COUNTY-OTHER	7,793	7,965	7,996	7,994	7,991	7,990
SABINE BASIN TOTAL	**14,813**	**15,143**	**15,203**	**15,202**	**15,201**	**15,201**
JASPER COUNTY TOTAL	**36,878**	**37,695**	**37,849**	**37,849**	**37,849**	**37,849**
BEAUMONT	42,437	45,174	48,050	51,392	55,079	59,207
BEVIL OAKS	1,345	1,431	1,522	1,628	1,745	1,875
CHINA	22	23	25	27	29	31
GROVES	496	496	496	496	496	496
JEFFERSON COUNTY WCID 10	945	1,006	1,070	1,144	1,226	1,319
MEEKER MWD	836	890	947	1,012	1,085	1,166
NEDERLAND	679	723	769	822	881	947
PORT ARTHUR	166	168	168	168	168	168
PORT NECHES	7,202	7,667	8,155	8,722	9,347	10,048
COUNTY-OTHER	1,022	1,392	1,838	2,357	2,928	3,569
NECHES BASIN TOTAL	**55,150**	**58,970**	**63,040**	**67,768**	**72,984**	**78,826**
BEAUMONT	87,587	93,235	99,171	106,070	113,679	122,199
CHINA	1,208	1,286	1,368	1,462	1,567	1,685
GROVES	15,511	15,511	15,511	15,511	15,511	15,511

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Region I Water User Group (WUG) Population

	WUG POPULATION					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
JEFFERSON COUNTY WCID 10	4,709	5,012	5,332	5,703	6,112	6,570
MEEKER MWD	2,497	2,658	2,827	3,024	3,240	3,484
NEDERLAND	18,176	19,348	20,579	22,011	23,590	25,359
PORT ARTHUR	55,227	55,922	55,922	55,922	55,922	55,922
PORT NECHES	6,656	7,085	7,536	8,060	8,639	9,287
WEST JEFFERSON COUNTY MWD	8,554	9,105	9,685	10,359	11,102	11,934
COUNTY-OTHER	12,104	16,488	21,773	27,912	34,684	42,264
NECHES-TRINITY BASIN TOTAL	**212,229**	**225,650**	**239,704**	**256,034**	**274,046**	**294,215**
JEFFERSON COUNTY TOTAL	**267,379**	**284,620**	**302,744**	**323,802**	**347,030**	**373,041**
APPLEBY WSC	3,656	4,108	4,553	5,026	5,527	6,050
CARO WSC	2,593	2,913	3,228	3,564	3,919	4,290
CUSHING	924	1,037	1,150	1,270	1,396	1,528
D & M WSC	6,238	7,009	7,767	8,574	9,430	10,322
ETOILE WSC	2,238	2,514	2,786	3,075	3,382	3,702
GARRISON	1,124	1,263	1,399	1,545	1,698	1,859
LILLY GROVE SUD	2,649	2,975	3,298	3,641	4,004	4,383
MELROSE WSC	2,828	3,178	3,521	3,887	4,275	4,680
NACOGDOCHES	37,580	42,218	46,790	51,655	56,802	62,183
SWIFT WSC	2,773	3,116	3,453	3,812	4,192	4,589
WODEN WSC	2,783	3,127	3,466	3,825	4,206	4,605
COUNTY-OTHER	6,750	7,582	8,404	9,281	10,204	11,173
NECHES BASIN TOTAL	**72,136**	**81,040**	**89,815**	**99,155**	**109,035**	**119,364**
NACOGDOCHES COUNTY TOTAL	**72,136**	**81,040**	**89,815**	**99,155**	**109,035**	**119,364**
BROOKELAND FWSD	896	901	902	902	902	902
MAURICEVILLE SUD	390	390	390	390	390	390
NEWTON	2,478	2,478	2,478	2,478	2,478	2,478
SOUTH NEWTON WSC	2,485	2,485	2,485	2,485	2,485	2,485
COUNTY-OTHER	8,196	8,191	8,190	8,190	8,190	8,190
SABINE BASIN TOTAL	**14,445**	**14,445**	**14,445**	**14,445**	**14,445**	**14,445**
NEWTON COUNTY TOTAL	**14,445**	**14,445**	**14,445**	**14,445**	**14,445**	**14,445**
BRIDGE CITY	1,350	1,411	1,454	1,483	1,505	1,522
KELLY G BREWER	268	280	289	294	299	302
MAURICEVILLE SUD	701	733	755	770	782	790
ORANGE COUNTY WCID 1	12,541	13,108	13,507	13,778	13,985	14,134
ORANGEFIELD WSC	1,897	1,982	2,043	2,084	2,115	2,138
PORT ARTHUR	5	5	5	5	5	5
COUNTY-OTHER	10,665	11,150	11,489	11,719	11,894	12,021
NECHES BASIN TOTAL	**27,427**	**28,669**	**29,542**	**30,133**	**30,585**	**30,912**
BRIDGE CITY	900	941	969	989	1,004	1,014
COUNTY-OTHER	98	102	106	108	109	110
NECHES-TRINITY BASIN TOTAL	**998**	**1,043**	**1,075**	**1,097**	**1,113**	**1,124**
BRIDGE CITY	6,741	7,045	7,260	7,405	7,517	7,598
KELLY G BREWER	231	241	249	254	258	260
MAURICEVILLE SUD	8,407	8,787	9,056	9,237	9,375	9,476
ORANGE	19,667	20,556	21,183	21,608	21,931	22,166
ORANGE COUNTY WCID 2	3,632	3,797	3,912	3,991	4,051	4,094
ORANGEFIELD WSC	2,968	3,102	3,197	3,261	3,310	3,344

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Region I Water User Group (WUG) Population

	WUG POPULATION					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
PINEHURST	2,226	2,326	2,397	2,445	2,481	2,509
SOUTH NEWTON WSC	1,398	1,461	1,506	1,536	1,559	1,576
COUNTY-OTHER	12,632	13,206	13,607	13,881	14,089	14,239
SABINE BASIN TOTAL	**57,902**	**60,521**	**62,367**	**63,618**	**64,571**	**65,262**
ORANGE COUNTY TOTAL	**86,327**	**90,233**	**92,984**	**94,848**	**96,269**	**97,298**
COUNTY-OTHER	55	58	60	62	63	64
CYPRESS BASIN TOTAL	**55**	**58**	**60**	**62**	**63**	**64**
BECKVILLE	994	1,113	1,186	1,254	1,305	1,345
CARTHAGE	6,925	7,066	7,152	7,232	7,292	7,339
GILL WSC*	817	841	857	871	882	891
MINDEN BRACHFIELD WSC	58	65	71	78	85	93
PANOLA-BETHANY WSC*	92	111	134	169	192	211
TATUM	324	387	425	460	487	507
COUNTY-OTHER	15,846	16,737	17,269	17,747	18,106	18,382
SABINE BASIN TOTAL	**25,056**	**26,320**	**27,094**	**27,811**	**28,349**	**28,768**
PANOLA COUNTY TOTAL	**25,111**	**26,378**	**27,154**	**27,873**	**28,412**	**28,832**
CHESTER WSC	224	230	235	239	242	245
CORRIGAN	1,871	2,091	2,263	2,410	2,530	2,627
DAMASCUS-STRYKER WSC	1,557	1,739	1,883	2,005	2,105	2,185
LAKE LIVINGSTON WSC*	1,000	1,124	1,246	1,378	1,515	1,660
MOSCOW WSC*	356	398	430	459	482	500
SODA WSC*	131	146	159	169	178	184
COUNTY-OTHER*	3,820	4,280	4,618	4,877	5,060	5,173
NECHES BASIN TOTAL	**8,959**	**10,008**	**10,834**	**11,537**	**12,112**	**12,574**
POLK COUNTY TOTAL	**8,959**	**10,008**	**10,834**	**11,537**	**12,112**	**12,574**
EBENEZER WSC	838	934	1,027	1,127	1,231	1,339
GASTON WSC	1,661	1,851	2,036	2,235	2,442	2,656
GOODSPRINGS WSC	2,869	3,198	3,518	3,861	4,218	4,588
HENDERSON	12,718	14,177	15,592	17,115	18,697	20,337
JACOBS WSC	82	91	101	110	121	131
MINDEN BRACHFIELD WSC	1,027	1,145	1,260	1,382	1,510	1,643
MT ENTERPRISE WSC	1,864	2,078	2,285	2,508	2,740	2,981
NEW LONDON	1,380	1,537	1,690	1,855	2,027	2,205
OVERTON*	282	314	346	379	414	451
SOUTH RUSK COUNTY WSC	1,888	2,104	2,314	2,541	2,775	3,019
WRIGHT CITY WSC	497	554	610	669	731	795
COUNTY-OTHER	4,914	5,498	6,054	6,646	7,251	7,868
NECHES BASIN TOTAL	**30,020**	**33,481**	**36,833**	**40,428**	**44,157**	**48,013**
CHALK HILL SUD	3,807	4,243	4,668	5,123	5,597	6,088
CROSS ROADS SUD*	3,134	3,494	3,844	4,218	4,609	5,013
CRYSTAL FARMS WSC	1,043	1,163	1,279	1,404	1,534	1,668
ELDERVILLE WSC*	1,902	2,094	2,301	2,534	2,790	3,073
HENDERSON	2,210	2,463	2,710	2,974	3,249	3,534
JACOBS WSC	2,265	2,525	2,777	3,049	3,330	3,623
KILGORE*	3,323	3,705	4,075	4,472	4,887	5,314
MINDEN BRACHFIELD WSC	461	514	565	620	678	737
NEW LONDON	1,111	1,238	1,361	1,494	1,632	1,775

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Region I Water User Group (WUG) Population

	WUG POPULATION					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
NEW PROSPECT WSC	1,156	1,289	1,418	1,557	1,700	1,850
OVERTON*	2,329	2,596	2,854	3,134	3,423	3,723
SOUTHERN UTILITIES*	419	452	487	527	570	618
TATUM	1,212	1,351	1,486	1,630	1,781	1,937
WEST GREGG SUD*	188	210	231	253	277	301
COUNTY-OTHER	4,692	5,249	5,780	6,346	6,924	7,513
SABINE BASIN TOTAL	**29,252**	**32,586**	**35,836**	**39,335**	**42,981**	**46,767**
RUSK COUNTY TOTAL	**59,272**	**66,067**	**72,669**	**79,763**	**87,138**	**94,780**
BROOKELAND FWSD	570	574	575	575	575	575
G M WSC	800	801	801	801	801	801
PINELAND	968	970	970	970	970	970
COUNTY-OTHER	64	64	64	64	64	64
NECHES BASIN TOTAL	**2,402**	**2,409**	**2,410**	**2,410**	**2,410**	**2,410**
BROOKELAND FWSD	81	82	82	82	82	82
G M WSC	5,950	5,954	5,955	5,955	5,955	5,955
HEMPHILL	1,294	1,304	1,304	1,304	1,304	1,304
COUNTY-OTHER	1,490	1,500	1,498	1,498	1,498	1,498
SABINE BASIN TOTAL	**8,815**	**8,840**	**8,839**	**8,839**	**8,839**	**8,839**
SABINE COUNTY TOTAL	**11,217**	**11,249**	**11,249**	**11,249**	**11,249**	**11,249**
SAN AUGUSTINE	2,121	2,121	2,121	2,121	2,121	2,121
SAN AUGUSTINE RURAL WSC	1,196	1,196	1,196	1,196	1,196	1,196
COUNTY-OTHER	4,824	4,824	4,824	4,824	4,824	4,824
NECHES BASIN TOTAL	**8,141**	**8,141**	**8,141**	**8,141**	**8,141**	**8,141**
G M WSC	563	563	563	563	563	563
SAN AUGUSTINE RURAL WSC	69	69	69	69	69	69
COUNTY-OTHER	144	144	144	144	144	144
SABINE BASIN TOTAL	**776**	**776**	**776**	**776**	**776**	**776**
SAN AUGUSTINE COUNTY TOTAL	**8,917**	**8,917**	**8,917**	**8,917**	**8,917**	**8,917**
CHOICE WSC	292	314	333	352	369	385
SAND HILLS WSC	869	934	992	1,047	1,098	1,145
TIMPSON	44	47	50	53	56	58
COUNTY-OTHER	1,703	1,832	1,945	2,053	2,153	2,248
NECHES BASIN TOTAL	**2,908**	**3,127**	**3,320**	**3,505**	**3,676**	**3,836**
CENTER	5,589	6,011	6,383	6,736	7,066	7,370
CHOICE WSC	851	914	972	1,025	1,075	1,121
EAST LAMAR WSC	853	918	975	1,029	1,079	1,125
FIVE WAY WSC	1,512	1,627	1,727	1,822	1,912	1,994
FLAT FORK WSC	1,161	1,248	1,326	1,399	1,467	1,530
HUXLEY	2,210	2,376	2,522	2,662	2,793	2,912
JOAQUIN	1,176	1,264	1,343	1,416	1,487	1,550
MCCLELLAND WSC	1,383	1,487	1,579	1,666	1,747	1,823
SAND HILLS WSC	856	921	978	1,032	1,082	1,128
TENAHA	1,252	1,347	1,430	1,509	1,583	1,651
TIMPSON	1,201	1,292	1,372	1,447	1,517	1,583
COUNTY-OTHER	6,509	7,000	7,435	7,847	8,231	8,590
SABINE BASIN TOTAL	**24,553**	**26,405**	**28,042**	**29,590**	**31,039**	**32,377**
SHELBY COUNTY TOTAL	**27,461**	**29,532**	**31,362**	**33,095**	**34,715**	**36,213**

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Region I Water User Group (WUG) Population

	WUG POPULATION					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
ALGONQUIN WATER RESOURCES OF TEXAS*	859	954	1,052	1,161	1,276	1,400
ARP	1,084	1,136	1,189	1,245	1,303	1,362
BEN WHEELER WSC*	17	19	20	21	22	23
BULLARD	3,674	4,714	5,757	6,881	8,024	9,197
CARROLL WSC*	855	950	1,048	1,156	1,270	1,394
CRYSTAL SYSTEMS TEXAS*	1,317	1,657	2,000	2,372	2,758	3,166
DEAN WSC	4,725	4,905	5,087	5,281	5,480	5,683
EMERALD BAY MUD	1,133	1,133	1,133	1,133	1,133	1,133
JACKSON WSC*	2,322	2,561	2,802	3,062	3,325	3,595
LINDALE RURAL WSC*	3,815	4,149	4,484	4,846	5,212	5,591
LINDALE*	2,099	2,704	3,311	3,964	4,629	5,311
OVERTON*	149	189	229	271	315	359
R P M WSC*	262	297	332	369	408	447
SOUTHERN UTILITIES*	35,552	37,774	39,984	42,376	44,796	47,271
TROUP	2,101	2,317	2,536	2,770	3,009	3,254
TYLER*	104,698	113,960	123,250	133,249	143,427	153,872
WALNUT GROVE WSC	8,728	10,281	11,839	13,516	15,222	16,973
WHITEHOUSE	9,215	10,854	12,499	14,270	16,071	17,920
WRIGHT CITY WSC	2,381	2,669	2,958	3,269	3,585	3,910
COUNTY-OTHER*	4,034	5,356	6,686	8,100	9,538	10,998
NECHES BASIN TOTAL	**189,020**	**208,579**	**228,196**	**249,312**	**270,803**	**292,859**
SMITH COUNTY TOTAL	**189,020**	**208,579**	**228,196**	**249,312**	**270,803**	**292,859**
CENTERVILLE WSC	855	925	932	905	937	981
GROVETON*	518	561	565	550	569	596
PENNINGTON WSC*	549	594	599	581	602	629
COUNTY-OTHER*	1,826	1,974	1,988	1,933	2,045	2,140
NECHES BASIN TOTAL	**3,748**	**4,054**	**4,084**	**3,969**	**4,153**	**4,346**
TRINITY COUNTY TOTAL	**3,748**	**4,054**	**4,084**	**3,969**	**4,153**	**4,346**
CHESTER WSC	872	899	917	932	944	954
COLMESNEIL	1,045	1,045	1,045	1,045	1,045	1,045
CYPRESS CREEK WSC	592	595	595	595	595	595
LAKE LIVINGSTON WSC*	29	33	36	40	44	49
MOSCOW WSC*	15	16	18	19	20	21
TYLER COUNTY WSC	5,684	5,711	5,711	5,711	5,711	5,711
WARREN WSC	1,371	1,377	1,377	1,377	1,377	1,377
WILDWOOD POA	598	626	645	658	669	678
WOODVILLE	5,809	5,825	5,825	5,825	5,825	5,825
COUNTY-OTHER	6,273	6,269	6,227	6,194	6,166	6,141
NECHES BASIN TOTAL	**22,288**	**22,396**	**22,396**	**22,396**	**22,396**	**22,396**
TYLER COUNTY TOTAL	**22,288**	**22,396**	**22,396**	**22,396**	**22,396**	**22,396**
REGION I POPULATION TOTAL	**1,151,556**	**1,233,973**	**1,309,681**	**1,388,867**	**1,469,843**	**1,553,652**

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Region I Water User Group (WUG) Demand

	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
BRUSHY CREEK WSC	181	177	171	167	166	166
FRANKSTON	238	240	238	235	235	235
FRANKSTON RURAL WSC	171	171	168	166	166	166
NECHES WSC	199	199	196	193	192	192
NORWOOD WSC	129	126	124	123	123	123
PALESTINE	2,512	2,548	2,542	2,522	2,519	2,519
SLOCUM WSC	258	257	252	249	248	248
WALSTON SPRINGS WSC	263	260	255	250	249	249
COUNTY-OTHER	87	88	87	86	86	86
MINING	64	81	85	67	48	34
STEAM ELECTRIC POWER	1,408	1,408	1,408	1,408	1,408	1,408
LIVESTOCK	474	474	474	474	474	474
IRRIGATION	288	288	288	288	288	288
NECHES BASIN TOTAL	**6,272**	**6,317**	**6,288**	**6,228**	**6,202**	**6,188**
ANDERSON COUNTY CEDAR CREEK WSC	101	100	98	96	96	96
B B S WSC*	131	130	127	124	124	124
B C Y WSC	220	212	206	202	202	202
BRUSHY CREEK WSC	107	104	101	98	98	98
ELKHART	249	251	249	246	246	246
FOUR PINES WSC	336	335	331	326	325	325
NORWOOD WSC	9	9	9	9	9	9
PALESTINE	2,384	2,418	2,411	2,393	2,390	2,390
PLEASANT SPRINGS WSC	169	171	169	167	167	167
SLOCUM WSC	27	27	27	26	26	26
TDCJ BETO GURNEY & POWLEDGE UNITS	1,129	1,150	1,152	1,145	1,144	1,144
TDCJ COFFIELD MICHAEL	3,116	3,195	3,214	3,205	3,203	3,203
THE CONSOLIDATED WSC*	129	129	126	124	124	123
TUCKER WSC	127	126	124	122	121	121
WALSTON SPRINGS WSC	105	104	102	100	100	100
COUNTY-OTHER	820	832	825	814	811	811
MINING	76	96	100	80	57	41
LIVESTOCK	552	552	552	552	552	552
IRRIGATION	369	369	369	369	369	369
TRINITY BASIN TOTAL	**10,156**	**10,310**	**10,292**	**10,198**	**10,164**	**10,147**
ANDERSON COUNTY TOTAL	**16,428**	**16,627**	**16,580**	**16,426**	**16,366**	**16,335**
ANGELINA WSC	251	251	254	265	274	284
CENTRAL WCID OF ANGELINA COUNTY	510	527	555	582	605	626
DIBOLL	738	758	776	811	841	870
FOUR WAY SUD	484	502	520	538	558	577
HUDSON WSC	644	689	727	762	793	820
HUNTINGTON	254	259	264	271	281	291
LUFKIN	7,253	7,545	7,792	8,073	8,382	8,668
M & M WSC	283	286	290	300	310	321
POLLOK-REDTOWN WSC	162	166	170	176	184	191
REDLAND WSC	203	201	210	219	227	235
UPPER JASPER COUNTY WATER AUTHORITY	11	11	10	10	10	10
WOODLAWN WSC	163	165	168	173	180	186
ZAVALLA	85	87	89	91	95	98

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Region I Water User Group (WUG) Demand

	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
COUNTY-OTHER	641	653	668	697	722	746
MANUFACTURING	3,658	3,878	3,878	3,878	3,878	3,878
MINING	486	585	410	312	237	180
STEAM ELECTRIC POWER	3,520	3,520	3,520	3,520	3,520	3,520
LIVESTOCK	1,028	1,028	1,028	1,028	1,028	1,028
IRRIGATION	779	779	779	779	779	779
NECHES BASIN TOTAL	**21,153**	**21,890**	**22,108**	**22,485**	**22,904**	**23,308**
ANGELINA COUNTY TOTAL	**21,153**	**21,890**	**22,108**	**22,485**	**22,904**	**23,308**
AFTON GROVE WSC	189	202	215	234	254	277
ALTO	236	253	270	293	319	347
ALTO RURAL WSC	637	677	734	801	873	951
BLACKJACK WSC	138	147	158	171	186	203
BULLARD	11	12	13	15	16	17
CRAFT TURNEY WSC	485	503	524	562	610	665
GUM CREEK WSC	129	134	142	153	167	181
JACKSONVILLE	3,045	3,247	3,457	3,745	4,076	4,440
NEW SUMMERFIELD	158	169	180	195	212	231
NORTH CHEROKEE WSC	601	640	680	736	801	872
POLLOK-REDTOWN WSC	14	14	15	15	16	17
RUSK	1,041	1,112	1,186	1,286	1,400	1,525
RUSK RURAL WSC	301	316	332	358	388	423
SOUTH RUSK COUNTY WSC	6	7	7	8	8	9
SOUTHERN UTILITIES*	712	749	791	847	914	991
TROUP	15	16	17	19	20	22
WELLS	141	150	159	172	187	204
WEST JACKSONVILLE WSC	165	175	187	203	221	241
WRIGHT CITY WSC	69	73	77	83	91	99
COUNTY-OTHER	238	260	281	311	344	380
MANUFACTURING	115	129	129	129	129	129
MINING	295	304	267	204	141	97
STEAM ELECTRIC POWER	3,211	3,211	3,211	3,211	3,211	3,211
LIVESTOCK	1,874	1,874	1,874	1,874	1,874	1,874
IRRIGATION	451	451	451	451	451	451
NECHES BASIN TOTAL	**14,277**	**14,825**	**15,357**	**16,076**	**16,909**	**17,857**
CHEROKEE COUNTY TOTAL	**14,277**	**14,825**	**15,357**	**16,076**	**16,909**	**17,857**
HARDIN COUNTY WCID 1	131	134	136	138	141	143
KOUNTZE	255	246	238	234	234	234
LUMBERTON MUD	2,610	2,805	2,929	3,032	3,137	3,222
NORTH HARDIN WSC	543	561	586	604	619	630
SILSBEE	944	931	918	913	919	925
SOUR LAKE	279	285	288	292	297	301
WEST HARDIN WSC*	235	236	237	237	238	238
WILDWOOD POA	156	160	162	164	166	168
COUNTY-OTHER	699	686	674	678	681	687
MANUFACTURING	40	45	45	45	45	45
MINING	12	12	12	12	12	12
STEAM ELECTRIC POWER	1	1	1	1	1	1

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Region I Water User Group (WUG) Demand

	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
LIVESTOCK	196	196	196	196	196	196
IRRIGATION	989	989	989	989	989	989
NECHES BASIN TOTAL	**7,090**	**7,287**	**7,411**	**7,535**	**7,675**	**7,791**
LAKE LIVINGSTON WSC*	7	8	8	9	10	11
WEST HARDIN WSC*	3	3	3	3	3	3
COUNTY-OTHER	11	10	10	10	10	10
LIVESTOCK	2	2	2	2	2	2
TRINITY BASIN TOTAL	**23**	**23**	**23**	**24**	**25**	**26**
HARDIN COUNTY TOTAL	**7,113**	**7,310**	**7,434**	**7,559**	**7,700**	**7,817**
ATHENS*	56	59	61	65	68	72
BERRYVILLE	118	124	129	138	147	157
BETHEL ASH WSC*	321	350	376	414	450	486
BROWNSBORO	218	259	295	343	386	428
BRUSHY CREEK WSC	79	80	81	84	89	93
CHANDLER	627	746	846	984	1,107	1,226
EDOM WSC*	22	23	24	26	27	30
FRANKSTON	8	12	16	20	24	27
LEAGUEVILLE WSC	215	221	233	250	313	397
MOORE STATION WSC	183	189	200	215	269	342
MURCHISON	94	91	89	88	88	89
R P M WSC*	69	79	88	101	112	123
VIRGINIA HILL WSC*	166	182	195	217	237	257
COUNTY-OTHER*	700	613	538	482	367	226
MINING*	77	86	77	59	40	28
LIVESTOCK*	1,006	1,006	1,006	1,006	1,006	1,006
IRRIGATION*	303	303	303	303	303	303
NECHES BASIN TOTAL	**4,262**	**4,423**	**4,557**	**4,795**	**5,033**	**5,290**
HENDERSON COUNTY TOTAL	**4,262**	**4,423**	**4,557**	**4,795**	**5,033**	**5,290**
GRAPELAND	83	81	79	77	77	77
PENNINGTON WSC*	29	28	28	27	27	27
THE CONSOLIDATED WSC*	325	315	305	300	299	299
COUNTY-OTHER	126	120	118	118	118	118
MANUFACTURING	7	10	10	10	10	10
MINING	113	89	66	42	18	8
LIVESTOCK	441	482	525	572	623	688
IRRIGATION	387	387	387	387	387	387
NECHES BASIN TOTAL	**1,511**	**1,512**	**1,518**	**1,533**	**1,559**	**1,614**
CROCKETT	1,280	1,253	1,225	1,211	1,208	1,208
GRAPELAND	128	124	121	120	119	119
LOVELADY	132	130	128	127	126	126
PENNINGTON WSC*	53	51	49	49	48	48
TDCJ EASTHAM UNIT	1,098	1,088	1,079	1,075	1,074	1,074
THE CONSOLIDATED WSC*	885	859	834	820	817	817
COUNTY-OTHER	25	24	23	23	23	23
MANUFACTURING	162	222	222	222	222	222
MINING	209	165	121	77	33	14
LIVESTOCK	1,123	1,225	1,335	1,455	1,585	1,751

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Region I Water User Group (WUG) Demand

	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
IRRIGATION	1,750	1,750	1,750	1,750	1,750	1,750
TRINITY BASIN TOTAL	**6,845**	**6,891**	**6,887**	**6,929**	**7,005**	**7,152**
HOUSTON COUNTY TOTAL	**8,356**	**8,403**	**8,405**	**8,462**	**8,564**	**8,766**
BROOKELAND FWSD	39	38	37	36	36	36
JASPER	1,963	1,963	1,937	1,918	1,915	1,915
RAYBURN COUNTRY MUD	178	174	170	167	167	167
RURAL WSC	107	105	102	101	100	100
SOUTH JASPER COUNTY WSC	31	30	28	28	28	28
UPPER JASPER COUNTY WATER AUTHORITY	145	143	140	139	139	139
COUNTY-OTHER	877	861	836	821	817	817
MANUFACTURING	45,841	57,200	57,200	57,200	57,200	57,200
MINING	70	56	42	27	13	7
LIVESTOCK	6,354	6,354	6,354	6,354	6,354	6,354
IRRIGATION	94	94	94	94	94	94
NECHES BASIN TOTAL	**55,699**	**67,018**	**66,940**	**66,885**	**66,863**	**66,857**
JASPER COUNTY WCID 1	204	192	188	188	188	188
KIRBYVILLE	402	401	395	391	390	390
MAURICEVILLE SUD	30	30	30	30	30	30
SOUTH JASPER COUNTY WSC	88	84	82	82	82	82
UPPER JASPER COUNTY WATER AUTHORITY	55	55	54	53	53	53
COUNTY-OTHER	821	806	784	769	766	766
MANUFACTURING	132	164	164	164	164	164
MINING	78	62	46	31	15	7
LIVESTOCK	3,646	3,646	3,646	3,646	3,646	3,646
IRRIGATION	57	57	57	57	57	57
SABINE BASIN TOTAL	**5,513**	**5,497**	**5,446**	**5,411**	**5,391**	**5,383**
JASPER COUNTY TOTAL	**61,212**	**72,515**	**72,386**	**72,296**	**72,254**	**72,240**
BEAUMONT	10,049	10,480	10,974	11,642	12,457	13,385
BEVIL OAKS	134	135	138	146	156	167
CHINA	3	3	3	3	3	3
GROVES	69	66	64	64	63	63
JEFFERSON COUNTY WCID 10	82	83	85	89	95	102
MEEKER MWD	108	111	116	122	131	140
NEDERLAND	88	90	93	98	105	112
PORT ARTHUR	58	58	57	57	57	57
PORT NECHES	744	754	771	809	864	928
COUNTY-OTHER	162	213	276	351	435	530
MANUFACTURING	109,387	126,100	126,100	126,100	126,100	126,100
MINING	128	143	161	194	217	243
LIVESTOCK	67	67	67	67	67	67
IRRIGATION	6,198	6,198	6,198	6,198	6,198	6,198
NECHES BASIN TOTAL	**127,277**	**144,501**	**145,103**	**145,940**	**146,948**	**148,095**
BEAUMONT	20,739	21,630	22,649	24,029	25,711	27,627
CHINA	139	142	147	154	165	177
GROVES	2,149	2,075	2,012	1,987	1,982	1,982
JEFFERSON COUNTY WCID 10	411	416	425	445	475	510
MEEKER MWD	323	333	346	366	390	420

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Region I Water User Group (WUG) Demand

	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
NEDERLAND	2,348	2,408	2,487	2,620	2,799	3,007
PORT ARTHUR	19,176	19,147	18,927	18,882	18,863	18,862
PORT NECHES	687	696	713	748	798	857
WEST JEFFERSON COUNTY MWD	741	752	771	809	863	926
COUNTY-OTHER	1,914	2,520	3,265	4,152	5,151	6,272
MANUFACTURING	93,515	107,802	107,802	107,802	107,802	107,802
MINING	66	73	83	100	112	125
STEAM ELECTRIC POWER	3,291	3,291	3,291	3,291	3,291	3,291
LIVESTOCK	770	770	770	770	770	770
IRRIGATION	82,338	82,338	82,338	82,338	82,338	82,338
NECHES-TRINITY BASIN TOTAL	**228,607**	**244,393**	**246,026**	**248,493**	**251,510**	**254,966**
JEFFERSON COUNTY TOTAL	**355,884**	**388,894**	**391,129**	**394,433**	**398,458**	**403,061**
APPLEBY WSC	658	722	787	862	946	1,035
CARO WSC	254	272	292	317	347	380
CUSHING	166	181	197	216	237	259
D & M WSC	904	993	1,086	1,189	1,305	1,428
ETOILE WSC	255	275	297	323	354	387
GARRISON	252	277	302	331	363	397
LILLY GROVE SUD	369	404	440	481	528	577
MELROSE WSC	410	447	485	529	581	635
NACOGDOCHES	6,868	7,514	8,177	8,945	9,818	10,742
SWIFT WSC	424	461	499	545	598	654
WODEN WSC	340	368	396	432	473	518
COUNTY-OTHER	686	749	827	909	996	1,090
MANUFACTURING	2,508	2,529	2,529	2,529	2,529	2,529
MINING	7,000	4,500	1,643	1,299	958	707
LIVESTOCK	9,693	10,122	10,619	11,195	11,854	12,836
IRRIGATION	266	266	266	266	266	266
NECHES BASIN TOTAL	**31,053**	**30,080**	**28,842**	**30,368**	**32,153**	**34,440**
NACOGDOCHES COUNTY TOTAL	**31,053**	**30,080**	**28,842**	**30,368**	**32,153**	**34,440**
BROOKELAND FWSD	104	101	99	97	97	97
MAURICEVILLE SUD	27	26	26	26	26	26
NEWTON	443	433	425	421	420	420
SOUTH NEWTON WSC	167	167	167	167	167	167
COUNTY-OTHER	886	846	811	803	800	800
MANUFACTURING	52	56	56	56	56	56
MINING	429	373	279	209	146	107
STEAM ELECTRIC POWER	5,778	5,778	5,778	5,778	5,778	5,778
LIVESTOCK	168	168	168	168	168	168
IRRIGATION	101	101	101	101	101	101
SABINE BASIN TOTAL	**8,155**	**8,049**	**7,910**	**7,826**	**7,759**	**7,720**
NEWTON COUNTY TOTAL	**8,155**	**8,049**	**7,910**	**7,826**	**7,759**	**7,720**
BRIDGE CITY	120	118	116	117	118	119
KELLY G BREWER	41	42	42	43	44	44
MAURICEVILLE SUD	49	49	51	52	53	53
ORANGE COUNTY WCID 1	1,553	1,569	1,576	1,595	1,614	1,631
ORANGEFIELD WSC	175	179	182	184	186	188

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Region I Water User Group (WUG) Demand

	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
PORT ARTHUR	2	2	2	2	2	2
COUNTY-OTHER	1,231	1,220	1,252	1,274	1,289	1,302
MANUFACTURING	542	589	589	589	589	589
MINING	139	141	141	141	143	147
LIVESTOCK	83	83	83	83	83	83
NECHES BASIN TOTAL	**3,935**	**3,992**	**4,034**	**4,080**	**4,121**	**4,158**
BRIDGE CITY	80	78	77	78	79	80
COUNTY-OTHER	11	11	12	12	12	12
NECHES-TRINITY BASIN TOTAL	**91**	**89**	**89**	**90**	**91**	**92**
BRIDGE CITY	596	588	577	583	589	596
KELLY G BREWER	36	36	37	37	37	38
MAURICEVILLE SUD	588	591	608	621	630	637
ORANGE	2,626	2,644	2,645	2,663	2,696	2,724
ORANGE COUNTY WCID 2	494	500	504	510	517	522
ORANGEFIELD WSC	274	280	284	287	291	294
PINEHURST	284	284	285	290	293	296
SOUTH NEWTON WSC	94	98	101	103	105	106
COUNTY-OTHER	1,458	1,445	1,483	1,508	1,526	1,542
MANUFACTURING	43,793	47,604	47,604	47,604	47,604	47,604
MINING	170	173	172	173	176	180
STEAM ELECTRIC POWER	4,298	4,298	4,298	4,298	4,298	4,298
LIVESTOCK	172	172	172	172	172	172
IRRIGATION	1,824	1,824	1,824	1,824	1,824	1,824
SABINE BASIN TOTAL	**56,707**	**60,537**	**60,594**	**60,673**	**60,758**	**60,833**
ORANGE COUNTY TOTAL	**60,733**	**64,618**	**64,717**	**64,843**	**64,970**	**65,083**
COUNTY-OTHER	6	6	6	6	6	6
MINING	6	6	5	4	4	4
LIVESTOCK	27	27	27	27	27	27
CYPRESS BASIN TOTAL	**39**	**39**	**38**	**37**	**37**	**37**
BECKVILLE	136	147	153	160	166	171
CARTHAGE	1,650	1,651	1,644	1,648	1,659	1,669
GILL WSC*	94	93	91	92	93	94
MINDEN BRACHFIELD WSC	4	4	5	5	6	6
PANOLA-BETHANY WSC*	18	21	25	32	36	40
TATUM	63	73	79	85	89	93
COUNTY-OTHER	1,589	1,602	1,594	1,607	1,633	1,658
MANUFACTURING	852	1,272	1,272	1,272	1,272	1,272
MINING	5,910	5,853	5,044	4,264	3,616	3,934
LIVESTOCK	2,625	2,625	2,625	2,625	2,625	2,625
IRRIGATION	574	574	574	574	574	574
SABINE BASIN TOTAL	**13,515**	**13,915**	**13,106**	**12,364**	**11,769**	**12,136**
PANOLA COUNTY TOTAL	**13,554**	**13,954**	**13,144**	**12,401**	**11,806**	**12,173**
CHESTER WSC	39	39	39	39	39	40
CORRIGAN	231	248	260	276	288	299
DAMASCUS-STRYKER WSC	194	210	222	234	245	254
LAKE LIVINGSTON WSC*	68	76	84	93	102	112
MOSCOW WSC*	52	57	60	64	67	69
SODA WSC*	11	12	12	13	13	14

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Region I Water User Group (WUG) Demand

	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
COUNTY-OTHER*	397	428	449	468	483	494
MANUFACTURING*	433	466	466	466	466	466
MINING*	123	97	72	46	20	9
LIVESTOCK*	174	174	174	174	174	174
IRRIGATION*	230	230	230	230	230	230
NECHES BASIN TOTAL	**1,952**	**2,037**	**2,068**	**2,103**	**2,127**	**2,161**
POLK COUNTY TOTAL	**1,952**	**2,037**	**2,068**	**2,103**	**2,127**	**2,161**
EBENEZER WSC	130	141	152	165	180	196
GASTON WSC	192	205	220	238	259	282
GOODSPRINGS WSC	260	275	292	315	343	372
HENDERSON	3,187	3,491	3,795	4,140	4,516	4,911
JACOBS WSC	10	11	11	12	13	15
MINDEN BRACHFIELD WSC	69	77	85	93	101	110
MT ENTERPRISE WSC	305	330	356	387	422	459
NEW LONDON	482	529	576	629	687	747
OVERTON*	60	65	71	77	84	91
SOUTH RUSK COUNTY WSC	188	200	213	230	250	272
WRIGHT CITY WSC	57	61	66	71	78	84
COUNTY-OTHER	533	568	605	654	711	771
MANUFACTURING	30	32	32	32	32	32
MINING	1,555	2,084	2,013	1,937	1,873	1,868
STEAM ELECTRIC POWER	4,493	4,493	4,493	4,493	4,493	4,493
LIVESTOCK	928	941	959	976	994	994
IRRIGATION	155	155	155	155	155	155
NECHES BASIN TOTAL	**12,634**	**13,658**	**14,094**	**14,604**	**15,191**	**15,852**
CHALK HILL SUD	332	352	375	404	440	478
CROSS ROADS SUD*	259	273	288	310	337	366
CRYSTAL FARMS WSC	104	111	118	127	139	151
ELDERVILLE WSC*	128	141	155	170	188	207
HENDERSON	554	607	659	719	785	853
JACOBS WSC	273	292	314	340	370	402
KILGORE*	717	783	848	924	1,008	1,095
MINDEN BRACHFIELD WSC	31	34	38	42	46	50
NEW LONDON	388	426	464	507	553	601
NEW PROSPECT WSC	91	96	101	109	118	129
OVERTON*	494	539	583	636	693	754
SOUTHERN UTILITIES*	72	75	80	85	92	100
TATUM	234	254	275	300	327	355
WEST GREGG SUD*	16	17	18	20	22	23
COUNTY-OTHER	509	543	577	624	679	736
MANUFACTURING	2	2	2	2	2	2
MINING	1,435	1,923	1,857	1,787	1,728	1,724
STEAM ELECTRIC POWER	40,811	40,811	40,811	40,811	40,811	40,811
LIVESTOCK	732	742	755	769	783	783
IRRIGATION	121	121	121	121	121	121
SABINE BASIN TOTAL	**47,303**	**48,142**	**48,439**	**48,807**	**49,242**	**49,741**
RUSK COUNTY TOTAL	**59,937**	**61,800**	**62,533**	**63,411**	**64,433**	**65,593**

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Region I Water User Group (WUG) Demand

	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
BROOKELAND FWSD	67	65	63	62	62	62
G M WSC	54	54	54	54	54	54
PINELAND	90	86	82	81	81	81
COUNTY-OTHER	6	5	5	5	5	5
MANUFACTURING	246	265	265	265	265	265
MINING	240	218	192	167	142	124
LIVESTOCK	20	28	36	46	57	57
NECHES BASIN TOTAL	**723**	**721**	**697**	**680**	**666**	**648**
BROOKELAND FWSD	9	9	9	9	9	9
G M WSC	400	400	400	400	400	400
HEMPHILL	305	302	297	295	294	294
COUNTY-OTHER	128	122	116	115	115	115
MINING	1,260	1,147	1,011	879	746	652
LIVESTOCK	109	148	195	248	306	306
SABINE BASIN TOTAL	**2,211**	**2,128**	**2,028**	**1,946**	**1,870**	**1,776**
SABINE COUNTY TOTAL	**2,934**	**2,849**	**2,725**	**2,626**	**2,536**	**2,424**
SAN AUGUSTINE	519	508	499	498	498	498
SAN AUGUSTINE RURAL WSC	113	108	104	102	102	102
COUNTY-OTHER	467	448	432	423	421	421
MANUFACTURING	6	6	6	6	6	6
MINING	3,800	2,850	1,405	1,121	840	629
LIVESTOCK	1,811	2,005	2,228	2,486	2,771	2,771
IRRIGATION	4	4	4	4	4	4
NECHES BASIN TOTAL	**6,720**	**5,929**	**4,678**	**4,640**	**4,642**	**4,431**
G M WSC	38	38	38	38	38	38
SAN AUGUSTINE RURAL WSC	7	6	6	6	6	6
COUNTY-OTHER	14	13	13	13	13	13
MINING	200	150	74	59	44	33
LIVESTOCK	193	214	237	265	295	295
SABINE BASIN TOTAL	**452**	**421**	**368**	**381**	**396**	**385**
SAN AUGUSTINE COUNTY TOTAL	**7,172**	**6,350**	**5,046**	**5,021**	**5,038**	**4,816**
CHOICE WSC	32	33	34	36	37	39
SAND HILLS WSC	150	156	163	170	178	186
TIMPSON	6	7	7	7	7	8
COUNTY-OTHER	186	192	198	206	215	224
MINING	919	822	699	554	411	304
LIVESTOCK	2,266	2,699	3,227	3,872	4,657	4,657
IRRIGATION	3	3	3	3	3	3
NECHES BASIN TOTAL	**3,562**	**3,912**	**4,331**	**4,848**	**5,508**	**5,421**
CENTER	1,842	1,952	2,050	2,152	2,255	2,351
CHOICE WSC	95	98	100	104	109	113
EAST LAMAR WSC	109	113	117	122	127	133
FIVE WAY WSC	163	168	172	179	187	195
FLAT FORK WSC	129	133	136	142	149	155
HUXLEY	285	295	304	318	333	347
JOAQUIN	180	187	194	203	213	222
MCCLELLAND WSC	216	225	234	244	256	267
SAND HILLS WSC	147	154	160	168	176	183

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Region I Water User Group (WUG) Demand

	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
TENAHA	227	237	247	258	271	282
TIMPSON	172	178	185	193	202	210
COUNTY-OTHER	712	735	758	787	823	858
MANUFACTURING	1,696	1,696	1,696	1,696	1,696	1,696
MINING	2,364	2,116	1,797	1,426	1,056	783
LIVESTOCK	9,592	11,429	13,664	16,391	19,716	19,716
IRRIGATION	7	7	7	7	7	7
SABINE BASIN TOTAL	**17,936**	**19,723**	**21,821**	**24,390**	**27,576**	**27,518**
SHELBY COUNTY TOTAL	**21,498**	**23,635**	**26,152**	**29,238**	**33,084**	**32,939**
ALGONQUIN WATER RESOURCES OF TEXAS*	58	64	71	78	86	94
ARP	175	178	182	189	197	206
BEN WHEELER WSC*	1	2	2	2	2	2
BULLARD	728	920	1,115	1,329	1,547	1,773
CARROLL WSC*	99	106	115	125	137	150
CRYSTAL SYSTEMS TEXAS*	411	512	616	730	848	973
DEAN WSC	763	772	784	805	833	864
EMERALD BAY MUD	175	170	167	166	165	165
JACKSON WSC*	212	222	234	252	272	294
LINDALE RURAL WSC*	298	308	321	341	365	391
LINDALE*	476	604	733	875	1,020	1,170
OVERTON*	32	39	47	55	64	73
R P M WSC*	29	31	34	38	41	45
SOUTHERN UTILITIES*	6,079	6,289	6,527	6,848	7,223	7,617
TROUP	416	447	481	520	564	610
TYLER*	20,032	21,313	22,676	24,310	26,118	28,007
WALNUT GROVE WSC	1,082	1,231	1,388	1,569	1,763	1,964
WHITEHOUSE	1,166	1,331	1,503	1,700	1,910	2,128
WRIGHT CITY WSC	272	295	319	348	380	415
COUNTY-OTHER*	475	610	745	894	1,049	1,209
MANUFACTURING*	2,956	3,348	3,348	3,348	3,348	3,348
MINING*	134	139	140	109	80	58
LIVESTOCK*	580	580	580	580	580	580
IRRIGATION*	448	448	448	448	448	448
NECHES BASIN TOTAL	**37,097**	**39,959**	**42,576**	**45,659**	**49,040**	**52,584**
SMITH COUNTY TOTAL	**37,097**	**39,959**	**42,576**	**45,659**	**49,040**	**52,584**
CENTERVILLE WSC	106	111	109	105	109	114
GROVETON*	55	57	55	53	55	57
PENNINGTON WSC*	52	54	53	50	52	54
COUNTY-OTHER*	131	133	134	130	137	144
MINING*	5	5	5	5	5	5
LIVESTOCK*	202	202	202	202	202	202
IRRIGATION*	278	278	278	278	278	278
NECHES BASIN TOTAL	**829**	**840**	**836**	**823**	**838**	**854**
TRINITY COUNTY TOTAL	**829**	**840**	**836**	**823**	**838**	**854**
CHESTER WSC	151	151	151	152	154	155
COLMESNEIL	252	247	243	241	241	241
CYPRESS CREEK WSC	117	115	113	112	112	112

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Region I Water User Group (WUG) Demand

	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
LAKE LIVINGSTON WSC*	2	2	2	3	3	3
MOSCOW WSC*	2	2	3	3	3	3
TYLER COUNTY WSC	660	638	617	606	604	604
WARREN WSC	185	180	175	173	172	172
WILDWOOD POA	116	119	120	122	123	125
WOODVILLE	1,241	1,218	1,196	1,184	1,182	1,182
COUNTY-OTHER	793	764	736	719	714	711
MINING	160	198	150	103	55	29
STEAM ELECTRIC POWER	200	200	200	200	200	200
LIVESTOCK	249	249	249	249	249	249
IRRIGATION	354	354	354	354	354	354
NECHES BASIN TOTAL	**4,482**	**4,437**	**4,309**	**4,221**	**4,166**	**4,140**
TYLER COUNTY TOTAL	**4,482**	**4,437**	**4,309**	**4,221**	**4,166**	**4,140**
REGION I DEMAND TOTAL	**738,081**	**793,495**	**798,814**	**811,072**	**826,138**	**839,601**

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Region I Water User Group (WUG) Category Summary

MUNICIPAL	2020	2030	2040	2050	2060	2070
POPULATION	999,152	1,069,403	1,133,698	1,201,086	1,270,452	1,342,338
DEMAND (acre-feet per year)	174,710	181,744	188,684	197,797	208,510	220,028
EXISTING SUPPLIES (acre-feet per year)	196,866	205,299	209,446	214,115	220,234	226,387
NEEDS (acre-feet per year)*	501	877	2,551	5,832	9,265	13,590

COUNTY-OTHER	2020	2030	2040	2050	2060	2070
POPULATION	152,404	164,570	175,983	187,781	199,391	211,314
DEMAND (acre-feet per year)	17,339	18,126	19,138	20,469	21,958	23,583
EXISTING SUPPLIES (acre-feet per year)	23,633	24,495	25,501	26,489	27,069	27,682
NEEDS (acre-feet per year)*	0	0	0	0	855	1,950

MANUFACTURING	2020	2030	2040	2050	2060	2070
DEMAND (acre-feet per year)	305,973	353,415	353,415	353,415	353,415	353,415
EXISTING SUPPLIES (acre-feet per year)	258,686	259,256	259,422	259,572	259,765	259,930
NEEDS (acre-feet per year)*	102,587	145,222	145,206	145,188	145,171	145,155

MINING	2020	2030	2040	2050	2060	2070
DEMAND (acre-feet per year)	27,523	24,547	18,169	15,488	12,986	12,093
EXISTING SUPPLIES (acre-feet per year)	23,863	23,790	23,196	22,602	22,065	22,199
NEEDS (acre-feet per year)*	8,413	5,281	903	468	308	207

STEAM ELECTRIC POWER	2020	2030	2040	2050	2060	2070
DEMAND (acre-feet per year)	67,011	67,011	67,011	67,011	67,011	67,011
EXISTING SUPPLIES (acre-feet per year)	88,574	88,574	88,574	88,574	88,574	88,574
NEEDS (acre-feet per year)*	3,494	3,494	3,494	3,494	3,494	3,494

LIVESTOCK	2020	2030	2040	2050	2060	2070
DEMAND (acre-feet per year)	47,157	50,284	54,029	58,524	63,890	65,103
EXISTING SUPPLIES (acre-feet per year)	29,384	29,416	29,438	29,450	28,561	27,946
NEEDS (acre-feet per year)*	23,708	26,613	30,128	34,381	39,483	40,666

IRRIGATION	2020	2030	2040	2050	2060	2070
DEMAND (acre-feet per year)	98,368	98,368	98,368	98,368	98,368	98,368
EXISTING SUPPLIES (acre-feet per year)	218,090	218,076	218,063	218,052	218,013	217,993
NEEDS (acre-feet per year)*	526	526	526	526	556	576

*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.

Region I Source Availability

GROUNDWATER SOURCE TYPE				SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
SOURCE NAME	COUNTY	BASIN	SALINITY *	2020	2030	2040	2050	2060	2070
CARRIZO-WILCOX AQUIFER	ANDERSON	NECHES	FRESH	23,335	23,335	23,335	23,335	23,335	23,335
CARRIZO-WILCOX AQUIFER	ANDERSON	TRINITY	FRESH	5,753	5,753	5,753	5,753	5,753	5,753
CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	FRESH	27,591	27,591	27,591	27,591	27,591	27,591
CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	FRESH	20,933	20,933	20,933	20,933	20,933	20,470
CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	FRESH	6,036	6,036	6,036	6,036	6,036	6,036
CARRIZO-WILCOX AQUIFER	HOUSTON	NECHES	FRESH	22,488	22,488	22,488	22,488	22,488	22,488
CARRIZO-WILCOX AQUIFER	HOUSTON	TRINITY	FRESH	3,806	3,806	3,806	3,806	3,806	3,806
CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	FRESH	24,181	24,181	24,181	24,181	24,181	24,181
CARRIZO-WILCOX AQUIFER	PANOLA	CYPRESS	FRESH	6	6	6	6	6	6
CARRIZO-WILCOX AQUIFER	PANOLA	SABINE	FRESH	8,370	8,212	8,212	8,212	8,062	8,062
CARRIZO-WILCOX AQUIFER	RUSK	NECHES	FRESH	11,769	11,769	11,769	11,750	11,750	11,750
CARRIZO-WILCOX AQUIFER	RUSK	SABINE	FRESH	9,068	9,068	9,068	9,068	9,068	9,068
CARRIZO-WILCOX AQUIFER	SABINE	NECHES	FRESH	356	356	356	356	356	356
CARRIZO-WILCOX AQUIFER	SABINE	SABINE	FRESH	3,249	3,249	3,249	3,249	3,249	3,249
CARRIZO-WILCOX AQUIFER	SAN AUGUSTINE	NECHES	FRESH	1,149	1,149	1,149	1,149	1,149	1,149
CARRIZO-WILCOX AQUIFER	SAN AUGUSTINE	SABINE	FRESH	290	290	290	290	290	290
CARRIZO-WILCOX AQUIFER	SHELBY	NECHES	FRESH	2,577	2,288	2,151	2,018	2,018	2,018
CARRIZO-WILCOX AQUIFER	SHELBY	SABINE	FRESH	8,317	8,154	8,154	7,705	7,269	7,081
CARRIZO-WILCOX AQUIFER	SMITH	NECHES	FRESH	22,705	22,705	22,705	22,705	22,705	22,693
CARRIZO-WILCOX AQUIFER	TRINITY	NECHES	FRESH	269	269	269	269	269	269
GULF COAST AQUIFER SYSTEM	HARDIN	NECHES	FRESH	34,789	34,789	34,789	34,789	34,789	34,789
GULF COAST AQUIFER SYSTEM	HARDIN	TRINITY	FRESH	138	138	138	138	138	138
GULF COAST AQUIFER SYSTEM	JASPER	NECHES	FRESH	37,630	37,630	37,630	37,630	37,630	37,630
GULF COAST AQUIFER SYSTEM	JASPER	SABINE	FRESH	29,854	29,854	29,854	29,854	29,854	29,854
GULF COAST AQUIFER SYSTEM	JEFFERSON	NECHES	FRESH	803	803	803	803	803	803
GULF COAST AQUIFER SYSTEM	JEFFERSON	NECHES-TRINITY	FRESH	1,722	1,722	1,722	1,722	1,722	1,722
GULF COAST AQUIFER SYSTEM	NEWTON	NECHES	FRESH	176	176	176	176	176	176
GULF COAST AQUIFER SYSTEM	NEWTON	SABINE	FRESH	34,043	34,043	34,043	34,043	34,043	34,043
GULF COAST AQUIFER SYSTEM	ORANGE	NECHES	FRESH	3,287	3,287	3,287	3,287	3,287	3,287
GULF COAST AQUIFER SYSTEM	ORANGE	NECHES-TRINITY	FRESH	256	256	256	256	256	256
GULF COAST AQUIFER SYSTEM	ORANGE	SABINE	FRESH	15,821	15,821	15,821	15,821	15,821	15,821
GULF COAST AQUIFER SYSTEM	POLK	NECHES	FRESH	15,957	15,957	15,957	15,957	15,957	15,957
GULF COAST AQUIFER SYSTEM	TYLER	NECHES	FRESH	38,211	38,211	38,211	38,211	38,211	38,211
OTHER AQUIFER	ANDERSON	TRINITY	FRESH	298	298	298	298	298	298
OTHER AQUIFER	ANGELINA	NECHES	FRESH	812	812	812	812	812	812
OTHER AQUIFER	CHEROKEE	NECHES	FRESH	268	268	268	268	268	268
OTHER AQUIFER	HENDERSON	NECHES	FRESH	5	5	5	5	5	5
OTHER AQUIFER	HENDERSON	TRINITY	FRESH	680	680	680	680	680	680
OTHER AQUIFER	HOUSTON	NECHES	FRESH	378	378	378	378	378	378
OTHER AQUIFER	HOUSTON	TRINITY	FRESH	888	888	888	888	888	888
OTHER AQUIFER	NACOGDOCHES	NECHES	FRESH	1,131	1,131	1,131	1,131	1,131	1,131
OTHER AQUIFER	RUSK	NECHES	FRESH	270	270	270	270	270	270
OTHER AQUIFER	RUSK	SABINE	FRESH	469	469	469	469	469	469
OTHER AQUIFER	SABINE	SABINE	FRESH	336	336	336	336	336	336
OTHER AQUIFER	SAN AUGUSTINE	NECHES	FRESH	1,395	1,395	1,395	1,395	1,395	1,395

* Salinity field indicates whether the source availability is considered 'fresh' (less than 1,000 mg/L), 'brackish' (1,000 to 10,000 mg/L), 'saline' (10,001 mg/L to 34,999 mg/L), or 'seawater' (35,000 mg/L or greater). Sources can also be labeled as 'fresh/brackish' or 'brackish/saline', if a combination of the salinity types is appropriate.

** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

Region I Source Availability

GROUNDWATER SOURCE TYPE				SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
SOURCE NAME	**COUNTY**	**BASIN**	**SALINITY ***	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
OTHER AQUIFER	SMITH	NECHES	FRESH	922	922	922	922	922	922
OTHER AQUIFER	TRINITY	NECHES	FRESH	700	700	700	700	700	700
QUEEN CITY AQUIFER	ANDERSON	NECHES	FRESH	11,828	11,828	11,828	11,828	11,828	11,828
QUEEN CITY AQUIFER	ANDERSON	TRINITY	FRESH	7,274	7,274	7,274	7,274	7,274	7,274
QUEEN CITY AQUIFER	ANGELINA	NECHES	FRESH	1,093	1,093	1,093	1,093	1,093	1,093
QUEEN CITY AQUIFER	CHEROKEE	NECHES	FRESH	23,211	23,211	23,211	23,211	23,039	22,866
QUEEN CITY AQUIFER	HENDERSON	NECHES	FRESH	12,067	12,067	12,067	12,067	12,067	12,067
QUEEN CITY AQUIFER	HOUSTON	NECHES	FRESH	2,043	2,043	2,043	2,043	2,043	2,043
QUEEN CITY AQUIFER	HOUSTON	TRINITY	FRESH	258	258	258	258	258	258
QUEEN CITY AQUIFER	NACOGDOCHES	NECHES	FRESH	2,985	2,985	2,985	2,985	2,985	2,985
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	SMITH	NECHES	FRESH	30,692	30,692	30,692	30,692	30,692	30,692
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	371	371	371	371	371	371
SPARTA AQUIFER	CHEROKEE	NECHES	FRESH	359	359	359	359	359	359
SPARTA AQUIFER	HOUSTON	NECHES	FRESH	477	477	477	477	477	477
SPARTA AQUIFER	HOUSTON	TRINITY	FRESH	977	977	977	977	977	977
SPARTA AQUIFER	NACOGDOCHES	NECHES	FRESH	365	365	365	365	365	365
SPARTA AQUIFER	SABINE	NECHES	FRESH	37	37	37	37	37	37
SPARTA AQUIFER	SABINE	SABINE	FRESH	160	160	160	160	160	160
SPARTA AQUIFER	SAN AUGUSTINE	NECHES	FRESH	163	163	163	163	163	163
SPARTA AQUIFER	SAN AUGUSTINE	SABINE	FRESH	3	3	3	3	3	3
SPARTA AQUIFER	TRINITY	NECHES	FRESH	154	154	154	154	154	154
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	570	570	570	570	570	570
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 SOURCE AVAILABILITY TOTAL		**548,868**	**548,258**	**548,121**	**547,520**	**546,379**	**545,543**

REUSE SOURCE TYPE				SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
SOURCE NAME	**COUNTY**	**BASIN**	**SALINITY ***	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
DIRECT REUSE	ORANGE	SABINE	FRESH	15	15	15	15	15	15
DIRECT REUSE	SABINE	SABINE	FRESH	20	20	20	20	20	20
DIRECT REUSE	SHELBY	SABINE	FRESH	233	246	259	270	284	299

* Salinity field indicates whether the source availability is considered 'fresh' (less than 1,000 mg/L), 'brackish' (1,000 to 10,000 mg/L), 'saline' (10,001 mg/L to 34,999 mg/L), or 'seawater' (35,000 mg/L or greater). Sources can also be labeled as 'fresh/brackish' or 'brackish/saline', if a combination of the salinity types is appropriate.
** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

Region I Source Availability

REUSE SOURCE TYPE				SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
SOURCE NAME	COUNTY	BASIN	SALINITY *	2020	2030	2040	2050	2060	2070
INDIRECT REUSE	JEFFERSON	NECHES-TRINITY	FRESH	13,687	13,687	13,687	13,687	13,687	13,687
REUSE SOURCE AVAILABILITY TOTAI				13,955	13,968	13,981	13,992	14,006	14,021

SURFACE WATERSOURCE TYPE				SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
SOURCE NAME	COUNTY	BASIN	SALINITY *	2020	2030	2040	2050	2060	2070
ATHENS LAKE/RESERVOIR	RESERVOIR**	NECHES	FRESH	5,950	5,864	5,778	5,692	5,606	5,520
BELLWOOD LAKE/RESERVOIR	RESERVOIR**	NECHES	FRESH	996	996	996	996	996	996
CENTER LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	1,460	1,460	1,460	1,460	1,460	1,460
CHEROKEE LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	31,456	31,309	31,162	31,015	30,867	30,720
CYPRESS LIVESTOCK LOCAL SUPPLY	PANOLA	CYPRESS	FRESH	30	30	30	30	30	30
HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR**	TRINITY	FRESH	6,250	6,145	6,040	5,935	5,830	5,725
JACKSONVILLE LAKE/RESERVOIR	RESERVOIR**	NECHES	FRESH	6,200	6,200	6,200	6,200	6,200	6,200
KURTH LAKE/RESERVOIR	RESERVOIR**	NECHES	FRESH	18,500	18,500	18,500	18,500	18,500	18,500
LAKE NACONICHE LAKE/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	21,367	20,686	20,006	19,325	18,644	17,963
NACOGDOCHES LAKE/RESERVOIR	RESERVOIR**	NECHES	FRESH	16,200	15,800	15,400	15,000	14,600	14,200
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
NECHES OTHER LOCAL SUPPLY	TYLER	NECHES	FRESH	8	8	8	8	8	8
NECHES RUN-OF-RIVER	ANDERSON	NECHES	FRESH	162	162	162	162	162	162
NECHES RUN-OF-RIVER	ANGELINA	NECHES	FRESH	14	14	14	14	14	14
NECHES RUN-OF-RIVER	CHEROKEE	NECHES	FRESH	108	108	108	108	108	108
NECHES RUN-OF-RIVER	HARDIN	NECHES	FRESH	57	57	57	57	57	57

* Salinity field indicates whether the source availability is considered 'fresh' (less than 1,000 mg/L), 'brackish' (1,000 to 10,000 mg/L), 'saline' (10,001 mg/L to 34,999 mg/L), or 'seawater' (35,000 mg/L or greater). Sources can also be labeled as 'fresh/brackish' or 'brackish/saline', if a combination of the salinity types is appropriate.

** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

Region I Source Availability

SURFACE WATERSOURCE TYPE				SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
SOURCE NAME	COUNTY	BASIN	SALINITY *	2020	2030	2040	2050	2060	2070
NECHES RUN-OF-RIVER	HOUSTON	NECHES	FRESH	208	208	208	208	208	208
NECHES RUN-OF-RIVER	JASPER	NECHES	FRESH	382,430	382,430	382,430	382,430	382,430	382,430
NECHES RUN-OF-RIVER	JEFFERSON	NECHES	BRACKISH	752,152	752,152	752,152	752,152	752,152	752,152
NECHES RUN-OF-RIVER	JEFFERSON	NECHES	FRESH	15,933	16,732	17,670	18,877	20,307	21,588
NECHES RUN-OF-RIVER	NACOGDOCHES	NECHES	FRESH	69	69	69	69	69	69
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	82	82	82	82	82	82
NECHES RUN-OF-RIVER	SABINE	NECHES	FRESH	178	178	178	178	178	178
NECHES RUN-OF-RIVER	SHELBY	NECHES	FRESH	1,000	1,000	1,000	1,000	1,000	1,000
NECHES RUN-OF-RIVER	SMITH	NECHES	FRESH	50	50	50	50	50	50
NECHES RUN-OF-RIVER	TRINITY	NECHES	FRESH	3	3	3	3	3	3
NECHES RUN-OF-RIVER	TYLER	NECHES	FRESH	88	88	88	88	88	88
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	51,274	51,274	51,274	51,274	51,274	51,274
PALESTINE LAKE/RESERVOIR	RESERVOIR**	NECHES	FRESH	197,710	196,110	194,610	193,010	191,310	189,010
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	40	40	40	40	40	40
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
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	133,128	133,128	133,128	133,128	133,128	133,128
SABINE RUN-OF-RIVER	ORANGE	SABINE	BRACKISH	267,000	267,000	267,000	267,000	267,000	267,000
SABINE RUN-OF-RIVER	ORANGE	SABINE	FRESH	28	28	28	28	28	28
SABINE RUN-OF-RIVER	PANOLA	SABINE	FRESH	574	574	574	574	574	574
SABINE RUN-OF-RIVER	RUSK	SABINE	FRESH	137	137	137	137	137	137
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	20,340	19,635	18,890	18,150	16,715	14,690
TIMPSON LAKE/RESERVOIR	RESERVOIR**	NECHES	FRESH	350	350	350	350	350	350
TOLEDO BEND LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	970,067	970,067	970,067	970,067	970,067	970,067
TOLEDO BEND LAKE/RESERVOIR	RESERVOIR**	SABINE-LOUISIANA	FRESH	343	343	343	343	343	343
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	1,290	1,290	1,290	1,290	1,290	1,290

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** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

Region I Source Availability

SURFACE WATERSOURCE TYPE				SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
SOURCE NAME	**COUNTY**	**BASIN**	**SALINITY ***	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
TRINITY RUN-OF-RIVER	HOUSTON	TRINITY	FRESH	2,522	2,522	2,522	2,522	2,522	2,522
TYLER LAKE/RESERVOIR	RESERVOIR**	NECHES	FRESH	34,830	34,666	34,502	34,338	34,174	34,010
SURFACE WATERSOURCE AVAILABILITY TOTAI				**3,862,224**	**3,859,135**	**3,856,246**	**3,853,530**	**3,850,241**	**3,845,614**

REGION I SOURCE AVAILABILITY TOTAI				**4,425,047**	**4,421,361**	**4,418,348**	**4,415,042**	**4,410,626**	**4,405,178**

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** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

Region I Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
BRUSHY CREEK WSC	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	181	177	171	167	166	166
FRANKSTON	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	356	350	346	340	334	328
FRANKSTON RURAL WSC	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	172	172	168	166	166	166
NECHES WSC	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	200	200	196	194	192	192
NORWOOD WSC	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	138	135	133	132	132	132
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
SLOCUM WSC	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	258	258	252	250	248	248
WALSTON SPRINGS WSC	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	299	299	299	299	299	299
COUNTY-OTHER	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	1	1	1	1	1	1
COUNTY-OTHER	I	OTHER AQUIFER | ANDERSON COUNTY	25	25	25	25	25	25
COUNTY-OTHER	I	PALESTINE LAKE/RESERVOIR	5	4	4	4	5	5
COUNTY-OTHER	I	QUEEN CITY AQUIFER | ANDERSON COUNTY	38	38	38	38	38	38
COUNTY-OTHER	I	SPARTA AQUIFER | ANDERSON COUNTY	28	28	28	28	28	28
MINING	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	64	81	85	68	48	35
STEAM ELECTRIC POWER	I	QUEEN CITY AQUIFER | ANDERSON COUNTY	1,408	1,408	1,408	1,408	1,408	1,408
LIVESTOCK	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	143	143	143	143	143	143
LIVESTOCK	I	LOCAL SURFACE WATER SUPPLY	333	333	333	333	333	333
LIVESTOCK	I	QUEEN CITY AQUIFER | ANDERSON COUNTY	160	160	160	160	160	160
LIVESTOCK	I	SPARTA AQUIFER | ANDERSON COUNTY	60	60	60	60	60	60
IRRIGATION	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	395	395	395	395	395	395
IRRIGATION	I	NECHES RUN-OF-RIVER	162	162	162	162	162	162
IRRIGATION	I	QUEEN CITY AQUIFER | ANDERSON COUNTY	247	247	247	247	247	247
		NECHES BASIN TOTAL	**7,261**	**7,302**	**7,274**	**7,220**	**7,186**	**7,167**
ANDERSON COUNTY CEDAR CREEK WSC	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	101	100	98	96	96	96
B B S WSC*	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	131	130	127	124	124	124
B C Y WSC	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	220	212	206	202	202	202
BRUSHY CREEK WSC	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	107	104	101	98	98	98
ELKHART	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	358	358	358	358	358	358
FOUR PINES WSC	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	458	458	458	458	458	458
NORWOOD WSC	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	42	43	44	44	44	44
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
PLEASANT SPRINGS WSC	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	195	195	195	195	195	195
SLOCUM WSC	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	28	28	28	26	26	26
TDCJ BETO GURNEY & POWLEDGE UNITS	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	1,130	1,150	1,152	1,146	1,144	1,144
TDCJ COFFIELD MICHAEL	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	3,116	3,196	3,214	3,206	3,204	3,204
THE CONSOLIDATED WSC*	I	CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	124	123	120	118	117	116
THE CONSOLIDATED WSC*	I	HOUSTON COUNTY LAKE/RESERVOIR	59	60	61	61	61	61
TUCKER WSC	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	128	126	124	122	122	122
WALSTON SPRINGS WSC	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	117	116	113	111	111	111
COUNTY-OTHER	I	OTHER AQUIFER | ANDERSON COUNTY	235	235	235	235	235	235
COUNTY-OTHER	I	PALESTINE LAKE/RESERVOIR	42	43	43	43	42	42
COUNTY-OTHER	I	QUEEN CITY AQUIFER | ANDERSON COUNTY	362	362	362	362	362	362
COUNTY-OTHER	I	SPARTA AQUIFER | ANDERSON COUNTY	263	263	263	263	263	263
MINING	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	100	100	100	100	100	100

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Region I Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
MINING	I	OTHER AQUIFER | ANDERSON COUNTY	29	29	29	29	29	29
LIVESTOCK	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	35	35	35	35	35	35
LIVESTOCK	I	LOCAL SURFACE WATER SUPPLY	684	684	684	684	684	684
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
IRRIGATION	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	97	97	97	97	97	97
IRRIGATION	I	QUEEN CITY AQUIFER | ANDERSON COUNTY	152	152	152	152	152	152
IRRIGATION	I	TRINITY RUN-OF-RIVER	1,060	1,060	1,060	1,060	1,060	1,060
		TRINITY BASIN TOTAL	**11,903**	**12,024**	**12,016**	**11,963**	**11,954**	**11,953**
		ANDERSON COUNTY TOTAL	**19,164**	**19,326**	**19,290**	**19,183**	**19,140**	**19,120**
ANGELINA WSC	I	OTHER AQUIFER | ANGELINA COUNTY	523	523	523	523	523	523
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	455	455	455	455	455	455
FOUR WAY SUD	I	YEGUA-JACKSON AQUIFER | ANGELINA COUNTY	1,216	1,216	1,216	1,216	1,216	1,216
HUDSON WSC	I	CARRIZO-WILCOX AQUIFER | ANGELINA COUNTY	644	689	727	762	793	820
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
LUFKIN	I	CARRIZO-WILCOX AQUIFER | ANGELINA COUNTY	4,352	4,527	4,675	4,844	5,029	4,186
LUFKIN	I	KURTH LAKE/RESERVOIR	2,901	3,018	3,117	3,229	3,353	4,482
M & M WSC	I	CARRIZO-WILCOX AQUIFER | ANGELINA COUNTY	283	286	290	300	310	321
POLLOK-REDTOWN WSC	I	CARRIZO-WILCOX AQUIFER | ANGELINA COUNTY	162	166	170	176	184	191
REDLAND WSC	I	CARRIZO-WILCOX AQUIFER | ANGELINA COUNTY	778	778	778	778	778	778
UPPER JASPER COUNTY WATER AUTHORITY	I	CARRIZO-WILCOX AQUIFER | ANGELINA COUNTY	11	11	10	10	10	10
WOODLAWN WSC	I	CARRIZO-WILCOX AQUIFER | ANGELINA COUNTY	163	165	168	173	180	186
ZAVALLA	I	YEGUA-JACKSON AQUIFER | ANGELINA COUNTY	85	87	89	91	95	98
COUNTY-OTHER	I	CARRIZO-WILCOX AQUIFER | ANGELINA COUNTY	1,512	1,512	1,512	1,512	1,512	1,512
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	573	599	599	599	599	599
MANUFACTURING	I	KURTH LAKE/RESERVOIR	293	311	311	311	311	311
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	128	128	128	128	128	128
LIVESTOCK	I	LOCAL SURFACE WATER SUPPLY	661	661	661	661	661	661
LIVESTOCK	I	SPARTA AQUIFER | ANGELINA COUNTY	73	73	73	73	73	73
LIVESTOCK	I	YEGUA-JACKSON AQUIFER | ANGELINA COUNTY	166	166	166	166	166	166
IRRIGATION	I	KURTH LAKE/RESERVOIR	779	779	779	779	779	779
IRRIGATION	I	YEGUA-JACKSON AQUIFER | ANGELINA COUNTY	331	331	331	331	331	331
		NECHES BASIN TOTAL	**38,612**	**39,004**	**39,301**	**39,640**	**40,009**	**40,349**
		ANGELINA COUNTY TOTAL	**38,612**	**39,004**	**39,301**	**39,640**	**40,009**	**40,349**
AFTON GROVE WSC	I	CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	57	61	65	70	76	83
AFTON GROVE WSC	I	JACKSONVILLE LAKE/RESERVOIR	132	141	150	164	178	194

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Region I Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
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
BLACKJACK WSC	I	CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	138	147	158	171	186	203
BULLARD	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	11	12	13	15	16	17
CRAFT TURNEY WSC	I	CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	146	151	157	169	183	200
CRAFT TURNEY WSC	I	JACKSONVILLE LAKE/RESERVOIR	339	352	367	393	427	465
GUM CREEK WSC	I	CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	39	40	43	46	50	54
GUM CREEK WSC	I	JACKSONVILLE LAKE/RESERVOIR	90	94	99	107	117	127
JACKSONVILLE	I	CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	914	974	1,037	1,124	1,223	1,332
JACKSONVILLE	I	JACKSONVILLE LAKE/RESERVOIR	2,131	2,273	2,420	2,621	2,853	3,108
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
POLLOK-REDTOWN WSC	I	CARRIZO-WILCOX AQUIFER | ANGELINA COUNTY	14	14	15	15	16	17
RUSK	I	CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	1,001	1,072	1,146	1,246	1,360	1,363
RUSK	I	RUSK CITY LAKE/RESERVOIR	40	40	40	40	40	40
RUSK RURAL WSC	I	CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	557	557	557	557	557	557
SOUTH RUSK COUNTY WSC	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	6	7	7	8	8	9
SOUTHERN UTILITIES*	I	CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	712	749	791	847	914	991
TROUP	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	15	16	17	19	20	22
WELLS	I	CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	141	150	159	172	187	204
WEST JACKSONVILLE WSC	I	CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	165	175	187	203	221	241
WRIGHT CITY WSC	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	149	122	93	59	20	0
COUNTY-OTHER	I	CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	19	21	22	25	27	30
COUNTY-OTHER	I	JACKSONVILLE LAKE/RESERVOIR	42	45	49	54	60	66
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	45	49	49	49	49	49
MANUFACTURING	I	JACKSONVILLE LAKE/RESERVOIR	80	90	90	90	90	90
MANUFACTURING	I	QUEEN CITY AQUIFER | CHEROKEE COUNTY	1	1	1	1	1	1
MINING	I	LOCAL SURFACE WATER 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	119	119	119	119	119	119
LIVESTOCK	I	LOCAL SURFACE WATER 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	170	170	170	170	170	170
IRRIGATION	I	NECHES RUN-OF-RIVER	108	108	108	108	108	108
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	191	191	191	191	191	191
IRRIGATION	I	SPARTA AQUIFER | CHEROKEE COUNTY	1	1	1	1	1	1
		NECHES BASIN TOTAL	**17,563**	**17,965**	**18,381**	**18,966**	**19,641**	**20,297**
		CHEROKEE COUNTY TOTAL	**17,563**	**17,965**	**18,381**	**18,966**	**19,641**	**20,297**
HARDIN COUNTY WCID 1	I	GULF COAST AQUIFER SYSTEM | HARDIN COUNTY	233	233	233	233	233	233
KOUNTZE	I	GULF COAST AQUIFER SYSTEM | HARDIN COUNTY	255	246	238	234	234	234

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Region I Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
LUMBERTON MUD	I	GULF COAST AQUIFER SYSTEM | HARDIN COUNTY	2,610	2,805	2,929	3,032	3,137	3,222
NORTH HARDIN WSC	I	GULF COAST AQUIFER SYSTEM | HARDIN COUNTY	543	561	586	604	619	630
SILSBEE	I	GULF COAST AQUIFER SYSTEM | HARDIN COUNTY	1,617	1,617	1,617	1,617	1,617	1,617
SOUR LAKE	I	GULF COAST AQUIFER SYSTEM | HARDIN COUNTY	374	374	374	374	374	374
WEST HARDIN WSC*	I	GULF COAST AQUIFER SYSTEM | HARDIN COUNTY	238	239	240	240	241	241
WILDWOOD POA	I	GULF COAST AQUIFER SYSTEM | HARDIN COUNTY	156	160	162	164	166	168
COUNTY-OTHER	I	GULF COAST AQUIFER SYSTEM | HARDIN COUNTY	703	689	677	681	684	690
MANUFACTURING	I	GULF COAST AQUIFER SYSTEM | HARDIN COUNTY	46	51	51	51	51	51
MINING	I	GULF COAST AQUIFER SYSTEM | HARDIN COUNTY	12	12	12	12	12	12
STEAM ELECTRIC POWER	I	GULF COAST AQUIFER SYSTEM | HARDIN COUNTY	1	1	1	1	1	1
LIVESTOCK	I	GULF COAST AQUIFER SYSTEM | HARDIN COUNTY	59	59	59	59	59	59
LIVESTOCK	I	LOCAL SURFACE WATER SUPPLY	155	155	155	155	155	155
IRRIGATION	I	GULF COAST AQUIFER SYSTEM | HARDIN COUNTY	932	932	932	932	932	932
IRRIGATION	I	NECHES RUN-OF-RIVER	57	57	57	57	57	57
NECHES BASIN TOTAL			**7,991**	**8,191**	**8,323**	**8,446**	**8,572**	**8,676**
LAKE LIVINGSTON WSC*	I	GULF COAST AQUIFER SYSTEM | HARDIN COUNTY	10	11	12	12	13	13
WEST HARDIN WSC*	I	GULF COAST AQUIFER SYSTEM | HARDIN COUNTY	3	3	3	3	3	3
COUNTY-OTHER	I	GULF COAST AQUIFER SYSTEM | HARDIN COUNTY	16	16	16	16	16	16
LIVESTOCK	I	GULF COAST AQUIFER SYSTEM | HARDIN COUNTY	2	2	2	2	2	2
TRINITY BASIN TOTAL			**31**	**32**	**33**	**33**	**34**	**34**
HARDIN COUNTY TOTAL			**8,022**	**8,223**	**8,356**	**8,479**	**8,606**	**8,710**
ATHENS*	I	ATHENS LAKE/RESERVOIR	17	22	25	29	30	26
ATHENS*	I	CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	32	24	20	16	8	6
BERRYVILLE	I	CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	118	124	129	138	147	157
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 | ANDERSON COUNTY	79	80	81	84	89	93
CHANDLER	I	CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	627	746	846	984	1,107	1,108
EDOM WSC*	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	20	20	20	21	20	21
FRANKSTON	I	CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	15	21	25	31	37	43
LEAGUEVILLE WSC	I	CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	215	221	233	250	313	397
MOORE STATION WSC	I	CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	231	231	231	231	231	231
MURCHISON	I	CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	94	91	89	88	88	89
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
VIRGINIA HILL WSC*	C	CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	156	156	156	156	155	152
VIRGINIA HILL WSC*	I	CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	108	108	108	108	107	105
COUNTY-OTHER*	I	CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	162	75	1	1	1	1
COUNTY-OTHER*	I	OTHER AQUIFER | HENDERSON COUNTY	539	539	539	539	539	539
MINING*	I	CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	2	0	2	2	2	2
MINING*	I	OTHER AQUIFER | HENDERSON COUNTY	65	65	65	65	65	65
LIVESTOCK*	I	ATHENS LAKE/RESERVOIR	3,023	3,023	3,023	3,023	2,120	1,505
LIVESTOCK*	I	LOCAL SURFACE WATER SUPPLY	770	770	770	770	770	770
IRRIGATION*	I	ATHENS LAKE/RESERVOIR	170	170	170	170	119	85
IRRIGATION*	I	PALESTINE LAKE/RESERVOIR	82	73	64	57	51	51
IRRIGATION*	I	QUEEN CITY AQUIFER | HENDERSON COUNTY	51	60	69	76	103	117
NECHES BASIN TOTAL			**7,527**	**7,588**	**7,658**	**7,876**	**7,178**	**6,682**
HENDERSON COUNTY TOTAL			**7,527**	**7,588**	**7,658**	**7,876**	**7,178**	**6,682**

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Region I Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
GRAPELAND	I	CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	118	119	118	117	118	118
GRAPELAND	I	HOUSTON COUNTY LAKE/RESERVOIR	2	2	2	2	2	2
PENNINGTON WSC*	I	YEGUA-JACKSON AQUIFER | HOUSTON COUNTY	23	22	22	22	22	21
PENNINGTON WSC*	H	YEGUA-JACKSON AQUIFER | TRINITY COUNTY	9	9	9	8	8	8
THE CONSOLIDATED WSC*	I	CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	755	755	755	755	755	755
THE CONSOLIDATED WSC*	I	HOUSTON COUNTY LAKE/RESERVOIR	148	148	147	147	147	147
COUNTY-OTHER	I	CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	86	86	87	87	87	87
COUNTY-OTHER	I	OTHER AQUIFER | HOUSTON COUNTY	87	87	88	88	88	88
COUNTY-OTHER	I	SPARTA AQUIFER | HOUSTON COUNTY	25	25	25	25	25	25
COUNTY-OTHER	I	YEGUA-JACKSON AQUIFER | HOUSTON COUNTY	42	42	42	42	42	42
MANUFACTURING	I	CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	4	4	4	4	4	4
MANUFACTURING	I	HOUSTON COUNTY LAKE/RESERVOIR	7	10	10	10	10	10
MINING	I	OTHER AQUIFER | HOUSTON COUNTY	113	89	66	42	18	8
LIVESTOCK	I	CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	26	26	26	26	26	26
LIVESTOCK	I	LOCAL SURFACE WATER SUPPLY	505	505	505	505	505	505
LIVESTOCK	I	OTHER AQUIFER | HOUSTON COUNTY	20	20	20	20	20	20
LIVESTOCK	I	QUEEN CITY AQUIFER | HOUSTON COUNTY	38	38	38	38	38	38
LIVESTOCK	I	SPARTA AQUIFER | HOUSTON COUNTY	44	44	44	44	44	44
IRRIGATION	I	CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	7	7	7	7	7	7
IRRIGATION	I	NECHES RUN-OF-RIVER	38	38	38	38	38	38
IRRIGATION	I	OTHER AQUIFER | HOUSTON COUNTY	10	10	10	10	10	10
IRRIGATION	I	QUEEN CITY AQUIFER | HOUSTON COUNTY	9	9	9	9	9	9
IRRIGATION	I	SPARTA AQUIFER | HOUSTON COUNTY	5	5	5	5	5	5
IRRIGATION	I	TRINITY RUN-OF-RIVER	457	457	457	457	457	457
		NECHES BASIN TOTAL	**2,578**	**2,557**	**2,534**	**2,508**	**2,485**	**2,474**
CROCKETT	I	HOUSTON COUNTY LAKE/RESERVOIR	1,282	1,282	1,282	1,282	1,282	1,282
CROCKETT	I	YEGUA-JACKSON AQUIFER | HOUSTON COUNTY	209	209	209	209	209	209
GRAPELAND	I	CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	182	181	182	183	182	182
GRAPELAND	I	HOUSTON COUNTY LAKE/RESERVOIR	3	3	3	3	3	3
LOVELADY	I	HOUSTON COUNTY LAKE/RESERVOIR	29	29	29	29	29	29
LOVELADY	I	YEGUA-JACKSON AQUIFER | HOUSTON COUNTY	133	133	133	133	133	133
PENNINGTON WSC*	I	YEGUA-JACKSON AQUIFER | HOUSTON COUNTY	42	40	39	41	39	38
PENNINGTON WSC*	H	YEGUA-JACKSON AQUIFER | TRINITY COUNTY	17	16	15	15	15	14
TDCJ EASTHAM UNIT	I	SPARTA AQUIFER | HOUSTON COUNTY	877	877	877	877	877	877
TDCJ EASTHAM UNIT	I	YEGUA-JACKSON AQUIFER | HOUSTON COUNTY	221	211	202	198	197	197
THE CONSOLIDATED WSC*	I	CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	1,299	1,298	1,296	1,296	1,295	1,294
THE CONSOLIDATED WSC*	I	HOUSTON COUNTY LAKE/RESERVOIR	404	402	402	402	401	401
COUNTY-OTHER	I	CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	18	18	17	17	17	17
COUNTY-OTHER	I	OTHER AQUIFER | HOUSTON COUNTY	18	18	17	17	17	17
COUNTY-OTHER	I	SPARTA AQUIFER | HOUSTON COUNTY	5	5	5	5	5	5
COUNTY-OTHER	I	YEGUA-JACKSON AQUIFER | HOUSTON COUNTY	8	8	8	8	8	8
MANUFACTURING	I	CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	18	18	18	18	18	18
MANUFACTURING	I	HOUSTON COUNTY LAKE/RESERVOIR	162	222	222	222	222	222
MINING	I	OTHER AQUIFER | HOUSTON COUNTY	209	165	121	77	33	14
LIVESTOCK	I	CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	64	64	64	64	64	64
LIVESTOCK	I	LOCAL SURFACE WATER SUPPLY	1,285	1,285	1,285	1,285	1,285	1,285
LIVESTOCK	I	OTHER AQUIFER | HOUSTON COUNTY	49	49	49	49	49	49
LIVESTOCK	I	QUEEN CITY AQUIFER | HOUSTON COUNTY	96	96	96	96	96	96

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Region I Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
LIVESTOCK	I	SPARTA AQUIFER | HOUSTON COUNTY	111	111	111	111	111	111
IRRIGATION	I	CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	31	31	31	31	31	31
IRRIGATION	I	NECHES RUN-OF-RIVER	170	170	170	170	170	170
IRRIGATION	I	OTHER AQUIFER | HOUSTON COUNTY	46	46	46	46	46	46
IRRIGATION	I	QUEEN CITY AQUIFER | HOUSTON COUNTY	41	41	41	41	41	41
IRRIGATION	I	SPARTA AQUIFER | HOUSTON COUNTY	20	20	20	20	20	20
IRRIGATION	I	TRINITY RUN-OF-RIVER	2,065	2,065	2,065	2,065	2,065	2,065
		TRINITY BASIN TOTAL	**9,114**	**9,113**	**9,055**	**9,010**	**8,960**	**8,938**
		HOUSTON COUNTY TOTAL	**11,692**	**11,670**	**11,589**	**11,518**	**11,445**	**11,412**
BROOKELAND FWSD	I	GULF COAST AQUIFER SYSTEM | JASPER COUNTY	39	38	37	36	36	36
JASPER	I	GULF COAST AQUIFER SYSTEM | JASPER COUNTY	1,963	1,963	1,963	1,963	1,963	1,963
RAYBURN COUNTRY MUD	I	GULF COAST AQUIFER SYSTEM | JASPER COUNTY	511	511	511	511	511	511
RURAL WSC	I	GULF COAST AQUIFER SYSTEM | JASPER COUNTY	250	250	250	250	250	250
SOUTH JASPER COUNTY WSC	I	GULF COAST AQUIFER SYSTEM | JASPER COUNTY	31	30	28	28	28	28
UPPER JASPER COUNTY WATER AUTHORITY	I	GULF COAST AQUIFER SYSTEM | JASPER COUNTY	145	143	140	139	139	139
COUNTY-OTHER	I	GULF COAST AQUIFER SYSTEM | JASPER COUNTY	1,196	1,168	1,127	1,101	1,095	1,095
MANUFACTURING	I	GULF COAST AQUIFER SYSTEM | JASPER COUNTY	31,230	31,231	31,231	31,231	31,231	31,231
MANUFACTURING	I	NECHES RUN-OF-RIVER	546	546	546	546	546	546
MANUFACTURING	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	45,841	57,200	57,200	57,200	57,200	57,200
MINING	I	GULF COAST AQUIFER SYSTEM | JASPER COUNTY	70	56	42	27	13	8
LIVESTOCK	I	GULF COAST AQUIFER SYSTEM | JASPER COUNTY	445	445	445	445	445	445
LIVESTOCK	I	LOCAL SURFACE WATER SUPPLY	332	332	332	332	332	332
IRRIGATION	I	GULF COAST AQUIFER SYSTEM | JASPER COUNTY	94	94	94	94	94	94
		NECHES BASIN TOTAL	**82,693**	**94,007**	**93,946**	**93,903**	**93,883**	**93,878**
JASPER COUNTY WCID 1	I	GULF COAST AQUIFER SYSTEM | JASPER COUNTY	204	192	188	188	188	188
KIRBYVILLE	I	GULF COAST AQUIFER SYSTEM | JASPER COUNTY	402	401	395	391	390	390
MAURICEVILLE SUD	I	GULF COAST AQUIFER SYSTEM | ORANGE COUNTY	73	73	71	70	68	68
SOUTH JASPER COUNTY WSC	I	GULF COAST AQUIFER SYSTEM | JASPER COUNTY	88	84	82	82	82	82
UPPER JASPER COUNTY WATER AUTHORITY	I	GULF COAST AQUIFER SYSTEM | JASPER COUNTY	55	55	54	53	53	53
COUNTY-OTHER	I	GULF COAST AQUIFER SYSTEM | JASPER COUNTY	1,008	969	897	856	847	847
MANUFACTURING	I	GULF COAST AQUIFER SYSTEM | JASPER COUNTY	90	89	89	89	89	89
MANUFACTURING	I	NECHES RUN-OF-RIVER	2	2	2	2	2	2
MANUFACTURING	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	132	164	164	164	164	164
MINING	I	GULF COAST AQUIFER SYSTEM | JASPER COUNTY	78	62	46	31	15	8
LIVESTOCK	I	GULF COAST AQUIFER SYSTEM | JASPER COUNTY	76	76	76	76	76	76
LIVESTOCK	I	LOCAL SURFACE WATER SUPPLY	215	215	215	215	215	215
IRRIGATION	I	GULF COAST AQUIFER SYSTEM | JASPER COUNTY	57	57	57	57	57	57
		SABINE BASIN TOTAL	**2,480**	**2,439**	**2,336**	**2,274**	**2,246**	**2,239**
		JASPER COUNTY TOTAL	**85,173**	**96,446**	**96,282**	**96,177**	**96,129**	**96,117**
BEAUMONT	I	GULF COAST AQUIFER SYSTEM | HARDIN COUNTY	3,101	3,100	3,211	3,211	3,211	3,211
BEAUMONT	I	NECHES RUN-OF-RIVER	4,363	4,405	4,443	4,650	5,102	5,506
BEAUMONT	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	2,585	2,975	3,023	2,637	2,180	1,770
BEVIL OAKS	I	GULF COAST AQUIFER SYSTEM | JEFFERSON COUNTY	135	137	139	147	157	169
CHINA	I	GULF COAST AQUIFER SYSTEM | JEFFERSON COUNTY	3	3	3	3	3	3
GROVES	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	69	66	64	64	63	63
JEFFERSON COUNTY WCID 10	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	82	83	85	89	95	102
MEEKER MWD	I	GULF COAST AQUIFER SYSTEM | JEFFERSON COUNTY	127	128	128	128	133	139

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Region I Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
MEEKER MWD	I	NECHES RUN-OF-RIVER	0	0	0	0	0	1
NEDERLAND	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	88	90	93	98	105	112
PORT ARTHUR	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	58	58	57	57	57	57
PORT NECHES	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	744	754	771	809	864	928
COUNTY-OTHER	I	GULF COAST AQUIFER SYSTEM | JEFFERSON COUNTY	2	2	2	2	1	1
COUNTY-OTHER	I	NECHES RUN-OF-RIVER	159	209	270	312	311	312
COUNTY-OTHER	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	22	26	32	39	47	56
MANUFACTURING	I	GULF COAST AQUIFER SYSTEM | HARDIN COUNTY	10	10	10	10	10	10
MANUFACTURING	I	GULF COAST AQUIFER SYSTEM | JEFFERSON COUNTY	123	123	123	123	123	123
MANUFACTURING	I	NECHES RUN-OF-RIVER	49,754	43,627	43,642	43,663	43,687	43,709
MANUFACTURING	I	SABINE RUN-OF-RIVER	582	582	582	582	582	582
MANUFACTURING	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	4,282	4,276	4,269	4,256	4,240	4,227
MINING	I	GULF COAST AQUIFER SYSTEM | JEFFERSON COUNTY	18	33	51	84	107	133
MINING	I	LOCAL SURFACE WATER SUPPLY	110	110	110	110	110	110
LIVESTOCK	I	GULF COAST AQUIFER SYSTEM | JEFFERSON COUNTY	16	16	16	16	16	16
LIVESTOCK	I	LOCAL SURFACE WATER SUPPLY	64	64	64	64	64	64
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	3,546	3,546	3,546	3,546	3,546	3,546
		NECHES BASIN TOTAL	**80,801**	**75,181**	**75,492**	**75,458**	**75,572**	**75,708**
BEAUMONT	I	GULF COAST AQUIFER SYSTEM | HARDIN COUNTY	6,399	6,400	6,289	6,289	6,289	6,289
BEAUMONT	I	NECHES RUN-OF-RIVER	9,005	9,091	9,169	9,599	10,530	11,364
BEAUMONT	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	5,335	6,139	6,240	5,442	4,499	3,654
CHINA	I	GULF COAST AQUIFER SYSTEM | JEFFERSON COUNTY	140	143	147	155	165	177
GROVES	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	2,149	2,075	2,012	1,987	1,982	1,982
JEFFERSON COUNTY WCID 10	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	411	416	425	445	475	510
MEEKER MWD	I	GULF COAST AQUIFER SYSTEM | JEFFERSON COUNTY	381	380	380	380	395	415
MEEKER MWD	I	NECHES RUN-OF-RIVER	4	4	5	5	5	5
NEDERLAND	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	2,348	2,408	2,487	2,620	2,799	3,007
PORT ARTHUR	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	19,176	19,147	18,927	18,882	18,863	18,862
PORT NECHES	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	687	696	713	748	798	857
WEST JEFFERSON COUNTY MWD	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	741	752	772	809	863	927
COUNTY-OTHER	I	GULF COAST AQUIFER SYSTEM | JEFFERSON COUNTY	48	48	48	48	49	49
COUNTY-OTHER	I	NECHES RUN-OF-RIVER	1,875	2,469	3,200	3,688	3,689	3,688
COUNTY-OTHER	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	308	369	444	533	634	746
MANUFACTURING	I	GULF COAST AQUIFER SYSTEM | HARDIN COUNTY	10	10	10	10	10	10
MANUFACTURING	I	GULF COAST AQUIFER SYSTEM | JEFFERSON COUNTY	1	1	1	1	1	1
MANUFACTURING	I	NECHES RUN-OF-RIVER	42,553	37,316	37,331	37,350	37,373	37,393
MANUFACTURING	I	SABINE RUN-OF-RIVER	538	538	538	538	538	538
MANUFACTURING	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	3,911	3,906	3,899	3,890	3,876	3,863
MINING	I	GULF COAST AQUIFER SYSTEM | JEFFERSON COUNTY	32	39	49	66	78	91
MINING	I	NECHES-TRINITY RUN-OF-RIVER	34	34	34	34	34	34
STEAM ELECTRIC POWER	I	GULF COAST AQUIFER SYSTEM | JEFFERSON COUNTY	900	900	900	900	900	900
LIVESTOCK	I	GULF COAST AQUIFER SYSTEM | JEFFERSON COUNTY	190	190	190	190	190	190
LIVESTOCK	I	LOCAL SURFACE WATER SUPPLY	736	736	736	736	736	736
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

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Region I Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
IRRIGATION	I	NECHES-TRINITY RUN-OF-RIVER	47,108	47,108	47,108	47,108	47,108	47,108
		NECHES-TRINITY BASIN TOTAL	**287,949**	**284,244**	**284,983**	**285,382**	**285,808**	**286,325**
		JEFFERSON COUNTY TOTAL	**368,750**	**359,425**	**360,475**	**360,840**	**361,380**	**362,033**
APPLEBY WSC	I	CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	873	873	874	874	881	971
APPLEBY WSC	I	NACOGDOCHES LAKE/RESERVOIR	67	67	66	66	65	65
CARO WSC	I	CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	254	272	292	317	347	380
CUSHING	I	CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	229	229	229	229	229	229
D & M WSC	I	CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	868	869	871	872	873	875
D & M WSC	I	NACOGDOCHES LAKE/RESERVOIR	186	185	183	182	181	179
ETOILE WSC	I	CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	255	275	297	323	354	387
GARRISON	I	CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	565	565	565	565	565	565
LILLY GROVE SUD	I	CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	664	664	664	664	664	664
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
NACOGDOCHES	I	CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	1,965	2,188	2,425	2,702	3,022	3,370
NACOGDOCHES	I	NACOGDOCHES LAKE/RESERVOIR	4,903	5,326	5,752	6,243	6,796	7,372
SWIFT WSC	I	CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	657	657	657	657	657	657
WODEN WSC	I	CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	770	770	770	770	770	770
COUNTY-OTHER	I	CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	157	220	298	380	467	561
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	1,254	1,265	1,265	1,265	1,265	1,265
MANUFACTURING	I	NACOGDOCHES LAKE/RESERVOIR	1,254	1,265	1,265	1,265	1,265	1,265
MANUFACTURING	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	10,000	10,000	10,000	10,000	10,000	10,000
MINING	I	LOCAL SURFACE WATER 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
LIVESTOCK	I	CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	851	851	851	851	851	851
LIVESTOCK	I	LOCAL SURFACE WATER SUPPLY	2,386	2,386	2,386	2,386	2,386	2,386
LIVESTOCK	I	OTHER AQUIFER | NACOGDOCHES COUNTY	20	20	20	20	20	20
LIVESTOCK	I	QUEEN CITY AQUIFER | NACOGDOCHES COUNTY	310	310	310	310	310	310
LIVESTOCK	I	SPARTA AQUIFER | NACOGDOCHES COUNTY	156	156	156	156	156	156
IRRIGATION	I	CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	373	373	373	373	373	373
IRRIGATION	I	NECHES RUN-OF-RIVER	67	67	67	67	67	67
		NECHES BASIN TOTAL	**31,947**	**32,716**	**33,499**	**34,400**	**35,427**	**36,601**
		NACOGDOCHES COUNTY TOTAL	**31,947**	**32,716**	**33,499**	**34,400**	**35,427**	**36,601**
BROOKELAND FWSD	I	GULF COAST AQUIFER SYSTEM | NEWTON COUNTY	104	101	99	97	97	97
MAURICEVILLE SUD	I	GULF COAST AQUIFER SYSTEM | ORANGE COUNTY	68	65	64	62	62	61
NEWTON	I	GULF COAST AQUIFER SYSTEM | NEWTON COUNTY	483	483	483	483	483	483
SOUTH NEWTON WSC	I	GULF COAST AQUIFER SYSTEM | NEWTON COUNTY	342	342	342	342	342	342
COUNTY-OTHER	I	GULF COAST AQUIFER SYSTEM | NEWTON COUNTY	886	846	811	803	800	800
MANUFACTURING	I	GULF COAST AQUIFER SYSTEM | 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 SYSTEM | NEWTON COUNTY	156	156	156	156	156	156
MINING	I	LOCAL SURFACE WATER SUPPLY	158	158	158	158	158	158
STEAM ELECTRIC POWER	I	SABINE RUN-OF-RIVER	13,442	13,442	13,442	13,442	13,442	13,442

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Region I Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
LIVESTOCK	I	GULF COAST AQUIFER SYSTEM | NEWTON COUNTY	104	104	104	104	104	104
LIVESTOCK	I	LOCAL SURFACE WATER SUPPLY	155	155	155	155	155	155
IRRIGATION	I	GULF COAST AQUIFER SYSTEM | NEWTON COUNTY	330	330	330	330	330	330
IRRIGATION	I	SABINE RUN-OF-RIVER	50	50	50	50	50	50
		SABINE BASIN TOTAL	**16,846**	**16,876**	**16,915**	**16,973**	**17,037**	**17,109**
		NEWTON COUNTY TOTAL	**16,846**	**16,876**	**16,915**	**16,973**	**17,037**	**17,109**
BRIDGE CITY	I	GULF COAST AQUIFER SYSTEM | ORANGE COUNTY	126	126	126	126	126	125
KELLY G BREWER	I	GULF COAST AQUIFER SYSTEM | ORANGE COUNTY	41	42	42	43	44	44
MAURICEVILLE SUD	I	GULF COAST AQUIFER SYSTEM | ORANGE COUNTY	121	121	120	120	121	122
ORANGE COUNTY WCID 1	I	GULF COAST AQUIFER SYSTEM | ORANGE COUNTY	1,553	1,569	1,576	1,595	1,614	1,631
ORANGEFIELD WSC	I	GULF COAST AQUIFER SYSTEM | ORANGE COUNTY	188	192	195	197	199	201
PORT ARTHUR	I	SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	2	2	2	2	2	2
COUNTY-OTHER	I	GULF COAST AQUIFER SYSTEM | ORANGE COUNTY	1,305	1,305	1,305	1,305	1,305	1,305
MANUFACTURING	I	SABINE RUN-OF-RIVER	684	684	684	684	684	684
MINING	I	GULF COAST AQUIFER SYSTEM | ORANGE COUNTY	149	149	149	149	149	147
LIVESTOCK	I	GULF COAST AQUIFER SYSTEM | ORANGE COUNTY	57	57	57	57	57	57
LIVESTOCK	I	LOCAL SURFACE WATER SUPPLY	32	32	32	32	32	32
		NECHES BASIN TOTAL	**4,258**	**4,279**	**4,288**	**4,310**	**4,333**	**4,350**
BRIDGE CITY	I	GULF COAST AQUIFER SYSTEM | ORANGE COUNTY	84	84	84	84	84	84
COUNTY-OTHER	I	GULF COAST AQUIFER SYSTEM | ORANGE COUNTY	12	12	13	12	12	12
		NECHES-TRINITY BASIN TOTAL	**96**	**96**	**97**	**96**	**96**	**96**
BRIDGE CITY	I	GULF COAST AQUIFER SYSTEM | ORANGE COUNTY	626	628	627	627	627	627
KELLY G BREWER	I	GULF COAST AQUIFER SYSTEM | ORANGE COUNTY	36	36	37	37	37	38
MAURICEVILLE SUD	I	GULF COAST AQUIFER SYSTEM | ORANGE COUNTY	1,425	1,428	1,432	1,436	1,436	1,436
ORANGE	I	GULF COAST AQUIFER SYSTEM | ORANGE COUNTY	2,626	2,644	2,645	2,663	2,696	2,724
ORANGE COUNTY WCID 2	I	GULF COAST AQUIFER SYSTEM | ORANGE COUNTY	494	500	504	510	517	522
ORANGEFIELD WSC	I	GULF COAST AQUIFER SYSTEM | ORANGE COUNTY	293	299	304	308	311	315
PINEHURST	I	GULF COAST AQUIFER SYSTEM | ORANGE COUNTY	284	284	285	290	293	296
SOUTH NEWTON WSC	I	GULF COAST AQUIFER SYSTEM | ORANGE COUNTY	192	192	192	192	192	192
COUNTY-OTHER	I	GULF COAST AQUIFER SYSTEM | ORANGE COUNTY	1,545	1,545	1,545	1,544	1,545	1,545
MANUFACTURING	I	SABINE RUN-OF-RIVER	55,276	55,276	55,276	55,276	55,276	55,276
MANUFACTURING	I	TOLEDO BEND LAKE/RESERVOIR	31	31	31	31	31	31
MINING	I	GULF COAST AQUIFER SYSTEM | ORANGE COUNTY	0	0	0	0	0	2
MINING	I	LOCAL SURFACE WATER SUPPLY	178	178	178	178	178	178
STEAM ELECTRIC POWER	I	GULF COAST AQUIFER SYSTEM | 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 SYSTEM | ORANGE COUNTY	117	117	117	117	117	117
LIVESTOCK	I	LOCAL SURFACE WATER SUPPLY	66	66	66	66	66	66
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	**70,278**	**70,313**	**70,328**	**70,364**	**70,411**	**70,454**
		ORANGE COUNTY TOTAL	**74,632**	**74,688**	**74,713**	**74,770**	**74,840**	**74,900**
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	LOCAL SURFACE WATER SUPPLY	27	27	27	27	27	27
		CYPRESS BASIN TOTAL	**41**	**41**	**40**	**39**	**41**	**41**
BECKVILLE	I	CARRIZO-WILCOX AQUIFER | PANOLA COUNTY	581	581	581	581	581	581

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Region I Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
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
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
MINDEN BRACHFIELD WSC	I	CARRIZO-WILCOX AQUIFER | PANOLA COUNTY	4	4	5	5	6	6
PANOLA-BETHANY WSC*	I	CARRIZO-WILCOX AQUIFER | PANOLA COUNTY	28	39	39	40	40	40
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	168	168	168	168	168	168
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	LOCAL SURFACE WATER SUPPLY	1,227	1,227	1,227	1,227	1,227	1,227
IRRIGATION	I	CARRIZO-WILCOX AQUIFER | PANOLA COUNTY	450	450	450	450	450	450
IRRIGATION	I	SABINE RUN-OF-RIVER	152	152	152	152	152	152
		SABINE BASIN TOTAL	**16,884**	**17,210**	**17,064**	**16,641**	**17,334**	**17,571**
		PANOLA COUNTY TOTAL	**16,925**	**17,251**	**17,104**	**16,680**	**17,375**	**17,612**
CHESTER WSC	I	GULF COAST AQUIFER SYSTEM | POLK COUNTY	39	39	39	39	39	40
CORRIGAN	I	GULF COAST AQUIFER SYSTEM | POLK COUNTY	231	248	260	276	288	299
DAMASCUS-STRYKER WSC	I	YEGUA-JACKSON AQUIFER | POLK COUNTY	194	210	222	234	245	254
LAKE LIVINGSTON WSC*	I	GULF COAST AQUIFER SYSTEM | POLK COUNTY	68	76	84	93	102	112
MOSCOW WSC*	I	GULF COAST AQUIFER SYSTEM | POLK COUNTY	71	71	71	71	71	71
SODA WSC*	H	GULF COAST AQUIFER SYSTEM | POLK COUNTY	11	12	12	13	13	14
COUNTY-OTHER*	I	GULF COAST AQUIFER SYSTEM | POLK COUNTY	743	797	840	882	923	957
MANUFACTURING*	I	GULF COAST AQUIFER SYSTEM | POLK COUNTY	475	475	475	475	475	475
MINING*	I	GULF COAST AQUIFER SYSTEM | POLK COUNTY	103	83	83	83	83	83
MINING*	I	LOCAL SURFACE WATER SUPPLY	20	20	20	20	20	20
LIVESTOCK*	I	GULF COAST AQUIFER SYSTEM | POLK COUNTY	1	1	1	1	1	1
LIVESTOCK*	I	LOCAL SURFACE WATER SUPPLY	396	396	396	396	396	396
LIVESTOCK*	I	YEGUA-JACKSON AQUIFER | POLK COUNTY	6	6	6	6	6	6
IRRIGATION*	I	GULF COAST AQUIFER SYSTEM | POLK COUNTY	313	313	313	313	313	313
		NECHES BASIN TOTAL	**2,671**	**2,747**	**2,822**	**2,902**	**2,975**	**3,041**
		POLK COUNTY TOTAL	**2,671**	**2,747**	**2,822**	**2,902**	**2,975**	**3,041**
EBENEZER WSC	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	130	141	152	165	180	196
GASTON WSC	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	192	205	220	238	259	282
GOODSPRINGS WSC	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	260	275	292	315	343	372
HENDERSON	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	2,466	2,466	2,466	2,466	2,466	2,466
HENDERSON	D	FORK LAKE/RESERVOIR	1,277	3,470	3,470	3,470	3,470	3,470
JACOBS WSC	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	10	11	11	12	13	14
MINDEN BRACHFIELD WSC	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	70	78	86	94	102	110
MT ENTERPRISE WSC	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	306	330	356	388	422	460
NEW LONDON	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	482	530	576	630	688	748
OVERTON*	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	53	53	53	53	53	53

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Region I Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
SOUTH RUSK COUNTY WSC	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	188	200	213	230	250	272
WRIGHT CITY WSC	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	57	61	66	71	78	63
COUNTY-OTHER	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	561	596	631	679	735	777
MANUFACTURING	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	333	357	377	395	422	450
MANUFACTURING	I	NECHES RUN-OF-RIVER	1	1	1	1	1	1
MINING	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	1,034	1,034	1,034	1,034	1,034	1,034
MINING	I	LOCAL SURFACE WATER SUPPLY	640	640	640	640	640	640
MINING	I	OTHER AQUIFER | RUSK COUNTY	251	251	251	251	251	251
STEAM ELECTRIC POWER	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	127	127	127	127	127	127
STEAM ELECTRIC POWER	I	MARTIN LAKE/RESERVOIR	2,479	2,479	2,479	2,479	2,479	2,479
STEAM ELECTRIC POWER	I	TOLEDO BEND LAKE/RESERVOIR	1,777	1,777	1,777	1,777	1,777	1,777
LIVESTOCK	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	286	299	305	305	305	305
LIVESTOCK	I	LOCAL SURFACE WATER SUPPLY	624	624	624	624	624	624
LIVESTOCK	I	QUEEN CITY AQUIFER | RUSK COUNTY	18	18	18	18	18	18
IRRIGATION	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	215	215	215	215	215	215
IRRIGATION	I	NECHES RUN-OF-RIVER	80	80	80	80	80	80
		NECHES BASIN TOTAL	**13,917**	**16,318**	**16,520**	**16,757**	**17,032**	**17,284**
CHALK HILL SUD	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	332	352	375	404	440	478
CROSS ROADS SUD*	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	397	398	399	399	398	397
CROSS ROADS SUD*	D	FORK LAKE/RESERVOIR	248	273	288	310	337	366
CRYSTAL FARMS WSC	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	104	111	118	127	139	151
ELDERVILLE WSC*	I	CHEROKEE LAKE/RESERVOIR	95	96	96	96	95	111
ELDERVILLE WSC*	D	FORK LAKE/RESERVOIR	97	97	97	97	97	96
HENDERSON	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	400	400	400	400	400	400
HENDERSON	D	FORK LAKE/RESERVOIR	222	603	603	603	603	603
HENDERSON	I	SABINE RUN-OF-RIVER	10	10	10	10	10	10
JACOBS WSC	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	273	292	314	340	370	381
KILGORE*	D	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	351	356	356	355	352	347
KILGORE*	D	FORK LAKE/RESERVOIR	434	783	848	924	1,008	1,095
MINDEN BRACHFIELD WSC	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	32	34	38	42	46	50
NEW LONDON	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	388	426	464	508	554	602
NEW PROSPECT WSC	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	92	96	102	110	118	130
OVERTON*	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	435	429	424	419	414	408
SOUTHERN UTILITIES*	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	72	75	80	85	92	100
SOUTHERN UTILITIES*	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	0	0	0	0	1	1
SOUTHERN UTILITIES*	I	PALESTINE LAKE/RESERVOIR	1	2	2	2	2	2
SOUTHERN UTILITIES*	I	TYLER LAKE/RESERVOIR	2	2	2	2	2	2
TATUM	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	358	348	342	336	336	367
WEST GREGG SUD*	D	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	22	22	22	22	22	23
COUNTY-OTHER	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	521	556	591	639	695	754
COUNTY-OTHER	I	OTHER AQUIFER | RUSK COUNTY	85	85	85	85	85	85
MANUFACTURING	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	13	14	15	15	16	18
MANUFACTURING	D	FORK LAKE/RESERVOIR	1	1	1	1	1	1
MINING	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	954	954	954	954	954	954
MINING	I	LOCAL SURFACE WATER SUPPLY	590	590	590	590	590	590
MINING	I	OTHER AQUIFER | RUSK COUNTY	233	233	233	233	233	233
STEAM ELECTRIC POWER	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	1,152	1,152	1,152	1,152	1,152	1,152
STEAM ELECTRIC POWER	I	MARTIN LAKE/RESERVOIR	22,521	22,521	22,521	22,521	22,521	22,521

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Region I Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
STEAM ELECTRIC POWER	I	TOLEDO BEND LAKE/RESERVOIR	16,145	16,145	16,145	16,145	16,145	16,145
LIVESTOCK	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	225	235	240	240	240	240
LIVESTOCK	I	LOCAL SURFACE WATER SUPPLY	492	492	492	492	492	492
LIVESTOCK	I	QUEEN CITY AQUIFER | RUSK COUNTY	15	15	15	15	15	15
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	**47,609**	**48,495**	**48,711**	**48,970**	**49,272**	**49,617**
		RUSK COUNTY TOTAL	**61,526**	**64,813**	**65,231**	**65,727**	**66,304**	**66,901**
BROOKELAND FWSD	I	CARRIZO-WILCOX AQUIFER | SABINE COUNTY	67	65	63	62	62	62
G M WSC	I	TOLEDO BEND LAKE/RESERVOIR	62	62	62	62	62	62
PINELAND	I	CARRIZO-WILCOX AQUIFER | SABINE COUNTY	90	86	82	81	81	81
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	TOLEDO BEND LAKE/RESERVOIR	29	28	29	29	29	29
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	178	178	178	178	178	178
MANUFACTURING	I	OTHER AQUIFER | SABINE COUNTY	48	67	67	67	67	67
MINING	I	TOLEDO BEND LAKE/RESERVOIR	320	319	319	319	320	320
LIVESTOCK	I	CARRIZO-WILCOX AQUIFER | SABINE COUNTY	8	8	8	8	8	8
LIVESTOCK	I	LOCAL SURFACE WATER SUPPLY	71	71	71	71	71	71
LIVESTOCK	I	SPARTA AQUIFER | SABINE COUNTY	3	3	3	3	3	3
		NECHES BASIN TOTAL	**1,095**	**1,106**	**1,101**	**1,099**	**1,100**	**1,100**
BROOKELAND FWSD	I	CARRIZO-WILCOX AQUIFER | SABINE COUNTY	9	9	9	9	9	9
G M WSC	I	CARRIZO-WILCOX AQUIFER | SABINE COUNTY	124	124	124	124	124	124
G M WSC	I	TOLEDO BEND LAKE/RESERVOIR	455	455	455	455	455	455
HEMPHILL	I	TOLEDO BEND LAKE/RESERVOIR	743	743	743	743	743	743
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	LOCAL SURFACE WATER 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	**4,433**	**4,435**	**4,434**	**4,434**	**4,433**	**4,433**
		SABINE COUNTY TOTAL	**5,528**	**5,541**	**5,535**	**5,533**	**5,533**	**5,533**
SAN AUGUSTINE	I	SAN AUGUSTINE LAKE/RESERVOIR	399	403	407	409	409	409
SAN AUGUSTINE RURAL WSC	I	SAN AUGUSTINE LAKE/RESERVOIR	113	108	104	102	102	102
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 SYSTEM | 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

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Region I Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
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
LIVESTOCK	I	CARRIZO-WILCOX AQUIFER | SAN AUGUSTINE COUNTY	26	26	26	26	26	26
LIVESTOCK	I	LOCAL SURFACE WATER SUPPLY	465	465	465	465	465	465
LIVESTOCK	I	SPARTA AQUIFER | SAN AUGUSTINE COUNTY	84	84	84	84	84	84
IRRIGATION	I	CARRIZO-WILCOX AQUIFER | SAN AUGUSTINE COUNTY	62	62	62	62	62	62
		NECHES BASIN TOTAL	**3,863**	**3,914**	**3,990**	**4,005**	**4,020**	**4,031**
G M WSC	I	TOLEDO BEND LAKE/RESERVOIR	43	43	43	43	43	43
SAN AUGUSTINE RURAL WSC	I	SAN AUGUSTINE LAKE/RESERVOIR	7	6	6	6	6	6
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	LOCAL SURFACE WATER SUPPLY	71	71	71	71	71	71
LIVESTOCK	I	OTHER AQUIFER | SAN AUGUSTINE COUNTY	9	9	9	9	9	9
		SABINE BASIN TOTAL	**434**	**392**	**327**	**324**	**323**	**312**
		SAN AUGUSTINE COUNTY TOTAL	**4,297**	**4,306**	**4,317**	**4,329**	**4,343**	**4,343**
CHOICE WSC	I	CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	32	33	34	36	37	39
SAND HILLS WSC	I	CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	69	68	69	68	68	69
SAND HILLS WSC	I	CENTER LAKE/RESERVOIR	14	14	14	15	16	16
SAND HILLS WSC	I	PINKSTON LAKE/RESERVOIR	35	36	37	39	40	42
TIMPSON	I	CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	7	7	7	8	8	8
COUNTY-OTHER	I	PINKSTON LAKE/RESERVOIR	3	3	3	4	4	4
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	200	200	200	200	200	200
LIVESTOCK	I	LOCAL SURFACE WATER SUPPLY	334	334	334	334	334	334
IRRIGATION	I	CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	16	16	16	16	16	16
		NECHES BASIN TOTAL	**1,991**	**1,908**	**1,827**	**1,833**	**1,556**	**1,560**
CENTER	I	CENTER LAKE/RESERVOIR	511	542	569	597	626	653
CENTER	I	PINKSTON LAKE/RESERVOIR	1,331	1,410	1,481	1,555	1,629	1,698
CHOICE WSC	I	CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	95	98	100	104	109	113
EAST LAMAR WSC	I	CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	109	113	117	122	127	133
FIVE WAY WSC	I	CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	163	168	172	179	187	195
FLAT FORK WSC	I	CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	129	133	136	142	149	155
HUXLEY	I	CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	285	295	304	318	333	347
JOAQUIN	I	TOLEDO BEND LAKE/RESERVOIR	190	195	200	208	215	222
MCCLELLAND WSC	I	CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	216	225	234	244	256	267
SAND HILLS WSC	I	CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	67	68	67	68	68	67
SAND HILLS WSC	I	CENTER LAKE/RESERVOIR	13	13	14	15	15	16
SAND HILLS WSC	I	PINKSTON LAKE/RESERVOIR	34	35	37	38	40	42
TENAHA	I	CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	227	237	247	258	271	282
TIMPSON	I	CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	558	558	558	558	558	558
COUNTY-OTHER	I	CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	718	742	765	794	830	866
COUNTY-OTHER	I	CENTER LAKE/RESERVOIR	1	1	1	1	1	2
COUNTY-OTHER	I	TOLEDO BEND LAKE/RESERVOIR	180	175	170	162	155	148

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Region I Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
MANUFACTURING	I	CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	175	175	175	175	175	175
MANUFACTURING	I	CENTER LAKE/RESERVOIR	471	471	471	471	471	471
MANUFACTURING	I	DIRECT REUSE	151	164	177	188	202	217
MANUFACTURING	I	PINKSTON LAKE/RESERVOIR	1,225	1,225	1,225	1,225	1,225	1,225
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	1,835	1,835	1,835	1,835	1,835	1,835
LIVESTOCK	I	LOCAL SURFACE WATER 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	**14,158**	**14,136**	**14,097**	**14,299**	**13,799**	**14,010**
		SHELBY COUNTY TOTAL	**16,149**	**16,044**	**15,924**	**16,132**	**15,355**	**15,570**
ALGONQUIN WATER RESOURCES OF TEXAS*	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	202	201	202	202	202	202
ARP	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	175	178	182	189	197	206
BEN WHEELER WSC*	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	2	4	4	3	3	3
BULLARD	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	587	588	589	590	591	591
CARROLL WSC*	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	99	106	115	125	137	150
CRYSTAL SYSTEMS TEXAS*	D	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	417	452	473	487	492	490
CRYSTAL SYSTEMS TEXAS*	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	163	177	185	191	192	192
DEAN WSC	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	763	772	784	805	833	864
EMERALD BAY MUD	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	175	170	167	166	165	165
JACKSON WSC*	D	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	212	222	234	252	272	294
LINDALE RURAL WSC*	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	811	811	811	811	811	811
LINDALE*	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	451	468	474	491	485	474
OVERTON*	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	28	32	35	37	39	41
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
SOUTHERN UTILITIES*	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	5,744	5,944	6,166	6,467	6,820	7,188
SOUTHERN UTILITIES*	I	PALESTINE LAKE/RESERVOIR	124	127	132	139	146	155
SOUTHERN UTILITIES*	I	TYLER LAKE/RESERVOIR	140	144	150	158	167	176
TROUP	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	416	447	481	520	564	610
TYLER*	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	2,226	2,368	2,520	2,701	2,902	3,112
TYLER*	I	PALESTINE LAKE/RESERVOIR	8,347	8,881	9,448	10,129	10,883	11,670
TYLER*	I	TYLER LAKE/RESERVOIR	9,460	10,064	10,708	11,480	12,334	13,226
WALNUT GROVE WSC	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	166	166	166	241	435	646
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
WHITEHOUSE	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	502	667	839	1,036	1,207	1,207
WHITEHOUSE	I	PALESTINE LAKE/RESERVOIR	311	311	311	311	311	311
WHITEHOUSE	I	TYLER LAKE/RESERVOIR	353	353	353	353	353	353
WRIGHT CITY WSC	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	272	295	319	348	380	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	1,028	1,053	1,053	1,053	1,053	1,053
MANUFACTURING*	I	OTHER AQUIFER | SMITH COUNTY	225	225	225	225	225	225

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Region I Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
MANUFACTURING*	I	PALESTINE LAKE/RESERVOIR	839	937	937	937	937	937
MANUFACTURING*	I	QUEEN CITY AQUIFER | SMITH COUNTY	100	100	100	100	100	100
MANUFACTURING*	I	TYLER LAKE/RESERVOIR	838	949	949	949	949	949
MINING*	D	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	111	116	119	105	88	72
MINING*	I	OTHER AQUIFER | SMITH COUNTY	26	26	26	26	26	26
LIVESTOCK*	I	LOCAL SURFACE WATER 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	NECHES RUN-OF-RIVER	50	50	50	50	50	50
IRRIGATION*	I	PALESTINE LAKE/RESERVOIR	487	478	469	462	456	456
		NECHES BASIN TOTAL	**39,561**	**41,768**	**43,842**	**46,405**	**49,285**	**52,121**
		SMITH COUNTY TOTAL	**39,561**	**41,768**	**43,842**	**46,405**	**49,285**	**52,121**
CENTERVILLE WSC	I	YEGUA-JACKSON AQUIFER | TRINITY COUNTY	106	111	109	105	109	114
GROVETON*	H	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	282	283	282	283	284	283
GROVETON*	H	YEGUA-JACKSON AQUIFER | TRINITY COUNTY	27	28	27	26	27	28
PENNINGTON WSC*	I	YEGUA-JACKSON AQUIFER | HOUSTON COUNTY	41	42	42	41	42	43
PENNINGTON WSC*	H	YEGUA-JACKSON AQUIFER | TRINITY COUNTY	17	17	16	16	16	16
PENNINGTON WSC*	I	YEGUA-JACKSON AQUIFER | TRINITY COUNTY	52	54	53	50	52	54
COUNTY-OTHER*	H	LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	250	250	250	250	250	250
COUNTY-OTHER*	I	YEGUA-JACKSON AQUIFER | TRINITY COUNTY	10	10	10	10	10	10
MINING*	H	YEGUA-JACKSON AQUIFER | TRINITY COUNTY	5	5	5	5	5	5
LIVESTOCK*	I	LOCAL SURFACE WATER 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	3	3	3	3	3	3
IRRIGATION*	I	YEGUA-JACKSON AQUIFER | TRINITY COUNTY	300	300	300	300	300	300
		NECHES BASIN TOTAL	**1,571**	**1,581**	**1,575**	**1,567**	**1,576**	**1,584**
		TRINITY COUNTY TOTAL	**1,571**	**1,581**	**1,575**	**1,567**	**1,576**	**1,584**
CHESTER WSC	I	GULF COAST AQUIFER SYSTEM | TYLER COUNTY	226	226	226	226	226	226
COLMESNEIL	I	GULF COAST AQUIFER SYSTEM | TYLER COUNTY	355	355	355	355	355	355
CYPRESS CREEK WSC	I	GULF COAST AQUIFER SYSTEM | TYLER COUNTY	117	115	113	112	112	112
LAKE LIVINGSTON WSC*	I	GULF COAST AQUIFER SYSTEM | TYLER COUNTY	5	5	5	5	5	5
MOSCOW WSC*	I	GULF COAST AQUIFER SYSTEM | TYLER COUNTY	2	2	3	3	3	3
TYLER COUNTY WSC	I	GULF COAST AQUIFER SYSTEM | TYLER COUNTY	660	638	617	606	604	604
WARREN WSC	I	GULF COAST AQUIFER SYSTEM | TYLER COUNTY	595	595	595	595	595	595
WILDWOOD POA	I	GULF COAST AQUIFER SYSTEM | TYLER COUNTY	116	119	120	122	123	125
WOODVILLE	I	GULF COAST AQUIFER SYSTEM | 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
COUNTY-OTHER	I	GULF COAST AQUIFER SYSTEM | TYLER COUNTY	793	764	736	719	714	711
MINING	I	GULF COAST AQUIFER SYSTEM | TYLER COUNTY	152	190	142	95	47	21
MINING	I	LOCAL SURFACE WATER SUPPLY	8	8	8	8	8	8
STEAM ELECTRIC POWER	I	GULF COAST AQUIFER SYSTEM | 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 SYSTEM | TYLER COUNTY	75	75	75	75	75	75
LIVESTOCK	I	LOCAL SURFACE WATER SUPPLY	239	239	239	239	239	239
IRRIGATION	I	GULF COAST AQUIFER SYSTEM | TYLER COUNTY	559	559	559	559	559	559
IRRIGATION	I	NECHES RUN-OF-RIVER	88	88	88	88	88	88
		NECHES BASIN TOTAL	**10,940**	**10,928**	**10,831**	**10,757**	**10,703**	**10,676**
		TYLER COUNTY TOTAL	**10,940**	**10,928**	**10,831**	**10,757**	**10,703**	**10,676**

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Region I Water User Group (WUG) Existing Water Supply

REGION I EXISTING WATER SUPPLY TOTAL	**839,096**	**848,906**	**853,640**	**858,854**	**864,281**	**870,711**

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Region I Water User Group (WUG) Needs/Surplus

WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The needs shown in the WUG Needs/Surplus 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. Surplus volumes are shown as positive values, and needs are shown as negative values in parentheses.

	(NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
ANDERSON COUNTY - NECHES BASIN						
BRUSHY CREEK WSC	0	0	0	0	0	0
FRANKSTON	118	110	108	105	99	93
FRANKSTON RURAL WSC	1	1	0	0	0	0
NECHES WSC	1	1	0	1	0	0
NORWOOD WSC	9	9	9	9	9	9
PALESTINE	76	78	78	78	77	77
SLOCUM WSC	0	1	0	1	0	0
WALSTON SPRINGS WSC	36	39	44	49	50	50
COUNTY-OTHER	10	8	9	10	11	11
MINING	0	0	0	1	0	1
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	222	222	222	222	222	222
IRRIGATION	516	516	516	516	516	516
ANDERSON COUNTY - TRINITY BASIN						
ANDERSON COUNTY CEDAR CREEK WSC	0	0	0	0	0	0
B B S WSC*	0	0	0	0	0	0
B C Y WSC	0	0	0	0	0	0
BRUSHY CREEK WSC	0	0	0	0	0	0
ELKHART	109	107	109	112	112	112
FOUR PINES WSC	122	123	127	132	133	133
NORWOOD WSC	33	34	35	35	35	35
PALESTINE	73	74	73	72	72	72
PLEASANT SPRINGS WSC	26	24	26	28	28	28
SLOCUM WSC	1	1	1	0	0	0
TDCJ BETO GURNEY & POWLEDGE UNITS	1	0	0	1	0	0
TDCJ COFFIELD MICHAEL	0	1	0	1	1	1
THE CONSOLIDATED WSC*	54	54	55	55	54	54
TUCKER WSC	1	0	0	0	1	1
WALSTON SPRINGS WSC	12	12	11	11	11	11
COUNTY-OTHER	82	71	78	89	91	91
MINING	53	33	29	49	72	88
LIVESTOCK	240	240	240	240	240	240
IRRIGATION	940	940	940	940	940	940
ANGELINA COUNTY - NECHES BASIN						
ANGELINA WSC	272	272	269	258	249	239
CENTRAL WCID OF ANGELINA COUNTY	367	350	322	295	272	251
DIBOLL	1,523	1,503	1,485	1,450	1,420	1,391
FOUR WAY SUD	732	714	696	678	658	639
HUDSON WSC	0	0	0	0	0	0
HUNTINGTON	803	798	793	786	776	766
LUFKIN	0	0	0	0	0	0
M & M WSC	0	0	0	0	0	0
POLLOK-REDTOWN WSC	0	0	0	0	0	0

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Region I Water User Group (WUG) Needs/Surplus

REDLAND WSC	575	577	568	559	551	543
UPPER JASPER COUNTY WATER AUTHORITY	0	0	0	0	0	0
WOODLAWN WSC	0	0	0	0	0	0
ZAVALLA	0	0	0	0	0	0
COUNTY-OTHER	1,496	1,484	1,469	1,440	1,415	1,391
MANUFACTURING	(1,449)	(1,625)	(1,625)	(1,625)	(1,625)	(1,625)
MINING	(473)	(572)	(397)	(299)	(224)	(167)
STEAM ELECTRIC POWER	13,282	13,282	13,282	13,282	13,282	13,282
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	331	331	331	331	331	331
CHEROKEE COUNTY - NECHES BASIN						
AFTON GROVE WSC	0	0	0	0	0	0
ALTO	272	255	238	215	189	161
ALTO RURAL WSC	99	59	2	(65)	(137)	(215)
BLACKJACK WSC	0	0	0	0	0	0
BULLARD	0	0	0	0	0	0
CRAFT TURNEY WSC	0	0	0	0	0	0
GUM CREEK WSC	0	0	0	0	0	0
JACKSONVILLE	0	0	0	0	0	0
NEW SUMMERFIELD	95	84	73	58	41	22
NORTH CHEROKEE WSC	1	0	1	1	0	1
POLLOK-REDTOWN WSC	0	0	0	0	0	0
RUSK	0	0	0	0	0	(122)
RUSK RURAL WSC	256	241	225	199	169	134
SOUTH RUSK COUNTY WSC	0	0	0	0	0	0
SOUTHERN UTILITIES*	0	0	0	0	0	0
TROUP	0	0	0	0	0	0
WELLS	0	0	0	0	0	0
WEST JACKSONVILLE WSC	0	0	0	0	0	0
WRIGHT CITY WSC	80	49	16	(24)	(71)	(99)
COUNTY-OTHER	851	834	818	796	771	744
MANUFACTURING	11	11	11	11	11	11
MINING	(238)	(247)	(210)	(147)	(84)	(40)
STEAM ELECTRIC POWER	1,789	1,789	1,789	1,789	1,789	1,789
LIVESTOCK	9	9	9	9	9	9
IRRIGATION	61	56	52	48	45	45
HARDIN COUNTY - NECHES BASIN						
HARDIN COUNTY WCID 1	102	99	97	95	92	90
KOUNTZE	0	0	0	0	0	0
LUMBERTON MUD	0	0	0	0	0	0
NORTH HARDIN WSC	0	0	0	0	0	0
SILSBEE	673	686	699	704	698	692
SOUR LAKE	95	89	86	82	77	73
WEST HARDIN WSC*	3	3	3	3	3	3
WILDWOOD POA	0	0	0	0	0	0
COUNTY-OTHER	4	3	3	3	3	3
MANUFACTURING	6	6	6	6	6	6
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	18	18	18	18	18	18

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Region I Water User Group (WUG) Needs/Surplus

IRRIGATION	0	0	0	0	0	0
HARDIN COUNTY - TRINITY BASIN						
LAKE LIVINGSTON WSC*	3	3	4	3	3	2
WEST HARDIN WSC*	0	0	0	0	0	0
COUNTY-OTHER	5	6	6	6	6	6
LIVESTOCK	0	0	0	0	0	0
HENDERSON COUNTY - NECHES BASIN						
ATHENS*	(7)	(13)	(16)	(20)	(30)	(40)
BERRYVILLE	0	0	0	0	0	0
BETHEL ASH WSC*	338	287	249	206	166	130
BROWNSBORO	0	1	0	0	0	0
BRUSHY CREEK WSC	0	0	0	0	0	0
CHANDLER	0	0	0	0	0	(118)
EDOM WSC*	(2)	(3)	(4)	(5)	(7)	(9)
FRANKSTON	7	9	9	11	13	16
LEAGUEVILLE WSC	0	0	0	0	0	0
MOORE STATION WSC	48	42	31	16	(38)	(111)
MURCHISON	0	0	0	0	0	0
R P M WSC*	5	(7)	(16)	(27)	(38)	(48)
VIRGINIA HILL WSC*	98	82	69	47	25	0
COUNTY-OTHER*	1	1	2	58	173	314
MINING*	(10)	(21)	(10)	8	27	39
LIVESTOCK*	2,787	2,787	2,787	2,787	1,884	1,269
IRRIGATION*	0	0	0	0	(30)	(50)
HOUSTON COUNTY - NECHES BASIN						
GRAPELAND	37	40	41	42	43	43
PENNINGTON WSC*	3	3	3	3	3	2
THE CONSOLIDATED WSC*	578	588	597	602	603	603
COUNTY-OTHER	114	120	124	124	124	124
MANUFACTURING	4	4	4	4	4	4
MINING	0	0	0	0	0	0
LIVESTOCK	192	151	108	61	10	(55)
IRRIGATION	139	139	139	139	139	139
HOUSTON COUNTY - TRINITY BASIN						
CROCKETT	211	238	266	280	283	283
GRAPELAND	57	60	64	66	66	66
LOVELADY	30	32	34	35	36	36
PENNINGTON WSC*	6	5	5	7	6	4
TDCJ EASTHAM UNIT	0	0	0	0	0	0
THE CONSOLIDATED WSC*	818	841	864	878	879	878
COUNTY-OTHER	24	25	24	24	24	24
MANUFACTURING	18	18	18	18	18	18
MINING	0	0	0	0	0	0
LIVESTOCK	482	380	270	150	20	(146)
IRRIGATION	623	623	623	623	623	623
JASPER COUNTY - NECHES BASIN						
BROOKELAND FWSD	0	0	0	0	0	0
JASPER	0	0	26	45	48	48
RAYBURN COUNTRY MUD	333	337	341	344	344	344
RURAL WSC	143	145	148	149	150	150

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Region I Water User Group (WUG) Needs/Surplus

SOUTH JASPER COUNTY WSC	0	0	0	0	0	0
UPPER JASPER COUNTY WATER AUTHORITY	0	0	0	0	0	0
COUNTY-OTHER	319	307	291	280	278	278
MANUFACTURING	31,776	31,777	31,777	31,777	31,777	31,777
MINING	0	0	0	0	0	1
LIVESTOCK	(5,577)	(5,577)	(5,577)	(5,577)	(5,577)	(5,577)
IRRIGATION	0	0	0	0	0	0
JASPER COUNTY - SABINE BASIN						
JASPER COUNTY WCID 1	0	0	0	0	0	0
KIRBYVILLE	0	0	0	0	0	0
MAURICEVILLE SUD	43	43	41	40	38	38
SOUTH JASPER COUNTY WSC	0	0	0	0	0	0
UPPER JASPER COUNTY WATER AUTHORITY	0	0	0	0	0	0
COUNTY-OTHER	187	163	113	87	81	81
MANUFACTURING	92	91	91	91	91	91
MINING	0	0	0	0	0	1
LIVESTOCK	(3,355)	(3,355)	(3,355)	(3,355)	(3,355)	(3,355)
IRRIGATION	0	0	0	0	0	0
JEFFERSON COUNTY - NECHES BASIN						
BEAUMONT	0	0	(297)	(1,144)	(1,964)	(2,898)
BEVIL OAKS	1	2	1	1	1	2
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 MWD	19	17	12	6	2	0
NEDERLAND	0	0	0	0	0	0
PORT ARTHUR	0	0	0	0	0	0
PORT NECHES	0	0	0	0	0	0
COUNTY-OTHER	21	24	28	2	(76)	(161)
MANUFACTURING	(54,636)	(77,482)	(77,474)	(77,466)	(77,458)	(77,449)
MINING	0	0	0	0	0	0
LIVESTOCK	13	13	13	13	13	13
IRRIGATION	8,106	8,106	8,106	8,106	8,106	8,106
JEFFERSON COUNTY - NECHES-TRINITY BASIN						
BEAUMONT	0	0	(951)	(2,699)	(4,393)	(6,320)
CHINA	1	1	0	1	0	0
GROVES	0	0	0	0	0	0
JEFFERSON COUNTY WCID 10	0	0	0	0	0	0
MEEKER MWD	62	51	39	19	10	0
NEDERLAND	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	1	0	0	1
COUNTY-OTHER	317	366	427	117	(779)	(1,789)
MANUFACTURING	(46,502)	(66,031)	(66,023)	(66,013)	(66,004)	(65,997)
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	(2,391)	(2,391)	(2,391)	(2,391)	(2,391)	(2,391)
LIVESTOCK	156	156	156	156	156	156
IRRIGATION	107,699	107,699	107,699	107,699	107,699	107,699

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Region I Water User Group (WUG) Needs/Surplus

NACOGDOCHES COUNTY - NECHES BASIN						
APPLEBY WSC	282	218	153	78	0	1
CARO WSC	0	0	0	0	0	0
CUSHING	63	48	32	13	(8)	(30)
D & M WSC	150	61	(32)	(135)	(251)	(374)
ETOILE WSC	0	0	0	0	0	0
GARRISON	313	288	263	234	202	168
LILLY GROVE SUD	295	260	224	183	136	87
MELROSE WSC	398	361	323	279	227	173
NACOGDOCHES	0	0	0	0	0	0
SWIFT WSC	233	196	158	112	59	3
WODEN WSC	430	402	374	338	297	252
COUNTY-OTHER	1	1	1	1	1	1
MANUFACTURING	10,000	10,001	10,001	10,001	10,001	10,001
MINING	(5,475)	(2,975)	(118)	226	567	818
LIVESTOCK	(5,970)	(6,399)	(6,896)	(7,472)	(8,131)	(9,113)
IRRIGATION	174	174	174	174	174	174
NEWTON COUNTY - SABINE BASIN						
BROOKELAND FWSD	0	0	0	0	0	0
MAURICEVILLE SUD	41	39	38	36	36	35
NEWTON	40	50	58	62	63	63
SOUTH NEWTON WSC	175	175	175	175	175	175
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	516	588	665	735	802	875
MINING	(115)	(59)	35	105	168	207
STEAM ELECTRIC POWER	7,664	7,664	7,664	7,664	7,664	7,664
LIVESTOCK	91	91	91	91	91	91
IRRIGATION	279	279	279	279	279	279
ORANGE COUNTY - NECHES BASIN						
BRIDGE CITY	6	8	10	9	8	6
KELLY G BREWER	0	0	0	0	0	0
MAURICEVILLE SUD	72	72	69	68	68	69
ORANGE COUNTY WCID 1	0	0	0	0	0	0
ORANGEFIELD WSC	13	13	13	13	13	13
PORT ARTHUR	0	0	0	0	0	0
COUNTY-OTHER	74	85	53	31	16	3
MANUFACTURING	142	95	95	95	95	95
MINING	10	8	8	8	6	0
LIVESTOCK	6	6	6	6	6	6
ORANGE COUNTY - NECHES-TRINITY BASIN						
BRIDGE CITY	4	6	7	6	5	4
COUNTY-OTHER	1	1	1	0	0	0
ORANGE COUNTY - SABINE BASIN						
BRIDGE CITY	30	40	50	44	38	31
KELLY G BREWER	0	0	0	0	0	0
MAURICEVILLE SUD	837	837	824	815	806	799
ORANGE	0	0	0	0	0	0
ORANGE COUNTY WCID 2	0	0	0	0	0	0
ORANGEFIELD WSC	19	19	20	21	20	21
PINEHURST	0	0	0	0	0	0

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Region I Water User Group (WUG) Needs/Surplus

SOUTH NEWTON WSC	98	94	91	89	87	86
COUNTY-OTHER	87	100	62	36	19	3
MANUFACTURING	11,514	7,703	7,703	7,703	7,703	7,703
MINING	8	5	6	5	2	0
STEAM ELECTRIC POWER	1,493	1,493	1,493	1,493	1,493	1,493
LIVESTOCK	11	11	11	11	11	11
IRRIGATION	(526)	(526)	(526)	(526)	(526)	(526)
PANOLA COUNTY - CYPRESS BASIN						
COUNTY-OTHER	0	0	0	0	0	0
MINING	2	2	2	2	4	4
LIVESTOCK	0	0	0	0	0	0
PANOLA COUNTY - SABINE BASIN						
BECKVILLE	445	434	428	421	415	410
CARTHAGE	0	0	0	0	0	1
GILL WSC*	65	66	68	67	66	65
MINDEN BRACHFIELD WSC	0	0	0	0	0	0
PANOLA-BETHANY WSC*	10	18	14	8	4	0
TATUM	2	2	2	2	3	3
COUNTY-OTHER	205	192	200	187	161	136
MANUFACTURING	407	26	65	98	165	196
MINING	3,189	3,511	4,135	4,448	5,705	5,578
LIVESTOCK	(982)	(982)	(982)	(982)	(982)	(982)
IRRIGATION	28	28	28	28	28	28
POLK COUNTY - NECHES BASIN						
CHESTER WSC	0	0	0	0	0	0
CORRIGAN	0	0	0	0	0	0
DAMASCUS-STRYKER WSC	0	0	0	0	0	0
LAKE LIVINGSTON WSC*	0	0	0	0	0	0
MOSCOW WSC*	19	14	11	7	4	2
SODA WSC*	0	0	0	0	0	0
COUNTY-OTHER*	346	369	391	414	440	463
MANUFACTURING*	42	9	9	9	9	9
MINING*	0	6	31	57	83	94
LIVESTOCK*	229	229	229	229	229	229
IRRIGATION*	83	83	83	83	83	83
RUSK COUNTY - NECHES BASIN						
EBENEZER WSC	0	0	0	0	0	0
GASTON WSC	0	0	0	0	0	0
GOODSPRINGS WSC	0	0	0	0	0	0
HENDERSON	556	2,445	2,141	1,796	1,420	1,025
JACOBS WSC	0	0	0	0	0	(1)
MINDEN BRACHFIELD WSC	1	1	1	1	1	0
MT ENTERPRISE WSC	1	0	0	1	0	1
NEW LONDON	0	1	0	1	1	1
OVERTON*	(7)	(12)	(18)	(24)	(31)	(38)
SOUTH RUSK COUNTY WSC	0	0	0	0	0	0
WRIGHT CITY WSC	0	0	0	0	0	(21)
COUNTY-OTHER	28	28	26	25	24	6
MANUFACTURING	304	326	346	364	391	419
MINING	370	(159)	(88)	(12)	52	57

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Region I Water User Group (WUG) Needs/Surplus

STEAM ELECTRIC POWER	(110)	(110)	(110)	(110)	(110)	(110)
LIVESTOCK	0	0	(12)	(29)	(47)	(47)
IRRIGATION	140	140	140	140	140	140
RUSK COUNTY - SABINE BASIN						
CHALK HILL SUD	0	0	0	0	0	0
CROSS ROADS SUD*	386	398	399	399	398	397
CRYSTAL FARMS WSC	0	0	0	0	0	0
ELDERVILLE WSC*	64	52	38	23	4	0
HENDERSON	78	406	354	294	228	160
JACOBS WSC	0	0	0	0	0	(21)
KILGORE*	68	356	356	355	352	347
MINDEN BRACHFIELD WSC	1	0	0	0	0	0
NEW LONDON	0	0	0	1	1	1
NEW PROSPECT WSC	1	0	1	1	0	1
OVERTON*	(59)	(110)	(159)	(217)	(279)	(346)
SOUTHERN UTILITIES*	3	4	4	4	5	5
TATUM	124	94	67	36	9	12
WEST GREGG SUD*	6	5	4	2	0	0
COUNTY-OTHER	97	98	99	100	101	103
MANUFACTURING	12	13	14	14	15	17
MINING	342	(146)	(80)	(10)	49	53
STEAM ELECTRIC POWER	(993)	(993)	(993)	(993)	(993)	(993)
LIVESTOCK	0	0	(8)	(22)	(36)	(36)
IRRIGATION	176	176	176	176	176	176
SABINE COUNTY - NECHES BASIN						
BROOKELAND FWSD	0	0	0	0	0	0
G M WSC	8	8	8	8	8	8
PINELAND	0	0	0	0	0	0
COUNTY-OTHER	177	177	178	178	178	178
MANUFACTURING	45	45	45	45	45	45
MINING	80	101	127	152	178	196
LIVESTOCK	62	54	46	36	25	25
SABINE COUNTY - SABINE BASIN						
BROOKELAND FWSD	0	0	0	0	0	0
G M WSC	179	179	179	179	179	179
HEMPHILL	438	441	446	448	449	449
COUNTY-OTHER	410	417	422	423	423	423
MINING	654	768	904	1,036	1,168	1,262
LIVESTOCK	541	502	455	402	344	344
SAN AUGUSTINE COUNTY - NECHES BASIN						
SAN AUGUSTINE	(120)	(105)	(92)	(89)	(89)	(89)
SAN AUGUSTINE RURAL WSC	0	0	0	0	0	0
COUNTY-OTHER	532	553	569	578	580	580
MANUFACTURING	11	11	11	11	11	11
MINING	(2,102)	(1,102)	419	718	1,014	1,236
LIVESTOCK	(1,236)	(1,430)	(1,653)	(1,911)	(2,196)	(2,196)
IRRIGATION	58	58	58	58	58	58
SAN AUGUSTINE COUNTY - SABINE BASIN						
G M WSC	5	5	5	5	5	5
SAN AUGUSTINE RURAL WSC	0	0	0	0	0	0

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Region I Water User Group (WUG) Needs/Surplus

COUNTY-OTHER	74	75	75	75	75	75
MINING	0	0	0	0	0	0
LIVESTOCK	(97)	(109)	(121)	(137)	(153)	(153)
SHELBY COUNTY - NECHES BASIN						
CHOICE WSC	0	0	0	0	0	0
SAND HILLS WSC	(32)	(38)	(43)	(48)	(54)	(59)
TIMPSON	1	0	0	1	1	0
COUNTY-OTHER	167	161	155	148	139	130
MINING	12	25	64	209	72	178
LIVESTOCK	(1,732)	(2,165)	(2,693)	(3,338)	(4,123)	(4,123)
IRRIGATION	13	13	13	13	13	13
SHELBY COUNTY - SABINE BASIN						
CENTER	0	0	0	0	0	0
CHOICE WSC	0	0	0	0	0	0
EAST LAMAR WSC	0	0	0	0	0	0
FIVE WAY WSC	0	0	0	0	0	0
FLAT FORK WSC	0	0	0	0	0	0
HUXLEY	0	0	0	0	0	0
JOAQUIN	10	8	6	5	2	0
MCCLELLAND WSC	0	0	0	0	0	0
SAND HILLS WSC	(33)	(38)	(42)	(47)	(53)	(58)
TENAHA	0	0	0	0	0	0
TIMPSON	386	380	373	365	356	348
COUNTY-OTHER	187	183	178	170	163	158
MANUFACTURING	326	339	352	363	377	392
MINING	30	62	165	536	186	460
LIVESTOCK	(4,759)	(6,596)	(8,831)	(11,558)	(14,883)	(14,883)
IRRIGATION	75	75	75	75	75	75
SMITH COUNTY - NECHES BASIN						
ALGONQUIN WATER RESOURCES OF TEXAS*	144	137	131	124	116	108
ARP	0	0	0	0	0	0
BEN WHEELER WSC*	1	2	2	1	1	1
BULLARD	(141)	(332)	(526)	(739)	(956)	(1,182)
CARROLL WSC*	0	0	0	0	0	0
CRYSTAL SYSTEMS TEXAS*	169	117	42	(52)	(164)	(291)
DEAN WSC	0	0	0	0	0	0
EMERALD BAY MUD	0	0	0	0	0	0
JACKSON WSC*	0	0	0	0	0	0
LINDALE RURAL WSC*	513	503	490	470	446	420
LINDALE*	(25)	(136)	(259)	(384)	(535)	(696)
OVERTON*	(4)	(7)	(12)	(18)	(25)	(32)
R P M WSC*	2	(2)	(5)	(11)	(13)	(17)
SOUTHERN UTILITIES*	(71)	(74)	(79)	(84)	(90)	(98)
TROUP	0	0	0	0	0	0
TYLER*	1	0	0	0	1	1
WALNUT GROVE WSC	426	277	120	14	14	24
WHITEHOUSE	0	0	0	0	(39)	(257)
WRIGHT CITY WSC	0	0	0	0	0	0
COUNTY-OTHER*	348	390	435	488	546	607
MANUFACTURING*	74	(84)	(84)	(84)	(84)	(84)

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Region I Water User Group (WUG) Needs/Surplus

MINING*	3	3	5	22	34	40
LIVESTOCK*	535	535	535	535	535	535
IRRIGATION*	489	480	471	464	458	458
TRINITY COUNTY - NECHES BASIN						
CENTERVILLE WSC	0	0	0	0	0	0
GROVETON*	254	254	254	256	256	254
PENNINGTON WSC*	58	59	58	57	58	59
COUNTY-OTHER*	129	127	126	130	123	116
MINING*	0	0	0	0	0	0
LIVESTOCK*	276	276	276	276	276	276
IRRIGATION*	25	25	25	25	25	25
TYLER COUNTY - NECHES BASIN						
CHESTER WSC	75	75	75	74	72	71
COLMESNEIL	103	108	112	114	114	114
CYPRESS CREEK WSC	0	0	0	0	0	0
LAKE LIVINGSTON WSC*	3	3	3	2	2	2
MOSCOW WSC*	0	0	0	0	0	0
TYLER COUNTY WSC	0	0	0	0	0	0
WARREN WSC	410	415	420	422	423	423
WILDWOOD POA	0	0	0	0	0	0
WOODVILLE	4,680	4,703	4,725	4,737	4,739	4,739
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	829	829	829	829	829	829
LIVESTOCK	65	65	65	65	65	65
IRRIGATION	293	293	293	293	293	293

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Region I Water User Group (WUG) Second-Tier Identified Water Needs

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

	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
FRANKSTON RURAL WSC	0	0	0	0	0	0
NECHES WSC	0	0	0	0	0	0
NORWOOD WSC	0	0	0	0	0	0
PALESTINE	0	0	0	0	0	0
SLOCUM WSC	0	0	0	0	0	0
WALSTON SPRINGS WSC	0	0	0	0	0	0
COUNTY-OTHER	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
ANDERSON COUNTY - TRINITY BASIN						
ANDERSON COUNTY CEDAR CREEK WSC	0	0	0	0	0	0
B B S WSC*	0	0	0	0	0	0
B C Y WSC	0	0	0	0	0	0
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
NORWOOD WSC	0	0	0	0	0	0
PALESTINE	0	0	0	0	0	0
PLEASANT SPRINGS WSC	0	0	0	0	0	0
SLOCUM WSC	0	0	0	0	0	0
TDCJ BETO GURNEY & POWLEDGE UNITS	0	0	0	0	0	0
TDCJ COFFIELD MICHAEL	0	0	0	0	0	0
THE CONSOLIDATED WSC*	0	0	0	0	0	0
TUCKER WSC	0	0	0	0	0	0
WALSTON SPRINGS 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
ANGELINA COUNTY - NECHES BASIN						
ANGELINA WSC	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 WSC	0	0	0	0	0	0
HUNTINGTON	0	0	0	0	0	0
LUFKIN	0	0	0	0	0	0
M & M WSC	0	0	0	0	0	0
POLLOK-REDTOWN WSC	0	0	0	0	0	0
REDLAND WSC	0	0	0	0	0	0

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Region I Water User Group (WUG) Second-Tier Identified Water Needs

	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
ANGELINA COUNTY - NECHES BASIN						
UPPER JASPER COUNTY WATER AUTHORITY	0	0	0	0	0	0
WOODLAWN WSC	0	0	0	0	0	0
ZAVALLA	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	1,449	1,625	1,625	1,625	1,625	1,625
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						
AFTON GROVE WSC	0	0	0	0	0	0
ALTO	0	0	0	0	0	0
ALTO RURAL WSC	0	0	0	44	112	187
BLACKJACK WSC	0	0	0	0	0	0
BULLARD	0	0	0	0	0	0
CRAFT TURNEY WSC	0	0	0	0	0	0
GUM CREEK WSC	0	0	0	0	0	0
JACKSONVILLE	0	0	0	0	0	0
NEW SUMMERFIELD	0	0	0	0	0	0
NORTH CHEROKEE WSC	0	0	0	0	0	0
POLLOK-REDTOWN WSC	0	0	0	0	0	0
RUSK	0	0	0	0	0	76
RUSK RURAL WSC	0	0	0	0	0	0
SOUTH RUSK COUNTY WSC	0	0	0	0	0	0
SOUTHERN UTILITIES*	0	0	0	0	0	0
TROUP	0	0	0	0	0	0
WELLS	0	0	0	0	0	0
WEST JACKSONVILLE WSC	0	0	0	0	0	0
WRIGHT CITY WSC	0	0	0	24	71	99
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						
HARDIN COUNTY WCID 1	0	0	0	0	0	0
KOUNTZE	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
WILDWOOD POA	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

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Region I Water User Group (WUG) Second-Tier Identified Water Needs

	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
HARDIN COUNTY - NECHES BASIN						
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 - TRINITY BASIN						
LAKE LIVINGSTON WSC*	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*	0	0	0	0	7	13
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	0	0	82
EDOM WSC*	2	3	4	5	7	9
FRANKSTON	0	0	0	0	0	0
LEAGUEVILLE WSC	0	0	0	0	0	0
MOORE STATION WSC	0	0	0	0	38	111
MURCHISON	0	0	0	0	0	0
R P M WSC*	0	7	16	27	38	48
VIRGINIA HILL WSC*	0	0	0	0	0	0
COUNTY-OTHER*	0	0	0	0	0	0
MINING*	10	21	10	0	0	0
LIVESTOCK*	0	0	0	0	0	0
IRRIGATION*	0	0	0	0	30	50
HOUSTON COUNTY - NECHES BASIN						
GRAPELAND	0	0	0	0	0	0
PENNINGTON WSC*	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	55
IRRIGATION	0	0	0	0	0	0
HOUSTON COUNTY - TRINITY BASIN						
CROCKETT	0	0	0	0	0	0
GRAPELAND	0	0	0	0	0	0
LOVELADY	0	0	0	0	0	0
PENNINGTON WSC*	0	0	0	0	0	0
TDCJ EASTHAM UNIT	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	146
IRRIGATION	0	0	0	0	0	0

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Region I Water User Group (WUG) Second-Tier Identified Water Needs

	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
JASPER COUNTY - NECHES BASIN						
BROOKELAND FWSD	0	0	0	0	0	0
JASPER	0	0	0	0	0	0
RAYBURN COUNTRY MUD	0	0	0	0	0	0
RURAL WSC	0	0	0	0	0	0
SOUTH JASPER COUNTY WSC	0	0	0	0	0	0
UPPER JASPER COUNTY WATER AUTHORITY	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	5,577	5,577	5,577	5,577	5,577	5,577
IRRIGATION	0	0	0	0	0	0
JASPER COUNTY - 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
SOUTH JASPER COUNTY WSC	0	0	0	0	0	0
UPPER JASPER COUNTY WATER AUTHORITY	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	3,355	3,355	3,355	3,355	3,355	3,355
IRRIGATION	0	0	0	0	0	0
JEFFERSON COUNTY - NECHES BASIN						
BEAUMONT	0	0	0	0	0	489
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 MWD	0	0	0	0	0	0
NEDERLAND	0	0	0	0	0	0
PORT ARTHUR	0	0	0	0	0	0
PORT NECHES	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	76	161
MANUFACTURING	54,636	77,482	77,474	77,466	77,458	77,449
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
JEFFERSON COUNTY - NECHES-TRINITY BASIN						
BEAUMONT	0	0	0	0	192	1,347
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 MWD	0	0	0	0	0	0
NEDERLAND	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

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Region I Water User Group (WUG) Second-Tier Identified Water Needs

	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
JEFFERSON COUNTY - NECHES-TRINITY BASIN						
COUNTY-OTHER	0	0	0	0	779	1,789
MANUFACTURING	46,502	66,031	66,023	66,013	66,004	65,997
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	2,391	2,391	2,391	2,391	2,391	2,391
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
CARO WSC	0	0	0	0	0	0
CUSHING	0	0	0	0	0	0
D & M WSC	0	0	32	135	251	374
ETOILE WSC	0	0	0	0	0	0
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
LIVESTOCK	5,970	6,399	6,896	7,472	8,131	9,113
IRRIGATION	0	0	0	0	0	0
NEWTON COUNTY - SABINE BASIN						
BROOKELAND FWSD	0	0	0	0	0	0
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
MINING	115	59	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
ORANGE COUNTY - NECHES BASIN						
BRIDGE CITY	0	0	0	0	0	0
KELLY G BREWER	0	0	0	0	0	0
MAURICEVILLE SUD	0	0	0	0	0	0
ORANGE COUNTY WCID 1	0	0	0	0	0	0
ORANGEFIELD WSC	0	0	0	0	0	0
PORT ARTHUR	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
ORANGE COUNTY - NECHES-TRINITY BASIN						
BRIDGE CITY	0	0	0	0	0	0

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Region I Water User Group (WUG) Second-Tier Identified Water Needs

	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
ORANGE COUNTY - NECHES-TRINITY BASIN						
COUNTY-OTHER	0	0	0	0	0	0
ORANGE COUNTY - SABINE BASIN						
BRIDGE CITY	0	0	0	0	0	0
KELLY G BREWER	0	0	0	0	0	0
MAURICEVILLE SUD	0	0	0	0	0	0
ORANGE	0	0	0	0	0	0
ORANGE COUNTY WCID 2	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
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	526	526	526	526	526	526
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
PANOLA COUNTY - SABINE BASIN						
BECKVILLE	0	0	0	0	0	0
CARTHAGE	0	0	0	0	0	0
GILL WSC*	0	0	0	0	0	0
MINDEN BRACHFIELD WSC	0	0	0	0	0	0
PANOLA-BETHANY WSC*	0	0	0	0	0	0
TATUM	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	982	982	982	982	982	982
IRRIGATION	0	0	0	0	0	0
POLK COUNTY - NECHES BASIN						
CHESTER WSC	0	0	0	0	0	0
CORRIGAN	0	0	0	0	0	0
DAMASCUS-STRYKER WSC	0	0	0	0	0	0
LAKE LIVINGSTON WSC*	0	0	0	0	0	0
MOSCOW WSC*	0	0	0	0	0	0
SODA 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
RUSK COUNTY - NECHES BASIN						
EBENEZER WSC	0	0	0	0	0	0
GASTON WSC	0	0	0	0	0	0

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Region I Water User Group (WUG) Second-Tier Identified Water Needs

	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
RUSK COUNTY - NECHES BASIN						
GOODSPRINGS WSC	0	0	0	0	0	0
HENDERSON	0	0	0	0	0	0
JACOBS WSC	0	0	0	0	0	1
MINDEN BRACHFIELD WSC	0	0	0	0	0	0
MT ENTERPRISE WSC	0	0	0	0	0	0
NEW LONDON	0	0	0	0	0	0
OVERTON*	6	10	16	22	29	35
SOUTH RUSK COUNTY WSC	0	0	0	0	0	0
WRIGHT CITY WSC	0	0	0	0	0	21
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	159	88	12	0	0
STEAM ELECTRIC POWER	110	110	110	110	110	110
LIVESTOCK	0	0	12	29	47	47
IRRIGATION	0	0	0	0	0	0
RUSK COUNTY - SABINE BASIN						
CHALK HILL SUD	0	0	0	0	0	0
CROSS ROADS SUD*	0	0	0	0	0	0
CRYSTAL FARMS WSC	0	0	0	0	0	0
ELDERVILLE WSC*	0	0	0	0	0	0
HENDERSON	0	0	0	0	0	0
JACOBS WSC	0	0	0	0	0	21
KILGORE*	0	0	0	0	0	0
MINDEN BRACHFIELD WSC	0	0	0	0	0	0
NEW LONDON	0	0	0	0	0	0
NEW PROSPECT WSC	0	0	0	0	0	0
OVERTON*	52	97	144	200	259	323
SOUTHERN UTILITIES*	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	146	80	10	0	0
STEAM ELECTRIC POWER	993	993	993	993	993	993
LIVESTOCK	0	0	8	22	36	36
IRRIGATION	0	0	0	0	0	0
SABINE COUNTY - NECHES BASIN						
BROOKELAND FWSD	0	0	0	0	0	0
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 COUNTY - SABINE BASIN						
BROOKELAND FWSD	0	0	0	0	0	0
G M WSC	0	0	0	0	0	0

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Region I Water User Group (WUG) Second-Tier Identified Water Needs

	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	110	88	74	69	67	66
SAN AUGUSTINE RURAL WSC	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	1,236	1,430	1,653	1,911	2,196	2,196
IRRIGATION	0	0	0	0	0	0
SAN AUGUSTINE COUNTY - SABINE BASIN						
G M WSC	0	0	0	0	0	0
SAN AUGUSTINE RURAL WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	97	109	121	137	153	153
SHELBY COUNTY - NECHES BASIN						
CHOICE WSC	0	0	0	0	0	0
SAND HILLS WSC	30	34	39	43	49	53
TIMPSON	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	1,732	2,165	2,693	3,338	4,123	4,123
IRRIGATION	0	0	0	0	0	0
SHELBY COUNTY - SABINE BASIN						
CENTER	0	0	0	0	0	0
CHOICE WSC	0	0	0	0	0	0
EAST LAMAR WSC	0	0	0	0	0	0
FIVE WAY WSC	0	0	0	0	0	0
FLAT FORK WSC	0	0	0	0	0	0
HUXLEY	0	0	0	0	0	0
JOAQUIN	0	0	0	0	0	0
MCCLELLAND WSC	0	0	0	0	0	0
SAND HILLS WSC	31	34	38	43	48	52
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	4,759	6,596	8,831	11,558	14,883	14,883
IRRIGATION	0	0	0	0	0	0
SMITH COUNTY - NECHES BASIN						
ALGONQUIN WATER RESOURCES OF TEXAS*	0	0	0	0	0	0
ARP	0	0	0	0	0	0
BEN WHEELER WSC*	0	0	0	0	0	0

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Region I Water User Group (WUG) Second-Tier Identified Water Needs

	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
SMITH COUNTY - NECHES BASIN						
BULLARD	130	310	498	703	912	1,128
CARROLL WSC*	0	0	0	0	0	0
CRYSTAL SYSTEMS TEXAS*	0	0	0	0	72	173
DEAN WSC	0	0	0	0	0	0
EMERALD BAY MUD	0	0	0	0	0	0
JACKSON WSC*	0	0	0	0	0	0
LINDALE RURAL WSC*	0	0	0	0	0	0
LINDALE*	18	122	241	361	506	660
OVERTON*	4	7	11	16	23	30
R P M WSC*	0	2	5	11	13	17
SOUTHERN UTILITIES*	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	39	257
WRIGHT CITY WSC	0	0	0	0	0	0
COUNTY-OTHER*	0	0	0	0	0	0
MANUFACTURING*	0	84	84	84	84	84
MINING*	0	0	0	0	0	0
LIVESTOCK*	0	0	0	0	0	0
IRRIGATION*	0	0	0	0	0	0
TRINITY COUNTY - NECHES BASIN						
CENTERVILLE WSC	0	0	0	0	0	0
GROVETON*	0	0	0	0	0	0
PENNINGTON 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
TYLER COUNTY - NECHES BASIN						
CHESTER WSC	0	0	0	0	0	0
COLMESNEIL	0	0	0	0	0	0
CYPRESS CREEK WSC	0	0	0	0	0	0
LAKE LIVINGSTON WSC*	0	0	0	0	0	0
MOSCOW WSC*	0	0	0	0	0	0
TYLER COUNTY WSC	0	0	0	0	0	0
WARREN WSC	0	0	0	0	0	0
WILDWOOD POA	0	0	0	0	0	0
WOODVILLE	0	0	0	0	0	0
COUNTY-OTHER	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

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Region I Water User Group (WUG) Second-Tier Identified Water Needs Summary

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

WUG CATEGORY	NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
MUNICIPAL	383	714	1,118	1,703	2,733	5,672
COUNTY-OTHER	0	0	0	0	855	1,950
MANUFACTURING	102,587	145,222	145,206	145,188	145,171	145,155
MINING	8,413	5,281	903	468	308	207
STEAM ELECTRIC POWER	3,494	3,494	3,494	3,494	3,494	3,494
LIVESTOCK	23,708	26,613	30,128	34,381	39,483	40,666
IRRIGATION	526	526	526	526	556	576

Region I Source Water Balance (Availability - WUG Supply)

GROUNDWATER SOURCE TYPE				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
SOURCE NAME	COUNTY	BASIN	SALINITY*	2020	2030	2040	2050	2060	2070
CARRIZO-WILCOX AQUIFER	ANDERSON	NECHES	FRESH	17,487	17,399	17,419	17,481	17,505	17,514
CARRIZO-WILCOX AQUIFER	ANDERSON	TRINITY	FRESH	1,563	1,480	1,488	1,521	1,528	1,528
CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	FRESH	3,173	3,119	3,070	3,014	2,957	2,905
CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	FRESH	14,204	14,068	13,920	13,722	13,493	12,896
CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	FRESH	2,377	2,294	2,218	2,007	1,769	1,631
CARRIZO-WILCOX AQUIFER	HOUSTON	NECHES	FRESH	21,409	21,409	21,409	21,409	21,409	21,409
CARRIZO-WILCOX AQUIFER	HOUSTON	TRINITY	FRESH	2,141	2,142	2,145	2,147	2,148	2,149
CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	FRESH	10,514	10,413	10,293	10,160	10,006	9,756
CARRIZO-WILCOX AQUIFER	PANOLA	CYPRESS	FRESH	0	0	0	0	0	0
CARRIZO-WILCOX AQUIFER	PANOLA	SABINE	FRESH	2,976	2,818	2,817	2,817	2,666	2,666
CARRIZO-WILCOX AQUIFER	RUSK	NECHES	FRESH	6,162	5,992	5,818	5,590	5,345	5,102
CARRIZO-WILCOX AQUIFER	RUSK	SABINE	FRESH	1,963	1,789	1,620	1,423	1,195	941
CARRIZO-WILCOX AQUIFER	SABINE	NECHES	FRESH	338	338	338	338	338	338
CARRIZO-WILCOX AQUIFER	SABINE	SABINE	FRESH	2,680	2,684	2,686	2,687	2,687	2,687
CARRIZO-WILCOX AQUIFER	SAN AUGUSTINE	NECHES	FRESH	627	627	627	627	627	627
CARRIZO-WILCOX AQUIFER	SAN AUGUSTINE	SABINE	FRESH	175	166	155	143	129	129
CARRIZO-WILCOX AQUIFER	SHELBY	NECHES	FRESH	626	337	200	66	66	66
CARRIZO-WILCOX AQUIFER	SHELBY	SABINE	FRESH	3,642	3,409	3,344	2,807	2,269	1,983
CARRIZO-WILCOX AQUIFER	SMITH	NECHES	FRESH	5,904	5,490	5,035	4,378	3,563	2,867
CARRIZO-WILCOX AQUIFER	TRINITY	NECHES	FRESH	269	269	269	269	269	269
GULF COAST AQUIFER SYSTEM	HARDIN	NECHES	FRESH	17,469	17,267	17,133	17,008	16,879	16,774
GULF COAST AQUIFER SYSTEM	HARDIN	TRINITY	FRESH	106	105	104	104	103	103
GULF COAST AQUIFER SYSTEM	JASPER	NECHES	FRESH	1,884	1,928	1,984	2,025	2,045	2,050
GULF COAST AQUIFER SYSTEM	JASPER	SABINE	FRESH	27,566	27,640	27,746	27,809	27,835	27,842
GULF COAST AQUIFER SYSTEM	JEFFERSON	NECHES	FRESH	199	182	162	121	88	50
GULF COAST AQUIFER SYSTEM	JEFFERSON	NECHES-TRINITY	FRESH	210	200	186	161	119	68
GULF COAST AQUIFER SYSTEM	NEWTON	NECHES	FRESH	176	176	176	176	176	176
GULF COAST AQUIFER SYSTEM	NEWTON	SABINE	FRESH	31,205	31,172	31,132	31,072	31,008	30,935
GULF COAST AQUIFER SYSTEM	ORANGE	NECHES	FRESH	2,136	2,131	2,127	2,124	2,121	2,118
GULF COAST AQUIFER SYSTEM	ORANGE	NECHES-TRINITY	FRESH	4	3	4	4	4	4
GULF COAST AQUIFER SYSTEM	ORANGE	SABINE	FRESH	4,498	4,452	4,433	4,381	4,317	4,260
GULF COAST AQUIFER SYSTEM	POLK	NECHES	FRESH	13,884	13,825	13,762	13,695	13,633	13,577
GULF COAST AQUIFER SYSTEM	TYLER	NECHES	FRESH	33,206	33,218	33,315	33,389	33,443	33,470
OTHER AQUIFER	ANDERSON	TRINITY	FRESH	0	0	0	0	0	0
OTHER AQUIFER	ANGELINA	NECHES	FRESH	0	0	0	0	0	0
OTHER AQUIFER	CHEROKEE	NECHES	FRESH	0	0	0	0	0	0
OTHER AQUIFER	HENDERSON	NECHES	FRESH	0	0	0	0	0	0
OTHER AQUIFER	HENDERSON	TRINITY	FRESH	81	81	81	81	81	81
OTHER AQUIFER	HOUSTON	NECHES	FRESH	196	220	243	267	291	301
OTHER AQUIFER	HOUSTON	TRINITY	FRESH	518	562	606	650	694	713
OTHER AQUIFER	NACOGDOCHES	NECHES	FRESH	1	1	1	1	1	1
OTHER AQUIFER	RUSK	NECHES	FRESH	0	0	0	0	0	0
OTHER AQUIFER	RUSK	SABINE	FRESH	0	0	0	0	0	0
OTHER AQUIFER	SABINE	SABINE	FRESH	51	32	32	32	32	32
OTHER AQUIFER	SAN AUGUSTINE	NECHES	FRESH	0	0	0	0	0	0

* Salinity field indicates whether the source availability is considered 'fresh' (less than 1,000 mg/L), 'brackish' (1,000 to 10,000 mg/L), 'saline' (10,001 mg/L to 34,999 mg/L), or 'seawater' (35,000 mg/L or greater). Sources can also be labeled as 'fresh/brackish' or 'brackish/saline', if a combination of the salinity types is appropriate.

** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

Region I Source Water Balance (Availability - WUG Supply)

GROUNDWATER SOURCE TYPE				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
SOURCE NAME	COUNTY	BASIN	SALINITY*	2020	2030	2040	2050	2060	2070
OTHER AQUIFER	SMITH	NECHES	FRESH	671	671	671	671	671	671
OTHER AQUIFER	TRINITY	NECHES	FRESH	700	700	700	700	700	700
QUEEN CITY AQUIFER	ANDERSON	NECHES	FRESH	10,517	10,517	10,517	10,517	10,517	10,517
QUEEN CITY AQUIFER	ANDERSON	TRINITY	FRESH	6,154	6,154	6,154	6,154	6,154	6,154
QUEEN CITY AQUIFER	ANGELINA	NECHES	FRESH	1,093	1,093	1,093	1,093	1,093	1,093
QUEEN CITY AQUIFER	CHEROKEE	NECHES	FRESH	22,167	22,167	22,167	22,167	21,995	21,822
QUEEN CITY AQUIFER	HENDERSON	NECHES	FRESH	11,369	11,369	11,369	11,369	11,369	11,369
QUEEN CITY AQUIFER	HOUSTON	NECHES	FRESH	1,962	1,962	1,962	1,962	1,962	1,962
QUEEN CITY AQUIFER	HOUSTON	TRINITY	FRESH	155	155	155	155	155	155
QUEEN CITY AQUIFER	NACOGDOCHES	NECHES	FRESH	2,454	2,454	2,454	2,454	2,454	2,454
QUEEN CITY AQUIFER	RUSK	NECHES	FRESH	7	7	7	7	7	7
QUEEN CITY AQUIFER	RUSK	SABINE	FRESH	18	18	18	18	18	18
QUEEN CITY AQUIFER	SMITH	NECHES	FRESH	29,322	29,145	28,965	28,763	28,550	28,329
QUEEN CITY AQUIFER	TRINITY	NECHES	FRESH	0	0	0	0	0	0
SPARTA AQUIFER	ANDERSON	NECHES	FRESH	121	121	121	121	121	121
SPARTA AQUIFER	ANDERSON	TRINITY	FRESH	144	144	144	144	144	144
SPARTA AQUIFER	ANGELINA	NECHES	FRESH	123	123	123	123	123	123
SPARTA AQUIFER	CHEROKEE	NECHES	FRESH	202	202	202	202	202	202
SPARTA AQUIFER	HOUSTON	NECHES	FRESH	367	367	367	367	367	367
SPARTA AQUIFER	HOUSTON	TRINITY	FRESH	0	0	0	0	0	0
SPARTA AQUIFER	NACOGDOCHES	NECHES	FRESH	53	53	53	53	53	53
SPARTA AQUIFER	SABINE	NECHES	FRESH	34	34	34	34	34	34
SPARTA AQUIFER	SABINE	SABINE	FRESH	157	157	157	157	157	157
SPARTA AQUIFER	SAN AUGUSTINE	NECHES	FRESH	0	0	0	0	0	0
SPARTA AQUIFER	SAN AUGUSTINE	SABINE	FRESH	3	3	3	3	3	3
SPARTA AQUIFER	TRINITY	NECHES	FRESH	154	154	154	154	154	154
YEGUA-JACKSON AQUIFER	ANGELINA	NECHES	FRESH	12,511	12,509	12,507	12,505	12,118	12,115
YEGUA-JACKSON AQUIFER	HOUSTON	NECHES	FRESH	1,324	1,324	1,324	1,324	1,324	1,324
YEGUA-JACKSON AQUIFER	HOUSTON	TRINITY	FRESH	3,247	3,257	3,266	3,270	3,271	3,271
YEGUA-JACKSON AQUIFER	NACOGDOCHES	NECHES	FRESH	209	209	209	209	209	209
YEGUA-JACKSON AQUIFER	POLK	NECHES	FRESH	365	349	337	325	314	305
YEGUA-JACKSON AQUIFER	SABINE	NECHES	FRESH	3,661	3,661	3,661	3,661	3,661	3,661
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	9	9	9	9	9	9
YEGUA-JACKSON AQUIFER	TRINITY	NECHES	FRESH	203	196	199	206	200	193
			GROUNDWATER SOURCE WATER BALANCE TOTAL	**343,532**	**341,158**	**339,636**	**337,039**	**333,384**	**330,150**

REUSE SOURCE TYPE				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
SOURCE NAME	COUNTY	BASIN	SALINITY*	2020	2030	2040	2050	2060	2070
DIRECT REUSE	ORANGE	SABINE	FRESH	0	0	0	0	0	0
DIRECT REUSE	SABINE	SABINE	FRESH	0	0	0	0	0	0
DIRECT REUSE	SHELBY	SABINE	FRESH	0	0	0	0	0	0

* Salinity field indicates whether the source availability is considered 'fresh' (less than 1,000 mg/L), 'brackish' (1,000 to 10,000 mg/L), 'saline' (10,001 mg/L to 34,999 mg/L), or 'seawater' (35,000 mg/L or greater). Sources can also be labeled as 'fresh/brackish' or 'brackish/saline', if a combination of the salinity types is appropriate.

** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

Region I Source Water Balance (Availability - WUG Supply)

REUSE SOURCE TYPE				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
SOURCE NAME	COUNTY	BASIN	SALINITY*	2020	2030	2040	2050	2060	2070
INDIRECT REUSE	JEFFERSON	NECHES-TRINITY	FRESH	0	0	0	0	0	0
REUSE SOURCE WATER BALANCE TOTAL				**0**	**0**	**0**	**0**	**0**	**0**

SURFACE WATERSOURCE TYPE				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
SOURCE NAME	COUNTY	BASIN	SALINITY*	2020	2030	2040	2050	2060	2070
ATHENS LAKE/RESERVOIR	RESERVOIR**	NECHES	FRESH	0	0	0	0	0	0
BELLWOOD LAKE/RESERVOIR	RESERVOIR**	NECHES	FRESH	596	596	596	596	596	596
CENTER LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	0	0	0	0	0	0
CHEROKEE LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	0	0	0	0	0	0
CYPRESS LIVESTOCK LOCAL SUPPLY	PANOLA	CYPRESS	FRESH	0	0	0	0	0	0
HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR**	TRINITY	FRESH	2,750	2,645	2,540	2,435	2,330	2,225
JACKSONVILLE LAKE/RESERVOIR	RESERVOIR**	NECHES	FRESH	1,027	1,027	1,027	1,027	1,027	1,027
KURTH LAKE/RESERVOIR	RESERVOIR**	NECHES	FRESH	0	0	0	0	0	0
LAKE NACONICHE LAKE/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	0	0	0	0	0	0
NACOGDOCHES LAKE/RESERVOIR	RESERVOIR**	NECHES	FRESH	0	0	0	0	0	0
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
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	14	14	14	14	14	14
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

* Salinity field indicates whether the source availability is considered 'fresh' (less than 1,000 mg/L), 'brackish' (1,000 to 10,000 mg/L), 'saline' (10,001 mg/L to 34,999 mg/L), or 'seawater' (35,000 mg/L or greater). Sources can also be labeled as 'fresh/brackish' or 'brackish/saline', if a combination of the salinity types is appropriate.
** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

Region I Source Water Balance (Availability - WUG Supply)

SURFACE WATERSOURCE TYPE				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
SOURCE NAME	COUNTY	BASIN	SALINITY*	2020	2030	2040	2050	2060	2070
NECHES RUN-OF-RIVER	HOUSTON	NECHES	FRESH	0	0	0	0	0	0
NECHES RUN-OF-RIVER	JASPER	NECHES	FRESH	6	6	6	6	6	6
NECHES RUN-OF-RIVER	JEFFERSON	NECHES	BRACKISH	752,152	752,152	752,152	752,152	752,152	752,152
NECHES RUN-OF-RIVER	JEFFERSON	NECHES	FRESH	0	0	0	0	0	0
NECHES RUN-OF-RIVER	NACOGDOCHES	NECHES	FRESH	2	2	2	2	2	2
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	1	1	1	1	1	1
NECHES RUN-OF-RIVER	SABINE	NECHES	FRESH	0	0	0	0	0	0
NECHES RUN-OF-RIVER	SHELBY	NECHES	FRESH	1,000	1,000	1,000	1,000	1,000	1,000
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-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	586	586	586	586	586	586
PALESTINE LAKE/RESERVOIR	RESERVOIR**	NECHES	FRESH	0	0	0	0	0	0
PINKSTON LAKE/RESERVOIR	RESERVOIR**	NECHES	FRESH	0	0	0	0	0	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
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	BRACKISH	267,000	267,000	267,000	267,000	267,000	267,000
SABINE RUN-OF-RIVER	ORANGE	SABINE	FRESH	0	0	0	0	0	0
SABINE RUN-OF-RIVER	PANOLA	SABINE	FRESH	140	140	140	140	140	140
SABINE RUN-OF-RIVER	RUSK	SABINE	FRESH	0	0	0	0	0	0
SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR**	NECHES	FRESH	28,000	56,000	56,000	56,000	56,000	56,000
SAN AUGUSTINE LAKE/RESERVOIR	RESERVOIR**	NECHES	FRESH	0	0	0	0	0	0
STRIKER LAKE/RESERVOIR	RESERVOIR**	NECHES	FRESH	0	0	0	1,435	665	0
TIMPSON LAKE/RESERVOIR	RESERVOIR**	NECHES	FRESH	0	0	0	0	0	0
TOLEDO BEND LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	0	0	0	0	0	0
TOLEDO BEND LAKE/RESERVOIR	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

* Salinity field indicates whether the source availability is considered 'fresh' (less than 1,000 mg/L), 'brackish' (1,000 to 10,000 mg/L), 'saline' (10,001 mg/L to 34,999 mg/L), or 'seawater' (35,000 mg/L or greater). Sources can also be labeled as 'fresh/brackish' or 'brackish/saline', if a combination of the salinity types is appropriate.

** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

Region I Source Water Balance (Availability - WUG Supply)

SURFACE WATERSOURCE TYPE				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
SOURCE NAME	**COUNTY**	**BASIN**	**SALINITY***	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
TRINITY RUN-OF-RIVER	ANDERSON	TRINITY	FRESH	230	230	230	230	230	230
TRINITY RUN-OF-RIVER	HOUSTON	TRINITY	FRESH	0	0	0	0	0	0
TYLER LAKE/RESERVOIR	RESERVOIR**	NECHES	FRESH	15,773	15,609	15,445	15,281	15,117	14,953
SURFACE WATERSOURCE WATER BALANCE TOTAL				**1,092,087**	**1,119,818**	**1,119,549**	**1,120,715**	**1,119,676**	**1,118,742**

REGION I SOURCE WATER BALANCE TOTAI				**1,435,619**	**1,460,976**	**1,459,185**	**1,457,754**	**1,453,060**	**1,448,892**

* Salinity field indicates whether the source availability is considered 'fresh' (less than 1,000 mg/L), 'brackish' (1,000 to 10,000 mg/L), 'saline' (10,001 mg/L to 34,999 mg/L), or 'seawater' (35,000 mg/L or greater). Sources can also be labeled as 'fresh/brackish' or 'brackish/saline', if a combination of the salinity types is appropriate.

** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

Region I Water User Group (WUG) Data Comparison to 2016 Regional Water Plan (RWP)

	2020 PLANNING DECADE			2070 PLANNING DECADE		
	2016 RWP	2021 RWP	DIFFERENCE (%)	2016 RWP	2021 RWP	DIFFERENCE (%)
ANDERSON COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	4,080	999	-75.5%	3,979	999	-74.9%
PROJECTED DEMAND TOTAL (acre-feet per year)	3,772	907	-76.0%	3,671	897	-75.6%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
ANDERSON COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,829	2,113	15.5%	1,829	2,113	15.5%
PROJECTED DEMAND TOTAL (acre-feet per year)	462	657	42.2%	462	657	42.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
ANDERSON COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,423	1,488	4.6%	1,423	1,488	4.6%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,402	1,026	-26.8%	1,402	1,026	-26.8%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
ANDERSON COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	30	0	-100.0%	48	0	-100.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	30	0	-100.0%	48	0	-100.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
ANDERSON COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	193	193	0.0%	164	164	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	140	140	0.0%	75	75	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
ANDERSON COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	7,860	12,963	64.9%	7,835	12,948	65.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	6,704	12,290	83.3%	6,652	12,272	84.5%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
ANDERSON COUNTY | STEAM ELECTRIC POWER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	0	1,408	100.0%	0	1,408	100.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	11,306	1,408	-87.5%	25,968	1,408	-94.6%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	11,306	0	-100.0%	25,968	0	-100.0%
ANGELINA COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,358	2,137	-9.4%	2,358	2,137	-9.4%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,961	641	-67.3%	2,289	746	-67.4%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
ANGELINA COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	812	1,110	36.7%	812	1,110	36.7%
PROJECTED DEMAND TOTAL (acre-feet per year)	481	779	62.0%	481	779	62.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
ANGELINA COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	737	1,028	39.5%	737	1,028	39.5%
PROJECTED DEMAND TOTAL (acre-feet per year)	648	1,028	58.6%	648	1,028	58.6%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
ANGELINA COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	4,527	2,209	-51.2%	6,105	2,253	-63.1%
PROJECTED DEMAND TOTAL (acre-feet per year)	15,249	3,658	-76.0%	23,142	3,878	-83.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	10,722	1,449	-86.5%	17,037	1,625	-90.5%

*WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The needs shown in the WUG Data Comparison to 2016 RWP 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 county and category level, calculated surpluses are updated to zero so that only the WUGs with needs in the decade are included with the Needs totals.

Region I Water User Group (WUG) Data Comparison to 2016 Regional Water Plan (RWP)

	2020 PLANNING DECADE			2070 PLANNING DECADE		
	2016 RWP	2021 RWP	DIFFERENCE (%)	2016 RWP	2021 RWP	DIFFERENCE (%)
ANGELINA COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	13	13	0.0%	13	13	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	486	486	0.0%	180	180	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	473	473	0.0%	167	167	0.0%
ANGELINA COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	15,470	15,313	-1.0%	16,763	17,006	1.4%
PROJECTED DEMAND TOTAL (acre-feet per year)	9,626	11,041	14.7%	11,490	13,177	14.7%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
ANGELINA COUNTY | STEAM ELECTRIC POWER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	16,802	16,802	0.0%	16,802	16,802	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,000	3,520	252.0%	1,000	3,520	252.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
CHEROKEE COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,814	1,089	-40.0%	1,937	1,124	-42.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,139	238	-79.1%	1,633	380	-76.7%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
CHEROKEE COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	436	512	17.4%	420	496	18.1%
PROJECTED DEMAND TOTAL (acre-feet per year)	355	451	27.0%	355	451	27.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
CHEROKEE COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,813	1,883	3.9%	1,813	1,883	3.9%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,681	1,874	11.5%	1,681	1,874	11.5%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
CHEROKEE COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	424	126	-70.3%	582	140	-75.9%
PROJECTED DEMAND TOTAL (acre-feet per year)	413	115	-72.2%	571	129	-77.4%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
CHEROKEE COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	57	57	0.0%	57	57	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	295	295	0.0%	97	97	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	238	238	0.0%	40	40	0.0%
CHEROKEE COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	8,225	8,896	8.2%	10,224	11,597	13.4%
PROJECTED DEMAND TOTAL (acre-feet per year)	6,905	8,093	17.2%	10,032	11,715	16.8%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	215	436	102.8%
CHEROKEE COUNTY | STEAM ELECTRIC POWER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	5,000	5,000	0.0%	5,000	5,000	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,790	3,211	79.4%	3,835	3,211	-16.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
HARDIN COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,647	719	-56.3%	1,826	706	-61.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,636	710	-56.6%	1,815	697	-61.6%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%

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	2016 RWP	2021 RWP	DIFFERENCE (%)	2016 RWP	2021 RWP	DIFFERENCE (%)
HARDIN COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	3,414	989	-71.0%	3,712	989	-73.4%
PROJECTED DEMAND TOTAL (acre-feet per year)	3,414	989	-71.0%	3,712	989	-73.4%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
HARDIN COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	226	216	-4.4%	226	216	-4.4%
PROJECTED DEMAND TOTAL (acre-feet per year)	163	198	21.5%	163	198	21.5%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
HARDIN COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	294	46	-84.4%	445	51	-88.5%
PROJECTED DEMAND TOTAL (acre-feet per year)	288	40	-86.1%	439	45	-89.7%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
HARDIN COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	12	12	0.0%	12	12	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	12	12	0.0%	12	12	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
HARDIN COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	12,321	6,039	-51.0%	12,311	6,735	-45.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	4,692	5,163	10.0%	5,431	5,875	8.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
HARDIN COUNTY | STEAM ELECTRIC POWER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	0	1	100.0%	0	1	100.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	0	1	100.0%	0	1	100.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
HENDERSON COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,583	701	-55.7%	1,357	540	-60.2%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,043	700	-32.9%	817	226	-72.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
HENDERSON COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	772	303	-60.8%	662	253	-61.8%
PROJECTED DEMAND TOTAL (acre-feet per year)	384	303	-21.1%	384	303	-21.1%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	50	100.0%
HENDERSON COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,865	3,793	32.4%	2,018	2,275	12.7%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,253	1,006	-19.7%	1,253	1,006	-19.7%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
HENDERSON COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	78	0	-100.0%	96	0	-100.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	54	0	-100.0%	95	0	-100.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
HENDERSON COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	119	67	-43.7%	119	67	-43.7%
PROJECTED DEMAND TOTAL (acre-feet per year)	77	77	0.0%	28	28	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	10	100.0%	0	0	0.0%

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	2016 RWP	2021 RWP	DIFFERENCE (%)	2016 RWP	2021 RWP	DIFFERENCE (%)
HENDERSON COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,454	2,663	8.5%	2,674	3,547	32.6%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,746	2,176	24.6%	2,942	3,727	26.7%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	5	9	80.0%	408	326	-20.1%
HOUSTON COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	375	289	-22.9%	365	289	-20.8%
PROJECTED DEMAND TOTAL (acre-feet per year)	184	151	-17.9%	169	141	-16.6%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
HOUSTON COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,239	2,899	29.5%	2,239	2,899	29.5%
PROJECTED DEMAND TOTAL (acre-feet per year)	2,989	2,137	-28.5%	4,578	2,137	-53.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	756	0	-100.0%	2,339	0	-100.0%
HOUSTON COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,238	2,238	0.0%	2,893	2,238	-22.6%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,630	1,564	-4.0%	2,542	2,439	-4.1%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	201	100.0%
HOUSTON COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	343	191	-44.3%	493	254	-48.5%
PROJECTED DEMAND TOTAL (acre-feet per year)	307	169	-45.0%	460	232	-49.6%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
HOUSTON COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	322	322	0.0%	22	22	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	322	322	0.0%	22	22	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
HOUSTON COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	5,896	5,753	-2.4%	5,757	5,710	-0.8%
PROJECTED DEMAND TOTAL (acre-feet per year)	3,190	4,013	25.8%	2,976	3,795	27.5%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
JASPER COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,659	2,204	-17.1%	2,664	1,942	-27.1%
PROJECTED DEMAND TOTAL (acre-feet per year)	2,467	1,698	-31.2%	2,302	1,583	-31.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
JASPER COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	127	151	18.9%	127	151	18.9%
PROJECTED DEMAND TOTAL (acre-feet per year)	36	151	319.4%	36	151	319.4%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
JASPER COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	796	1,068	34.2%	796	1,068	34.2%
PROJECTED DEMAND TOTAL (acre-feet per year)	362	10,000	2662.4%	362	10,000	2662.4%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	8,932	100.0%	0	8,932	100.0%
JASPER COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	91,936	77,841	-15.3%	91,936	89,232	-2.9%
PROJECTED DEMAND TOTAL (acre-feet per year)	91,580	45,973	-49.8%	100,356	57,364	-42.8%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	8,420	0	-100.0%

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	2020 PLANNING DECADE			2070 PLANNING DECADE		
	2016 RWP	2021 RWP	DIFFERENCE (%)	2016 RWP	2021 RWP	DIFFERENCE (%)
JASPER COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	148	148	0.0%	14	16	14.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	148	148	0.0%	14	14	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
JASPER COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	6,520	3,761	-42.3%	6,515	3,708	-43.1%
PROJECTED DEMAND TOTAL (acre-feet per year)	2,355	3,242	37.7%	2,284	3,128	37.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
JEFFERSON COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,937	2,414	-17.8%	4,241	4,852	14.4%
PROJECTED DEMAND TOTAL (acre-feet per year)	2,560	2,076	-18.9%	7,537	6,802	-9.8%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	3,296	1,950	-40.8%
JEFFERSON COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	208,433	204,341	-2.0%	208,433	204,341	-2.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	161,952	88,536	-45.3%	173,833	88,536	-49.1%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
JEFFERSON COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,006	1,006	0.0%	1,006	1,006	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	943	837	-11.2%	943	837	-11.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
JEFFERSON COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	242,797	101,764	-58.1%	399,214	90,456	-77.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	423,258	202,902	-52.1%	707,817	233,902	-67.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	180,461	101,138	-44.0%	308,603	143,446	-53.5%
JEFFERSON COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	194	194	0.0%	368	368	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	194	194	0.0%	368	368	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
JEFFERSON COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	57,618	58,131	0.9%	61,541	60,110	-2.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	57,537	58,048	0.9%	68,437	69,325	1.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	6,896	9,218	33.7%
JEFFERSON COUNTY | STEAM ELECTRIC POWER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	0	900	100.0%	0	900	100.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	13,426	3,291	-75.5%	30,839	3,291	-89.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	13,426	2,391	-82.2%	30,839	2,391	-92.2%
NACOGDOCHES COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,185	687	-42.0%	1,881	1,091	-42.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,185	686	-42.1%	1,881	1,090	-42.1%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
NACOGDOCHES COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	509	440	-13.6%	509	440	-13.6%
PROJECTED DEMAND TOTAL (acre-feet per year)	400	266	-33.5%	400	266	-33.5%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%

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NACOGDOCHES COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,720	3,723	36.9%	2,720	3,723	36.9%
PROJECTED DEMAND TOTAL (acre-feet per year)	4,364	9,693	122.1%	5,779	12,836	122.1%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	1,644	5,970	263.1%	3,059	9,113	197.9%
NACOGDOCHES COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	12,564	12,508	-0.4%	13,758	12,530	-8.9%
PROJECTED DEMAND TOTAL (acre-feet per year)	2,564	2,508	-2.2%	3,758	2,529	-32.7%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
NACOGDOCHES COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,525	1,525	0.0%	1,525	1,525	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	7,000	7,000	0.0%	707	707	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	5,475	5,475	0.0%	0	0	0.0%
NACOGDOCHES COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	12,675	13,064	3.1%	16,568	17,292	4.4%
PROJECTED DEMAND TOTAL (acre-feet per year)	10,342	10,900	5.4%	16,161	17,012	5.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	234	404	72.6%
NACOGDOCHES COUNTY | STEAM ELECTRIC POWER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	7,280	0	-100.0%	7,280	0	-100.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	6,911	0	-100.0%	15,874	0	-100.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	8,594	0	-100.0%
NEWTON COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,425	886	-37.8%	1,425	800	-43.9%
PROJECTED DEMAND TOTAL (acre-feet per year)	969	886	-8.6%	875	800	-8.6%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
NEWTON COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	380	380	0.0%	380	380	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	375	101	-73.1%	375	101	-73.1%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
NEWTON COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	259	259	0.0%	259	259	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	121	168	38.8%	121	168	38.8%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
NEWTON COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	568	568	0.0%	931	931	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	568	52	-90.8%	931	56	-94.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
NEWTON COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	314	314	0.0%	314	314	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	429	429	0.0%	107	107	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	115	115	0.0%	0	0	0.0%
NEWTON COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	872	997	14.3%	865	983	13.6%
PROJECTED DEMAND TOTAL (acre-feet per year)	648	741	14.4%	624	710	13.8%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%

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Region I Water User Group (WUG) Data Comparison to 2016 Regional Water Plan (RWP)

	2020 PLANNING DECADE			2070 PLANNING DECADE		
	2016 RWP	2021 RWP	DIFFERENCE (%)	2016 RWP	2021 RWP	DIFFERENCE (%)
NEWTON COUNTY | STEAM ELECTRIC POWER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	13,442	13,442	0.0%	13,442	13,442	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	14,132	5,778	-59.1%	32,463	5,778	-82.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	690	0	-100.0%	19,021	0	-100.0%
ORANGE COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,899	2,862	-1.3%	3,066	2,862	-6.7%
PROJECTED DEMAND TOTAL (acre-feet per year)	2,899	2,700	-6.9%	3,066	2,856	-6.8%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
ORANGE COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,298	1,298	0.0%	1,298	1,298	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	3,730	1,824	-51.1%	4,056	1,824	-55.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	2,432	526	-78.4%	2,758	526	-80.9%
ORANGE COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	326	272	-16.6%	326	272	-16.6%
PROJECTED DEMAND TOTAL (acre-feet per year)	208	255	22.6%	208	255	22.6%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
ORANGE COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	61,929	55,991	-9.6%	61,915	55,991	-9.6%
PROJECTED DEMAND TOTAL (acre-feet per year)	64,461	44,335	-31.2%	94,026	48,193	-48.7%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	2,532	0	-100.0%	32,111	0	-100.0%
ORANGE COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	327	327	0.0%	327	327	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	309	309	0.0%	327	327	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
ORANGE COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	9,165	8,091	-11.7%	9,525	8,359	-12.2%
PROJECTED DEMAND TOTAL (acre-feet per year)	7,744	7,012	-9.5%	8,148	7,330	-10.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
ORANGE COUNTY | STEAM ELECTRIC POWER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	5,791	5,791	0.0%	5,791	5,791	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	4,966	4,298	-13.5%	10,637	4,298	-59.6%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	4,846	0	-100.0%
PANOLA COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,800	1,800	0.0%	1,800	1,800	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,620	1,595	-1.5%	1,702	1,664	-2.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
PANOLA COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	574	602	4.9%	574	602	4.9%
PROJECTED DEMAND TOTAL (acre-feet per year)	64	574	796.9%	64	574	796.9%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
PANOLA COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,670	1,670	0.0%	1,670	1,670	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,480	2,652	79.2%	1,480	2,652	79.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	982	100.0%	0	982	100.0%

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PANOLA COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,259	1,259	0.0%	1,468	1,468	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,393	852	-38.8%	1,777	1,272	-28.4%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	134	0	-100.0%	309	0	-100.0%
PANOLA COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	9,235	9,107	-1.4%	9,648	9,520	-1.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	5,916	5,916	0.0%	3,938	3,938	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
PANOLA COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,455	2,487	1.3%	2,506	2,552	1.8%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,933	1,965	1.7%	2,018	2,073	2.7%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
POLK COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	743	743	0.0%	957	957	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	743	397	-46.6%	957	494	-48.4%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
POLK COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	769	313	-59.3%	769	313	-59.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	428	230	-46.3%	428	230	-46.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
POLK COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	634	403	-36.4%	634	403	-36.4%
PROJECTED DEMAND TOTAL (acre-feet per year)	357	174	-51.3%	357	174	-51.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
POLK COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	613	475	-22.5%	1,009	475	-52.9%
PROJECTED DEMAND TOTAL (acre-feet per year)	604	433	-28.3%	1,000	466	-53.4%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
POLK COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	186	123	-33.9%	186	103	-44.6%
PROJECTED DEMAND TOTAL (acre-feet per year)	123	123	0.0%	9	9	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
POLK COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	292	614	110.3%	292	790	170.5%
PROJECTED DEMAND TOTAL (acre-feet per year)	225	595	164.4%	292	788	169.9%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
RUSK COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	4,331	1,167	-73.1%	4,331	1,616	-62.7%
PROJECTED DEMAND TOTAL (acre-feet per year)	2,889	1,042	-63.9%	4,172	1,507	-63.9%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
RUSK COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	598	592	-1.0%	598	592	-1.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	100	276	176.0%	100	276	176.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%

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RUSK COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,496	1,660	11.0%	1,534	1,694	10.4%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,207	1,660	37.5%	1,292	1,777	37.5%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	83	100.0%
RUSK COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	349	348	-0.3%	471	470	-0.2%
PROJECTED DEMAND TOTAL (acre-feet per year)	317	32	-89.9%	439	34	-92.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
RUSK COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,915	3,702	93.3%	1,915	3,702	93.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	2,990	2,990	0.0%	3,592	3,592	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	1,075	0	-100.0%	1,677	0	-100.0%
RUSK COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	11,452	9,856	-13.9%	11,774	14,626	24.2%
PROJECTED DEMAND TOTAL (acre-feet per year)	6,489	8,633	33.0%	9,915	13,103	32.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	66	100.0%	184	427	132.1%
RUSK COUNTY | STEAM ELECTRIC POWER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	44,201	44,201	0.0%	44,201	44,201	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	27,458	45,304	65.0%	63,069	45,304	-28.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	1,103	100.0%	18,868	1,103	-94.2%
SABINE COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	761	721	-5.3%	761	721	-5.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	149	134	-10.1%	132	120	-9.1%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
SABINE COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	732	732	0.0%	732	732	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	159	129	-18.9%	448	363	-19.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
SABINE COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	847	291	-65.6%	847	310	-63.4%
PROJECTED DEMAND TOTAL (acre-feet per year)	467	246	-47.3%	785	265	-66.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
SABINE COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,278	2,234	-1.9%	2,278	2,234	-1.9%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,500	1,500	0.0%	776	776	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
SABINE COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,327	1,550	16.8%	1,328	1,536	15.7%
PROJECTED DEMAND TOTAL (acre-feet per year)	881	925	5.0%	863	900	4.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
SAN AUGUSTINE COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,087	1,087	0.0%	1,089	1,089	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	589	481	-18.3%	532	434	-18.4%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%

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SAN AUGUSTINE COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	62	62	0.0%	62	62	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	62	4	-93.5%	62	4	-93.5%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
SAN AUGUSTINE COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	921	671	-27.1%	1,400	717	-48.8%
PROJECTED DEMAND TOTAL (acre-feet per year)	903	2,004	121.9%	1,382	3,066	121.9%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	1,333	100.0%	0	2,349	100.0%
SAN AUGUSTINE COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	17	17	0.0%	17	17	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	8	6	-25.0%	13	6	-53.8%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
SAN AUGUSTINE COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,898	1,898	0.0%	1,898	1,898	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	4,000	4,000	0.0%	662	662	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	2,102	2,102	0.0%	0	0	0.0%
SAN AUGUSTINE COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	595	562	-5.5%	593	560	-5.6%
PROJECTED DEMAND TOTAL (acre-feet per year)	567	677	19.4%	546	644	17.9%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	120	100.0%	0	89	100.0%
SHELBY COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,326	1,252	-46.2%	2,660	1,370	-48.5%
PROJECTED DEMAND TOTAL (acre-feet per year)	2,021	898	-55.6%	2,433	1,082	-55.5%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
SHELBY COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	98	98	0.0%	98	98	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	26	10	-61.5%	26	10	-61.5%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
SHELBY COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	3,898	5,367	37.7%	3,898	5,367	37.7%
PROJECTED DEMAND TOTAL (acre-feet per year)	5,265	11,858	125.2%	10,822	24,373	125.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	1,367	6,491	374.8%	6,924	19,006	174.5%
SHELBY COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,821	2,022	11.0%	2,540	2,088	-17.8%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,510	1,696	12.3%	2,170	1,696	-21.8%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
SHELBY COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	3,325	3,325	0.0%	1,725	1,725	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	3,283	3,283	0.0%	1,087	1,087	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
SHELBY COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	3,045	4,085	34.2%	3,588	4,922	37.2%
PROJECTED DEMAND TOTAL (acre-feet per year)	2,390	3,753	57.0%	3,029	4,691	54.9%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	65	100.0%	0	117	100.0%

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SMITH COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	823	823	0.0%	1,816	1,816	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	823	475	-42.3%	1,816	1,209	-33.4%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
SMITH COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,486	937	-36.9%	1,659	906	-45.4%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,486	448	-69.9%	1,659	448	-73.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
SMITH COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,115	1,115	0.0%	1,115	1,115	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,115	580	-48.0%	1,115	580	-48.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
SMITH COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	3,656	3,030	-17.1%	5,116	3,264	-36.2%
PROJECTED DEMAND TOTAL (acre-feet per year)	5,120	2,956	-42.3%	7,553	3,348	-55.7%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	1,464	0	-100.0%	2,437	84	-96.6%
SMITH COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	26	137	426.9%	26	98	276.9%
PROJECTED DEMAND TOTAL (acre-feet per year)	134	134	0.0%	58	58	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	108	0	-100.0%	32	0	-100.0%
SMITH COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	33,296	33,519	0.7%	44,177	44,922	1.7%
PROJECTED DEMAND TOTAL (acre-feet per year)	32,365	32,504	0.4%	46,502	46,941	0.9%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	116	241	107.8%	2,396	2,573	7.4%
TRINITY COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	995	260	-73.9%	996	260	-73.9%
PROJECTED DEMAND TOTAL (acre-feet per year)	230	131	-43.0%	250	144	-42.4%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
TRINITY COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	170	303	78.2%	170	303	78.2%
PROJECTED DEMAND TOTAL (acre-feet per year)	500	278	-44.4%	500	278	-44.4%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	330	0	-100.0%	330	0	-100.0%
TRINITY COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	478	478	0.0%	478	478	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	478	202	-57.7%	478	202	-57.7%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
TRINITY COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	5	5	0.0%	5	5	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	5	5	0.0%	5	5	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
TRINITY COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	312	525	68.3%	316	538	70.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	58	213	267.2%	61	225	268.9%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%

*WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The needs shown in the WUG Data Comparison to 2016 RWP 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 county and category level, calculated surpluses are updated to zero so that only the WUGs with needs in the decade are included with the Needs totals.

Region I Water User Group (WUG) Data Comparison to 2016 Regional Water Plan (RWP)

	2020 PLANNING DECADE			2070 PLANNING DECADE		
	2016 RWP	2021 RWP	DIFFERENCE (%)	2016 RWP	2021 RWP	DIFFERENCE (%)
TYLER COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,494	793	-46.9%	1,376	711	-48.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,494	793	-46.9%	1,376	711	-48.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
TYLER COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	682	647	-5.1%	682	647	-5.1%
PROJECTED DEMAND TOTAL (acre-feet per year)	675	354	-47.6%	675	354	-47.6%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
TYLER COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	314	314	0.0%	314	314	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	288	249	-13.5%	288	249	-13.5%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
TYLER COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	476	0	-100.0%	506	0	-100.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	476	0	-100.0%	506	0	-100.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
TYLER COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	237	160	-32.5%	237	29	-87.8%
PROJECTED DEMAND TOTAL (acre-feet per year)	160	160	0.0%	29	29	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
TYLER COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	7,766	7,997	3.0%	7,766	7,946	2.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,876	2,726	45.3%	1,779	2,597	46.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
TYLER COUNTY | STEAM ELECTRIC POWER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,029	1,029	0.0%	1,029	1,029	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,029	200	-80.6%	1,029	200	-80.6%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
REGION I						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,027,695	839,096	-18.4%	1,216,723	870,711	-28.4%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,108,800	738,081	-33.4%	1,607,250	839,601	-47.8%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	236,971	139,229	-41.2%	508,008	205,638	-59.5%

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Region I Source Data Comparison to 2016 Regional Water Plan (RWP)

	2020 PLANNING DECADE			2070 PLANNING DECADE		
	2016 RWP	2021 RWP	DIFFERENCE (%)	2016 RWP	2021 RWP	DIFFERENCE (%)
ANDERSON COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	29,792	49,104	64.8%	29,792	49,104	64.8%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	2,274	2,469	8.6%	2,274	2,469	8.6%
ANGELINA COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	45,898	46,757	1.9%	45,515	46,374	1.9%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	735	675	-8.2%	735	675	-8.2%
CHEROKEE COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	34,245	44,771	30.7%	34,245	43,963	28.4%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	1,756	1,682	-4.2%	1,756	1,682	-4.2%
HARDIN COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	34,959	34,927	-0.1%	34,959	34,927	-0.1%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	212	212	0.0%	212	212	0.0%
HENDERSON COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	17,000	18,788	10.5%	17,000	18,788	10.5%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	770	770	0.0%	770	770	0.0%
HOUSTON COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	13,313	36,700	175.7%	13,313	36,700	175.7%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	3,860	4,520	17.1%	3,860	4,520	17.1%
JASPER COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	67,573	67,484	-0.1%	67,494	67,484	0.0%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	383,166	382,977	0.0%	383,166	382,977	0.0%
JEFFERSON COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	2,445	2,525	3.3%	2,445	2,525	3.3%
REUSE AVAILABILITY TOTAL (acre-feet per year)	13,687	13,687	0.0%	13,687	13,687	0.0%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	825,935	821,269	-0.6%	831,590	826,924	-0.6%
NACOGDOCHES COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	28,162	28,897	2.6%	28,162	28,897	2.6%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	3,016	2,949	-2.2%	3,016	2,949	-2.2%
NEWTON COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	34,177	34,219	0.1%	34,139	34,219	0.2%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	147,598	133,441	-9.6%	147,598	133,441	-9.6%
ORANGE COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	20,013	19,364	-3.2%	20,013	19,364	-3.2%
REUSE AVAILABILITY TOTAL (acre-feet per year)	15	15	0.0%	15	15	0.0%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	284,614	284,614	0.0%	284,614	284,614	0.0%
PANOLA COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	8,227	8,376	1.8%	8,069	8,068	0.0%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	1,855	1,828	-1.5%	1,855	1,828	-1.5%
POLK COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	13,516	16,527	22.3%	12,854	16,527	28.6%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	416	416	0.0%	416	416	0.0%
RESERVOIR* COUNTY						
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	1,995,968	2,214,644	11.0%	1,975,130	2,192,379	11.0%
RUSK COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	21,640	21,634	0.0%	21,611	21,615	0.0%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	2,571	2,565	-0.2%	2,571	2,565	-0.2%
SABINE COUNTY						

* Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

Region I Source Data Comparison to 2016 Regional Water Plan (RWP)

	2020 PLANNING DECADE			2070 PLANNING DECADE		
	2016 RWP	2021 RWP	DIFFERENCE (%)	2016 RWP	2021 RWP	DIFFERENCE (%)
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	11,789	8,437	-28.4%	11,789	8,437	-28.4%
REUSE AVAILABILITY TOTAL (acre-feet per year)	20	20	0.0%	20	20	0.0%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	887	883	-0.5%	887	883	-0.5%
SAN AUGUSTINE COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	5,499	5,111	-7.1%	5,499	5,111	-7.1%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	536	536	0.0%	536	536	0.0%
SHELBY COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	11,217	10,894	-2.9%	9,729	9,099	-6.5%
REUSE AVAILABILITY TOTAL (acre-feet per year)	233	233	0.0%	299	299	0.0%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	4,332	4,332	0.0%	4,332	4,332	0.0%
SMITH COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	50,185	54,319	8.2%	50,185	54,307	8.2%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	655	655	0.0%	655	655	0.0%
TRINITY COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	2,827	1,823	-35.5%	2,827	1,823	-35.5%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	511	452	-11.5%	511	452	-11.5%
TYLER COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	38,199	38,211	0.0%	38,156	38,211	0.1%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	370	335	-9.5%	370	335	-9.5%
REGION I						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	490,676	548,868	11.9%	487,796	545,543	11.8%
REUSE AVAILABILITY TOTAL (acre-feet per year)	13,955	13,955	0.0%	14,021	14,021	0.0%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	3,662,037	3,862,224	5.5%	3,646,854	3,845,614	5.5%

* Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

Region I Water User Group (WUG) Unmet Needs

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.

	WUG UNMET NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
ANGELINA COUNTY - NECHES BASIN						
MINING	473	0	0	0	0	0
CHEROKEE COUNTY - NECHES BASIN						
MINING	238	0	0	0	0	0
HENDERSON COUNTY - NECHES BASIN						
MINING*	10	0	0	0	0	0
JEFFERSON COUNTY - NECHES BASIN						
MANUFACTURING	54,636	0	0	0	0	0
JEFFERSON COUNTY - NECHES-TRINITY BASIN						
MANUFACTURING	46,502	0	0	0	0	0
STEAM ELECTRIC POWER	2,391	0	0	0	0	0
NACOGDOCHES COUNTY - NECHES BASIN						
MINING	5,475	0	0	0	0	0
LIVESTOCK	5,970	0	0	0	0	0
ORANGE COUNTY - SABINE BASIN						
IRRIGATION	526	0	0	0	0	0
PANOLA COUNTY - SABINE BASIN						
LIVESTOCK	982	0	0	0	0	0
RUSK COUNTY - NECHES BASIN						
OVERTON*	6	0	0	0	0	0
STEAM ELECTRIC POWER	110	0	0	0	0	0
RUSK COUNTY - SABINE BASIN						
OVERTON*	52	0	0	0	0	0
STEAM ELECTRIC POWER	993	0	0	0	0	0
SAN AUGUSTINE COUNTY - NECHES BASIN						
SAN AUGUSTINE	110	0	0	0	0	0
MINING	2,102	0	0	0	0	0
LIVESTOCK	1,236	0	0	0	0	0
SAN AUGUSTINE COUNTY - SABINE BASIN						
LIVESTOCK	97	0	0	0	0	0
SMITH COUNTY - NECHES BASIN						
BULLARD	130	0	0	0	0	0
OVERTON*	4	0	0	0	0	0

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

Region I Water User Group (WUG) Unmet Needs Summary

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.

WUG CATEGORY	NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
MUNICIPAL	302	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	101,138	0	0	0	0	0
MINING	8,298	0	0	0	0	0
STEAM ELECTRIC POWER	3,494	0	0	0	0	0
LIVESTOCK	8,285	0	0	0	0	0
IRRIGATION	526	0	0	0	0	0

Region I Recommended Water User Group (WUG) Water Management Strategies (WMS)

						WATER MANAGEMENT STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
WUG ENTITY NAME	WMS SPONSOR REGION	WMS NAME	SOURCE NAME	UNIT COST 2020	UNIT COST 2070	2020	2030	2040	2050	2060	2070
ALTO	I	ALTO - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$500	$300	4	6	7	7	9	10
ALTO	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	N/A	$333	0	428	428	428	428	86
ALTO RURAL WSC	I	ALTO RURAL WSC - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$556	$286	9	16	18	21	25	28
ALTO RURAL WSC	I	CHER-ALT-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	N/A	$162	0	0	0	191	191	191
APPLEBY WSC	I	APPLEBY WSC - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$556	$281	9	17	20	23	27	32
ARP	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	N/A	$13	0	428	428	428	428	86
ARP	I	ARP - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$1000	N/A	2	0	0	0	0	0
ATHENS*	C	ATHENS MWA - NEW WELL (S) IN CARRIZO-WILCOX AQUIFER	C | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	N/A	$942	0	0	0	0	4	10
ATHENS*	I	AMWA ATHENS FISH HATCHERY REUSE	I | NECHES INDIRECT REUSE	N/A	$33	0	0	0	0	6	14
ATHENS*	I	HDSN-ATN-ADVANCED CONSERVATION	DEMAND REDUCTION	$1429	$926	7	13	16	20	23	27
BEAUMONT	I	BEAUMONT CONTRACT AMENDMENT	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	N/A	$977	0	0	0	0	228	2,249
BEAUMONT	I	JEFF-BEA-ADVANCED CONSERVATION	DEMAND REDUCTION	$448	$261	2,027	3,425	4,202	5,112	6,171	7,382
BLACKJACK WSC	I	BLACKJACK WSC - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$500	$333	2	3	4	5	5	6
BROWNSBORO	I	BROWNSBORO - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$667	N/A	3	0	0	0	0	0
BULLARD	I	BULLARD - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$545	$259	11	22	28	36	44	54
BULLARD	I	TYLER-LAKE PALESTINE	I | PALESTINE LAKE/RESERVOIR	N/A	$896	0	322	511	718	928	1,145
CARTHAGE	I	CARTHAGE - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$435	$220	23	39	41	44	47	50
CENTER	I	CENTER - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$308	$157	26	45	52	57	64	70
CENTER	I	CENT-REU-CITY OF CENTER REUSE PIPELINE FROM WWTP TO LAKE CENTER	I | SABINE INDIRECT REUSE	N/A	$583	0	1,121	1,121	1,121	1,121	1,121
CENTER	I	CENT-TOL-PIPELINE FROM TOLEDO BEND TO LAKE CENTER	I | TOLEDO BEND LAKE/RESERVOIR	N/A	$937	0	0	2,242	2,242	2,242	2,242
CHANDLER	I	CHANDLER - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$667	$306	9	17	21	26	32	36
CHANDLER	I	HDSN-CHN-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	N/A	$1119	0	0	0	0	0	101
CHANDLER	I	TYLER-LAKE PALESTINE	I | PALESTINE LAKE/RESERVOIR	N/A	$411	0	0	0	350	350	350
CHESTER WSC	I	CHESTER WSC - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$1000	$333	2	5	5	5	6	6
COLMESNEIL	I	COLMESNEIL - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$500	$250	4	6	6	7	7	8
COUNTY-OTHER, CHEROKEE	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	N/A	$13	0	3,848	3,848	3,848	3,848	773

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

Region I Recommended Water User Group (WUG) Water Management Strategies (WMS)

						WATER MANAGEMENT STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
WUG ENTITY NAME	WMS SPONSOR REGION	WMS NAME	SOURCE NAME	UNIT COST 2020	UNIT COST 2070	2020	2030	2040	2050	2060	2070
COUNTY-OTHER, HOUSTON	I	COUNTY-OTHER, HOUSTON - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$500	$250	2	3	3	4	4	4
COUNTY-OTHER, JEFFERSON	I	COUNTY-OTHER, JEFFERSON - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$588	N/A	34	0	0	0	0	0
COUNTY-OTHER, JEFFERSON	I	JEFF-CTR-PURCHASE FROM LOWER NECHES VALLEY AUTHORITY (SAM RAYBURN)	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	N/A	$1232	0	0	0	0	855	1,950
COUNTY-OTHER, NACOGDOCHES	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	N/A	$13	0	428	428	428	428	86
CROCKETT	I	CROCKETT - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$579	$306	19	29	30	32	34	36
CRYSTAL SYSTEMS TEXAS*	D	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, CARRIZO, NECHES)	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	N/A	$99	0	0	134	134	269	538
CRYSTAL SYSTEMS TEXAS*	I	TYLER-LAKE PALESTINE	I | PALESTINE LAKE/RESERVOIR	N/A	$896	0	34	74	124	179	224
CRYSTAL SYSTEMS TEXAS*	I	WUG-CONS-MUNICIPAL CONSERVATION- CRYSTAL SYSTEMS TEXAS	DEMAND REDUCTION	$818	$332	18	38	52	71	92	118
CUSHING	I	WUG-CONS-MUNICIPAL CONSERVATION-CUSHING	DEMAND REDUCTION	$1404	$927	10	19	24	30	37	45
CYPRESS CREEK WSC	I	CYPRESS CREEK WSC - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$500	$250	2	3	3	3	3	4
D & M WSC	I	NACW-DMW-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I | CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	N/A	$139	0	0	32	135	251	374
DEAN WSC	I	DEAN WSC - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$636	N/A	11	18	0	0	0	0
EDOM WSC*	D	DRILL NEW WELLS (EDOM WSC, VAN ZANDT, CARRIZO, NECHES)	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	$3308	$2250	2	3	4	5	7	9
ELKHART	I	ELKHART - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$500	$250	4	6	6	7	7	8
FRANKSTON	I	FRANKSTON - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$500	$250	4	6	7	7	7	8
GARRISON	I	GARRISON - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$500	$250	4	6	8	9	10	12
GROVETON*	H	GROVETON GROUNDWATER EXPANSION	H | YEGUA-JACKSON AQUIFER | TRINITY COUNTY	$699	$56	109	109	109	110	110	109
HEMPHILL	I	HEMPHILL - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$500	$250	4	8	7	7	8	8
HENDERSON	I	ANCD-VOL-VOLUMETRIC SURVEY AND NORMAL POOL ELEVATION ADJUSTMENT	I | STRIKER LAKE/RESERVOIR	N/A	$476	0	0	5,600	5,600	5,600	5,600
HENDERSON	I	WUG-CONS-MUNICIPAL CONSERVATION-HENDERSON	DEMAND REDUCTION	$1857	$1109	83	148	179	235	283	334
IRRIGATION, HENDERSON*	C	ATHENS MWA - NEW WELL (S) IN CARRIZO-WILCOX AQUIFER	C | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	N/A	$942	0	0	0	0	20	34
IRRIGATION, HENDERSON*	I	AMWA ATHENS FISH HATCHERY REUSE	I | NECHES INDIRECT REUSE	N/A	$33	0	0	0	0	10	16
IRRIGATION, ORANGE	I	ORAN-IRR-PURCHASE FROM SABINE RIVER AUTHORITY (SABINE RIVER)	I | TOLEDO BEND LAKE/RESERVOIR	N/A	$639	0	526	526	526	526	526

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Region I Recommended Water User Group (WUG) Water Management Strategies (WMS)

						WATER MANAGEMENT STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
WUG ENTITY NAME	WMS SPONSOR REGION	WMS NAME	SOURCE NAME	UNIT COST 2020	UNIT COST 2070	2020	2030	2040	2050	2060	2070
JACKSON WSC*	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	N/A	$13	0	855	855	855	855	172
JACKSONVILLE	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	N/A	$13	0	4,275	4,275	4,275	4,275	4,275
JACKSONVILLE	I	JACKSONVILLE - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$540	$236	50	85	110	129	152	178
JACOBS WSC	I	RUSK-JAW-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	N/A	$6364	0	0	0	0	0	22
JASPER	I	WUG-CONS-MUNICIPAL CONSERVATION-JASPER	DEMAND REDUCTION	$2942	$2716	75	124	141	158	178	196
KILGORE*	I	KILGORE - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$500	$250	10	19	21	25	28	32
KIRBYVILLE	I	KIRBYVILLE - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$500	$250	6	9	10	11	11	12
LAKE LIVINGSTON WSC*	H	WATER LOSS REDUCTION, LAKE LIVINGSTON WSC	DEMAND REDUCTION	N/A	N/A	0	0	0	0	0	0
LINDALE*	D	DRILL NEW WELLS (LINDALE, CARRIZO, NECHES)	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	$370	$93	116	242	367	507	626	734
LINDALE*	I	LINDALE - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$429	$222	7	14	18	23	29	36
LINDALE*	I	TYLER-LAKE PALESTINE	I | PALESTINE LAKE/RESERVOIR	N/A	$896	0	64	117	177	236	288
LIVESTOCK, HENDERSON*	C	ATHENS MWA - NEW WELL (S) IN CARRIZO-WILCOX AQUIFER	C | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	N/A	$942	0	0	0	0	158	266
LIVESTOCK, HENDERSON*	I	AMWA ATHENS FISH HATCHERY REUSE	I | NECHES INDIRECT REUSE	N/A	$33	0	0	0	0	227	381
LIVESTOCK, HOUSTON	I	HOUS-LTK-NEW WELLS IN YEGUA-JACKSON	I | YEGUA-JACKSON AQUIFER | HOUSTON COUNTY	N/A	$194	0	0	0	0	0	201
LIVESTOCK, JASPER	I	JASP-LTK-PURCHASE FROM LOWER NECHES VALLEY AUTHORITY (SAM RAYBURN)	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	$326	$326	8,932	8,932	8,932	8,932	8,932	8,932
LIVESTOCK, NACOGDOCHES	I	NACW-LTK-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I | CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	N/A	$90	0	6,399	6,896	7,472	8,131	9,113
LIVESTOCK, PANOLA	I	PANL-LTK-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I | CARRIZO-WILCOX AQUIFER | PANOLA COUNTY	N/A	$40	0	982	982	982	982	982
LIVESTOCK, RUSK	I	RUSK-LTK-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	N/A	$48	0	0	20	51	83	83
LIVESTOCK, SAN AUGUSTINE	I	SAUG-LTK-PURCHASE FROM SRA (TOLEDO BEND)	I | TOLEDO BEND LAKE/RESERVOIR	N/A	$122	0	1,539	1,774	2,048	2,349	2,349
LIVESTOCK, SHELBY	I	SHEL-LTK-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)	I | TOLEDO BEND LAKE/RESERVOIR	$699	$431	6,491	8,761	11,524	14,896	19,006	19,006
LOVELADY	I	LOVELADY - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$500	$250	2	3	3	3	4	4
LUFKIN	I	LUFKIN - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$397	N/A	151	239	273	0	0	0
LUFKIN	I	LUFK-RAY SAM RAYBURN INFRASTRUCTURE	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	N/A	$919	0	11,210	22,420	28,000	28,000	28,000
MANUFACTURING, ANGELINA	I	ANGELINA MANUFACTURING	I | KURTH LAKE/RESERVOIR	$326	$326	1,625	1,625	1,625	1,625	1,625	1,625

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Region I Recommended Water User Group (WUG) Water Management Strategies (WMS)

						WATER MANAGEMENT STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
WUG ENTITY NAME	WMS SPONSOR REGION	WMS NAME	SOURCE NAME	UNIT COST 2020	UNIT COST 2070	2020	2030	2040	2050	2060	2070
MANUFACTURING, JEFFERSON	I	JEFF-MFG-PURCHASE FROM LOWER NECHES VALLEY AUTHORITY (SAM RAYBURN)	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	N/A	$372	0	143,513	143,497	143,479	143,462	143,446
MANUFACTURING, SMITH*	I	TYLER-LAKE PALESTINE	I | PALESTINE LAKE/RESERVOIR	N/A	$1310	0	84	84	84	84	84
MINING, ANGELINA	I	ANRA-RUN-OF-RIVER (SUBMITTED APPLICATION)	I | NECHES RUN-OF-RIVER	N/A	$1201	0	572	397	299	224	167
MINING, CHEROKEE	I	CHER-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY (ANGELINA RIVER)	I | NECHES RUN-OF-RIVER	N/A	$1457	0	247	210	147	84	40
MINING, HENDERSON*	C	INTEGRATED PIPELINE	C | TRINITY INDIRECT REUSE	N/A	N/A	0	2	0	0	0	0
MINING, HENDERSON*	C	TRWD - CARRIZO-WILCOX GROUNDWATER	C | CARRIZO-WILCOX AQUIFER | FREESTONE COUNTY	N/A	N/A	0	0	0	0	0	0
MINING, HENDERSON*	C	TRWD - CARRIZO-WILCOX GROUNDWATER	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	N/A	N/A	0	0	0	0	0	0
MINING, HENDERSON*	C	TRWD - CARRIZO-WILCOX GROUNDWATER	I | QUEEN CITY AQUIFER | ANDERSON COUNTY	N/A	N/A	0	0	0	0	0	0
MINING, HENDERSON*	C	TRWD - TEHUACANA	C | TEHUACANA LAKE/RESERVOIR	N/A	N/A	0	0	0	0	0	0
MINING, HENDERSON*	C	TRWD - UNALLOCATED SUPPLY UTILIZATION	C | TRWD LAKE/RESERVOIR SYSTEM	N/A	N/A	0	0	0	0	0	0
MINING, HENDERSON*	C	WRIGHT PATMAN REALLOCATION FOR NTMWD, TRWD, AND UTRWD	D | WRIGHT PATMAN LAKE/RESERVOIR	N/A	N/A	0	0	0	0	0	0
MINING, HENDERSON*	I	HDSN-MIN-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	N/A	N/A	0	19	10	0	0	0
MINING, NACOGDOCHES	I	ANRA-RUN-OF-RIVER (SUBMITTED APPLICATION)	I | NECHES RUN-OF-RIVER	N/A	N/A	0	2,975	118	0	0	0
MINING, NEWTON	I	NEWTON MINING - TRANSFER FROM SRA	I | TOLEDO BEND LAKE/RESERVOIR	$965	N/A	115	59	0	0	0	0
MINING, RUSK	I	ANRA-RUN-OF-RIVER (SUBMITTED APPLICATION)	I | NECHES RUN-OF-RIVER	N/A	N/A	0	305	168	22	0	0
MINING, SAN AUGUSTINE	I	ANRA-RUN-OF-RIVER (SUBMITTED APPLICATION)	I | NECHES RUN-OF-RIVER	N/A	N/A	0	1,102	0	0	0	0
MINING, SMITH*	I	TYLER-LAKE PALESTINE	I | PALESTINE LAKE/RESERVOIR	N/A	$896	0	113	114	83	54	32
MOORE STATION WSC	I	HDSN-MSW-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	N/A	$1045	0	0	0	0	38	111
MT ENTERPRISE WSC	I	MT ENTERPRISE WSC - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$750	N/A	4	8	0	0	0	0
NACOGDOCHES	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	N/A	$13	0	8,551	8,551	8,551	8,551	8,551
NACOGDOCHES	I	WUG-CONS-MUNICIPAL CONSERVATION-NACOGDOCHES	DEMAND REDUCTION	$1729	$1020	247	426	532	656	802	966
NEW LONDON	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	N/A	$1442	0	855	855	855	855	172
NEW LONDON	I	NEW LONDON - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$308	$150	13	22	26	30	36	40
NEW SUMMERFIELD	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	N/A	$1442	0	2,565	2,565	2,565	2,565	515

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Region I Recommended Water User Group (WUG) Water Management Strategies (WMS)

						WATER MANAGEMENT STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
WUG ENTITY NAME	WMS SPONSOR REGION	WMS NAME	SOURCE NAME	UNIT COST 2020	UNIT COST 2070	2020	2030	2040	2050	2060	2070
NEWTON	I	NEWTON - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$667	$333	6	10	10	11	12	12
NORTH CHEROKEE WSC	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	N/A	$539	0	4,275	4,275	4,275	4,275	858
NORWOOD WSC	I	NORWOOD WSC - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$500	N/A	2	0	0	0	0	0
OVERTON*	I	OVERTON - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$500	$250	8	15	18	21	24	28
OVERTON*	I	SMTH-OVN-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	N/A	$526	0	122	177	241	310	384
OVERTON*	I	SMTH-OVN-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	N/A	$526	0	7	12	18	25	32
PALESTINE	I	PALESTINE - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$346	$174	81	129	140	150	161	172
PANOLA-BETHANY WSC*	D	DRILL NEW WELLS (PANOLA BETHANY, QUEEN CITY, SABINE)	D | QUEEN CITY AQUIFER | HARRISON COUNTY	N/A	$77	0	4	0	14	4	1
PANOLA-BETHANY WSC*	I	PANOLA-BETHANY WSC - MUNICIPAL CONSERVATION	DEMAND REDUCTION	N/A	$750	0	0	0	0	1	2
PLEASANT SPRINGS WSC	I	PLEASANT SPRINGS WSC - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$500	$333	2	4	5	5	5	6
PORT ARTHUR	I	PORT-CONS-CITY OF PORT ARTHUR - ADVANCED CONSERVATION	DEMAND REDUCTION	$336	$162	2,708	4,449	5,222	6,029	6,844	7,664
R P M WSC*	D	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES)	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	N/A	$1355	0	9	21	38	51	65
RUSK	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	N/A	$13	0	4,275	4,275	4,275	4,275	858
RUSK	I	CHER-RUS NEW WELLS IN CARRIZO-WILCOX AQUIFER	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	N/A	$1574	0	0	0	0	0	122
RUSK	I	RUSK - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$600	$304	15	26	30	34	40	46
RUSK RURAL WSC	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	N/A	$13	0	855	855	855	855	172
SAN AUGUSTINE	I	SAUG-SAG-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I | CARRIZO-WILCOX AQUIFER | SAN AUGUSTINE COUNTY	N/A	$125	0	105	92	89	89	89
SAN AUGUSTINE	I	WUG-CONS-MUNICIPAL CONSERVATION-SAN AUGUSTINE	DEMAND REDUCTION	$3461	$3310	10	17	18	20	22	23
SAND HILLS WSC	I	SAND HILLS WSC - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$750	$250	4	8	8	9	10	12
SAND HILLS WSC	I	SHEL-SHW-PURCHASE FROM CENTER	I | TOLEDO BEND LAKE/RESERVOIR	$971	$971	61	68	77	87	97	105
SOUTHERN UTILITIES*	I	WUG-CONS-MUNICIPAL CONSERVATION-SOUTHERN UTILITIES	DEMAND REDUCTION	$944	$693	514	866	1,058	1,279	1,527	1,803
STEAM ELECTRIC POWER, JEFFERSON	I	JEFF-SEP-PURCHASE FROM LOWER NECHES VALLEY AUTHORITY (SAM RAYBURN)	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	N/A	$526	0	2,391	2,391	2,391	2,391	2,391
STEAM ELECTRIC POWER, RUSK	I	RUSK-SEP-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)	I | SABINE RUN-OF-RIVER	N/A	$655	0	1,103	1,103	1,103	1,103	1,103
TATUM	I	TATUM - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$500	$286	4	8	9	10	12	14

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Region I Recommended Water User Group (WUG) Water Management Strategies (WMS)

						WATER MANAGEMENT STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
WUG ENTITY NAME	WMS SPONSOR REGION	WMS NAME	SOURCE NAME	UNIT COST 2020	UNIT COST 2070	2020	2030	2040	2050	2060	2070
TDCJ BETO GURNEY & POWLEDGE UNITS	I	TDCJ BETO GURNEY & POWLEDGE UNITS - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$313	$176	16	27	29	30	32	34
TDCJ COFFIELD MICHAEL	I	TDCJ COFFIELD MICHAEL - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$182	$83	44	75	80	85	91	96
TDCJ EASTHAM UNIT	I	TDCJ EASTHAM UNIT - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$267	$125	15	25	27	29	30	32
TENAHA	I	TENAHA - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$500	$250	4	6	6	7	8	8
TROUP	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	N/A	$1442	0	4,275	4,275	4,275	4,275	858
TROUP	I	TROUP - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$500	$278	6	11	12	14	17	18
TYLER*	I	WUG-CONS-MUNICIPAL CONSERVATION-TYLER	DEMAND REDUCTION	$1288	$893	657	1,101	1,338	1,613	1,924	2,268
WELLS	I	WELLS - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$500	N/A	2	0	0	0	0	0
WHITEHOUSE	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	N/A	$1442	0	8,551	8,551	8,551	8,551	1,717
WHITEHOUSE	I	SMTH-WTH-PURCHASE FROM CITY OF TYLER (LAKE PALESTINE/LAKE TYLER/CARRIZO-WILCOX)	I | TYLER LAKE/RESERVOIR	N/A	$2868	0	0	0	0	39	257
WILDWOOD POA	I	WILDWOOD POA - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$500	$250	4	6	7	7	8	8
WOODVILLE	I	WOODVILLE - MUNICIPAL CONSERVATION	DEMAND REDUCTION	$529	$250	17	28	30	32	34	36
WRIGHT CITY WSC	I	CHER-WCW-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	N/A	$548	0	0	0	25	71	121
					REGION I RECOMMENDED WMS SUPPLY TOTAL	24,468	250,791	271,865	284,718	294,829	278,546

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Region I Recommended Projects Associated with Water Management Strategies

SPONSOR NAME	SPONSOR IS WWP?	ONLINE DECADE	PROJECT NAME	PROJECT DESCRIPTION	CAPITAL COST
ALTO RURAL WSC	YES	2020	CHER-ALT-NEW WELLS IN CARRIZO-WILCOX AQUIFER	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; PUMP STATION; STORAGE TANK	$2,426,000
ANGELINA & NECHES RIVER AUTHORITY	YES	2030	ANRA-COL-LAKE COLUMBIA	RESERVOIR CONSTRUCTION	$402,862,000
ANGELINA & NECHES RIVER AUTHORITY	YES	2030	ANRA-GW-ANRA GROUNDWATER WELLS	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$29,775,000
ANGELINA & NECHES RIVER AUTHORITY	YES	2030	ANRA-WTP-ANRA TREATMENT PLANT AND DISTRIBUTION SYSTEM	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; NEW WATER TREATMENT PLANT	$228,001,000
ANGELINA & NECHES RIVER AUTHORITY	YES	2030	CHER-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY (ANGELINA RIVER)	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; NEW CONTRACT	$7,013,000
ANGELINA NACOGDOCHES WCID #1	YES	2040	ANCD-VOL-VOLUMETRIC SURVEY AND NORMAL POOL ELEVATION ADJUSTMENT	DREDGE TO RECOVER CAPACITY	$23,716,000
ATHENS	YES	2020	HDSN-ATN-ADVANCED CONSERVATION	CONSERVATION - MUNICIPAL (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); DATA GATHERING/MONITORING TECHNOLOGY; WATER LOSS CONTROL	$786,000
BEAUMONT	YES	2020	JEFF-BEA-ADVANCED CONSERVATION	CONSERVATION - MUNICIPAL (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); DATA GATHERING/MONITORING TECHNOLOGY; WATER LOSS CONTROL	$60,175,000
BULLARD	YES	2030	SMTH-BLD-PURCHASE FROM CITY OF TYLER	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$14,264,000
CENTER	YES	2030	CENT-REU-CITY OF CENTER REUSE PIPELINE FROM WWTP TO LAKE CENTER	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; WATER TREATMENT PLANT EXPANSION	$18,110,000
CENTER	YES	2040	CENT-TOL-PIPELINE FROM TOLEDO BEND TO LAKE CENTER	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; WATER TREATMENT PLANT EXPANSION	$38,916,000
CHANDLER	YES	2070	HDSN-CHN-NEW WELLS IN CARRIZO-WILCOX AQUIFER	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; PUMP STATION	$1,397,000
COUNTY-OTHER, JEFFERSON	YES	2060	JEFF-CTR-PURCHASE FROM LOWER NECHES VALLEY AUTHORITY (SAM RAYBURN)	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$21,665,000
COUNTY-OTHER, NACOGDOCHES	YES	2030	NACN-LK - LAKE NACONICHE INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; NEW WATER TREATMENT PLANT	$42,117,000
CRYSTAL SYSTEMS TEXAS	YES	2020	SMTH-CYS-NEW WELLS IN CARRIZO-WILCOX AQUIFER	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$2,531,000
CRYSTAL SYSTEMS TEXAS	YES	2020	WUG-CONS-MUNICIPAL CONSERVATION- CRYSTAL SYSTEMS TEXAS	CONSERVATION - MUNICIPAL (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS)	$954,000
CUSHING	YES	2020	WUG-CONS-MUNICIPAL CONSERVATION-CUSHING	CONSERVATION - MUNICIPAL (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS)	$1,030,000
D & M WSC	YES	2040	NACW-DMW-NEW WELLS IN CARRIZO-WILCOX AQUIFER	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; PUMP STATION	$4,567,000
HENDERSON	YES	2020	WUG-CONS-MUNICIPAL CONSERVATION- HENDERSON	CONSERVATION - MUNICIPAL (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS)	$9,900,000
IRRIGATION, ORANGE	YES	2030	ORAN-IRR-PURCHASE FROM SABINE RIVER AUTHORITY (SABINE RIVER)	CONVEYANCE/TRANSMISSION PIPELINE; NEW CONTRACT	$14,624,000
JACKSONVILLE	YES	2030	JACK-COL-SUPPLY FROM LAKE COLUMBIA	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; WATER TREATMENT PLANT EXPANSION	$29,390,000
JACOBS WSC	YES	2070	RUSK-JAW-NEW WELLS IN CARRIZO-WILCOX AQUIFER	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; PUMP STATION	$1,795,000
JASPER	YES	2020	WUG-CONS-MUNICIPAL CONSERVATION-JASPER	CONSERVATION - MUNICIPAL (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS)	$15,444,000
LINDALE	YES	2020	SMTH-LDL-INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$7,592,000
LIVESTOCK, HOUSTON	YES	2070	HOUS-LTK-NEW WELLS IN YEGUA-JACKSON	MULTIPLE WELLS/WELL FIELD	$399,000
LIVESTOCK, NACOGDOCHES	YES	2030	NACW-LTK-NEW WELLS IN CARRIZO-WILCOX AQUIFER	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; PUMP STATION	$26,677,000
LIVESTOCK, PANOLA	YES	2030	PANL-LTK-NEW WELLS IN CARRIZO-WILCOX AQUIFER	MULTIPLE WELLS/WELL FIELD; CONVEYANCE/TRANSMISSION PIPELINE	$1,172,000

Region I Recommended Projects Associated with Water Management Strategies

SPONSOR NAME	SPONSOR IS WWP?	ONLINE DECADE	PROJECT NAME	PROJECT DESCRIPTION	CAPITAL COST
LIVESTOCK, RUSK	YES	2040	RUSK-LTK-NEW WELLS IN CARRIZO-WILCOX AQUIFER	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$283,000
LIVESTOCK, SAN AUGUSTINE	YES	2030	SAUG-LTK-PURCHASE FROM SRA (TOLEDO BEND)	CONVEYANCE/TRANSMISSION PIPELINE; NEW CONTRACT	$41,302,000
LIVESTOCK, SHELBY	YES	2020	SHEL-LTK-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$18,582,000
LOWER NECHES VALLEY AUTHORITY	YES	2040	LNVA-SRA-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$529,606,000
LOWER NECHES VALLEY AUTHORITY	YES	2020	LNVA-WRR-BEAUMONT WEST REGIONAL RESERVOIR	PUMP STATION; RESERVOIR CONSTRUCTION	$37,538,000
LUFKIN	YES	2030	LUFK-RAY-CONVEYANCE FROM SAM RAYBURN TO KURTH LAKE - PHASE 1	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; WATER TREATMENT PLANT EXPANSION	$78,220,000
LUFKIN	YES	2040	LUFK-RAY-CONVEYANCE FROM SAM RAYBURN TO KURTH LAKE - PHASE 2	PUMP STATION; WATER TREATMENT PLANT EXPANSION	$78,199,000
LUFKIN	YES	2050	LUFK-RAY-CONVEYANCE FROM SAM RAYBURN TO KURTH LAKE - PHASE 3	PUMP STATION	$8,834,000
MANUFACTURING, JEFFERSON	YES	2030	JEFF-MFG-PURCHASE FROM LOWER NECHES VALLEY AUTHORITY (SAM RAYBURN)	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$279,210,000
MANUFACTURING, SMITH	YES	2020	SMTH-MFG-PURCHASE FROM CITY OF TYLER	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$6,198,000
MINING, ANGELINA	YES	2030	ANGL-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY (RUN OF RIVER, ANGELINA)	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$7,927,000
MINING, HENDERSON	YES	2030	HDSN-MIN-NEW WELLS IN CARRIZO-WILCOX AQUIFER	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$201,000
MINING, NACOGDOCHES	YES	2030	NACW-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY (ANGELINA RIVER)	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$18,647,000
MINING, RUSK	YES	2020	RUSK-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY (ANGELINA RIVER)	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$14,808,000
MINING, SAN AUGUSTINE	YES	2030	SAUG-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$42,807,000
MOORE STATION WSC	YES	2060	HDSN-MSW-NEW WELLS IN CARRIZO-WILCOX AQUIFER	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; MULTIPLE WELLS/WELL FIELD	$1,417,000
NACOGDOCHES	YES	2040	NACP-COL-LAKE COLUMBIA TO NACOGDOCHES RAW WATER TRANSMISSION SYSTEM	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; WATER TREATMENT PLANT EXPANSION	$50,754,000
NACOGDOCHES	YES	2020	WUG-CONS-MUNICIPAL CONSERVATION- NACOGDOCHES	CONSERVATION - MUNICIPAL (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS)	$27,720,000
OVERTON	YES	2030	SMTH-OVN-NEW WELLS IN CARRIZO-WILCOX AQUIFER	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; PUMP STATION; STORAGE TANK	$8,914,000
PORT ARTHUR	YES	2020	PORT-CONS-CITY OF PORT ARTHUR - ADVANCED CONSERVATION	CONSERVATION - MUNICIPAL (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS)	$51,618,000
RUSK	YES	2070	CHER-RUS NEW WELLS IN CARRIZO-WILCOX AQUIFER	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; PUMP STATION; STORAGE TANK	$2,361,000
SAN AUGUSTINE	YES	2030	SAUG-SAG-NEW WELLS IN CARRIZO-WILCOX AQUIFER	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; PUMP STATION	$1,055,000
SAN AUGUSTINE	YES	2020	WUG-CONS-MUNICIPAL CONSERVATION-SAN AUGUSTINE	CONSERVATION - MUNICIPAL (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS)	$2,297,000
SAND HILLS WSC	YES	2020	SHEL-SHW-PURCHASE FROM CENTER	CONVEYANCE/TRANSMISSION PIPELINE; NEW CONTRACT	$102,000
SOUTHERN UTILITIES	YES	2020	WUG-CONS-MUNICIPAL CONSERVATION-SOUTHERN UTILITIES	CONSERVATION - MUNICIPAL (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS)	$33,264,000
STEAM ELECTRIC POWER, JEFFERSON	YES	2030	JEFF-SEP-PURCHASE FROM LOWER NECHES VALLEY AUTHORITY (SAM RAYBURN)	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$32,302,000
STEAM ELECTRIC POWER, RUSK	YES	2030	RUSK-SEP-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$30,008,000
TYLER	YES	2030	TYLR-PAL-CITY OF TYLER - LAKE PALESTINE EXPANSION	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; WATER TREATMENT PLANT EXPANSION	$111,190,000
TYLER	YES	2020	WUG-CONS-MUNICIPAL CONSERVATION-TYLER	CONSERVATION - MUNICIPAL (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS)	$58,766,000
UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY	YES	2020	UNM-LP-RUN-OF-RIVER, NECHES WITH LAKE PALESTINE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$518,977,000

Region I Recommended Projects Associated with Water Management Strategies

SPONSOR NAME	SPONSOR IS WWP?	ONLINE DECADE	PROJECT NAME	PROJECT DESCRIPTION	CAPITAL COST
WHITEHOUSE	YES	2060	SMTH-WTH-PURCHASE FROM CITY OF TYLER (LAKE PALESTINE/LAKE TYLER/CARRIZO-WILCOX)	CONVEYANCE/TRANSMISSION PIPELINE; NEW CONTRACT	$7,666,000
WRIGHT CITY WSC	YES	2050	CHER-WCW-NEW WELLS IN CARRIZO-WILCOX AQUIFER	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; SINGLE WELL; STORAGE TANK	$2,361,000
				REGION I RECOMMENDED CAPITAL COST TOTAI	**$3,110,432,000**

Region I Alternative Water User Group (WUG) Water Management Strategies (WMS)

						WATER MANAGEMENT STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
WUG ENTITY NAME	**WMS SPONSOR REGION**	**WMS NAME**	**SOURCE NAME**	**UNIT COST 2020**	**UNIT COST 2070**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
ATHENS*	C	ALTERNATIVE - ATHENS - NEW WELL(S) IN CARRIZO-WILCOX AQUIFER	C | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	$929	$414	24	23	22	22	13	10
ATHENS*	I	AMWA-BSI-WTP BOOSTER PS IMPROVEMENT	I | ATHENS LAKE/RESERVOIR	N/A	N/A	0	0	0	0	0	0
IRRIGATION, HENDERSON*	I	AMWA-BSI-WTP BOOSTER PS IMPROVEMENT	I | ATHENS LAKE/RESERVOIR	N/A	N/A	0	0	0	0	0	0
LIVESTOCK, HENDERSON*	I	AMWA-BSI-WTP BOOSTER PS IMPROVEMENT	I | ATHENS LAKE/RESERVOIR	N/A	N/A	0	0	0	0	0	0
REGION I ALTERNATIVE WMS SUPPLY TOTAL						24	23	22	22	13	10

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

Region I Alternative Projects Associated with Water Management Strategies

SPONSOR NAME	SPONSOR IS WWP?	ONLINE DECADE	PROJECT NAME	PROJECT DESCRIPTION	CAPITAL COST
ATHENS MUNICIPAL WATER AUTHORITY	YES	2020	AMWA-BSI-WTP BOOSTER PS IMPROVEMENT	PUMP STATION	$65,000
HOUSTON COUNTY WCID #1	YES	2020	HCWC-GW-WELL	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$22,793,000
				REGION I ALTERNATIVE CAPITAL COST TOTAL	**$22,858,000**

Region I Water User Group (WUG) Management Supply Factor

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. If a WUG is split by more than one planning region, the whole WUG's management supply factor will show up in each of its planning region's management supply factor reports.

	WUG MANAGEMENT SUPPLY FACTOR					
WUG NAME	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
AFTON GROVE WSC	1.0	1.0	1.0	1.0	1.0	1.0
ALGONQUIN WATER RESOURCES OF TEXAS*	3.5	3.1	2.8	2.6	2.3	2.1
ALTO	2.2	3.7	3.5	3.2	3.0	1.7
ALTO RURAL WSC	1.2	1.1	1.0	1.2	1.1	1.0
ANDERSON COUNTY CEDAR CREEK WSC	1.0	1.0	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	3.4	3.4	3.3	3.2	1.4
ATHENS*	1.0	1.1	1.1	1.1	1.0	1.0
B B S WSC*	1.0	1.0	1.0	1.0	1.0	1.0
B C Y WSC	1.0	1.0	1.0	1.0	1.0	1.0
BEAUMONT	1.1	1.1	1.1	1.0	1.0	1.0
BECKVILLE	4.3	4.0	3.8	3.6	3.5	3.4
BEN WHEELER WSC*	1.9	1.9	1.8	1.7	1.7	1.6
BERRYVILLE	1.0	1.0	1.0	1.0	1.0	1.0
BETHEL ASH WSC*	1.9	1.7	1.5	1.4	1.3	1.2
BEVIL OAKS	1.0	1.0	1.0	1.0	1.0	1.0
BLACKJACK WSC	1.0	1.0	1.0	1.0	1.0	1.0
BRIDGE CITY	1.1	1.1	1.1	1.1	1.1	1.1
BROOKELAND FWSD	1.0	1.0	1.0	1.0	1.0	1.0
BROWNSBORO	1.0	1.0	1.0	1.0	1.0	1.0
BRUSHY CREEK WSC	1.0	1.0	1.0	1.0	1.0	1.0
BULLARD	0.8	1.0	1.0	1.0	1.0	1.0
CARO WSC	1.0	1.0	1.0	1.0	1.0	1.0
CARROLL WSC*	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	1.0	1.6	2.7	2.6	2.5	2.5
CENTERVILLE WSC	1.0	1.0	1.0	1.0	1.0	1.0
CENTRAL WCID OF ANGELINA COUNTY	1.7	1.7	1.6	1.5	1.4	1.4
CHALK HILL SUD	1.0	1.0	1.0	1.0	1.0	1.0
CHANDLER	1.0	1.0	1.0	1.4	1.3	1.3
CHESTER WSC	1.4	1.4	1.4	1.4	1.4	1.4
CHINA	1.0	1.0	1.0	1.0	1.0	1.0
CHOICE WSC	1.0	1.0	1.0	1.0	1.0	1.0
COLMESNEIL	1.4	1.5	1.5	1.5	1.5	1.5
CORRIGAN	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, ANDERSON	1.1	1.1	1.1	1.1	1.1	1.1
COUNTY-OTHER, ANGELINA	3.3	3.3	3.2	3.1	3.0	2.9
COUNTY-OTHER, CHEROKEE	4.6	19.0	17.6	15.9	14.4	5.0
COUNTY-OTHER, HARDIN	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, HENDERSON*	1.0	1.0	1.1	1.1	1.4	2.0
COUNTY-OTHER, HOUSTON	1.9	2.0	2.1	2.1	2.1	2.1
COUNTY-OTHER, JASPER	1.3	1.3	1.2	1.2	1.2	1.2
COUNTY-OTHER, JEFFERSON	1.2	1.1	1.1	1.0	1.0	1.0

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Region I Water User Group (WUG) Management Supply Factor

	WUG MANAGEMENT SUPPLY FACTOR					
WUG NAME	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
COUNTY-OTHER, NACOGDOCHES	1.0	1.6	1.5	1.5	1.4	1.1
COUNTY-OTHER, NEWTON	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, ORANGE	1.1	1.1	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, POLK*	1.2	1.2	1.3	1.3	1.3	1.3
COUNTY-OTHER, RUSK	1.1	1.1	1.1	1.1	1.1	1.1
COUNTY-OTHER, SABINE	5.4	5.7	6.0	6.0	6.0	6.0
COUNTY-OTHER, SAN AUGUSTINE	2.3	2.4	2.4	2.5	2.5	2.5
COUNTY-OTHER, SHELBY	1.4	1.4	1.3	1.3	1.3	1.3
COUNTY-OTHER, SMITH*	1.4	1.3	1.3	1.3	1.3	1.3
COUNTY-OTHER, TRINITY*	1.9	1.9	1.9	2.0	1.9	1.8
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	1.2	1.2	1.2	1.3	1.3	1.3
CROSS ROADS SUD*	2.5	2.5	2.4	2.3	2.2	2.1
CRYSTAL FARMS WSC	1.0	1.0	1.0	1.0	1.0	1.0
CRYSTAL SYSTEMS TEXAS*	1.4	1.3	1.4	1.3	1.3	1.4
CUSHING	1.4	1.4	1.3	1.2	1.1	1.1
CYPRESS CREEK WSC	1.0	1.0	1.0	1.0	1.0	1.0
D & M WSC	1.2	1.1	1.0	1.0	1.0	1.0
DAMASCUS-STRYKER WSC	1.0	1.0	1.0	1.0	1.0	1.0
DEAN WSC	1.0	1.0	1.0	1.0	1.0	1.0
DIBOLL	3.1	3.0	2.9	2.8	2.7	2.6
EAST LAMAR WSC	1.0	1.0	1.0	1.0	1.0	1.0
EBENEZER WSC	1.0	1.0	1.0	1.0	1.0	1.0
EDOM WSC*	1.0	1.0	1.0	1.0	1.0	1.0
ELDERVILLE WSC*	2.1	1.9	1.8	1.6	1.4	1.3
ELKHART	1.5	1.5	1.5	1.5	1.5	1.5
EMERALD BAY MUD	1.0	1.0	1.0	1.0	1.0	1.0
ETOILE WSC	1.0	1.0	1.0	1.0	1.0	1.0
FIVE WAY WSC	1.0	1.0	1.0	1.0	1.0	1.0
FLAT FORK WSC	1.0	1.0	1.0	1.0	1.0	1.0
FOUR PINES WSC	1.4	1.4	1.4	1.4	1.4	1.4
FOUR WAY SUD	2.5	2.4	2.3	2.3	2.2	2.1
FRANKSTON	1.5	1.5	1.5	1.5	1.5	1.4
FRANKSTON RURAL WSC	1.0	1.0	1.0	1.0	1.0	1.0
G M WSC	1.4	1.4	1.4	1.4	1.4	1.4
GARRISON	2.3	2.1	1.9	1.7	1.6	1.5
GASTON WSC	1.0	1.0	1.0	1.0	1.0	1.0
GILL WSC*	1.7	1.7	1.6	1.6	1.5	1.4
GOODSPRINGS WSC	1.0	1.0	1.0	1.0	1.0	1.0
GRAPELAND	1.4	1.5	1.5	1.5	1.6	1.6
GROVES	1.0	1.0	1.0	1.0	1.0	1.0
GROVETON*	7.6	7.4	7.7	8.0	7.8	7.5
GUM CREEK WSC	1.0	1.0	1.0	1.0	1.0	1.0
HARDIN COUNTY WCID 1	1.8	1.7	1.7	1.7	1.7	1.6
HEMPHILL	2.4	2.5	2.5	2.5	2.6	2.6
HENDERSON	1.2	1.7	2.9	2.6	2.4	2.2

*A single asterisk next to a WUG's name denotes that the WUG is split by more than one planning region.

Region I Water User Group (WUG) Management Supply Factor

	WUG MANAGEMENT SUPPLY FACTOR					
WUG NAME	2020	2030	2040	2050	2060	2070
HUDSON WSC	1.0	1.0	1.0	1.0	1.0	1.0
HUNTINGTON	4.2	4.1	4.0	3.9	3.8	3.6
HUXLEY	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, ANDERSON	3.2	3.2	3.2	3.2	3.2	3.2
IRRIGATION, ANGELINA	1.4	1.4	1.4	1.4	1.4	1.4
IRRIGATION, CHEROKEE	1.1	1.1	1.1	1.1	1.1	1.1
IRRIGATION, HARDIN	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, HENDERSON*	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, HOUSTON	1.4	1.4	1.4	1.4	1.4	1.4
IRRIGATION, JASPER	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, JEFFERSON	2.3	2.3	2.3	2.3	2.3	2.3
IRRIGATION, NACOGDOCHES	1.7	1.7	1.7	1.7	1.7	1.7
IRRIGATION, NEWTON	3.8	3.8	3.8	3.8	3.8	3.8
IRRIGATION, ORANGE	0.7	1.0	1.0	1.0	1.0	1.0
IRRIGATION, PANOLA	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, POLK*	1.1	1.1	1.1	1.1	1.1	1.1
IRRIGATION, RUSK	2.1	2.1	2.1	2.1	2.1	2.1
IRRIGATION, SAN AUGUSTINE	15.5	15.5	15.5	15.5	15.5	15.5
IRRIGATION, SHELBY	9.8	9.8	9.8	9.8	9.8	9.8
IRRIGATION, SMITH*	1.6	1.6	1.6	1.6	1.6	1.6
IRRIGATION, TRINITY*	1.1	1.1	1.1	1.1	1.1	1.1
IRRIGATION, TYLER	1.8	1.8	1.8	1.8	1.8	1.8
JACKSON WSC*	1.0	2.9	2.8	2.6	2.5	1.3
JACKSONVILLE	1.0	2.3	2.3	2.2	2.1	2.0
JACOBS WSC	1.0	1.0	1.0	1.0	1.0	1.0
JASPER	1.0	1.1	1.1	1.1	1.1	1.1
JASPER COUNTY WCID 1	1.0	1.0	1.0	1.0	1.0	1.0
JEFFERSON COUNTY WCID 10	1.0	1.0	1.0	1.0	1.0	1.0
JOAQUIN	1.1	1.0	1.0	1.0	1.0	1.0
KELLY G BREWER	1.0	1.0	1.0	1.0	1.0	1.0
KILGORE*	1.1	2.0	1.8	1.6	1.5	1.4
KIRBYVILLE	1.0	1.0	1.0	1.0	1.0	1.0
KOUNTZE	1.0	1.0	1.0	1.0	1.0	1.0
LAKE LIVINGSTON WSC*	1.9	1.9	1.8	1.8	1.7	1.7
LEAGUEVILLE WSC	1.0	1.0	1.0	1.0	1.0	1.0
LILLY GROVE SUD	1.8	1.6	1.5	1.4	1.3	1.2
LINDALE RURAL WSC*	2.2	2.1	1.9	1.8	1.6	1.4
LINDALE*	1.2	1.3	1.3	1.4	1.4	1.3
LIVESTOCK, ANDERSON	1.5	1.5	1.5	1.5	1.5	1.5
LIVESTOCK, ANGELINA	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, CHEROKEE	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, HARDIN	1.1	1.1	1.1	1.1	1.1	1.1
LIVESTOCK, HENDERSON*	2.2	2.2	2.2	2.2	2.0	1.8
LIVESTOCK, HOUSTON	1.4	1.3	1.2	1.1	1.0	1.0
LIVESTOCK, JASPER	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, JEFFERSON	1.2	1.2	1.2	1.2	1.2	1.2
LIVESTOCK, NACOGDOCHES	0.4	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, NEWTON	1.5	1.5	1.5	1.5	1.5	1.5

*A single asterisk next to a WUG's name denotes that the WUG is split by more than one planning region.

Region I Water User Group (WUG) Management Supply Factor

	WUG MANAGEMENT SUPPLY FACTOR					
WUG NAME	2020	2030	2040	2050	2060	2070
LIVESTOCK, ORANGE	1.1	1.1	1.1	1.1	1.1	1.1
LIVESTOCK, PANOLA	0.6	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, POLK*	1.6	1.6	1.6	1.6	1.6	1.6
LIVESTOCK, RUSK	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, SABINE	5.7	4.2	3.2	2.5	2.0	2.0
LIVESTOCK, SAN AUGUSTINE	0.3	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*	1.5	1.5	1.5	1.5	1.5	1.5
LIVESTOCK, TRINITY*	1.7	1.7	1.7	1.7	1.7	1.7
LIVESTOCK, TYLER	1.3	1.3	1.3	1.3	1.3	1.3
LOVELADY	1.2	1.3	1.3	1.3	1.3	1.3
LUFKIN	1.0	2.5	3.9	4.5	4.3	4.2
LUMBERTON MUD	1.0	1.0	1.0	1.0	1.0	1.0
M & M WSC	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, ANGELINA	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, CHEROKEE	1.1	1.1	1.1	1.1	1.1	1.1
MANUFACTURING, HARDIN	1.2	1.1	1.1	1.1	1.1	1.1
MANUFACTURING, HOUSTON	1.1	1.1	1.1	1.1	1.1	1.1
MANUFACTURING, JASPER	1.7	1.6	1.6	1.6	1.6	1.6
MANUFACTURING, JEFFERSON	0.5	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, NACOGDOCHES	5.0	5.0	5.0	5.0	5.0	5.0
MANUFACTURING, NEWTON	10.9	11.5	12.9	14.1	15.3	16.6
MANUFACTURING, ORANGE	1.3	1.2	1.2	1.2	1.2	1.2
MANUFACTURING, PANOLA	1.5	1.0	1.1	1.1	1.1	1.2
MANUFACTURING, POLK*	1.1	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, RUSK	10.9	11.0	11.6	12.1	12.9	13.8
MANUFACTURING, SABINE	1.2	1.2	1.2	1.2	1.2	1.2
MANUFACTURING, SAN AUGUSTINE	2.8	2.8	2.8	2.8	2.8	2.8
MANUFACTURING, SHELBY	1.2	1.2	1.2	1.2	1.2	1.2
MANUFACTURING, SMITH*	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
MCCLELLAND WSC	1.0	1.0	1.0	1.0	1.0	1.0
MEEKER MWD	1.2	1.2	1.1	1.1	1.0	1.0
MELROSE WSC	2.0	1.8	1.7	1.5	1.4	1.3
MINDEN BRACHFIELD WSC	1.0	1.0	1.0	1.0	1.0	1.0
MINING, ANDERSON	1.4	1.2	1.2	1.3	1.7	2.2
MINING, ANGELINA	0.0	1.0	1.0	1.0	1.0	1.0
MINING, CHEROKEE	0.2	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, HENDERSON*	1.1	1.0	1.0	1.0	1.1	1.1
MINING, HOUSTON	1.0	1.0	1.0	1.0	1.0	1.0
MINING, JASPER	1.0	1.0	1.0	1.0	1.0	1.1
MINING, JEFFERSON	1.0	1.0	1.0	1.0	1.0	1.0
MINING, NACOGDOCHES	0.2	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	1.5	1.6	1.8	2.0	2.6	2.4
MINING, POLK*	1.0	1.0	1.2	1.6	3.3	7.5

*A single asterisk next to a WUG's name denotes that the WUG is split by more than one planning region.

Region I Water User Group (WUG) Management Supply Factor

	WUG MANAGEMENT SUPPLY FACTOR					
WUG NAME	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
MINING, RUSK	1.2	1.0	1.0	1.0	1.0	1.0
MINING, SABINE	1.5	1.6	1.9	2.1	2.5	2.9
MINING, SAN AUGUSTINE	0.5	1.0	1.3	1.6	2.1	2.9
MINING, SHELBY	1.0	1.0	1.1	1.4	1.2	1.6
MINING, SMITH*	1.4	1.6	1.6	1.5	1.5	1.5
MINING, TRINITY*	1.0	1.0	1.0	1.0	1.0	1.0
MINING, TYLER	1.0	1.0	1.0	1.0	1.0	1.0
MOORE STATION WSC	1.3	1.2	1.2	1.1	1.0	1.0
MOSCOW WSC*	1.4	1.2	1.2	1.1	1.1	1.0
MT ENTERPRISE WSC	1.0	1.0	1.0	1.0	1.0	1.0
MURCHISON	1.0	1.0	1.0	1.0	1.0	1.0
NACOGDOCHES	1.0	2.2	2.1	2.0	2.0	1.9
NECHES WSC	1.0	1.0	1.0	1.0	1.0	1.0
NEDERLAND	1.0	1.0	1.0	1.0	1.0	1.0
NEW LONDON	1.0	1.9	1.8	1.8	1.7	1.2
NEW PROSPECT WSC	1.0	1.0	1.0	1.0	1.0	1.0
NEW SUMMERFIELD	1.6	16.7	15.7	14.5	13.3	3.3
NEWTON	1.1	1.1	1.2	1.2	1.2	1.2
NORTH CHEROKEE WSC	1.0	7.7	7.3	6.8	6.3	2.0
NORTH HARDIN WSC	1.0	1.0	1.0	1.0	1.0	1.0
NORWOOD WSC	1.3	1.3	1.3	1.3	1.3	1.3
ORANGE	1.0	1.0	1.0	1.0	1.0	1.0
ORANGE COUNTY WCID 1	1.0	1.0	1.0	1.0	1.0	1.0
ORANGE COUNTY WCID 2	1.0	1.0	1.0	1.0	1.0	1.0
ORANGEFIELD WSC	1.1	1.1	1.1	1.1	1.1	1.1
OVERTON*	0.9	1.0	1.0	1.0	1.0	1.0
PALESTINE	1.0	1.1	1.1	1.1	1.1	1.1
PANOLA-BETHANY WSC*	1.0	1.1	1.0	1.0	1.0	1.0
PENNINGTON WSC*	1.3	1.3	1.3	1.4	1.4	1.3
PINEHURST	1.0	1.0	1.0	1.0	1.0	1.0
PINELAND	1.0	1.0	1.0	1.0	1.0	1.0
PLEASANT SPRINGS WSC	1.2	1.2	1.2	1.2	1.2	1.2
POLLOK-REDTOWN WSC	1.0	1.0	1.0	1.0	1.0	1.0
PORT ARTHUR	1.1	1.2	1.3	1.3	1.4	1.4
PORT NECHES	1.0	1.0	1.0	1.0	1.0	1.0
R P M WSC*	1.1	1.0	1.0	1.0	1.0	1.0
RAYBURN COUNTRY MUD	2.9	2.9	3.0	3.1	3.1	3.1
REDLAND WSC	3.8	3.9	3.7	3.6	3.4	3.3
RURAL WSC	2.3	2.4	2.5	2.5	2.5	2.5
RUSK	1.0	4.9	4.6	4.4	4.1	1.6
RUSK RURAL WSC	1.9	4.5	4.3	3.9	3.6	1.7
SAN AUGUSTINE	0.8	1.0	1.0	1.0	1.0	1.0
SAN AUGUSTINE RURAL WSC	1.0	1.0	1.0	1.0	1.0	1.0
SAND HILLS WSC	1.0	1.0	1.0	1.0	1.0	1.0
SILSBEE	1.7	1.7	1.8	1.8	1.8	1.7
SLOCUM WSC	1.0	1.0	1.0	1.0	1.0	1.0
SODA WSC*	1.0	1.1	1.1	1.1	1.1	1.1
SOUR LAKE	1.3	1.3	1.3	1.3	1.3	1.2

*A single asterisk next to a WUG's name denotes that the WUG is split by more than one planning region.

Region I Water User Group (WUG) Management Supply Factor

	WUG MANAGEMENT SUPPLY FACTOR					
WUG NAME	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
SOUTH JASPER COUNTY WSC	1.0	1.0	1.0	1.0	1.0	1.0
SOUTH NEWTON WSC	2.0	2.0	2.0	2.0	2.0	2.0
SOUTH RUSK COUNTY WSC	1.0	1.0	1.0	1.0	1.0	1.0
SOUTHERN UTILITIES*	1.1	1.1	1.1	1.1	1.1	1.1
STEAM ELECTRIC POWER, ANDERSON	1.0	1.0	1.0	1.0	1.0	1.0
STEAM ELECTRIC POWER, ANGELINA	4.8	4.8	4.8	4.8	4.8	4.8
STEAM ELECTRIC POWER, CHEROKEE	1.6	1.6	1.6	1.6	1.6	1.6
STEAM ELECTRIC POWER, HARDIN	1.0	1.0	1.0	1.0	1.0	1.0
STEAM ELECTRIC POWER, JEFFERSON	0.3	1.0	1.0	1.0	1.0	1.0
STEAM ELECTRIC POWER, NEWTON	2.3	2.3	2.3	2.3	2.3	2.3
STEAM ELECTRIC POWER, ORANGE	1.3	1.3	1.3	1.3	1.3	1.3
STEAM ELECTRIC POWER, RUSK	1.0	1.0	1.0	1.0	1.0	1.0
STEAM ELECTRIC POWER, TYLER	5.1	5.1	5.1	5.1	5.1	5.1
SWIFT WSC	1.5	1.4	1.3	1.2	1.1	1.0
TATUM	1.4	1.3	1.2	1.1	1.1	1.1
TDCJ BETO GURNEY & POWLEDGE UNITS	1.0	1.0	1.0	1.0	1.0	1.0
TDCJ COFFIELD MICHAEL	1.0	1.0	1.0	1.0	1.0	1.0
TDCJ EASTHAM UNIT	1.0	1.0	1.0	1.0	1.0	1.0
TENAHA	1.0	1.0	1.0	1.0	1.0	1.0
THE CONSOLIDATED WSC*	2.1	2.1	2.2	2.2	2.2	2.2
TIMPSON	3.2	3.1	2.9	2.8	2.7	2.6
TROUP	1.0	10.3	9.6	9.0	8.3	2.4
TUCKER WSC	1.0	1.0	1.0	1.0	1.0	1.0
TYLER COUNTY WSC	1.0	1.0	1.0	1.0	1.0	1.0
TYLER*	1.0	1.1	1.1	1.1	1.1	1.1
UPPER JASPER COUNTY WATER AUTHORITY	1.0	1.0	1.0	1.0	1.0	1.0
VIRGINIA HILL WSC*	1.6	1.5	1.4	1.2	1.1	1.0
WALNUT GROVE WSC	1.4	1.2	1.1	1.0	1.0	1.0
WALSTON SPRINGS WSC	1.1	1.1	1.2	1.2	1.2	1.2
WARREN WSC	3.2	3.3	3.4	3.4	3.5	3.5
WELLS	1.0	1.0	1.0	1.0	1.0	1.0
WEST GREGG SUD*	1.7	1.6	1.5	1.4	1.2	1.1
WEST HARDIN WSC*	1.0	1.0	1.0	1.0	1.0	1.0
WEST JACKSONVILLE WSC	1.0	1.0	1.0	1.0	1.0	1.0
WEST JEFFERSON COUNTY MWD	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
WILDWOOD POA	1.0	1.0	1.0	1.0	1.0	1.0
WODEN WSC	2.3	2.1	1.9	1.8	1.6	1.5
WOODLAWN WSC	1.0	1.0	1.0	1.0	1.0	1.0
WOODVILLE	4.8	4.9	5.0	5.0	5.0	5.0
WRIGHT CITY WSC	1.2	1.1	1.0	1.0	1.0	1.0
ZAVALLA	1.0	1.0	1.0	1.0	1.0	1.0

*A single asterisk next to a WUG's name denotes that the WUG is split by more than one planning region.

Region I Recommended Water Management Strategy (WMS) Supply Associated with a New or Amended Inter-Basin Transfer (IBT) Permit

IBT WMS supply is the portion of the total WMS benefitting WUGs that will require a new or amended IBT permit that is not considered exempt under the Texas Water Code § 11.085.

			IBT WMS SUPPLY (ACRE-FEET PER YEAR)					
WMS NAME	**SOURCE BASIN**	**RECIPIENT WUG BASIN**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
ANRA-COL - LAKE COLUMBIA	NECHES	SABINE	0	0	0	0	0	8
ANRA-COL - LAKE COLUMBIA	NECHES	SULPHUR	0	0	0	0	0	9
ANRA-COL - LAKE COLUMBIA	NECHES	TRINITY	0	0	0	0	0	31,343
UNM-ROR-NECHES RUN OF RIVER	NECHES	SABINE	0	0	0	0	6	6
UNM-ROR-NECHES RUN OF RIVER	NECHES	SULPHUR	0	0	0	0	10	8
UNM-ROR-NECHES RUN OF RIVER	NECHES	TRINITY	0	0	0	0	25,821	26,446

Region I Water User Groups (WUGs)
Recommended Water Management Strategy (WMS) Supply Associated with a
New or Amended Inter-Basin Transfer (IBT) Permit and Total Recommended Conservation WMS Supply

IBT WMS supply is the portion of the total WMS benefitting the WUG basin split listed that will require a new or amended IBT permit that is not considered exempt under the Texas Water Code § 11.085. Total conservation supply represents all conservation WMS volumes recommended within the WUG's region-basin geographic split.

BENEFITTING WUG NAME | BASIN	WMS SOURCE ORIGIN BASIN | WMS NAME	WMS SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
MINING, HENDERSON | NECHES BASIN	SULPHUR BASIN | WRIGHT PATMAN REALLOCATION FOR NTMWD, TRWD, AND UTRWD	0	0	0	0	0	0
	TOTAL RECOMMENDED IBT WMS SUPPLY	**0**	**0**	**0**	**0**	**0**	**0**
	TOTAL RECOMMENDED CONSERVATION	**0**	**0**	**0**	**0**	**0**	**0**

Region I Sponsored Recommended Water Management Strategy (WMS) Supplies Unallocated* to Water User Groups (WUG)

WMS NAME	WMS SPONSOR	SOURCE NAME	UNALLOCATED STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
AMWA ATHENS FISH HATCHERY REUSE	ATHENS MUNICIPAL WATER AUTHORITY	I | NECHES INDIRECT REUSE	2,872	2,872	2,872	2,872	2,078	626
ANRA-COL - LAKE COLUMBIA	ANGELINA & NECHES RIVER AUTHORITY	I | COLUMBIA LAKE/RESERVOIR	0	31,086	31,036	30,986	30,936	171
ANRA-COL - LAKE COLUMBIA	DALLAS	I | COLUMBIA LAKE/RESERVOIR	0	0	0	0	0	24,640
ANRA-GW-ANRA GROUNDWATER WELLS	ANGELINA & NECHES RIVER AUTHORITY	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	0	5,600	5,600	5,000	4,800	4,500
ANRA-RUN-OF-RIVER (SUBMITTED APPLICATION)	ANGELINA & NECHES RIVER AUTHORITY	I | NECHES RUN-OF-RIVER	7,024	1,788	1,788	1,788	1,775	1,766
CHER-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY (ANGELINA RIVER)	ANGELINA & NECHES RIVER AUTHORITY	I | NECHES RUN-OF-RIVER	0	19,991	20,000	20,000	20,000	20,000
HCWC PERMIT AMENDMENT	HOUSTON COUNTY WCID #1	I | HOUSTON COUNTY LAKE/RESERVOIR	2,750	2,645	2,540	2,435	2,330	2,225
LNVA-SRA-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)	LOWER NECHES VALLEY AUTHORITY	I | TOLEDO BEND LAKE/RESERVOIR	0	0	0	200,000	200,000	200,000
LNVA-WRR-BEAUMONT WEST REGIONAL RESERVOIR	LOWER NECHES VALLEY AUTHORITY	I | BEAUMONT WEST REGIONAL LAKE/RESERVOIR	0	7,700	7,700	7,700	7,700	7,700
NACN-LK - LAKE NACONICHE INFRASTRUCTURE	COUNTY-OTHER, NACOGDOCHES	I | LAKE NACONICHE LAKE/RESERVOIR	0	1,700	1,700	1,700	1,700	1,700
UNM-ROR-NECHES RUN OF RIVER	DALLAS	I | NECHES RUN-OF-RIVER	0	0	0	0	21,413	20,790
UNM-ROR-NECHES RUN OF RIVER	UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY	I | NECHES RUN-OF-RIVER	68,625	68,625	68,625	68,625	21,375	21,375
TOTAL UNALLOCATED STRATEGY SUPPLIES			**81,271**	**142,007**	**141,861**	**341,106**	**314,107**	**305,493**

* Strategy supplies created through the WMS that have not been assigned to a WUG will be allocated to the entity responsible for the water through an‘unassigned water volumes’ entity. Only strategy supplies associated with an 'unassigned water volume' entity are shown in this report, and may not represent all strategy supplies associated with the listed WMS.

Region I Water User Group (WUG) Strategy Supplies by Water Management Strategy (WMS) Type

WMS TYPE *	STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
GROUNDWATER WELLS & OTHER	227	8,001	8,856	10,012	11,420	13,692
INDIRECT REUSE	0	1,123	1,121	1,121	1,364	1,532
MUNICIPAL CONSERVATION	7,017	11,658	13,920	16,188	18,987	22,032
NEW MAJOR RESERVOIR	0	44,464	44,464	44,464	44,464	19,179
OTHER SURFACE WATER	17,224	185,545	203,504	212,933	218,594	222,111
OTHER CONSERVATION	0	0	0	0	0	0
SEAWATER DESALINATION	0	0	0	0	0	0
OTHER STRATEGIES	0	0	0	0	0	0
GROUNDWATER DESALINATION	0	0	0	0	0	0
CONJUNCTIVE USE	0	0	0	0	0	0
OTHER DIRECT REUSE	0	0	0	0	0	0
AQUIFER STORAGE & RECOVERY	0	0	0	0	0	0
IRRIGATION CONSERVATION	0	0	0	0	0	0
DIRECT POTABLE REUSE	0	0	0	0	0	0
DROUGHT MANAGEMENT	0	0	0	0	0	0
TOTAL STRATEGY SUPPLIES	**24,468**	**250,791**	**271,865**	**284,718**	**294,829**	**278,546**

* WMS type descriptions can be found on the interactive state water plan website at http://texasstatewaterplan.org/ using the 'View data for' drop-down menus to navigate to a specific WMS Type page. The data used to create each WMS type value is available in Appendix 3 of the Guidelines for Regional Water Planning Data Deliverable (Exhibit D) document at http://www.twdb.texas.gov/waterplanning/rwp/planningdocu/2021/doc/current_docs/contract_docs/ExhibitD.pdf

Region I Water User Group (WUG)
Recommended Water Management Strategy (WMS) Supplies by Source Type

SOURCE SUBTYPE*	STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
AQUIFER STORAGE & RECOVERY	0	0	0	0	0	0
GROUNDWATER	227	8,001	8,856	10,012	11,420	13,692
GROUNDWATER TOTAL STRATEGY SUPPLIES	**227**	**8,001**	**8,856**	**10,012**	**11,420**	**13,692**
DIRECT NON-POTABLE REUSE	0	0	0	0	0	0
DIRECT POTABLE REUSE	0	0	0	0	0	0
INDIRECT NON-POTABLE REUSE	0	0	0	0	0	0
INDIRECT POTABLE REUSE	0	1,123	1,121	1,121	1,364	1,532
REUSE TOTAL STRATEGY SUPPLIES	**0**	**1,123**	**1,121**	**1,121**	**1,364**	**1,532**
ATMOSPHERE	0	0	0	0	0	0
GULF OF MEXICO	0	0	0	0	0	0
LIVESTOCK LOCAL SUPPLY	0	0	0	0	0	0
OTHER LOCAL SUPPLY	0	0	0	0	0	0
RAINWATER HARVESTING	0	0	0	0	0	0
RESERVOIR	8,292	57,659	68,732	73,024	77,779	53,012
RESERVOIR SYSTEM	8,932	166,046	177,240	182,802	183,868	186,968
RUN-OF-RIVER	0	6,304	1,996	1,571	1,411	1,310
SURFACE WATERTOTAL STRATEGY SUPPLIES	**17,224**	**230,009**	**247,968**	**257,397**	**263,058**	**241,290**
REGION I TOTAL STRATEGY SUPPLIES	**17,451**	**239,133**	**257,945**	**268,530**	**275,842**	**256,514**

* A full list of source subtype definitions can be found in section 3 of the Guidelines for Regional Water Planning Data Deliverable (Exhibit D) document at http://www.twdb.texas.gov/waterplanning/rwp/planningdocu/2021/doc/current_docs/contract_docs/ExhibitD.pdf.

Region I Major Water Provider (MWP) Existing Sales and Transfers

Major Water Providers are entities of particular significance to a region's water supply as defined by the Regional Water Planning Group (RWPG), and may be a Water User Group (WUG) entity, Wholesale Water Provider (WWP) entity , or both (WUG/WWP).

Retail denotes WUG projected demands and existing water supplies used by the WUG. Wholesale denotes a WWP or WUG/WWP selling water to another entity.

ANGELINA & NECHES RIVER AUTHORITY - WWP	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
PROJECTED WHOLESALE CONTRACT DEMANDS	44,529	44,534	44,534	44,534	44,534	44,534
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**44,529**	**44,534**	**44,534**	**44,534**	**44,534**	**44,534**
GROUNDWATER SALES TO WHOLESALE CUSTOMERS	65	70	70	70	70	70
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**65**	**70**	**70**	**70**	**70**	**70**

ANGELINA NACOGDOCHES WCID #1 - WWP	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
PROJECTED WHOLESALE CONTRACT DEMANDS	5,000	5,000	13,289	13,289	13,289	13,289
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**5,000**	**5,000**	**13,289**	**13,289**	**13,289**	**13,289**
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	5,000	5,000	13,289	13,289	13,289	13,289
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**5,000**	**5,000**	**13,289**	**13,289**	**13,289**	**13,289**

ATHENS MUNICIPAL WATER AUTHORITY - WWP	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
PROJECTED WHOLESALE CONTRACT DEMANDS	5,271	5,649	5,877	6,211	8,878	11,972
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**5,271**	**5,649**	**5,877**	**6,211**	**8,878**	**11,972**
GROUNDWATER SALES TO WHOLESALE CUSTOMERS	886	886	886	886	886	886
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	4,385	4,763	4,991	5,325	5,606	5,520
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**5,271**	**5,649**	**5,877**	**6,211**	**6,492**	**6,406**

BEAUMONT - WUG/WWP	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
PROJECTED RETAIL WUG DEMANDS	30,788	32,110	33,623	35,671	38,168	41,012
PROJECTED WHOLESALE CONTRACT DEMANDS	3,680	4,340	5,150	5,697	5,714	5,732
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**34,468**	**36,450**	**38,773**	**41,368**	**43,882**	**46,744**
GROUNDWATER SALES TO RETAIL CUSTOMERS	9,500	9,500	9,500	9,500	9,500	9,500
SURFACE WATER SALES TO RETAIL CUSTOMERS	21,288	22,610	22,875	22,328	22,311	22,294
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	3,680	4,340	5,150	5,697	5,714	5,732
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**34,468**	**36,450**	**37,525**	**37,525**	**37,525**	**37,526**

HENDERSON - WUG/WWP	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
PROJECTED RETAIL WUG DEMANDS	3,741	4,098	4,454	4,859	5,301	5,764
PROJECTED WHOLESALE CONTRACT DEMANDS	29	29	29	29	29	29
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**3,770**	**4,127**	**4,483**	**4,888**	**5,330**	**5,793**
GROUNDWATER SALES TO RETAIL CUSTOMERS	2,866	2,866	2,866	2,866	2,866	2,866
SURFACE WATER SALES TO RETAIL CUSTOMERS	1,509	4,083	4,083	4,083	4,083	4,083
GROUNDWATER SALES TO WHOLESALE CUSTOMERS	28	28	28	28	28	28
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	1	1	1	1	1	1
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**4,404**	**6,978**	**6,978**	**6,978**	**6,978**	**6,978**

HOUSTON COUNTY WCID #1 - WWP	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**

Region I Major Water Provider (MWP) Existing Sales and Transfers

PROJECTED WHOLESALE CONTRACT DEMANDS	2,785	2,848	2,848	2,848	2,848	2,848
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**2,785**	**2,848**	**2,848**	**2,848**	**2,848**	**2,848**
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	2,266	2,329	2,329	2,329	2,329	2,329
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**2,266**	**2,329**	**2,329**	**2,329**	**2,329**	**2,329**

JACKSONVILLE - WUG/WWP	**WATER VOLUMES (ACRE-FEET PER YEAR)**					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
PROJECTED RETAIL WUG DEMANDS	3,045	3,247	3,457	3,745	4,076	4,440
PROJECTED WHOLESALE CONTRACT DEMANDS	1,593	1,686	1,774	1,906	2,060	2,233
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**4,638**	**4,933**	**5,231**	**5,651**	**6,136**	**6,673**
GROUNDWATER SALES TO RETAIL CUSTOMERS	914	974	1,037	1,124	1,223	1,332
SURFACE WATER SALES TO RETAIL CUSTOMERS	2,131	2,273	2,420	2,621	2,853	3,108
GROUNDWATER SALES TO WHOLESALE CUSTOMERS	480	507	533	573	618	671
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	1,113	1,179	1,241	1,333	1,442	1,562
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**4,638**	**4,933**	**5,231**	**5,651**	**6,136**	**6,673**

LOWER NECHES VALLEY AUTHORITY - WWP	**WATER VOLUMES (ACRE-FEET PER YEAR)**					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
PROJECTED WHOLESALE CONTRACT DEMANDS	425,909	427,553	429,499	431,682	433,750	434,487
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**425,909**	**427,553**	**429,499**	**431,682**	**433,750**	**434,487**
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	406,787	408,402	410,127	412,265	414,314	415,050
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**406,787**	**408,402**	**410,127**	**412,265**	**414,314**	**415,050**

LUFKIN - WUG/WWP	**WATER VOLUMES (ACRE-FEET PER YEAR)**					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
PROJECTED RETAIL WUG DEMANDS	7,253	7,545	7,792	8,073	8,382	8,668
PROJECTED WHOLESALE CONTRACT DEMANDS	49,082	21,126	21,126	21,126	21,126	21,126
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**56,335**	**28,671**	**28,918**	**29,199**	**29,508**	**29,794**
GROUNDWATER SALES TO RETAIL CUSTOMERS	4,352	4,527	4,675	4,844	5,029	4,186
SURFACE WATER SALES TO RETAIL CUSTOMERS	2,901	3,018	3,117	3,229	3,353	4,482
GROUNDWATER SALES TO WHOLESALE CUSTOMERS	13,289	13,315	13,315	13,315	13,315	13,315
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	35,793	7,811	7,811	7,811	7,811	7,811
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**56,335**	**28,671**	**28,918**	**29,199**	**29,508**	**29,794**

NACOGDOCHES - WUG/WWP	**WATER VOLUMES (ACRE-FEET PER YEAR)**					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
PROJECTED RETAIL WUG DEMANDS	6,868	7,514	8,177	8,945	9,818	10,742
PROJECTED WHOLESALE CONTRACT DEMANDS	2,963	2,984	2,984	2,984	2,984	2,984
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**9,831**	**10,498**	**11,161**	**11,929**	**12,802**	**13,726**
GROUNDWATER SALES TO RETAIL CUSTOMERS	1,965	2,188	2,425	2,702	3,022	3,370
SURFACE WATER SALES TO RETAIL CUSTOMERS	4,903	5,326	5,752	6,243	6,796	7,372
GROUNDWATER SALES TO WHOLESALE CUSTOMERS	1,381	1,394	1,397	1,398	1,400	1,402
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	1,582	1,591	1,588	1,587	1,585	1,583
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**9,831**	**10,499**	**11,162**	**11,930**	**12,803**	**13,727**

PANOLA COUNTY FWSD #1 - WWP	**WATER VOLUMES (ACRE-FEET PER YEAR)**					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
PROJECTED WHOLESALE CONTRACT DEMANDS	17,002	16,967	16,481	16,013	15,624	15,815
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**17,002**	**16,967**	**16,481**	**16,013**	**15,624**	**15,815**

Region I Major Water Provider (MWP) Existing Sales and Transfers

SURFACE WATER SALES TO WHOLESALE CUSTOMERS	17,002	16,967	16,481	16,013	15,624	15,815
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**17,002**	**16,967**	**16,481**	**16,013**	**15,624**	**15,815**

SABINE RIVER AUTHORITY - WWP	**WATER VOLUMES (ACRE-FEET PER YEAR)**					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
PROJECTED WHOLESALE CONTRACT DEMANDS	512,482	512,482	512,482	512,482	512,482	512,482
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**512,482**	**512,482**	**512,482**	**512,482**	**512,482**	**512,482**
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	499,343	472,640	469,585	466,299	462,823	462,734
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**499,343**	**472,640**	**469,585**	**466,299**	**462,823**	**462,734**

SOUTHERN UTILITIES - WUG/WWP	**WATER VOLUMES (ACRE-FEET PER YEAR)**					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
PROJECTED RETAIL WUG DEMANDS	8,827	9,265	9,793	10,579	11,438	12,408
PROJECTED WHOLESALE CONTRACT DEMANDS	282	282	282	282	282	282
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**9,109**	**9,547**	**10,075**	**10,861**	**11,720**	**12,690**
GROUNDWATER SALES TO RETAIL CUSTOMERS	8,492	8,920	9,432	10,198	11,036	11,980
SURFACE WATER SALES TO RETAIL CUSTOMERS	267	275	286	301	317	335
GROUNDWATER SALES TO WHOLESALE CUSTOMERS	282	282	282	282	282	282
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**9,041**	**9,477**	**10,000**	**10,781**	**11,635**	**12,597**

TYLER - WUG/WWP	**WATER VOLUMES (ACRE-FEET PER YEAR)**					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
PROJECTED RETAIL WUG DEMANDS	20,217	21,519	22,908	24,573	26,419	28,354
PROJECTED WHOLESALE CONTRACT DEMANDS	4,959	5,204	5,216	5,232	5,251	5,271
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**25,176**	**26,723**	**28,124**	**29,805**	**31,670**	**33,625**
GROUNDWATER SALES TO RETAIL CUSTOMERS	2,247	2,392	2,547	2,731	2,937	3,152
SURFACE WATER SALES TO RETAIL CUSTOMERS	17,978	19,134	20,368	21,851	23,493	25,215
GROUNDWATER SALES TO WHOLESALE CUSTOMERS	505	533	534	535	538	540
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	4,454	4,671	4,682	4,697	4,713	4,731
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**25,184**	**26,730**	**28,131**	**29,814**	**31,681**	**33,638**

UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY - WWP	**WATER VOLUMES (ACRE-FEET PER YEAR)**					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
PROJECTED WHOLESALE CONTRACT DEMANDS	210,247	210,224	210,202	210,184	210,169	210,169
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**210,247**	**210,224**	**210,202**	**210,184**	**210,169**	**210,169**
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	197,710	196,110	194,610	193,010	191,310	189,010
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**197,710**	**196,110**	**194,610**	**193,010**	**191,310**	**189,010**

Region I Major Water Provider (MWP) Water Management Strategy (WMS) Summary

MWPs are entities of significance to a region's water supply as defined by the Regional Water Planning Group (RWPG) and may be a Water User Group (WUG) entity, Wholesale Water Provider (WWP) entity, or both (WUG/WWP).'MWP Retail Customers' denotes recommended WMS supply used by the WUG. 'Transfers Related to Wholesale Customers' denotes a WWP or WUG/WWP selling or transferring recommended WMS supply to another entity. Supply associated with the MWP's wholesale transfers will only display if it is listed as the main seller in the State Water Planning database, even if multiple sellers are involved with the sale o water to WUGs. Unallocated water volumes represent MWP recommended WMS supply not currently allocated to a customer of the MWP.'Total MWP Related WMS Supply' will display if the MWP's WMS is related to more than one WMS supply type (retail, wholesale, and/or unallocated). Associated WMS Projects are listed when the MWP is one of the project's sponsors. Report contains draft data and is subject to change.

ANGELINA & NECHES RIVER AUTHORITY | ANRA-COL - LAKE COLUMBIA

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	44,464	44,464	44,464	44,464	19,179
RELATED UNALLOCATED WMS WATER VOLUMES	0	31,086	31,036	30,986	30,936	171
TOTAL MWP RELATED WMS SUPPLY	0	75,550	75,500	75,450	75,400	19,350
WMS RELATED MWP SPONSORED PROJECTS	**PROJECT DESCRIPTION**					
ANRA-COL-LAKE COLUMBIA	RESERVOIR CONSTRUCTION					
ANRA-WTP-ANRA TREATMENT PLANT AND DISTRIBUTION SYSTEM	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; NEW WATER TREATMENT PLANT					

ANGELINA & NECHES RIVER AUTHORITY | ANRA-GW-ANRA GROUNDWATER WELLS

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
RELATED UNALLOCATED WMS WATER VOLUMES	0	5,600	5,600	5,000	4,800	4,500
WMS RELATED MWP SPONSORED PROJECTS	**PROJECT DESCRIPTION**					
ANRA-GW-ANRA GROUNDWATER WELLS	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK					

ANGELINA & NECHES RIVER AUTHORITY | ANRA-RUN-OF-RIVER (SUBMITTED APPLICATION)

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	4,954	683	321	224	167
RELATED UNALLOCATED WMS WATER VOLUMES	7,024	1,788	1,788	1,788	1,775	1,766
TOTAL MWP RELATED WMS SUPPLY	7,024	6,742	2,471	2,109	1,999	1,933

ANGELINA & NECHES RIVER AUTHORITY | CHER-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY (ANGELINA RIVER)

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	247	210	147	84	40
RELATED UNALLOCATED WMS WATER VOLUMES	0	19,991	20,000	20,000	20,000	20,000
TOTAL MWP RELATED WMS SUPPLY	0	20,238	20,210	20,147	20,084	20,040
WMS RELATED MWP SPONSORED PROJECTS	**PROJECT DESCRIPTION**					
CHER-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY (ANGELINA RIVER)	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; NEW CONTRACT					

ANGELINA NACOGDOCHES WCID #1 | ANCD-VOL-VOLUMETRIC SURVEY AND NORMAL POOL ELEVATION ADJUSTMENT

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	0	5,600	5,600	5,600	5,600
WMS RELATED MWP SPONSORED PROJECTS	**PROJECT DESCRIPTION**					
ANCD-VOL-VOLUMETRIC SURVEY AND NORMAL POOL ELEVATION ADJUSTMENT	DREDGE TO RECOVER CAPACITY					

ATHENS MUNICIPAL WATER AUTHORITY | AMWA ATHENS FISH HATCHERY REUSE

	WATER VOLUMES (ACRE-FEET PER YEAR)

Region I Major Water Provider (MWP) Water Management Strategy (WMS) Summary

DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	0	0	0	794	2,246
RELATED UNALLOCATED WMS WATER VOLUMES	2,872	2,872	2,872	2,872	2,078	626
TOTAL MWP RELATED WMS SUPPLY	2,872	2,872	2,872	2,872	2,872	2,872
WMS RELATED MWP SPONSORED PROJECTS	**PROJECT DESCRIPTION**					
ATHENS MWA - WTP INFRASTRUCTURE IMPROVEMENTS	WATER TREATMENT PLANT EXPANSION					

ATHENS MUNICIPAL WATER AUTHORITY | ATHENS MWA - NEW WELL(S) IN CARRIZO-WILCOX AQUIFER

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	0	0	0	590	1,693
WMS RELATED MWP SPONSORED PROJECTS	**PROJECT DESCRIPTION**					
ATHENS MWA - NEW WELLS PHASE I	MULTIPLE WELLS/WELL FIELD					
ATHENS MWA - NEW WELLS PHASE II	SINGLE WELL					

BEAUMONT | BEAUMONT CONTRACT AMENDMENT

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
MWP RETAIL CUSTOMERS	0	0	0	0	228	2,249

BEAUMONT | JEFF-BEA-ADVANCED CONSERVATION

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
MWP RETAIL CUSTOMERS	2,027	3,425	4,202	5,112	6,171	7,382
WMS RELATED MWP SPONSORED PROJECTS	**PROJECT DESCRIPTION**					
JEFF-BEA-ADVANCED CONSERVATION	CONSERVATION - MUNICIPAL (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); DATA GATHERING/MONITORING TECHNOLOGY; WATER LOSS CONTROL					

HENDERSON | ANCD-VOL-VOLUMETRIC SURVEY AND NORMAL POOL ELEVATION ADJUSTMENT

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
MWP RETAIL CUSTOMERS	0	0	5,600	5,600	5,600	5,600

HENDERSON | WUG-CONS-MUNICIPAL CONSERVATION- HENDERSON

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
MWP RETAIL CUSTOMERS	83	148	179	235	283	334
WMS RELATED MWP SPONSORED PROJECTS	**PROJECT DESCRIPTION**					
WUG-CONS-MUNICIPAL CONSERVATION- HENDERSON	CONSERVATION - MUNICIPAL (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS)					

HOUSTON COUNTY WCID #1 | HCWC PERMIT AMENDMENT

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
RELATED UNALLOCATED WMS WATER VOLUMES	2,750	2,645	2,540	2,435	2,330	2,225

JACKSONVILLE | ANRA-COL - LAKE COLUMBIA

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
MWP RETAIL CUSTOMERS	0	4,275	4,275	4,275	4,275	4,275

Region I Major Water Provider (MWP) Water Management Strategy (WMS) Summary

WMS RELATED MWP SPONSORED PROJECTS	PROJECT DESCRIPTION
JACK-COL-SUPPLY FROM LAKE COLUMBIA	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; WATER TREATMEN PLANT EXPANSION

JACKSONVILLE | JACKSONVILLE - MUNICIPAL CONSERVATION						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
MWP RETAIL CUSTOMERS	50	85	110	129	152	178

LOWER NECHES VALLEY AUTHORITY | BEAUMONT CONTRACT AMENDMENT						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	0	0	0	228	2,249

LOWER NECHES VALLEY AUTHORITY | JASP-LTK-PURCHASE FROM LOWER NECHES VALLEY AUTHORITY (SAM RAYBURN)						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	8,932	8,932	8,932	8,932	8,932	8,932

LOWER NECHES VALLEY AUTHORITY | JEFF-CTR-PURCHASE FROM LOWER NECHES VALLEY AUTHORITY (SAM RAYBURN)						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	0	0	0	855	1,950

LOWER NECHES VALLEY AUTHORITY | JEFF-MFG-PURCHASE FROM LOWER NECHES VALLEY AUTHORITY (SAM RAYBURN)						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	143,513	143,497	143,479	143,462	143,446

LOWER NECHES VALLEY AUTHORITY | JEFF-SEP-PURCHASE FROM LOWER NECHES VALLEY AUTHORITY (SAM RAYBURN)						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	2,391	2,391	2,391	2,391	2,391

LOWER NECHES VALLEY AUTHORITY | LNVA-SRA-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
RELATED UNALLOCATED WMS WATER VOLUMES	0	0	0	200,000	200,000	200,000
WMS RELATED MWP SPONSORED PROJECTS	**PROJECT DESCRIPTION**					
LNVA-SRA-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK					

LOWER NECHES VALLEY AUTHORITY | LNVA-WRR-BEAUMONT WEST REGIONAL RESERVOIR						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
RELATED UNALLOCATED WMS WATER VOLUMES	0	7,700	7,700	7,700	7,700	7,700
WMS RELATED MWP SPONSORED PROJECTS	**PROJECT DESCRIPTION**					
LNVA-WRR-BEAUMONT WEST REGIONAL RESERVOIR	PUMP STATION; RESERVOIR CONSTRUCTION					

LOWER NECHES VALLEY AUTHORITY | NEW / EXPANDED CONTRACT WITH LNVA	
	WATER VOLUMES (ACRE-FEET PER YEAR)

Region I Major Water Provider (MWP) Water Management Strategy (WMS) Summary

DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	416	712	68,044	68,383	68,764	69,156
WMS RELATED MWP SPONSORED PROJECTS	**PROJECT DESCRIPTION**					
LNVA NECHES-TRINITY BASIN INTERCONNECT	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION					

LUFKIN | ANGELINA MANUFACTURING

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	1,625	1,625	1,625	1,625	1,625	1,625

LUFKIN | LUFKIN - MUNICIPAL CONSERVATION

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
MWP RETAIL CUSTOMERS	151	239	273	0	0	0

LUFKIN | LUFK-RAY SAM RAYBURN INFRASTRUCTURE

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
MWP RETAIL CUSTOMERS	0	11,210	22,420	28,000	28,000	28,000
WMS RELATED MWP SPONSORED PROJECTS	**PROJECT DESCRIPTION**					
LUFK-RAY-CONVEYANCE FROM SAM RAYBURN TO KURTH LAKE - PHASE 1	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; WATER TREATMEN PLANT EXPANSION					
LUFK-RAY-CONVEYANCE FROM SAM RAYBURN TO KURTH LAKE - PHASE 2	PUMP STATION; WATER TREATMENT PLANT EXPANSION					
LUFK-RAY-CONVEYANCE FROM SAM RAYBURN TO KURTH LAKE - PHASE 3	PUMP STATION					

NACOGDOCHES | ANRA-COL - LAKE COLUMBIA

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
MWP RETAIL CUSTOMERS	0	8,551	8,551	8,551	8,551	8,551
WMS RELATED MWP SPONSORED PROJECTS	**PROJECT DESCRIPTION**					
NACP-COL-LAKE COLUMBIA TO NACOGDOCHES RAW WATER TRANSMISSION SYSTEM	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; WATER TREATMEN PLANT EXPANSION					

NACOGDOCHES | WUG-CONS-MUNICIPAL CONSERVATION- NACOGDOCHES

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
MWP RETAIL CUSTOMERS	247	426	532	656	802	966
WMS RELATED MWP SPONSORED PROJECTS	**PROJECT DESCRIPTION**					
WUG-CONS-MUNICIPAL CONSERVATION- NACOGDOCHES	CONSERVATION - MUNICIPAL (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS)					

PANOLA COUNTY FWSD #1 | NO RECOMMENDED WMS SUPPLY RELATED TO MWP

SABINE RIVER AUTHORITY | CENT-TOL-PIPELINE FROM TOLEDO BEND TO LAKE CENTER

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	0	2,242	2,242	2,242	2,242

SABINE RIVER AUTHORITY | EAST TEXAS TRANSFER

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070

Region I Major Water Provider (MWP) Water Management Strategy (WMS) Summary

TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	0	0	250,000	250,000	250,000
WMS RELATED MWP SPONSORED PROJECTS	**PROJECT DESCRIPTION**					
EAST TEXAS TRANSFER	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION					

SABINE RIVER AUTHORITY | LNVA-SRA-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	0	0	200,000	200,000	200,000

SABINE RIVER AUTHORITY | NEWTON MINING - TRANSFER FROM SRA						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	115	59	0	0	0	0

SABINE RIVER AUTHORITY | ORAN-IRR-PURCHASE FROM SABINE RIVER AUTHORITY (SABINE RIVER)						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	526	526	526	526	526

SABINE RIVER AUTHORITY | RUSK-SEP-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	1,103	1,103	1,103	1,103	1,103

SABINE RIVER AUTHORITY | SAUG-LTK-PURCHASE FROM SRA (TOLEDO BEND)						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	1,539	1,774	2,048	2,349	2,349

SABINE RIVER AUTHORITY | SHEL-LTK-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	6,491	8,761	11,524	14,896	19,006	19,006

SABINE RIVER AUTHORITY | SHEL-SHW-PURCHASE FROM CENTER						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	61	68	77	87	97	105

SOUTHERN UTILITIES | WUG-CONS-MUNICIPAL CONSERVATION-SOUTHERN UTILITIES						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
MWP RETAIL CUSTOMERS	514	866	1,058	1,279	1,527	1,803
WMS RELATED MWP SPONSORED PROJECTS	**PROJECT DESCRIPTION**					
WUG-CONS-MUNICIPAL CONSERVATION-SOUTHERN UTILITIES	CONSERVATION - MUNICIPAL (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS)					

TYLER | SMTH-WTH-PURCHASE FROM CITY OF TYLER (LAKE PALESTINE/LAKE TYLER/CARRIZO-WILCOX)						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	0	0	0	39	257

Region I Major Water Provider (MWP) Water Management Strategy (WMS) Summary

TYLER | TYLER-LAKE PALESTINE						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	804	1,251	2,081	2,588	3,079
WMS RELATED MWP SPONSORED PROJECTS	**PROJECT DESCRIPTION**					
TYLR-PAL-CITY OF TYLER - LAKE PALESTINE EXPANSION	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; WATER TREATMENT PLANT EXPANSION					

TYLER | WUG-CONS-MUNICIPAL CONSERVATION-TYLER						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
MWP RETAIL CUSTOMERS	657	1,101	1,338	1,613	1,924	2,268
WMS RELATED MWP SPONSORED PROJECTS	**PROJECT DESCRIPTION**					
WUG-CONS-MUNICIPAL CONSERVATION-TYLER	CONSERVATION - MUNICIPAL (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS)					

UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY | UNM-ROR-NECHES RUN OF RIVER						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
RELATED UNALLOCATED WMS WATER VOLUMES	68,625	68,625	68,625	68,625	21,375	21,375
WMS RELATED MWP SPONSORED PROJECTS	**PROJECT DESCRIPTION**					
UNM-LP-RUN OF RIVER, NECHES WITH LAKE PALESTINE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK					

Appendix 1-A

Species of Special Concern in the East Texas Regional Water Planning Area

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
DL, PDL	Federally Delisted/Proposed for Delisting
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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2019 Species of Special Concern

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	Cajun Chorus Frog				•		•	•	•	•				•			•		•		•	•	•
	Southern Crawfish Frog			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Southern Dusky Salamander			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Strecker's Chorus Frog			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Woodhouse's Toad			•	•		•		•	•		•	•	•	•	•	•	•			•	•	
Birds	Bachman's Sparrow		T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Bald Eagle		T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Black Rail	PT		•				•	•		•												
	Franklin's Gull			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Interior Least Tern	LE	E	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•
	Piping Plover	LT	T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Red Knot	LT		•				•	•		•												
	Red-cockaded Woodpecker	LE	E		•	•	•		•	•	•	•	•	•		•	•	•	•	•		•	•
	Reddish Egret		T				•				•												
	Swallow-tailed kite		T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Western Burrowing Owl			•				•															
	White-faced Ibis		T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Whooping Crane	LE	E					•															
	Wood Stork		T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Crustaceans	Blackbelted Crayfish			•	•	•		•	•	•		•				•	•	•	•	•	•	•	•
	Neches Crayfish				•				•			•				•						•	
	Big Thicket Burrowing 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
Fish	Alligator Gar										•			•									
	American Eel						•			•	•		•	•									•
	Blackspot Shiner			•	•	•	•		•	•		•	•		•	•	•	•	•	•	•	•	•
	Blue Sucker		T							•					•								•
	Chub Shiner															•							
	Ironcolor Shiner			•			•	•															•
	Mississippi Silvery Minnow												•										
	Oceanic Whitetip Shark	LT	T								•			•									
	Paddlefish		T		•	•			•	•			•		•	•		•	•	•		•	•
	River Darter				•					•		•	•						•				•
	Sabine Shiner			•	•	•	•		•	•	•	•	•	•	•	•	•	•	•		•	•	•
	Saltmarsh Topminnow										•			•									
	Shortfin Mako Shark		T								•			•									
	Silverband Shiner					•				•			•			•							•
	Southern Flounder										•			•									
	Taillight Shiner														•								
	Western Creek Chubsucker		T	•	•	•	•			•		•	•		•	•	•						•
	Western Sand Darter						•			•			•		•		•						•
Insects	A Caddisfly			•						•													
	A Purse Casemaker Caddisfly			•																			
	American Bumblebee			•	•	•	•		•	•	•	•		•	•	•		•		•	•		•
	Bay skipper										•												
	Comanche Harvester Ant																•				•		
	Holzenthal's Philopotamid Caddisfly			•																			

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
Insects	Morse's Net-Spinning Caddisfly			•																			
	Cotalpa Conclamara (No accepted common name)			•																			•
	Neotrichia Mobilensis (No accepted common name)						•			•						•							
	Somatochlora Margarita (No accepted common name)			•	•		•		•	•								•	•			•	•
	Texas emerald dragonfly			•	•		•		•	•								•	•			•	•
Mammals	American Badger			•		•		•	•												•	•	
	Big Brown Bat			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Black Bear		T	•		•		•		•			•			•	•	•		•	•		
	Blue Whale										•			•									
	Eastern Red Bat			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Eastern Spotted Skunk			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Gulf of Mexico Bryde's Whale										•			•									
	Hoary Bat			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Humpback Whale	LE	E								•			•									
	Long-tailed Weasel			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Louisiana Black Bear		T	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•		•	•	•
	Mexican Free-tailed Bat			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Mink			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Mountain Lion			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	North Atlantic right whale	LE	E								•			•									
	Plains Spotted Skunk			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Prairie Vole						•																
	Rafinesque's Big-eared Bat		T		•	•	•		•	•	•	•	•	•	•	•	•	•	•	•		•	•
	Sei Whale	LE	E								•			•									
	Southeastern Myotis Bat			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Sperm Whale	LE	E								•			•									
	Southern Short-tailed Shrew			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

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
Mammals	Swamp Rabbit			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Thirteen-lined Ground Squirrel			•				•															
	Tricolored Bat			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Western Hog-nosed Skunk						•				•												
	Woodland Vole			•	•	•		•	•	•		•	•		•	•	•	•	•	•	•	•	•
Mollusks	Louisiana Pigtoe		T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Fusconaia Chunii (No accepted common name)							•	•													•	
	Sandbank Pocketbook		T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Southern Hickorynut		T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Texas Heelsplitter		T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Texas Pigtoe		T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Plants	Arkansas Oak									•													
	Awnless Bluestem										•												
	Barbed Rattlesnake-root				•	•	•			•		•	•			•	•	•	•	•			•
	Bog Coneflower				•					•			•					•		•			
	Boynton's Oak				•											•							
	Bristle Nailwort											•											
	Carrizo Sands Leather-flower					•		•													•		
	Centerville Brazos-mint			•				•	•														
	Chapman's Orchid						•				•			•									•
	Chapman's Yellow-eyed Grass							•															
	Clasping Twistflower			•		•						•						•	•		•		
	Corkwood										•												
	Cypress Knee Sedge									•											•		

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	Drummond's Yellow-eyed Grass				•					•			•										•
	Earth Fruit	LT	T	•											•								
	Florida Pinkroot															•							
	Giant Spiral Ladies'-tresses						•						•										
	Goldenwave Tickseed			•		•		•	•			•	•								•	•	
	Incised Groovebur			•	•					•			•					•					
	Indianola Beakrush						•			•													
	Large Beakrush				•			•	•	•			•										•
	Long-sepaled False Dragon-head						•			•			•	•									•
	Lundell's Whitlow-wort																						
	Mohlenbrock's Sedge			•		•	•	•	•			•	•				•		•	•	•		•
	Navasota False Foxglove																						•
	Navasota Ladies'-tresses	LE	E							•													
	Neches River Rose-mallow	LT	T			•			•			•										•	
	Nixon's Dwarf Hawthorn											•					•						
	Nodding Yucca									•			•										
	Oklahoma Grass Pink						•	•				•				•			•				•
	Panicled Indigobush			•	•	•	•	•	•	•		•	•			•	•				•	•	•
	Roughleaf Yellow-eyed Grass				•					•			•					•					
	Rough-stem Aster			•				•													•		
	Sandhill Woolywhite			•																			
	Scarlet Catchfly						•			•	•		•			•		•		•			•
	Shinner's Sunflower												•										
	Slender Gay-feather				•		•			•			•	•				•	•				•

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	Small-headed Pipewort			•				•															
	Smooth Indigobush						•			•													
	Southern Lady's-slipper											•	•					•	•	•			•
	Soxman's Milkvetch			•	•	•	•	•	•			•					•				•		
	Texas Golden Gladecress	LE	E									•						•	•				
	Texas Ladies'-tresses																						•
	Texas Prairie Dawn	LE	E																			•	
	Texas Sandmint			•				•													•		
	Texas Screwstem				•		•			•		•	•			•			•				•
	Texas Sunnybell						•			•													•
	Texas Three-birds Orchid								•														
	Texas Trailing Phlox	LE	E				•									•							•
	Texas Trillium				•	•			•	•		•			•		•				•		
	Tiny Bog Button									•			•										
	Topeka Purple-coneflower															•							
	White Bladderpod	LE	E																•				
	White Firewheel						•						•										•
	Yellow Fringeless Orchid				•					•			•										
Reptiles	Alligator Snapping Turtle		T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Common Garter Snake				•				•		•												
	Eastern Box Turtle			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Green Sea Turtle	LT	T								•												
	Kemp's Ridley Sea Turtle	LE	E								•												
	Leatherback Sea Turtle	LE	E								•												

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	Loggerhead Sea Turtle	LT	T								•												
	Louisiana Pine Snake	LT	T	•	•	•	•			•		•	•			•		•	•		•	•	•
	Northern Scarlet Snake		T	•	•	•	•	•		•	•		•	•			•	•			•		•
	Slender Glass Lizard			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Smooth Softshell				•		•			•	•		•		•	•	•	•	•	•			•
	Texas Diamondback Terrapin										•			•									
	Texas Horned Lizard		T	•	•	•	•	•	•		•	•		•	•		•	•	•	•	•	•	
	Texas Indigo Snake		T										•										
	Timber (canebrake) Rattlesnake		T	•	•		•	•	•	•	•	•	•		•	•		•	•	•	•	•	•
	Western Box Turtle			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•
	Western Chicken Turtle			•																			
	Western Hognose Snake			•		•		•				•									•		

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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 2017.

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PWS Name	PWS Code	Person Filing Name	Report Period Start	Report Period End	Surface Water Percentage	Ground Water Percentage	Retail Population Served	Wholesale Population Served	Main Lines Miles	Main Lines Miles AS
Beechwood WSC	TX2020014	gregory revere	01/01/17	12/31/17	100.00	0.00	1,143	0	11	5
BIG THICKET RETREAT	TX1000053	Boyd McDaniel	01/01/17	12/31/17	0.00	100.00	114	0	5	3
Cardinal Meadows Improvement District	TX1230020	Joshua Armfield	01/01/17	12/31/17	0.00	0.00	164	0	2	1
City of Beaumont Water Utility Dept	TX1230001	John Pippins III	01/01/17	12/31/17	77.03	22.97	118,299	14,282	854	5
City of Bridge City	TX1810001	mike lund	01/01/17	12/31/17	0.00	100.00	11,571	90	90	3
City of Carthage	TX1830001	Michael Delaney	01/01/17	12/31/17	100.00	0.00	6,756	5,629	331	3
City of Center	TX2100001	Marcus Cameron	01/01/17	12/31/17	100.00	0.00	5,193	0	84	5
City of Cushing	TX1740001	Brian Delafield	01/01/17	12/31/17	0.00	0.00	967	0	13	3
City of Groves	TX1230012	David Molbert	01/01/17	12/31/17	100.00	0.00	17,265	0	98	4
City of Henderson	TX2010001	Matt Linthicum	01/01/17	12/31/17	11.20	88.80	13,416	0	125	5
City of Huntington	TX0030002	Shane Price	01/01/17	12/31/17	0.00	100.00	2,106	0	38	1
City of Jacksonville	TX0370002	Brian Gay	01/01/17	12/31/17	15.00	85.00	14,544	13,204	130	4
City of Jasper	TX1210001	erik rogers	01/01/17	12/31/17	0.00	100.00	11,322	0	195	3
City of Lufkin	TX0030004	Gary Barton	01/01/17	12/31/17	0.00	100.00	47,988	7,161	695	5
City of Nacogdoches	TX1740003	Bart Allen	01/01/17	12/31/17	85.00	15.00	37,000	0	350	4
City of Nederland	TX1230006	Robert Sangster	01/01/17	12/31/17	100.00	0.00	17,565	1,176	109	5
City of Orange	TX1810004	Timmy Campbell	01/01/17	12/31/17	0.00	100.00	18,595	0	170	1
City of Palestine	TX0010001	Scott Swanson	01/01/17	12/31/17	100.00	0.00	17,345	1,092	275	2
City of Port Arthur	TX1230009	Clyde Trahan	01/01/17	12/31/17	100.00	0.00	53,818	0	350	3
City of Port Neches	TX1230010	PHILLIP PRYOR	01/01/17	12/31/17	100.00	0.00	13,601	0	250	4
City of Reklaw	TX0370039	Francisco Hernandez	01/01/17	12/31/17	0.00	100.00	615	0	20	3
City of San Augustine	TX2030001	chris anding	01/01/17	12/31/17	100.00	0.00	2,108	0	29	3
City of Silsbee	TX1000002	Tammy Kirkindall	01/01/17	12/31/17	0.00	100.00	9,915	0	25	1
City of Tyler	TX2120004	Katherine Dietz	01/01/17	12/31/17	99.00	1.00	103,700	160,090	742	2
Evadale WCID 1	TX1210011	Kenny Gibson	01/01/17	12/01/17	0.00	0.00	792	0	8	1
G-M WSC	TX2020067	Debra Daniel	01/01/17	12/31/17	80.00	20.00	10,080	0	45	1
Holmwood Angelina & Neches River Authori	TX1210020	Chris Key	01/01/17	12/31/17	0.00	100.00	444	0	6	5
Hudson WSC	TX0030023	Brad Naron	12/01/17	12/31/17	0.00	100.00	10,146	0	120	1
Jasper County WCID 1	TX1210003	LaVerne Carrell	01/01/17	12/31/17	0.00	100.00	3,000	0	18	1
Jefferson County WCID 10	TX1230003	Thomas McDonald	01/01/17	12/31/17	100.00	0.00	5,500	0	27	4
Lumberton MUD	TX1000035	Robb Starr	01/01/17	12/31/17	0.00	100.00	27,195	0	289	3
Orange County WCID 1	TX1810005	peggy jackson	01/01/17	12/31/17	0.00	100.00	17,262	0	110	4
Orange County WCID 2	TX1810006	Jason Lawson	01/01/17	12/31/17	0.00	100.00	3,440	0	31	5
Pleasant Springs WSC	TX0010026	sam martine	01/01/17	12/31/17	100.00	0.00	975	0	10	1
Rayburn Country MUD	TX1210014	Gregory Alexander	01/01/17	12/31/17	0.00	100.00	2,664	0	52	3
Southern Utilities	TX2120063	Siglinda West	01/01/17	12/31/17	0.00	100.00	58,335	0	420	4

PWS Name	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	Production Meter Accuracy Percentage
Beechwood WSC	0	506	46	60	4	G	G	24,776,000	5	100.00
BIG THICKET RETREAT	0	38	8	50	5	G	G	3,066,000	5	99.90
Cardinal Meadows Improvement District	0	63	36	45	1	G	G	0	N/A	0.00
City of Beaumont Water Utility Dept	4645	61,971	73	55	4	G	G	7,550,298,028	4	100.00
City of Bridge City	30	3,857	43	50	4	G	G	301,818,000	4	90.00
City of Carthage	9	4,080	12	42	3	G	G	657,616,000	4	95.00
City of Center	0	2,417	29	70	3	G	G	1,075,756,000	5	99.00
City of Cushing	0	419	32	60	2	G	G	28,870,000	3	100.00
City of Groves	0	6,532	67	54	3	G	G	561,292,000	5	99.00
City of Henderson	0	6,353	51	50	4	G	G	798,960,000	5	100.30
City of Huntington	0	1,038	27	50	2	G	G	82,000,000	3	99.00
City of Jacksonville	4401	6,134	47	80	3	G	G	1,050,994,000	5	99.00
City of Jasper	0	4,726	24	80	2	G	G	498,816,000	5	95.00
City of Lufkin	2615	17,450	25	70	3	G	G	2,593,076,000	4	98.00
City of Nacogdoches	14	18,774	54	60	3	G	G	2,706,665,000	4	98.00
City of Nederland	0	8,817	81	56	2	G	G	722,640,000	5	98.00
City of Orange	0	8,962	53	60	2	G	G	963,692,000	5	96.00
City of Palestine	2	6,938	25	82	1	G	G	946,129,000	4	99.00
City of Port Arthur	0	22,136	63	55	3	G	G	6,043,711,100	5	98.00
City of Port Neches	0	5,419	22	45	4	G	G	465,526,000	2	90.00
City of Reklaw	0	209	11	73	2	G	G	15,086,000	4	100.00
City of San Augustine	0	1,109	38	65	2	G	G	190,103,000	5	100.00
City of Silsbee	0	3,305	132	59	3	G	G	261,857,700	3	101.00
City of Tyler	3	35,942	48	60	1	G	G	8,244,245,000	4	98.00
Evadale WCID 1	0	263	33	45	2	G	G	14,282,890	5	98.00
G-M WSC	0	3,360	75	70	3	G	G	141,936,220	4	99.00
Holmwood Angelina & Neches River Authori	0	159	28	70	3	G	G	11,850,088	5	101.00
Hudson WSC	0	3,381	28	65	1	G	G	253,816,000	1	98.00
Jasper County WCID 1	0	1,112	62	60	2	G	G	68,651,900	3	99.50
Jefferson County WCID 10	0	1,582	59	48	4	G	G	175,230,000	4	97.00
Lumberton MUD	0	9,065	31	56	4	G	G	693,143,500	5	99.90
Orange County WCID 1	0	6,374	58	56	3	G	G	413,999,000	5	100.00
Orange County WCID 2	0	2,050	66	55	4	G	G	112,874,000	4	99.00
Pleasant Springs WSC	0	325	33	80	2	G	G	0	N/A	0.00
Rayburn Country MUD	0	888	17	65	3	G	G	105,508,000	5	99.00
Southern Utilities	2	19,699	47	104	4	G	G	2,809,361,000	5	99.90

PWS Name	Production Meter Accuracy Percentage AS	Corrected Input Volume (c)	System Input Volume (c)	Billed Metered (c)	Billed Metered AS	Billed Unmetered	Billed Unmetered AS	Unbilled Metered	Unbilled Metered AS
Beechwood WSC	4.00	24,776,000	24,776,000	22,789,000	3	0	3	0	2
BIG THICKET RETREAT	0.00	3,069,069	3,069,069	2,021,000	5	0	5	0	5
Cardinal Meadows Improvement District	4.00	0	4,822,737	4,536,302	2	0	5	0	2
City of Beaumont Water Utility Dept	5.00	7,550,298,028	6,926,128,230	5,098,955,300	4	0	3	192,623,688	5
City of Bridge City	5.00	335,353,333	332,766,667	64,589,000	3	0	3	75,000	3
City of Carthage	4.00	692,227,368	615,070,021	646,339,600	3	0	1	45,875	2
City of Center	5.00	1,086,622,222	1,048,107,696	811,982,400	4	0	1	105,133,400	2
City of Cushing	2.00	28,870,000	28,870,000	20,541,200	3	0	1	0	1
City of Groves	2.00	566,961,616	566,961,616	436,994,600	3	26,655,400	1	0	1
City of Henderson	0.00	796,570,289	796,570,289	614,721,000	4	0	4	18,960,400	4
City of Huntington	5.00	82,828,283	82,828,283	78,775,922	3	0	1	0	1
City of Jacksonville	3.00	1,061,610,101	844,277,680	570,152,070	4	0	1	0	1
City of Jasper	4.00	525,069,474	525,069,474	321,101,892	3	0	2	29,840,469	3
City of Lufkin	0.00	2,645,995,918	2,498,488,286	1,972,683,160	4	0	1	28,113,000	3
City of Nacogdoches	0.00	2,761,903,061	2,729,150,714	2,119,804,900	3	350,000	2	98,000,000	3
City of Nederland	4.00	737,387,755	701,710,204	570,235,000	4	0	1	0	1
City of Orange	5.00	1,003,845,833	1,003,845,833	535,415,000	5	0	1	0	1
City of Palestine	4.00	955,685,859	913,507,071	743,162,000	4	0	1	0	1
City of Port Arthur	0.00	6,167,052,143	6,167,052,143	3,665,511,000	1	0	1	383,502,600	3
City of Port Neches	5.00	517,251,111	517,251,111	380,262,100	3	0	3	22,430,000	3
City of Reklaw	5.00	15,086,000	15,086,000	10,211,200	2	0	1	0	1
City of San Augustine	5.00	190,103,000	121,881,947	93,232,000	2	0	3	17,474,000	5
City of Silsbee	4.00	259,265,050	259,265,050	204,265,300	2	0	1	0	2
City of Tyler	5.00	8,412,494,898	8,092,982,653	6,269,793,000	4	814,955	1	540,422,110	3
Evadale WCID 1	0.00	14,574,378	15,607,418	14,282,890	4	0	5	0	5
G-M WSC	2.00	143,369,919	190,412,414	127,811,020	4	0	1	0	1
Holmwood Angelina & Neches River Authori	0.00	11,732,760	11,732,760	10,062,046	3	0	5	121,487	2
Hudson WSC	2.00	258,995,918	258,995,918	248,000,000	4	0	1	0	1
Jasper County WCID 1	4.00	68,996,884	68,996,884	57,838,000	3	5,000	3	8,673,700	4
Jefferson County WCID 10	4.00	180,649,485	180,649,485	133,936,000	3	0	3	0	3
Lumberton MUD	5.00	693,837,337	693,837,337	621,409,000	3	0	5	0	1
Orange County WCID 1	4.00	413,999,000	413,999,000	306,594,740	5	1,320,000	4	528,502	4
Orange County WCID 2	4.00	114,014,141	114,014,141	88,403,000	4	0	5	0	3
Pleasant Springs WSC	5.00	0	31,005,000	27,748,000	2	0	5	0	5
Rayburn Country MUD	4.00	106,573,737	106,573,737	54,338,100	4	0	1	0	1
Southern Utilities	5.00	2,812,173,173	2,860,998,999	1,789,418,000	4	0	5	0	4

PWS Name	Unbilled Unmetered (c)	Unbilled Unmetered AS	Total Authorized Consumption (c)	Water Losses (c)	Customer Meter Accuracy Percentage	Customer Meter Accuracy Percentage AS	Customer Meter Accuracy Loss (c)	Data Handling Discrepancy	Data Handling Discrepancy AS
Beechwood WSC	309,700	3	23,098,700	1,677,300	98	2	465,082	0	2
BIG THICKET RETREAT	38,363	5	2,059,363	1,009,706	100	5	2,023	0	5
Cardinal Meadows Improvement District	60,284	3	4,596,586	226,151	99	1	45,821	0	2
City of Beaumont Water Utility Dept	19,890,000	3	5,311,468,988	1,614,659,242	99	4	51,504,599	0	4
City of Bridge City	4,159,583	3	68,823,583	263,943,083	90	3	7,176,556	50000	3
City of Carthage	7,688,375	1	654,073,850	-39,003,829	98	2	13,190,604	1615850	1
City of Center	18,396,583	2	935,512,383	112,595,313	95	3	42,735,916	0	1
City of Cushing	360,875	1	20,902,075	7,967,925	97	1	635,295	0	1
City of Groves	57,453,173	4	521,103,173	45,858,443	95	2	22,999,716	0	1
City of Henderson	30,000,000	4	663,681,400	132,888,889	98	3	12,545,327	0	4
City of Huntington	1,035,354	1	79,811,276	3,017,007	99	1	795,716	0	1
City of Jacksonville	8,640,000	2	578,792,070	265,485,610	92	2	49,578,441	0	4
City of Jasper	6,563,368	3	357,505,729	167,563,744	95	2	16,900,100	0	4
City of Lufkin	31,231,104	1	2,032,027,264	466,461,022	95	4	103,825,429	0	3
City of Nacogdoches	34,114,384	3	2,252,269,284	476,881,430	98	3	43,261,324	6500000	2
City of Nederland	8,771,378	1	579,006,378	122,703,827	98	3	11,637,449	0	1
City of Orange	12,548,073	1	547,963,073	455,882,760	96	2	22,308,958	0	1
City of Palestine	11,418,838	2	754,580,838	158,926,232	95	2	39,113,789	0	1
City of Port Arthur	77,088,152	3	4,126,101,752	2,040,950,391	95	3	192,921,632	0	2
City of Port Neches	6,465,639	4	409,157,739	108,093,372	96	4	15,844,254	26500000	2
City of Reklaw	4,123,850	1	14,335,050	750,950	93	2	768,585	0	1
City of San Augustine	1,523,524	3	112,229,524	9,652,423	95	2	4,906,947	0	3
City of Silsbee	3,240,813	3	207,506,113	51,758,936	98	2	4,168,680	0	4
City of Tyler	160,456,594	3	6,971,486,659	1,121,495,994	95	2	329,989,105	157448250	4
Evadale WCID 1	221,574	5	14,504,464	1,102,954	100	1	0	0	2
G-M WSC	2,380,155	3	130,191,175	60,221,239	95	4	6,726,896	0	1
Holmwood Angelina & Neches River Authori	0	4	10,183,533	1,549,227	98	2	205,348	0	2
Hudson WSC	3,237,449	1	251,237,449	7,758,469	95	1	13,052,632	0	1
Jasper County WCID 1	862,461	1	67,379,161	1,617,723	100	2	115,908	5000	4
Jefferson County WCID 10	2,258,119	2	136,194,119	44,455,366	95	3	7,049,263	0	2
Lumberton MUD	38,293,572	3	659,702,572	34,134,765	97	3	19,218,835	8374120	2
Orange County WCID 1	34,263,600	5	342,706,842	71,292,158	99	4	3,096,917	0	5
Orange County WCID 2	16,371,000	4	104,774,000	9,240,141	100	3	0	0	5
Pleasant Springs WSC	387,563	3	28,135,563	2,869,438	96	2	1,156,167	0	1
Rayburn Country MUD	1,332,172	1	55,670,272	50,903,466	97	5	1,680,560	0	1
Southern Utilities	35,762,487	3	1,825,180,487	1,035,818,512	99	4	18,074,929	100	4

PWS Name	Unauthorized Consumption (c)	Unauthorized Consumption AS	Total Apparent Losses (c)	Reported Breaks Leaks	Reported Breaks Leaks AS	Unreported Loss (c)	Unreported Loss AS	Total Real Losses (c)	Apparent Plus Real Losses(c)
Beechwood WSC	20,000	4	485,082	250,000	5	942,218	2	1,192,218	1,677,300
BIG THICKET RETREAT	7,673	5	9,696	196,275	5	803,735	4	1,000,010	1,009,706
Cardinal Meadows Improvement District	12,057	2	57,878	0	3	168,273	1	168,273	226,151
City of Beaumont Water Utility Dept	17,315,321	2	68,819,920	134,180,327	4	1,411,658,995	1	1,545,839,322	1,614,659,242
City of Bridge City	831,917	3	8,058,472	150,000	3	255,734,611	3	255,884,611	263,943,083
City of Carthage	1,537,675	2	16,344,129	1,223,000	2	-56,570,958	1	-55,347,958	-39,003,829
City of Center	2,620,269	2	45,356,185	2,317,936	4	64,921,192	1	67,239,128	112,595,313
City of Cushing	72,175	1	707,470	0	1	7,260,455	1	7,260,455	7,967,925
City of Groves	1,417,404	2.5	24,417,120	2,520,000	1	18,921,323	1	21,441,323	45,858,443
City of Henderson	3,000,000	3	15,545,327	10,000,000	2	107,343,563	3	117,343,563	132,888,889
City of Huntington	207,071	1	1,002,787	0	1	2,014,220	1	2,014,220	3,017,007
City of Jacksonville	2,110,694	2	51,689,135	175,000,000	1	38,796,475	1	213,796,475	265,485,610
City of Jasper	1,312,674	2.5	18,212,773	850,000	4	148,500,971	1	149,350,971	167,563,744
City of Lufkin	6,246,221	2.5	110,071,650	34,299,171	4	322,090,201	3	356,389,372	466,461,022
City of Nacogdoches	6,822,877	2.5	56,584,201	1,400,000	3	418,897,229	3	420,297,229	476,881,430
City of Nederland	1,754,276	1	13,391,724	100,000	4	109,212,102	1	109,312,102	122,703,827
City of Orange	2,509,615	0.5	24,818,573	0	1	431,064,188	1	431,064,188	455,882,760
City of Palestine	2,283,768	2	41,397,557	526,000	2	117,002,675	2	117,528,675	158,926,232
City of Port Arthur	15,417,630	4	208,339,262	99,951,100	5	1,732,660,029	1	1,832,611,129	2,040,950,391
City of Port Neches	1,293,128	4	43,637,382	8,700,000	2	55,755,990	3	64,455,990	108,093,372
City of Reklaw	37,715	1	806,300	4,123,850	2	-4,179,200	1	-55,350	750,950
City of San Augustine	304,705	1	5,211,652	1,715,000	1	2,725,771	3	4,440,771	9,652,423
City of Silsbee	648,163	3.5	4,816,842	4,200,000	5	42,742,094	1	46,942,094	51,758,936
City of Tyler	20,232,457	2	507,669,812	35,110,635	4	578,715,547	2	613,826,182	1,121,495,994
Evadale WCID 1	39,019	1.5	39,019	8,981,097	2	-7,917,162	1	1,063,935	1,102,954
G-M WSC	476,031	2.5	7,202,927	32,000	3	52,986,312	2	53,018,312	60,221,239
Holmwood Angelina & Neches River Authori	29,332	2	234,680	72,000	3	1,242,548	2	1,314,548	1,549,227
Hudson WSC	647,490	1	13,700,121	5,000,000	3	-10,941,652	2	-5,941,652	7,758,469
Jasper County WCID 1	172,492	2	293,400	100,000	1	1,224,323	2	1,324,323	1,617,723
Jefferson County WCID 10	451,624	2	7,500,887	20,442,744	3	16,511,735	3	36,954,479	44,455,366
Lumberton MUD	1,734,593	2	29,327,548	7,318,516	3	-2,511,299	2	4,807,217	34,134,765
Orange County WCID 1	1,034,998	4.5	4,131,914	1,501,000	5	65,659,244	4	67,160,244	71,292,158
Orange County WCID 2	285,035	2	285,035	8,100,000	5	855,106	2	8,955,106	9,240,141
Pleasant Springs WSC	77,513	2.5	1,233,679	0	4	1,635,758	2	1,635,758	2,869,438
Rayburn Country MUD	266,434	1	1,946,994	38,620,000	3	10,336,472	2	48,956,472	50,903,466
Southern Utilities	7,152,497	2.5	25,227,527	722,093,000	4	288,497,985	4	1,010,590,985	1,035,818,512

PWS Name	Nonrevenue Water (c)	Apparent Loss Connections (c)	Real Loss Volume (c)	Unavoidable Annual Real Losses (c)	Infrastructure Leakage Index (c)	Real Loss Connections (c)	Real Loss Miles (c)	Total Apparent Losses 2 (c)	Retail Price Of Water
Beechwood WSC	1,987,000	3	1,192,218	0	0	6	0	485,082	0.00
BIG THICKET RETREAT	1,048,069	1	1,000,010	0	0	0	559	9,696	0.04
Cardinal Meadows Improvement District	286,435	3	168,273	0	0	7	0	57,878	0.01
City of Beaumont Water Utility Dept	1,827,172,930	3	1,545,839,322	279,327,989	6	68	0	68,819,920	0.00
City of Bridge City	268,177,667	6	255,884,611	19,444,463	13	182	0	8,058,472	7.00
City of Carthage	-31,269,579	11	-55,347,958	0	0	0	0	16,344,129	0.00
City of Center	236,125,296	51	67,239,128	0	0	0	2193	45,356,185	0.00
City of Cushing	8,328,800	5	7,260,455	0	0	47	0	707,470	0.00
City of Groves	103,311,616	10	21,441,323	29,761,706	1	9	0	24,417,120	0.00
City of Henderson	181,849,289	7	117,343,563	29,732,900	4	51	0	15,545,327	0.01
City of Huntington	4,052,361	3	2,014,220	0	0	0	145	1,002,787	0.00
City of Jacksonville	274,125,610	23	213,796,475	47,403,280	5	95	0	51,689,135	0.00
City of Jasper	203,967,582	11	149,350,971	51,504,420	3	0	2098	18,212,773	0.00
City of Lufkin	525,805,126	17	356,389,372	162,925,878	2	0	1405	110,071,650	0.00
City of Nacogdoches	608,995,814	8	420,297,229	103,140,240	4	61	0	56,584,201	0.00
City of Nederland	131,475,204	4	109,312,102	39,086,186	3	34	0	13,391,724	0.00
City of Orange	468,430,833	8	431,064,188	49,581,600	9	132	0	24,818,573	0.00
City of Palestine	170,345,071	16	117,528,675	75,676,509	2	0	1171	41,397,557	0.00
City of Port Arthur	2,501,541,143	26	1,832,611,129	104,669,043	18	227	0	208,339,262	0.00
City of Port Neches	136,989,011	22	64,455,990	35,565,874	2	0	706	43,637,382	0.00
City of Reklaw	4,874,800	11	-55,350	0	0	0	0	806,300	0.01
City of San Augustine	28,649,947	13	4,440,771	0	0	11	0	5,211,652	0.00
City of Silsbee	54,999,750	4	46,942,094	13,588,585	3	39	0	4,816,842	0.00
City of Tyler	1,822,374,698	39	613,826,182	205,980,888	3	47	0	507,669,812	0.00
Evadale WCID 1	1,324,528	0	1,063,935	0	0	11	0	39,019	27.50
G-M WSC	62,601,394	6	53,018,312	19,097,348	3	43	0	7,202,927	0.00
Holmwood Angelina & Neches River Authori	1,670,714	4	1,314,548	0	0	0	643	234,680	0.00
Hudson WSC	10,995,918	11	-5,941,652	27,434,404	0	0	0	13,700,121	0.01
Jasper County WCID 1	11,153,884	1	1,324,323	0	0	3	0	293,400	0.01
Jefferson County WCID 10	46,713,485	13	36,954,479	0	0	64	0	7,500,887	0.00
Lumberton MUD	72,428,337	9	4,807,217	59,751,026	0	0	46	29,327,548	0.00
Orange County WCID 1	106,084,260	2	67,160,244	31,706,528	2	29	0	4,131,914	0.01
Orange County WCID 2	25,611,141	0	8,955,106	0	0	12	0	285,035	0.01
Pleasant Springs WSC	3,257,000	10	1,635,758	0	0	14	0	1,233,679	0.00
Rayburn Country MUD	52,235,637	6	48,956,472	0	0	0	2579	1,946,994	0.01
Southern Utilities	1,071,580,999	4	1,010,590,985	198,418,818	5	141	0	25,227,527	0.01

PWS Name	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)	Total Assessment Score (c)	Total Cost Of Losses (c)	Total Loss Percent (c)
Beechwood WSC	5.00	1,392	1,192,218	0	5	5,961	7353	14,093	6.77
BIG THICKET RETREAT	4.00	375	1,000,010	0	5	400	775	11,357,934	32.90
Cardinal Meadows Improvement District	1.00	289	168,273	0	1	841	1131	5,097	4.69
City of Beaumont Water Utility Dept	4.00	303,496	1,545,839,322	0	4	431,289	734785	1,832,175	23.31
City of Bridge City	3.50	56,409,306	255,884,611	0	3	31,730	56441035	26,285	79.32
City of Carthage	3.00	62,925	-55,347,958	0	1	-61,990	935	944	0.00
City of Center	3.00	172,354	67,239,128	0	3	47,740	220093	21,922	10.74
City of Cushing	2.00	3,184	7,260,455	0	2	32,672	35856	222,285	27.60
City of Groves	3.00	84,239	21,441,323	0	3	42,454	126693	140,310	8.09
City of Henderson	5.00	116,745	117,343,563	0	5	199,484	316229	1,662,634	16.68
City of Huntington	2.00	4,773	2,014,220	0	1	9,588	14361	45,135,249	3.64
City of Jacksonville	2.00	133,875	213,796,475	0	2	162,485	296360	22,718	31.45
City of Jasper	2.00	42,254	149,350,971	0	2	4,481	46734	159,362	31.91
City of Lufkin	3.50	243,258	356,389,372	0	3	345,698	588956	0	18.67
City of Nacogdoches	4.00	234,259	420,297,229	0	3	210,149	444407	8,221,032	17.47
City of Nederland	2.50	34,818	109,312,102	0	3	89,636	124454	2,996,671	17.49
City of Orange	3.00	64,528	431,064,188	0	3	1,120,767	1185295	4,537	45.41
City of Palestine	2.00	145,719	117,528,675	0	2	99,899	245619	114,549	17.40
City of Port Arthur	4.00	962,527	1,832,611,129	0	2	8,466,663	9429191	252,365	33.09
City of Port Neches	4.00	139,640	64,455,990	0	4	36,740	176380	116,040,113	20.90
City of Reklaw	4.00	6,209	-55,350	0	4	-28	6181	17,344,760	4.98
City of San Augustine	3.00	22,723	4,440,771	0	3	138	22860	2,646,463	7.92
City of Silsbee	1.00	12,042	46,942,094	0	3	469,421	481463	114,908	19.96
City of Tyler	2.00	1,644,850	613,826,182	0	3	209,929	1854779	205,897,800	13.86
Evadale WCID 1	3.50	1,073,010	1,063,935	11690	2	12,436,904,893	12437977903	352,035	7.07
G-M WSC	1.00	26,291	53,018,312	0	2	190,336	216626	487,905	31.63
Holmwood Angelina & Neches River Authori	2.00	526	1,314,548	0	4	2,945	3470	4,559,158	13.20
Hudson WSC	4.00	99,874	-5,941,652	0	4	-28,538	71336	42	3.00
Jasper County WCID 1	2.00	1,467	1,324,323	0	3	1,059	2526	1,490	2.34
Jefferson County WCID 10	3.00	27,003	36,954,479	0	3	36,954	63958	211,101,851	24.61
Lumberton MUD	3.50	85,050	4,807,217	0	4	1,058	86107	146,923	4.92
Orange County WCID 1	5.00	21,486	67,160,244	0	5	12,089	33575	787	17.22
Orange County WCID 2	3.00	1,861	8,955,106	0	4	1,881	3742	248	8.10
Pleasant Springs WSC	2.00	4,935	1,635,758	0	3	6,543	11478	39,681,784	9.25
Rayburn Country MUD	2.00	22,390	48,956,472	0	3	41,613	64003	813	47.76
Southern Utilities	3.50	141,779	1,010,590,985	0	4	212,224	354003	32,717	36.20

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Appendix 2-A

Correspondence of the East Texas Regional Water Planning Group Chair to the Texas Water Development Board

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Following is a letter from Kelley Holcomb, Chair of the ETRWPG, to the TWDB, regarding the 2021 Plan Projected Demands. The letter is dated January 12, 2018, and presents a proposal and supplemental documentation requesting for the TWDB to revise projected demands with the following attachments:

- Attachment 1 – LNVA Projected Manufacturing Demands (Jefferson Manufacturing, Jasper Livestock, and Nacogdoches Livestock)
- Attachment 2 – Southeast Texas Groundwater Conservation District Meter Readings (Tyler Steam Electric Power)
- Attachment 3 – Email from Lumberton Municipal Utility District (Lumberton MUD)
- Attachment 4 – Email from Texas Department of Criminal Justice Representative (Woodville)

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Region I
East Texas Regional
Water Planning Group

Kelley Holcomb, Chair
P.O. Box 635030
Nacogdoches TX 75963
936-633-7543

January 12, 2018

Mr. Jeff Walker
Executive Administrator
Texas Water Development Board
1700 North congress Avenue
Austin, Texas 78701

Re: Proposed Revisions to Projections for the East Texas Regional Water Planning Area

Dear Mr. Walker:

This letter transmits proposed revisions of the East Texas Regional Water Planning Area (Region I) population and water demand projections developed by the Texas Water Development Board (TWDB) for the 2021 Regional Water Plan (2021 Plan). These recommendations were adopted by the East Texas Regional Water Planning Group (ETRWPG) at its general meeting held on December 11, 2017. Following is a summary of the proposed revisions by demand category; documentation for these revisions has already been provided to TWDB staff.

- **Municipal Demands**
  - Moved population from Tyler County-Other to City of Woodville to account for the Gib Lewis Unit Texas Department of Corrections facility located within Woodville's service area. Decreased City of Woodville Base GPCD from 315 to 200 in order for water demand projections to remain constant with population increase. Tyler County-Other Base GPCD remained constant; therefore, the water demand projections decreased with population decrease.
  - Moved population from Hardin County-Other to Lumberton MUD per historical data. The Base GPCD for each Water User Group remained constant. Overall, the Municipal demand for Hardin County decreased as Lumberton MUD has a lower Base GPCD than Hardin County-Other.
- **Manufacturing Demands**
  - Increased Jefferson County Manufacturing demand per existing contract data provided by Lower Neches Valley Authority.
- **Steam-Electric Demands**
  - Added Tyler County Steam-Electric demand per historical data provided by County Judge.
- **Livestock Demands**
  - Increased Jasper County Livestock demand per existing contract data provided by Lower Neches Valley Authority.
  - Increased Nacogdoches Livestock demand per existing contract data provided by Lower Neches Valley Authority.

- **Mining Demands**
  - No recommended changes
- **Irrigation Demands**
  - No recommended changes.

Table 1: Summary of Proposed Revisions by Demand Category

Demand Category	Water Plan	Projected Water Demand (af/yr)					
		2020	2030	2040	2050	2060	2070
Municipal	2017 SWP(1)	188,646	196,302	204,157	214,540	226,622	239607
	2021 RWP(2)	192,490	200,322	208,279	218,742	230,951	244,099
	2021 ETRWPG(3)	192,050	199,869	207,822	218,267	230,468	243,610
Manufacturing	2017 SWP(1)	608,667	800,989	838,639	874,546	909,373	945886
	2021 RWP(2)	209,070	233,049	233,049	233,049	233,049	233,049
	2021 ETRWPG(3)	318,071	365,513	365,513	365,513	365,513	365,513
Steam-Electric	2017 SWP(1)	82,018	95,544	112,035	132,137	156,640	184714
	2021 RWP(2)	66,811	66,811	66,811	66,811	66,811	66,811
	2021 ETRWPG(3)	67,011	67,011	67,011	67,011	67,011	67,011
Livestock	2017 SWP(1)	24,027	25,549	27,361	29,521	32,081	32764
	2021 RWP(2)	37,673	40,800	44,545	49,040	54,406	55,619
	2021 ETRWPG(3)	47,464	50,591	54,336	58,831	64,197	65,410
Mining	2017 SWP(1)	27,523	24,547	18,169	15,488	12,986	12093
	2021 RWP(2)	27,523	24,547	18,169	15,488	12,986	12,093
	2021 ETRWPG(3)	27,523	24,547	18,169	15,488	12,986	12,093
Irrigation	2017 SWP(1)	177,919	187,894	194,851	197,546	195,445	192186
	2021 RWP(2)	98,368	98,368	98,368	98,368	98,368	98,368
	2021 ETRWPG(3)	98,368	98,368	98,368	98,368	98,368	98,368
Total Water Demands	2017 SWP(1)	1,108,800	1,330,825	1,395,212	1,463,778	1,533,147	1607250
	2021 RWP(2)	631,935	663,897	669,221	681,498	696,571	710,039
	2021 ETRWPG(3)	750,487	805,899	811,219	823,478	838,543	852,005

(1) 2017 SWP: Projections are from the 2017 State Water Plan, adopted on May 19, 2016.

(2) 2021 RWP: Projections are from the Texas Water Development Board website.

(3) 2021 ETRWPG: Projections are those proposed by the East Texas Regional Water Planning Group (ETRWPG)

The enclosure to this letter provides the proposed revisions in the format requested by the TWDB.

In addition to these proposed revisions, the ETRWPG would like to notify you of the following name change: the Water User Group formerly known as Lake Livingston Water Supply and Sewer Service has changed their name to Lake Livingston WSC.

The ETRWPG appreciates the opportunity to submit these recommendations. Please do not hesitate to contact me if you have any questions.

Sincerely,

Kelley Holcomb, Chair
East Texas Regional Water Planning Group

Enclosures

cc: Mr. Lann Bookout, Texas Water Development Board
Ms. Spandana Tummuri, PH.D., P.E., ENV SP, Freese and Nichols, Inc.
Ms. Cynthia Amoles Syvarth, P.E., Alan Plummer Associates, Inc.

Appendix 2-A: Attachment 1
LNVA PROJECTED MANUFACTURING DEMAND

WATER USER on Canal System	2010-2016 ANNUAL DIVERSION (AC-FT)	2017 Annual Contract Quantity (AC-FT)	Reported Expansion Demand (AC-FT)	Projected 2020 Demand (AC-FT)	Projected 2030 Demand (AC-FT)	AVERAGE FLOW (MGD)	COUNTY	2020 LIVESTOCK (NACOGDOCHES)	2020 LIVESTOCK (JASPER)	2020 MANUFACTURING (JASPER)	2020 MANUFACTURING (JEFFERSON)	2030 MANUFACTURING (JEFFERSON)	NOTES
AGL	2,078	475		475	475	0.42	JEFFERSON	--	--	--	475	475	Historic non-development use; years with cavern development demand is 6000 ac-ft
AIR LIQUIDE	419	605		605	605	0.54	JEFFERSON	--	--	--	605	605	contract volume
ARKEMA	191	638	645	1,284	1,284	1.15	JEFFERSON	--	--	--	1,284	1,284	contract volume
BASF - BMT	880	921	621	1,542	1,542	1.38	JEFFERSON	--	--	--	1,542	1,542	3 year average is 923 ac-ft/yr
BASF - PA	7,021	7,672	13,533	21,205	21,205	18.93	JEFFERSON	--	--	--	21,205	21,205	Peak Usage in 2016 of 7,983 ac-ft
CHEMTRADE LOGISTICS	87	166		166	166	0.15	JEFFERSON	--	--	--	166	166	Demand varies - peak year of 477 ac-ft & low year of 38 ac-ft. use contract quantity
City of Port Arthur Industrial (Cheniere & GP LNG)	637	-	17,700	17,700	17,700	15.80	JEFFERSON	--	--	--	17,700	17,700	Pt Arthur expanded treatment plant to provide service to LNG Export Plants - new 2016
COASTAL CAVERNS	1,639	28		28	28	0.0250	JEFFERSON	--	--	--	28	28	Historic non-development use; years with cavern development demand is 3500 ac-ft
DCP MISTREAM	1,009	28		28	28	0.0250	JEFFERSON	--	--	--	28	28	Historic non-development use; years with cavern development demand is 3000 ac-ft
EXXON MOBIL (LDPE)	2,131	2,161	1,296	3,457	3,457	3.09	JEFFERSON	--	--	--	3,457	3,457	BPEX Project - 60% production capacity increase under construction 2017
EXXON MOBIL (O&A)	5,191	5,524	968	6,492	6,492	5.80	JEFFERSON	--	--	--	6,492	6,492	Current Contractual Commitment
EXXON MOBIL (Oil)	22,343	26,615	6,452	33,067	33,067	29.52	JEFFERSON	--	--	--	33,067	33,067	Expansion for additional crude unit
GT Omniport	-	-	16,000	-	16,000	14.28	JEFFERSON	--	--	--	-	16,000	Reclaimed industrial site under development - future demand beyond 2020
GOODYEAR TIRE AND RUBBER	4,433	3,609		5,400	5,400	4.82	JEFFERSON	--	--	--	5,400	5,400	Peak Usage; 3 year average is 5,406 ac-ft/yr
HUNTSMAN CORPORATION	17,240	16,572	10,823	27,395	27,395	24.46	JEFFERSON	--	--	--	27,395	27,395	Peak Usage; Total Huntsman 3 year average is 17,149 ac-ft/yr
LUCITE (formerly DuPont)	6,299	8,763	8,065	16,828	16,828	15.02	JEFFERSON	--	--	--	16,828	16,828	Current Contractual Commitment plus reported expansion
MOTIVA ENTERPRISES	32,272	31,303	4,033	35,335	35,335	31.55	JEFFERSON	--	--	--	35,335	35,335	3 year average post expansion, increased in contract quantity 2014
NATGASOLINE	2	6,452		6,452	6,452	5.76	JEFFERSON	--	--	--	6,452	6,452	New Plant startup in 2018
TOTAL PETROCHEMICAL	6,221	7,807	6,452	14,259	14,259	12.73	JEFFERSON	--	--	--	14,259	14,259	Expansion projected to startup in 2019
VALERO	19,194	23,017	15000	23,017	38,017	33.94	JEFFERSON	--	--	--	23,017	38,017	Future expansion beyond 2020
VARIOUS MIN. ACCOUNTS	384	267		267	267	0.24	JEFFERSON	--	--	--	267	267	Peak Usage
TEXAS PARKS AND WILDLFE JASPER FISH HATCHERY	10,000	10,000		10,000	10,000	8.93	JASPER	--	10000		--	--	Current Contractual Commitment; Revised to Livestock per TWDB.
TEXAS PARKS AND WILDLIFE ALAZON BAYOU	10,000	10,000		10,000	10,000	8.93	NACOGDOCHES	10000	--	--	--	--	Current Contractual Commitment; Revised to Livestock per TWDB.
WEST VACO	5,994	5,600		5,600	5,600	5.00	JASPER	--		5600	--	--	Current Contractual Commitment
TOTALS	**155,665**	**168,221**	**86,588**	**240,600**	**271,600**	**242**		**10,000**	**10,000**	**5,600**	**215,000**	**246,000**	

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Appendix 2-A: Attachment 2
Lumberton Municipal Utility District
Meter Readings

	JANUARY 2016	FEBRUARY 2016	MARCH 2016	APRIL 2016	MAY 2016	JUNE 2016	JULY 2016	AUGUST 2016	SEPTEMBER 2016	OCTOBER 2016	NOVEMBER 2016	DECEMBER 2016	2016 TOTALS TOTALS	2016 Monthly AVERAGE	2015 Monthly AVERAGE	2014 Monthly AVERAGE
New Connections	23	13	13	15	16	8	23	9	7	14	13	3	157	13	17	16
Water Taps	12	4	7	6	6	3	12	5	3	7	7	2	74	6	4	4
Water Tie-Ins	11	9	6	9	10	5	11	4	4	7	6	1	83	7	12	11
Sewer Tap	10	2	2	5	6	2	12	3	4	7	5	1	59	5	4	4
Sewer Tie-Ins	11	10	6	9	11	6	14	5	3	7	6	1	89	7	9	11
Lpss	6	0	1	4	2	2	1	2	1	3	3	2	27	2	2	1
New Customers	53	59	69	51	66	64	71	61	49	68	55	38	704	59	64	97
Finals	105	90	94	79	93	94	46	100	81	89	94	69	1,034	86	88	82
Lock Non-Pays	181	159	132	138	164	93	152	242	117	151	86	42	1,657	138	111	134
Completed Meter Changeouts	4	13	31	1	16	8	44	16	3	35	6	1	178	15	26	11
Permits Issued	23	28	26	13	22	20	23	16	21	22	13	22	249	21	22	26
Inspections Made	48	47	47	39	35	32	45	33	42	37	29	48	482	40	39	43
Equivalent Living Units		8,786	8,819	8,820	8,864	8,864	8,882	8,894	8,887	8,907	8,907	8,887				
Active Metered Customers	8,073	8,297	8,258	8,267	8,300	8,306	8,325	8,340	8,349	8,369	8,384	8,464			7,792	8,077
Total Meters	8,501	8,514	8,527	8,542	8,558	8,566	8,589	8,598	8,605	8,619	8,632	8,635			8,493	8,291
Gain		224	33	1	44	0	18	12	-7	20	0	-20			-24	14
Water Leaks	23	24	24	25	25	35	43	43	25	42	22	20	351	29	27	28
Other Water Complaints	44	21	15	24	21	29	27	29	26	11	20	40	307	26	22	22
Customer Service Work Orders	244	183	273	196	190	150	272	231	231	171	188	195	2,524	210	198	150
Line Locates	34	24	33	31	29	26	46	20	25	19	32	16	335	28	20	22
Sewer Stoppages	13	20	19	9	24	27	9	18	19	16	11	28	213	18	15	13
LPSS Complaints	23	8	23	5	24	31	9	16	13	4	17	11	184	15	14	12
Lift Station Complaints	23	5	23	6	25	17	0	7	2	4	7	11	130	11	13	4
Lift Station Maintenance	65	53	1	62	3	32	4	66	6	1	5	8	306	26	22	61
Wastewater Gallons Treated	60,156,700	42,105,500	68,689,500	68,393,600	74,470,100	86,641,500	43,926,100	55,536,400	50,419,900	39,096,700	39,696,700	62,365,000	691,497,700	57,624,808	59,786,017	48,184,250
Wastewater Gallons Billed	50,406,610	40,283,320	42,962,150	50,468,800	45,329,950	46,693,470	56,656,810	53,107,990	52,650,900	48,368,550	44,364,640	45,634,880	576,928,070	48,077,339	48,215,870	43,520,439
Total Gallons of Water Pumped	51,709,300	49,650,400	51,040,300	54,397,700	56,606,700	52,695,500	69,792,700	62,822,400	56,153,900	63,339,100	53,779,400	55,995,100	677,982,500	56,498,542	56,849,785	55,865,367
Total Gallons of Water Billed	52,361,680	41,574,070	44,557,390	52,579,060	47,273,800	48,840,420	60,387,250	58,256,910	56,541,540	52,320,870	48,298,380	48,270,980	611,262,350	50,938,529	51,039,089	49,236,797
Estimated Gallons of Water Flushed	2,659,656	2,661,556	2,646,951	2,676,711	2,672,556	2,692,141	2,611,116	2,595,756	2,667,396	2,749,015	2,735,496	2,753,476	32,121,826	2,676,819	2,812,947	3,173,157
Estimated Gallons in Water Leakage	457,268	225,146	2,516,760	1,264,250	1,983,856	364,025	22,210	2,300	189,515	259,595	586,539	115,250	7,986,714	665,560	487,294	121,553
Not metered Not Billed (Water for Construction)	18,654	12,900	33,823	1,298,000	1,500	120	1,990	200	3,080	1,060	500	6,000	1,377,827	114,819	7,512	60,405
Gallons of Water USED - LVFD 64001247	6,000	19,000	11,000	9,000	34,000	10,000	27,000	11,000	7,000	11,000	32,000	28,000	205,000	17,083	7,889	65,003
Total Gallons of Water Accounted for	55,497,258	44,473,672	49,754,924	57,818,021	51,931,712	51,896,706	63,022,566	60,855,166	59,401,531	55,341,540	51,620,915	51,145,706	652,759,717	54,396,643	54,347,342	52,609,580
Total Gallons of Water Unaccounted	-3,787,958	5,176,728	1,285,376	-3,420,321	4,674,988	798,794	6,770,134	1,967,234	-3,247,631	7,997,560	2,158,485	4,849,394	25,222,783	2,101,899	2,502,443	3,255,787
Percent Unaccounted Water	-7%	10%	3%	-6%	8%	2%	10%	3%	-6%	13%	4%	9%		3%	5%	6%
% W.W.Treated vs Wastewater Billed	119%	105%	160%	136%	164%	186%	78%	105%	96%	81%	89%	137%		121%	129%	113%
Population Served		26,358	26,457	26,460	26,592	26,592	26,646	26,682	26,661	26,721	26,721	26,661			23,781	24,057
Customers with usage 0 - 1500 Gallons "Minimum"	982	1,238	1,092	947	1,232	1,071	944	952	1,012	1,069	1,069	1,073		1,057	1,190	999
Customers with usage 1500 - 7000 Gallons "Average"	4,752	5,397	5,273	4,881	5,247	5,056	4,478	4,662	4,743	4,949	4,949	5,163		4,963	4,248	4,805
Customers with usage 7000 & Up Gallons "High"	2,208	1,248	1,457	2,034	1,544	1,754	2,500	2,296	2,217	1,916	2,059	1,681		1,910	2,706	2,584
Average Gallons of Water per Household per Month	6,486	4,732	5,052	5,961	5,333	5,510	6,799	6,550	6,362	5,874	5,423	5,432		5792.9	6418.0	6129.9
AVERAGE Gallons of Water per person per day used		56.3	54.3	66.2	57.3	61.2	73.1	70.4	70.7	63.2	60.3	58.4			70.5	67.3
AVERAGE Gallons of Sewer per person per day used		54.6	52.4	63.6	55.0	58.5	68.6	64.2	65.8	58.4	55.3	55.2			66.6	61.0
Monthly average GPM per Connection	0.145	0.117	0.113	0.138	0.119	0.128	0.152	0.147	0.147	0.132	0.126	0.122		0.132	0.147	0.145

24485 5yr/AVG
2012-2016

Appendix 2-A: Attachment 2
Lumberton Municipal Utility District
Meter Readings

	JANUARY 2015	FEBRUARY 2015	MARCH 2015	APRIL 2015	MAY 2015	JUNE 2015	JULY 2015	AUGUST 2015	SEPTEMBER 2015	OCTOBER 2015	NOVEMBER 2015	DECEMBER 2015	2015 TOTALS TOTALS	2015 Monthly AVERAGE	2014 Monthly AVERAGE	2013 Monthly AVERAGE	2012 Monthly AVERAGE
New Connections	32	11	15	49	6	14	19	15	14	12	6	9	202	17	16	13	13
Water Taps	8	5	3	5	1	1	10	3	2	3	1	3	45	4	4	4	4
Water Tie-Ins	9	6	12	44	5	13	9	12	12	9	5	6	142	12	11	9	9
Sewer Tap	5	4	3	6	2	1	11	5	3	1	1	2	44	4	4	3	2
Sewer Tie-Ins	10	7	11	12	5	12	8	12	12	8	5	6	108	9	11	10	7
Lpss	2	0	1	4	0	4	4	5	2	1	2	0	25	2	1	1	1
New Customers	78	85	59	61	49	56	68	68	60	63	50	61	767	64	97	96	92
Finals	81	88	86	83	88	91	124	118	73	85	65	70	1,052	88	82	86	83
Lock Non-Pays	103	111	106	121	95	81	119	117	125	109	94	76	1,337	111	134	160	152
Completed Meter Changeouts	68	73	8	0	14	8	15	5	24	30	68	1	316	26	11	34	73
Permits Issued	16	16	23	29	11	23	24	13	32	25	12	32	258	22	26	21	23
Inspections Made	43	26	36	47	28	36	35	53	48	40	34	40	466	39	43	39	39
Active Metered Customers	8,074	8,071	8,044	8,022	7,983	7,948	7,892	7,842	7,838	7,816	7,801	7,792					
Total Meters	8,323	8,334	8,349	8,398	8,404	8,418	8,437	8,452	8,466	8,478	8,484	8,493					
Gain	-3	-3	-27	-22	-39	-35	-56	-50	-4	-22	-15	-9	-285	-24	14	11	9
Water Leaks	28	23	17	18	22	41	57	40	20	27	13	16	322	27	28	23	27
Other Water Complaints	14	18	21	20	16	17	47	30	39	25	2	10	259	22	22	10	6.6
Customer Service Work Orders	189	122	102	107	139	303	229	241	319	223	212	187	2,375	198	150	172	163.5
Line Locates	15	23	16	31	8	23	35	12	19	31	15	14	244	20	22	17	19.6
Sewer Stoppages	18	8	8	8	14	21	17	10	14	12	26	23	179	15	13	16	13.5
LPSS Complaints	9	5	16	11	15	20	7	31	7	9	26	17	173	14	12	15	17.7
Lift Station Complaints	15	3	13	11	33	16	5	6	6	8	30	11	157	13	4	7	5.3
Lift Station Maintenance	60	64	0	35	10	68	1	20	2	2	0	0	262	22	61	62	81
Wastewater Gallons Treated	63,786,100	40,796,500	68,760,200	65,353,300	70,752,000	66,223,700	48,179,900	45,805,800	51,306,100	60,651,700	75,358,900	60,458,000	717,432,200	59,786,017	48,184,250	44,372,800	43,318,633
Wastewater Gallons Billed	52,587,460	39,032,690	42,818,140	45,584,620	43,698,920	44,340,140	53,750,030	74,182,230	50,070,370	53,051,360	37,918,130	41,556,350	578,590,440	48,215,870	43,520,439	44,444,554	45,359,746
Total Gallons of Water Pumped	52,193,700	46,016,600	51,999,700	51,213,000	56,665,720	58,814,200	73,992,000	79,101,900	57,094,500	56,488,200	47,944,600	50,673,300	682,197,420	56,849,785	55,865,367	57,122,417	56,274,292
Total Gallons of Water Billed	60,472,430	40,764,500	42,059,140	45,005,820	45,192,600	47,388,620	56,519,750	80,912,180	54,243,350	57,082,700	39,612,930	43,215,050	612,469,070	51,039,089	49,236,797	50,640,095	51,969,539
Estimated Gallons of Water Flushed	3,017,396	3,095,146	5,149,616	5,127,071	3,027,711	3,075,501	3,081,456	3,368,341	3,179,561	2,799,901	2,634,711	198,950	33,755,361	2,812,947	3,173,157	2,861,631	2,261,116
Estimated Gallons in Water Leakage	10,370	5,060	32,970	222,631	424,471	436,641	64,678	2,655,389	945,888	978,515	6,650	44,270	5,847,533	487,294	121,553	459,399	132,984
Not metered Not Billed (Water for Construction)	0	0	13,485	67,771	4,832	0	0	0	0	0	400	3,650	90,138	7,512	60,405	95,157	124,833
Gallons of Water USED - LVFD	12,840	7,450	12,124	3,250	0	0	0	40,000	6,000	6,000	1,000	6,000	94,664	7,889	65,003	12,102	9,479
Total Gallons of Water Accounted for	63,500,196	43,864,706	45,255,211	48,423,293	48,649,614	50,920,762	59,665,884	86,935,910	58,368,799	60,867,116	42,254,691	43,461,920	652,168,102	54,347,342	52,609,580	54,056,283	54,488,471
Total Gallons of Water Unaccounted	-11,306,496	2,151,894	6,744,489	2,789,707	8,016,106	7,893,438	14,326,116	-7,834,010	-1,274,299	-4,378,916	5,689,909	7,211,380	30,029,318	2,502,443	3,255,787	3,066,134	1,785,820
Percent Unaccounted Water	-22%	5%	13%	5%	14%	13%	19%	-10%	-2%	-8%	12%	14%		5%	6%	5.1%	3%
% W.W Treated vs Wastewater Billed	121%	105%	161%	143%	162%	149%	90%	62%	102%	114%	199%	145%		129%	113%	102%	97%
Population Served	24,222	24,213	24,132	24,066	23,949	23,844	23,676	23,526	23,514	23,448	23,403	23,376		23,781	24,057	23,955	23,895
Customers with usage 0 - 1500 Gallons "Minimum"	830	1,293	1,490	1,144	830	1,008	895	2,703	759	884	1,255	1,186		1,190	999	951	915
Customers with usage 1500 - 7000 Gallons "Average"	4,207	5,451	3,622	3,286	3,736	5,028	4,432	2,662	3,337	4,631	5,329	5,250		4,248	4,805	4,542	4,403
Customers with usage 7000 & Up Gallons "High"	3,425	1,729	3,237	3,409	3,288	1,789	2,387	2,369	3,808	3,109	2,587	1,332		2,706	2,584	2,726	2,292
Average Gallons of Water per Household per Month	7,490	5,051	5,229	5,610	5,661	5,962	7,162	10,318	6,921	7,303	5,078	5,232		6418.0	6129.9	5931.8	6075.7
AVERAGE Gallons of Water per person per day used	80.5	60.1	56.2	62.3	60.9	66.2	77.0	110.9	76.9	78.5	56.4	59.6		70.5	67.3	69.5	71.5
AVERAGE Gallons of Sewer per person per day used	70.0	57.6	57.2	63.1	58.9	62.0	73.2	101.7	71.0	73.0	54.0	57.3		66.6	59.5	61.0	62.4
Monthly average GPM per Connection	0.168	0.125	0.117	0.130	0.127	0.138	0.160	0.231	0.160	0.164	0.118	0.124		0.147	0.140	0.145	0.149

assuming 3 persons per connection

Appendix 2-A: Attachment 2
Lumberton Municipal Utility District
Meter Readings

	JANUARY 2014	FEBRUARY 2014	MARCH 2014	APRIL 2014	MAY 2014	JUNE 2014	JULY 2014	AUGUST 2014	SEPTEMBER 2014	OCTOBER 2014	NOVEMBER 2014	DECEMBER 2014	2014 TOTALS TOTALS	2014 Monthly AVERAGE	2013 Monthly AVERAGE	2012 Monthly AVERAGE
New Connections	35	18	14	22	16	18	24	14	7	11	9	4	**192**	**16**	13	13
Water Taps	8	4	7	2	2	4	13	5	0	3	0	1	**49**	**4**	4	4
Water Tie-Ins	10	14	7	20	14	14	11	9	7	8	9	3	**126**	**11**	9	9
Sewer Tap	6	6	5	5	3	5	7	3	0	0	1	1	**42**	**4**	3	2
Sewer Tie-Ins	11	14	7	20	19	15	10	10	7	8	5	4	**130**	**11**	10	7
Lpss	1	3	1	2	1	2	1	0	0	1	0	1	**13**	**1**	1	1
New Customers	106	114	80	90	104	101	114	121	93	110	63	63	**1,159**	**97**	96	92
Finals	86	83	77	72	87	81	87	97	96	103	66	54	**989**	**82**	86	83
Lock Non-Pays	159	128	118	102	94	137	171	148	167	170	120	90	**1,604**	**134**	160	152
Completed Meter Changeouts	1	4	0	1	2	25	21	10	7	40	5	12	**128**	**11**	34	73
Permits Issued	27	21	27	37	24	25	42	17	29	32	18	9	**308**	**26**	21	23
Inspections Made	43	38	29	63	40	44	64	47	40	54	29	30	**521**	**43**	39	39
Active Metered Customers	7,927	7,958	7,961	7,979	7,996	8,016	8,043	8,067	8,064	8,071	8,068	8,077				
Total Meters	8,134	8,152	8,166	8,188	8,204	8,222	8,246	8,260	8,267	8,278	8,287	8,291				
Gain	20	31	3	18	17	20	27	24	-3	7	-3	9	**170**	14	11	9
Water Leaks	42	26	27	38	27	39	36	29	14	22	13	28	**341**	**28**	23	27
Other Water Complaints	22	3	5	1	4	5	72	98	13	16	6	17	**262**	**22**	10	6.6
Customer Service Work Orders	173	181	167	118	143	159	188	119	139	174	112	132	**1,805**	**150**	172	163.5
Line Locates	24	29	23	14	26	17	18	26	27	18	22	16	**260**	**22**	17	19.6
Sewer Stoppages	17	13	12	20	8	15	11	9	14	15	5	15	**154**	**13**	16	13.5
LPSS Complaints	10	6	7	19	5	23	10	8	7	22	10	12	**139**	**12**	15	17.7
Lift Station Complaints	5	2	0	3	2	8	6	8	10	3	2	3	**52**	**4**	7	5.3
Lift Station Maintenance	64	73	63	63	61	66	78	1	61	84	62	60	**736**	**61**	62	81
Wastewater Gallons Treated	43,781,200	46,305,400	48,226,400	44,454,000	41,812,600	52,337,200	59,623,000	48,433,400	45,938,100	43,253,800	48,412,100	55,633,800	**578,211,000**	**48,184,250**	44,372,800	43,318,633
Wastewater Gallons Billed	54,677,420	37,519,400	35,942,290	41,266,297	43,393,230	55,050,375	42,433,780	47,790,610	44,455,750	42,408,688	40,035,436	37,271,990	**522,245,266**	**43,520,439**	44,444,554	45,359,746
Total Gallons of Water Pumped	55,522,300	48,077,000	52,443,800	56,234,800	65,680,700	56,997,400	56,954,800	62,895,400	57,514,800	55,668,000	50,524,700	51,870,700	**670,384,400**	**55,865,367**	57,122,417	56,274,292
Total Gallons of Water Billed	61,361,640	41,750,600	40,165,630	43,386,547	49,438,560	63,700,595	48,308,350	54,603,970	51,155,890	48,619,438	45,564,586	42,785,760	**590,841,566**	**49,236,797**	50,640,095	51,969,539
Estimated Gallons of Water Flushed	2,984,536	3,002,016	3,459,026	2,999,616	3,081,361	3,068,356	3,298,137	3,512,196	3,205,661	3,383,816	2,966,196	3,116,966	**38,077,883**	**3,173,157**	2,861,631	2,261,116
Estimated Gallons in Water Leakage	11,780	30,960	134,591	5,420	76,645	107,105	26,140	37,760	43,900	762,490	69,120	152,730	**1,458,641**	**121,553**	459,399	132,984
Not metered Not Billed (Water for Construction)	600	11,300	15,420	43,000	26,452	11,860	146,473	39,490	8,000	398,700	17,329	6,240	**724,864**	60,405	95,157	124,833
Gallons of Water USED - LVFD	286,352	40,870	4,630	1,080	30,050	41,275	19,450	14,380	55,096	212,000	74,852	0	**780,035**	**65,003**	12,102	9,479
Total Gallons of Water Accounted for	64,358,556	44,794,876	43,774,667	46,434,583	52,623,018	66,887,916	51,779,100	58,193,416	54,413,451	53,376,444	48,617,231	46,061,696	**631,314,954**	**52,609,580**	54,056,283	54,488,471
Total Gallons of Water Unaccounted	-8,836,256	3,282,124	8,669,133	9,800,217	13,057,682	-9,890,516	5,175,700	4,701,984	3,101,349	2,291,556	1,907,469	5,809,004	**39,069,446**	**3,255,787**	3,066,134	1,785,820
Percent Unaccounted Water	-16%	7%	17%	17%	20%	-17%	9%	7%	5%	4%	4%	11%		**6%**	5.1%	3%
% W.W.Treated vs. Wastewater Billed	80%	123%	134%	108%	96%	95%	141%	101%	103%	102%	121%	149%		**113%**	102%	97%
Population Served	23,781	23,874	23,883	23,937	23,988	24,048	24,129	24,201	24,192	24,213	24,204	24,231		24,057	23,955	23,895
Customers with usage 0 - 1500 Gallons "Minimum"	805	1,094	1,151	994	1,004	784	1,056	909	989	1,029	1,043	1,126		999	951	915
Customers with usage 1500 - 7000 Gallons "Average"	3,917	5,254	5,309	4,915	4,624	3,988	4,820	4,543	4,784	4,964	5,147	5,395		4,805	4,542	4,403
Customers with usage 7000 & Up Gallons "High"	3,594	1,994	1,855	2,441	2,715	3,638	2,479	2,973	2,627	2,451	2,268	1,968		2,584	2,726	2,292
Average Gallons of Water per Household per Month	7,741	5,246	5,045	5,438	6,183	7,947	6,006	6,769	6,344	6,024	5,648	5,169		6129.9	5931.8	6075.7
AVERAGE Gallons of Water per person per day used	83.2	62.5	54.3	60.4	66.5	88.3	64.6	72.8	70.5	64.8	62.8	57.0		67.3	69.5	71.5
AVERAGE Gallons of Sewer per person per day used	74.2	56.1	48.5	57.5	58.4	76.3	56.7	63.7	61.3	56.5	55.1	49.6		59.5	61.0	62.4
Monthly average GPM per Connection	0.173	0.130	0.113	0.126	0.139	0.184	0.135	0.152	0.147	0.135	0.131	0.119		0.140	0.145	0.149

assuming 3 persons per connection

Appendix 2-A: Attachment 2
Lumberton Municipal Utility District
Meter Readings

2013 Production Report

	JANUARY 2013	FEBRUARY 2013	MARCH 2013	APRIL 2013	MAY 2013	JUNE 2013	JULY 2013	AUGUST 2013	SEPTEMBER 2013	OCTOBER 2013	NOVEMBER 2013	DECEMBER 2013	2013 TOTALS TOTALS	2013 Monthly AVERAGE	2012 Monthly AVERAGE
New Connections	21	12	9	8	17	12	21	15	10	18	12	6	**161**	13	13
Water Taps	5	4	4	1	4	4	3	5	4	4	2	3	**43**	4	4
Water Tie-Ins	9	8	5	7	13	8	18	10	6	14	10	3	**111**	9	9
Sewer Tap	3	2	3	3	5	3	3	7	2	3	4	3	**41**	3	2
Sewer Tie-Ins	4	7	6	6	11	13	17	13	7	16	13	2	**115**	10	7
Lpss	0	1	1	2	1	3	0	0	1	3	0	1	**13**	1	1
New Customers	93	87	78	92	110	101	95	135	90	112	93	71	**1,157**	96	92
Finals	70	69	81	93	89	91	93	106	84	84	92	77	**1,029**	86	83
Lock Non-Pays	173	146	190	154	156	84	184	191	205	222	128	89	**1,922**	160	152
Completed Meter Changeouts	66	81	61	93	19	30	5	11	6	13	2	25	**412**	34	73
Permits Issued	13	11	15	17	28	14	36	30	17	28	21	18	**248**	21	23
Inspections Made	35	35	29	31	44	29	42	55	36	54	31	41	**462**	39	39
Active Metered Customers	7,930	7,948	7,945	7,944	7,965	7,975	7,977	8,006	8,012	8,040	8,041	8,035			
Total Meters	8,120	8,132	8,141	8,149	8,166	8,178	8,199	8,214	8,224	8,242	8,254	8,260			
Gain	23	18	-3	-1	21	10	2	29	6	28	1	-6	**128**	11	9
Water Leaks	23	13	21	22	40	21	33	27	16	16	25	24	**281**	23	27
Other Water Complaints	15	2	26	5	4	23	3	18	7	7	5	7	**122**	10	6.6
Customer Service Work Orders	169	143	184	155	179	189	209	210	186	169	146	125	**2,064**	172	163.5
Line Locates	10	26	18	27	6	14	14	24	18	20	14	12	**203**	17	19.6
Sewer Stoppages	24	17	21	16	17	12	7	9	17	16	14	19	**189**	16	13.5
LPSS Complaints	25	14	16	11	22	15	15	19	8	11	14	10	**180**	15	17.7
Lift Station Complaints	7	1	4	1	16	8	4	5	9	15	9	0	79	7	5.3
Lift Station Maintenance	64	62	52	63	64	64	63	64	65	65	61	62	749	62	81
Wastewater Gallons Treated	54,292,600	40,928,500	38,542,000	43,532,000	49,916,400	41,423,900	39,068,700	40,038,600	41,677,400	53,922,000	48,276,500	40,855,000	**532,473,600**	44,372,800	43,318,633
Wastewater Gallons Billed	47,149,189	36,266,600	40,191,792	36,782,940	45,963,725	54,511,320	52,771,430	46,832,060	54,748,570	44,848,030	37,815,720	35,453,274	**533,334,650**	44,444,554	45,359,746
Total Gallons of Water Pumped	49,553,400	43,210,000	55,626,600	58,260,200	61,028,300	60,572,200	69,338,100	67,627,300	65,077,000	52,182,800	50,955,900	52,037,200	**685,469,000**	57,122,417	56,274,292
Total Gallons of Water Billed	54,274,129	40,757,560	45,057,292	41,793,390	51,769,535	62,795,680	60,336,400	54,261,560	63,225,500	51,225,680	42,496,110	39,688,304	**607,681,140**	50,640,095	51,969,539
Estimated Gallons of Water Flushed	3,051,611	2,273,835	2,344,245	2,705,686	2,975,940	2,258,091	2,618,546	3,328,161	3,831,923	2,875,812	3,024,116	3,051,611	**34,339,576**	2,861,631	2,261,116
Estimated Gallons in Water Leakage	5,500	29,200	104,850	1,348,200	1,842,247	1,474,770	278,150	268,900	77,200	3,950	21,300	58,525	**5,512,792**	459,399	132,984
Not metered Not Billed (Water for Construction)	3,284	23,981	25,687	287,591	313,652	258,800	13,460	2,000	15,840	167,589	18,547	11,452	**1,141,883**	95,157	124,833
Gallons of Water USED - LVFD	5,000	24,000	9,000	15,000	4,000	7,000	62,000	18,980	20,000	130,000	80,000	10,000	**384,980**	32,082	9,479
Total Gallons of Water Accounted for	57,334,524	43,084,576	47,532,074	46,134,867	56,901,374	66,787,341	63,246,556	57,860,621	67,150,463	54,273,031	45,560,073	42,809,892	**648,675,391**	54,056,283	54,488,471
Total Gallons of Water Unaccounted	-7,781,124	125,424	8,094,526	12,125,333	4,126,926	-6,215,141	6,091,544	9,766,679	-2,073,463	-2,090,231	5,395,827	9,227,308	**36,793,609**	3,066,134	1,785,820
Percent Unaccounted Water	-16%	0%	15%	21%	7%	-10%	9%	14%	-3%	-4%	11%	18%		5.1%	3%
% W.W.Treated vs. Wastewater Billed	115%	113%	96%	118%	109%	76%	74%	85%	76%	120%	128%	115%		102%	97%
Population Served	23,790	23,844	23,835	23,832	23,895	23,925	23,931	24,018	24,036	24,120	24,123	24,105		23,955	23,895
Customers with usage 0 - 1500 Gallons "Minimum"	873	1,118	1,020	1,068	881	765	818	903	782	908	1,116	1,156		951	915
Customers with usage 1500 - 7000 Gallons "Average"	4,143	5,083	4,997	5,055	4,377	3,797	3,907	4,273	3,895	4,595	5,104	5,273		4,542	4,403
Customers with usage 7000 & Up Gallons "High"	3,044	1,923	2,194	2,065	2,950	3,668	3,476	3,040	3,575	2,798	2,092	1,881		2,726	2,292
Average Gallons of Water per Household per Month	6,844	5,128	5,671	5,261	6,500	7,874	7,564	6,778	7,891	6,371	5,285	15		5931.8	6075.7
AVERAGE Gallons of Water per person per day used	73.6	61.0	61.0	58.5	69.9	87.5	81.3	72.9	87.7	68.5	58.7	53.1		69.5	71.5
AVERAGE Gallons of Sewer per person per day used	63.9	54.3	54.4	51.4	62.1	75.9	71.1	62.9	75.9	60.0	52.3	47.4		61.0	62.4
Monthly average GPM per Connection	0.153	0.127	0.127	0.122	0.146	0.182	0.169	0.152	0.183	0.143	0.122	0.111		0.145	0.149

Appendix 2-A: Attachment 2
Lumberton Municipal Utility District
Meter Readings

2012 Production Report

	JANUARY 2012	FEBRUARY 2012	MARCH 2012	APRIL 2012	MAY 2012	JUNE 2012	JULY 2012	AUGUST 2012	SEPTEMBER 2012	OCTOBER 2012	NOVEMBER 2012	DECEMBER 2012	2012 TOTALS TOTALS	2012 Monthly AVERAGE	2011 Monthly AVERAGE
New Connections	5	10	13	15	11	19	12	8	12	15	17	17	**154**	13	12
Water Taps	1	3	4	3	5	7	5	1	5	4	0	6	**44**	4	5
Water Tie-Ins	2	7	9	12	6	12	7	7	7	11	17	11	**108**	9	5
Sewer Tap	0	4	2	1	2	3	2	0	3	4	1	4	**26**	2	3
Sewer Tie-Ins	2	7	9	10	7	10	3	8	8	12	2	9	**87**	7	5
Lpss	2	1	0	0	0	2	3	0	0	1	0	2	**11**	1	1
New Customers	81	94	91	80	108	109	95	99	96	104	74	72	**1,103**	92	87
Finals	80	80	76	66	94	105	98	94	82	100	63	54	**992**	83	78
Lock Non-Pays	176	107	207	144	229	129	130	169	100	237	107	86	**1,821**	152	116
Completed Meter Changeouts	10	103	117	112	120	28	64	105	9	105	58	44	**875**	73	81
Permits Issued	11	17	25	27	29	23	42	29	23	22	17	10	**275**	23	21
Inspections Made	38	46	39	53	50	26	30	50	35	54	29	21	**471**	39	17
Active Metered Customers	7,908	7,922	7,937	7,951	7,965	7,969	7,966	7,971	7,985	7,989	8,000	8,018			
Total Meters	8,104	8,114	8,127	8,142	8,153	8,172	8,184	8,192	8,204	8,219	8,236	8,253			
Gain	1	14	15	14	14	4	-3	5	14	4	11	18	**111**	9	9
Water Leaks	24	23	42	46	26	38	18	31	25	23	14	16	**326**	27	33
Other Water Complaints	4	12	3	3	7	10	2	12	4	8	12	2	**79**	7	21.5
Customer Service Work Orders	201	174	170	178	169	161	166	153	194	173	103	120	**1,962**	164	148.1
Line Locates	30	7	29	24	12	20	23	29	12	24	10	15	**235**	20	16.3
Sewer Stoppages	24	26	14	6	9	7	13	15	14	13	7	14	**162**	14	13.5
LPSS Complaints	13	39	20	8	25	17	14	12	25	10	11	18	**212**	18	14.9
Lift Station Complaints	5	11	14	3	5	5	10	5	0	2	1	2	**63**	5	4.4
Lift Station Maintenance	113	105	111	107	103	80	58	58	59	58	58	58	**968**	81	114
Wastewater Gallons Treated	41,937,100	58,566,000	55,557,200	41,768,500	41,353,000	37,927,500	58,119,700	38,004,400	38,649,900	36,452,800	32,459,300	39,028,200	**519,823,600**	43,318,633	39,396,517
Wastewater Gallons Billed	46,034,325	37,212,999	47,789,903	40,964,276	48,067,168	54,170,784	55,688,750	46,085,031	51,873,806	41,273,851	37,810,500	37,345,560	**544,316,953**	45,359,746	51,823,938
Total Gallons of Water Pumped	50,355,000	45,694,000	50,758,000	56,068,100	69,795,000	61,675,700	57,716,900	65,651,000	59,462,400	56,545,000	51,828,400	49,742,000	**675,291,500**	56,274,292	65,346,275
Total Gallons of Water Billed	52,194,715	41,717,469	52,717,893	46,089,536	55,840,548	62,889,474	63,163,630	53,064,709	60,518,798	48,535,431	43,598,530	43,303,730	**623,634,463**	51,969,539	59,373,518
Estimated Gallons of Water Flushed	2,182,450	2,164,316	2,177,546	2,142,826	3,161,826	2,198,591	2,148,563	2,135,121	2,277,511	2,223,136	2,138,971	2,182,536	**27,133,393**	2,261,116	2,352,497
Estimated Gallons in Water Leakage	14,070	26,030	179,320	39,280	409,000	289,190	16,845	514,980	4,550	36,670	39,970	25,900	**1,595,805**	132,984	1,099,498
Not metered Not Billed (Water for Construction)	12,450	6,587	14,856	453,487	756,984	32,958	18,654	65,487	43,852	12,600	37,500	42,580	**1,497,995**	124,833	11,718
Gallons of Water USED - LVFD	6,000	3,000	5,000	1,000	8,000	5,000	9,000	750	7,000	37,000	9,000	23,000	**113,750**	9,479	12,167
Total Gallons of Water Accounted for	54,403,685	43,914,402	55,089,615	48,725,129	60,168,358	65,410,213	65,347,692	55,780,297	62,844,711	50,807,837	45,814,971	45,554,746	**653,861,656**	54,488,471	62,837,231
Total Gallons of Water Unaccounted	-4,048,685	1,779,598	-4,331,615	7,342,971	9,626,642	-3,734,513	-7,630,792	9,870,703	-3,382,311	5,737,163	6,013,429	4,187,254	**21,429,844**	1,785,820	2,509,044
Percent Unaccounted Water	-8%	4%	-9%	13%	14%	-6%	-13%	15%	-6%	10%	12%	8%		2.9%	3%
% W.W Treated vs Wastewater Billed	91%	157%	116%	102%	86%	70%	104%	82%	75%	88%	86%	105%		97%	80%
Population Served	23,724	23,766	23,811	23,853	23,895	23,907	23,898	23,913	23,955	23,967	24,000	24,054		23,895	23,924
Customers with usage 0 - 1500 Gallons "Minimum"	828	1,043	976	916	853	741	873	973	775	966	990	1,042		915	
Customers with usage 1500 - 7000 Gallons "Average"	4,170	4,922	4,757	4,556	4,029	3,616	4,160	4,211	3,980	4,622	4,892	4,917		4,403	
Customers with usage 7000 & Up Gallons "High"	2,130	1,215	1,430	1,691	2,313	2,837	2,955	2,837	3,318	2,472	2,164	2,137		2,292	
Average Gallons of Water per Household per Month	6,600	5,266	6,642	5,797	7,011	7,892	7,929	6,657	7,579	6,075	5,450	10		6075.7	7444.9
AVERAGE Gallons of Water per person per day used	71.0	62.7	71.4	64.4	75.4	87.7	85.3	71.6	84.2	65.3	60.6	58.1		71.5	81.5
AVERAGE Gallons of Sewer per person per day used	62.6	55.9	64.7	57.2	64.9	75.5	75.2	62.2	72.2	55.6	52.5	50.1		62.4	71.1
Monthly average GPM per Connection	0.148	0.131	0.149	0.134	0.157	0.183	0.178	0.149	0.175	0.136	0.126	0.121		0.149	0.170

assuming 3 persons per connection

Appendix 2-A: Attachment 3
Email from Texas Department of Criminal Justice Representative
(Woodville, Texas)

Syvarth,Cynthia

From: Tony Robinson <Tony.Robinson@tdcj.texas.gov>
Sent: Tuesday, October 17, 2017 12:39 PM
To: Syvarth,Cynthia
Subject: RE: Reg I - Tyler County

Mrs. Syvarth,

As you are aware by now, Mr. Flowers retired in April 2017. I have assumed his duties until his position becomes filled. The average population for the Gib Lewis Unit is 2,240 personnel; which is offenders and staff. The water demand for the unit is 16,203,850 per month, based on the last 3 years of water data. There are no plans for expansions for this Unit.

Tony Robinson
Facilities Maintenance Operations
Office: 325-643-5575 Ext 6278
Cell: 936-355-2829
Fax: 325-223-0294
Tony.robinson@tdcj.texas.gov

From: Syvarth,Cynthia [mailto:csyvarth@apaienv.com]
Sent: Monday, October 16, 2017 11:09 AM
To: Jimmy Flowers <jimmy.flowers@tdcj.texas.gov>
Cc: Tony Robinson <Tony.Robinson@tdcj.texas.gov>
Subject: Reg I - Tyler County

Good morning Mr. Flowers,

I am one of the consultants working with the Texas Water Development Board to create the next regional water plan for East Texas. We are currently reviewing population projections and water demands in Tyler County.

Can you provide me with the average population and water demand of the Gib Lewis Unit located in Woodville, TX and how those demands are expected to change over the next fifty years?

I appreciate your time,

Cynthia Amoles Syvarth, PE

Alan Plummer Associates, Inc.
6300 La Calma Drive, Suite 400
Austin, Texas 78752

512.687.2185 (Direct)
512.452.5905 (Austin Main)
csyvarth@apaienv.com
www.apaienv.com
TBPE Firm No. 13

Appendix 2-A: Attachment 4
Southeast Texas Groundwater Conservation District
Meter Readings

SOUTHEAST TEXAS GROUNDWATER CONSERVATION DISTRICT
P.O. Box 1407 / 271 E. Lamar
Jasper, TX 75951
Phone (409) 383-1577 Fax (409) 383-0799
Website: www.setgcd.org / Email: Jmartin@setgcd.org

Permittee: SETGCD-1024-42011-O

Well Name/ID: ETEC WELL # 1

Month 2015	Previous Meter Reading	Current Meter Reading	Total Monthly Usage
January	10256835	42178833	31921998
February	42178833	43777515	1598682
March	43777515	44872776	1095261
April	44872776	45741356	868580
May	45741356	46503246	761890
June	46503246	47022970	519724
July	47022970	51194435	4171465
August	51194435	53258308	2063873
September	53258308	54252159	993851
October	54252159	59659492	5407333
November	59659492	60170319	510827
December	60170319	60471703	301384

Well Name/ID: ETEC WELL # 1

Month 2016	Previous Meter Reading	Current Meter Reading	Total Monthly Usage
January	60,471,703	61,453,835	982,132
February	61,453,835	62,054,333	600,498
March	62,054,333	62,054,939	606
April	62,054,939	62,146,252	91,313
May	62,146,252	62,846,775	700,523
June	62,846,775	63,488,701	641,926
July	63,488,701	63,677,383	189,137
August	63,677,383	0	0
September	0	0	0
October	0	0	0
November	0	0	0
December	0	0	0

Please be sure to submit the pumpage numbers after the end of each calendar quarter.

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Appendix 2-B

Historical Estimates for Utility Water User Group in Region I

The following appendix includes a copy of the WUG Historical Estimates data from the TWDB Data Web Interface known as the DB22. The summary is divided by Water User Group and county.

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REGION I	Historical Population Estimates						Historical Net Use Estimates					
	2010	2011	2012	2013	2014	2015	2010	2011	2012	2013	2014	2015
ANDERSON COUNTY												
ANDERSON COUNTY CEDAR CREEK WSC	956	966	966	966	966	1,018	96	106	106	106	112	110
B B S WSC	1,132	1,132	1,132	1,132	1,132	1,068	122	122	122	122	122	118
B C Y WSC	1,901	2,078	2,226	2,226	2,374	2,449	204	239	224	176	160	172
BRUSHY CREEK WSC	3,191	3,206	3,204	3,248	3,301	3,297	240	328	288	272	246	291
ELKHART	1,371	1,490	1,408	1,471	1,846	1,846	213	252	234	212	202	205
FOUR PINES WSC	3,444	3,453	3,321	3,333	3,486	3,507	286	350	293	282	268	295
FRANKSTON	1,188	818	818	804	804	799	190	236	236	185	172	179
FRANKSTON RURAL WSC	1,274	1,061	1,274	1,274	1,274	1,274	161	185	195	190	219	221
NECHES WSC	1,575	1,588	1,905	2,244	2,244	2,244	213	225	215	218	147	145
NORWOOD WSC	876	855	883	757	904	922	87	148	126	134	112	117
PALESTINE	18,159	18,236	18,336	18,552	18,571	17,233	3,663	4,865	4,750	5,851	4,823	3,028
PLEASANT SPRINGS WSC	888	888	867	882	882	929	108	163	127	126	77	77
SLOCUM WSC	2,121	1,833	1,833	1,851	1,897	2,090	212	235	235	209	161	224
TDCJ BETO GURNEY & POWLEDGE UNITS	3,448	4,453	5,017	5,017	5,017	5,017	1,433	1,118	1,790	1,790	1,790	1,790
TDCJ COFFIELD MICHAEL	4,002	4,002	4,002	4,002	4,002	4,002	2,198	2,471	2,265	2,265	2,265	2,265
THE CONSOLIDATED WSC	1,128	1,147	1,148	1,148	1,148	1,148	150	188	155	156	155	156
TUCKER WSC	1,125	1,125	1,125	1,125	1,125	1,147	96	135	134	108	134	110
WALSTON SPRINGS WSC	3,459	3,486	3,521	3,519	3,543	3,565	353	434	363	371	339	354
COUNTY-OTHER, ANDERSON	7,220	6,909	5,978	5,457	3,985	5,351	872	909	739	624	339	561
ANDERSON COUNTY TOTAL	58,458	58,726	58,964	59,008	58,501	58,906	10,897	12,709	12,597	13,397	11,843	10,418
ANGELINA COUNTY												
ANGELINA WSC	2,789	2,928	3,430	3,486	2,905	2,938	276	300	244	257	247	240
CENTRAL WCID OF ANGELINA COUNTY	6,341	6,429	6,458	6,543	6,531	6,551	541	623	543	558	478	641
DIBOLL	5,249	5,249	5,209	5,209	5,209	5,209	740	756	742	727	632	745
FOUR WAY SUD	5,203	5,269	5,416	5,374	5,467	5,490	502	562	460	504	489	552
HUDSON WSC	8,915	8,915	7,517	7,517	8,743	8,817	767	767	787	765	790	839
HUNTINGTON	2,328	2,385	2,364	2,364	2,454	2,384	258	272	226	252	246	263
LUFKIN	40,565	40,602	40,939	40,939	45,829	45,944	6,181	7,238	6,038	6,522	6,458	6,144
M & M WSC	3,092	3,120	3,834	3,862	3,178	3,892	279	299	271	251	233	261
POLLOK-REDTOWN WSC	1,651	1,651	1,651	1,651	1,651	1,651	155	179	153	145	148	149
REDLAND WSC	2,440	2,029	2,103	2,103	2,103	2,103	409	216	177	170	206	190
UPPER JASPER COUNTY WATER AUTHORITY	85	91	94	104	99	107	11	12	11	11	10	11
WOODLAWN WSC	1,700	1,700	1,700	1,700	1,700	1,700	153	170	196	156	143	251
ZAVALLA	776	776	855	1,019	852	855	100	92	104	88	101	97
COUNTY-OTHER, ANGELINA	5,637	7,070	7,280	7,968	3,090	2,732	511	756	727	889	234	188
ANGELINA COUNTY TOTAL	86,771	88,214	88,850	89,839	89,811	90,373	10,883	12,242	10,679	11,295	10,415	10,571
CHEROKEE COUNTY												
AFTON GROVE WSC	1,257	1,252	1,279	1,360	1,430	1,416	154	193	143	158	130	149
ALTO	1,165	1,241	1,241	1,313	1,297	1,297	246	224	165	169	248	248
ALTO RURAL WSC	2,694	2,754	2,754	3,385	3,385	3,385	529	619	620	649	554	546
BLACKJACK WSC	730	612	612	600	630	644	100	130	91	94	85	108
BULLARD	43	49	37	37	37	37	7	9	8	8	8	9
CRAFT TURNEY WSC	4,765	4,814	4,845	4,837	4,934	4,948	493	528	463	480	451	487
GUM CREEK WSC	1,198	1,223	1,260	1,260	1,262	1,268	98	133	92	132	95	99
JACKSONVILLE	13,096	13,868	14,858	14,747	14,544	14,544	2,510	2,754	2,513	2,151	2,279	2,429
NEW SUMMERFIELD	1,131	1,196	1,196	1,196	1,196	1,580	144	155	127	137	137	136

REGION I	Historical Population Estimates						Historical Net Use Estimates					
	2010	2011	2012	2013	2014	2015	2010	2011	2012	2013	2014	2015
NORTH CHEROKEE WSC	4,479	4,479	4,674	4,770	4,929	5,046	438	543	480	488	437	471
POLLOK-REDTOWN WSC	143	143	143	143	143	143	13	16	13	13	13	13
RUSK	5,670	5,670	5,670	5,670	5,670	5,966	925	953	865	852	766	815
RUSK RURAL WSC	2,713	2,728	2,782	2,800	2,795	2,807	311	368	279	288	299	284
SOUTH RUSK COUNTY WSC	49	51	54	52	54	54	5	6	5	7	6	9
SOUTHERN UTILITIES	3,560	3,616	3,623	3,662	3,707	3,558	668	751	650	654	593	625
TROUP	69	70	68	67	67	72	12	14	13	13	12	12
WELLS	802	802	802	802	802	802	113	122	105	95	94	89
WEST JACKSONVILLE WSC	1,253	1,007	1,267	1,267	1,308	1,338	201	198	150	169	133	141
WRIGHT CITY WSC	499	495	503	508	510	514	70	79	58	59	43	45
COUNTY-OTHER, CHEROKEE	5,529	5,228	4,055	4,062	3,854	2,897	649	657	643	569	584	576
CHEROKEE COUNTY TOTAL	50,845	51,298	51,723	52,538	52,554	52,316	7,686	8,452	7,483	7,185	6,967	7,291
HARDIN COUNTY												
HARDIN COUNTY WCID 1	1,107	-	-	-	1,300	1,344	-	-	-	-	133	136
KOUNTZE	2,129	2,129	2,129	1,955	1,955	1,955	282	279	255	260	265	261
LAKE LIVINGSTON WSC	89	87	89	94	89	92	11	11	9	9	9	10
LUMBERTON MUD	19,693	19,693	20,103	19,693	21,067	21,645	2,160	2,406	2,072	2,108	2,054	2,107
NORTH HARDIN WSC	7,260	7,257	7,299	7,305	7,335	7,353	559	574	497	490	544	464
SILSBEE	6,991	4,659	6,069	6,095	6,959	6,959	999	1,012	919	858	895	896
SOUR LAKE	1,813	1,813	1,813	1,867	1,867	1,867	251	267	284	300	242	280
WEST HARDIN WSC	3,490	3,734	3,734	3,485	3,485	2,738	312	316	301	233	233	290
WILDWOOD POA	647	575	509	570	622	687	95	130	87	91	80	84
COUNTY-OTHER, HARDIN	11,416	15,544	14,075	15,941	12,367	13,001	1,393	2,104	1,754	2,045	1,451	1,531
HARDIN COUNTY TOTAL	54,635	55,491	55,820	57,005	57,046	57,641	6,062	7,099	6,178	6,394	5,906	6,059
HENDERSON COUNTY												
ATHENS	239	230	230	245	246	234	46	52	44	41	42	44
BERRYVILLE	985	1,078	1,119	1,078	1,078	1,078	106	117	103	130	93	95
BETHEL ASH WSC	2,624	3,206	3,290	2,774	3,302	3,394	239	297	245	261	252	237
BROWNSBORO	1,040	1,040	901	898	898	910	172	172	110	146	137	146
BRUSHY CREEK WSC	871	875	875	887	901	900	66	90	78	74	67	79
CHANDLER	2,822	2,822	2,822	2,822	3,724	4,015	438	528	435	434	398	443
EDOM WSC	190	191	191	191	191	191	17	23	19	18	17	16
FRANKSTON	41	28	28	28	28	28	7	8	8	6	6	6
LEAGUEVILLE WSC	1,708	1,722	1,736	1,763	1,789	1,817	186	200	183	165	170	173
MOORE STATION WSC	1,321	1,335	1,321	1,335	3,052	3,052	169	185	154	116	169	146
MURCHISON	600	600	606	606	605	875	-	113	95	91	95	95
R P M WSC	487	493	481	481	487	556	54	66	64	64	57	53
VIRGINIA HILL WSC	1,444	1,463	1,478	1,484	1,487	1,495	143	167	195	163	154	165
COUNTY-OTHER, HENDERSON	8,419	7,883	7,970	8,715	5,687	5,076	1,101	1,103	1,053	1,112	892	820
HENDERSON COUNTY TOTAL	22,791	22,966	23,048	23,307	23,475	23,621	2,744	3,121	2,786	2,821	2,549	2,518
HOUSTON COUNTY												
CROCKETT	7,005	7,005	7,005	7,005	6,713	6,713	1,178	1,314	1,310	1,127	1,036	1,171
GRAPELAND	1,519	1,519	1,280	1,280	1,278	1,280	237	220	159	171	198	184
LOVELADY	652	652	652	652	652	652	105	130	90	97	94	91
PENNINGTON WSC	853	863	863	863	869	878	82	90	70	47	75	76
TDCJ EASTHAM UNIT	2,360	2,360	2,360	2,360	2,360	2,360	1,052	1,077	1,032	1,032	1,032	1,032
THE CONSOLIDATED WSC	10,575	10,748	10,763	10,763	10,763	10,763	1,405	1,760	1,456	1,460	1,454	1,460

REGION I	Historical Population Estimates						Historical Net Use Estimates					
	2010	2011	2012	2013	2014	2015	2010	2011	2012	2013	2014	2015
COUNTY-OTHER, HOUSTON	768	604	904	473	700	516	92	92	87	69	88	89
HOUSTON COUNTY TOTAL	23,732	23,751	23,827	23,396	23,335	23,162	4,151	4,683	4,204	4,003	3,977	4,103
JASPER COUNTY												
BROOKELAND FWSD	312	312	312	326	335	268	42	42	32	25	25	30
JASPER	8,771	8,771	11,048	11,048	11,048	11,048	2,254	2,034	1,790	1,868	1,757	1,667
JASPER COUNTY WCID 1	2,643	2,278	2,839	2,392	2,742	2,461	233	217	190	210	229	238
KIRBYVILLE	2,147	2,251	2,222	2,147	2,147	2,147	417	486	385	351	329	302
MAURICEVILLE SUD	408	408	408	417	408	420	29	30	30	32	31	30
RAYBURN COUNTRY MUD	1,367	1,771	1,771	2,349	2,134	2,559	-	154	154	344	261	222
RURAL WSC	982	982	982	982	982	982	113	113	113	113	113	113
SOUTH JASPER COUNTY WSC	1,367	1,428	1,479	1,535	1,536	1,655	136	121	119	170	130	122
UPPER JASPER COUNTY WATER AUTHORITY	1,586	1,698	1,757	1,933	1,842	2,002	211	221	212	201	186	200
COUNTY-OTHER, JASPER	16,127	16,018	13,268	12,309	12,747	11,311	1,901	2,088	1,562	1,442	1,354	1,213
JASPER COUNTY TOTAL	35,710	35,917	36,086	35,438	35,921	34,853	5,336	5,506	4,587	4,756	4,415	4,137
JEFFERSON COUNTY												
BEAUMONT	122,678	129,574	129,574	129,574	129,574	129,574	26,640	31,477	29,175	25,794	23,843	23,441
BEVIL OAKS	1,268	1,342	1,342	1,451	1,493	1,493	128	141	113	111	111	105
CHINA	1,160	892	892	754	809	809	141	147	147	122	140	179
GROVES	16,007	16,425	16,425	16,425	16,425	17,550	2,047	2,416	2,249	2,143	2,172	2,160
JEFFERSON COUNTY WCID 10	5,334	5,625	5,162	5,162	5,334	5,334	488	565	567	563	529	659
MEEKER MWD	3,144	3,027	2,949	3,240	3,333	3,363	342	420	320	308	267	372
NEDERLAND	17,789	17,789	17,787	17,807	17,787	17,787	2,406	2,495	2,170	2,167	2,177	2,138
PORT ARTHUR	52,262	49,382	49,382	46,877	46,877	46,877	13,481	18,141	16,653	16,701	14,542	14,669
PORT NECHES	13,075	12,536	12,536	12,536	12,536	12,536	1,614	1,489	1,661	1,502	1,653	1,662
WEST JEFFERSON COUNTY MWD	8,070	8,130	8,430	8,928	8,442	9,309	669	784	740	696	710	678
COUNTY-OTHER, JEFFERSON	11,486	8,428	9,633	10,561	9,030	6,427	1,299	931	1,016	1,180	906	659
JEFFERSON COUNTY TOTAL	252,273	253,150	254,112	253,315	251,640	251,059	49,255	59,006	54,811	51,287	47,050	46,722
NACOGDOCHES COUNTY												
APPLEBY WSC	3,507	3,582	3,617	3,584	3,584	3,602	778	925	724	715	678	786
CARO WSC	2,026	2,026	1,974	2,098	2,098	2,098	220	220	309	358	358	358
CUSHING	826	826	967	967	967	967	106	119	107	96	88	92
D & M WSC	5,580	4,752	5,727	5,814	5,919	5,958	599	728	583	616	558	586
ETOILE WSC	1,783	1,440	1,296	1,216	1,073	1,070	149	187	166	192	240	260
GARRISON	1,006	1,034	1,034	1,034	1,034	1,034	209	221	217	180	160	191
LILLY GROVE SUD	2,369	2,747	2,426	2,426	2,593	2,585	405	358	306	324	286	360
MELROSE WSC	2,530	2,530	2,530	2,769	2,769	2,670	1	1	1	786	729	639
NACOGDOCHES	29,914	33,253	33,533	32,927	34,132	35,107	5,914	6,673	5,430	5,871	5,410	6,187
SWIFT WSC	2,481	2,481	2,481	2,481	2,531	2,481	397	410	333	353	319	334
WODEN WSC	2,489	2,030	2,436	2,028	2,028	2,028	264	290	251	238	198	218
COUNTY-OTHER, NACOGDOCHES	10,013	8,559	7,732	7,699	6,686	6,049	1,198	1,112	920	947	733	657
NACOGDOCHES COUNTY TOTAL	64,524	65,260	65,753	65,043	65,414	65,649	10,240	11,244	9,347	10,676	9,757	10,668
NEWTON COUNTY												
BROOKELAND FWSD	833	833	832	871	894	716	113	112	86	66	66	81
MAURICEVILLE SUD	371	371	371	379	371	382	27	28	27	29	28	27
NEWTON	2,478	2,478	2,633	2,633	2,708	2,708	467	467	338	338	341	341
SOUTH NEWTON WSC	2,438	2,438	2,438	2,438	2,438	2,438	197	205	206	224	217	237
COUNTY-OTHER, NEWTON	8,325	8,403	8,321	8,204	8,171	7,930	995	1,092	990	981	932	893

REGION I	Historical Population Estimates						Historical Net Use Estimates					
	2010	2011	2012	2013	2014	2015	2010	2011	2012	2013	2014	2015
NEWTON COUNTY TOTAL	14,445	14,523	14,595	14,525	14,582	14,174	1,799	1,904	1,647	1,638	1,584	1,579
ORANGE COUNTY												
BRIDGE CITY	8,523	8,942	8,912	8,878	8,874	9,047	728	857	765	794	826	850
KELLY G BREWER	473	473	473	645	645	765	50	78	97	128	320	321
MAURICEVILLE SUD	8,659	8,659	8,659	8,849	8,659	8,909	625	646	639	680	656	630
ORANGE	18,643	19,000	19,000	19,000	18,948	18,500	2,703	2,609	2,337	3,076	3,433	2,807
ORANGE COUNTY WCID 1	11,888	14,300	11,233	11,233	17,780	17,699	-	1,502	1,369	1,300	1,236	1,222
ORANGE COUNTY WCID 2	3,443	3,443	3,443	3,443	3,443	3,445	423	502	503	506	398	335
ORANGEFIELD WSC	4,611	4,815	4,658	4,658	4,658	4,722	453	519	505	517	486	536
PINEHURST	2,358	2,289	2,289	2,012	2,012	2,000	294	292	298	269	256	256
PORT ARTHUR	5	5	5	4	4	4	1	2	2	2	1	1
SOUTH NEWTON WSC	1,372	1,372	1,372	1,372	1,372	1,372	111	116	116	126	122	133
COUNTY-OTHER, ORANGE	21,862	18,734	22,721	22,707	16,227	16,606	2,604	2,434	2,855	2,889	1,903	4,259
ORANGE COUNTY TOTAL	81,837	82,032	82,765	82,801	82,622	83,069	7,992	9,557	9,486	10,287	9,637	11,350
PANOLA COUNTY												
BECKVILLE	870	885	986	812	1,015	1,016	127	131	116	111	100	102
CARTHAGE	6,647	6,643	6,762	6,651	6,762	6,864	1,586	1,721	1,488	1,686	1,339	1,347
GILL WSC	771	763	774	780	783	780	91	106	85	89	77	88
MINDEN BRACHFIELD WSC	54	-	-	75	75	75	-	-	-	7	5	7
PANOLA-BETHANY WSC	81	81	81	81	86	82	15	17	15	15	14	18
TATUM	285	303	303	295	304	304	66	73	63	53	39	54
COUNTY-OTHER, PANOLA	15,088	15,340	15,234	15,550	15,232	15,245	1,580	1,631	1,407	1,480	1,105	1,181
PANOLA COUNTY TOTAL	23,796	24,015	24,140	24,244	24,257	24,366	3,465	3,679	3,174	3,441	2,679	2,797
POLK COUNTY												
CHESTER WSC	198	198	186	186	186	186	33	36	31	31	31	31
CORRIGAN	1,639	1,946	1,946	1,316	1,161	1,535	220	218	217	195	195	204
DAMASCUS-STRYKER WSC	1,358	1,358	1,426	1,435	1,395	1,395	146	183	154	94	116	122
LAKE LIVINGSTON WSC	889	870	892	936	892	920	110	107	90	93	92	101
MOSCOW WSC	242	235	383	353	1,036	923	-	37	37	125	216	204
SODA WSC	111	111	110	110	110	110	10	10	12	12	12	12
COUNTY-OTHER, POLK	3,406	3,080	2,999	3,799	3,371	3,181	319	332	293	376	332	291
POLK COUNTY TOTAL	7,843	7,798	7,942	8,135	8,151	8,250	838	923	834	926	994	965
RUSK COUNTY												
CHALK HILL SUD	3,425	3,470	3,530	4,263	4,305	4,317	289	339	273	282	267	270
CROSS ROADS SUD	2,824	2,859	2,869	2,864	3,346	3,346	281	294	270	246	298	256
CRYSTAL FARMS WSC	939	939	939	1,021	1,021	1,126	100	104	93	102	102	115
EBENEZER WSC	772	792	670	636	488	601	77	132	101	115	129	98
ELDERVILLE WSC	1,730	1,751	1,757	1,772	1,780	1,780	177	140	180	178	161	165
GASTON WSC	1,389	1,389	1,389	1,418	1,418	1,389	121	175	154	153	153	144
GOODSPRINGS WSC	2,560	2,580	2,590	2,670	2,700	2,871	244	262	221	221	211	232
HENDERSON	13,431	13,430	13,430	13,430	13,430	13,430	2,898	3,526	2,898	2,636	1,241	2,686
JACOBS WSC	719	1,239	1,244	1,244	632	632	141	147	116	116	125	136
KILGORE	3,024	3,222	3,222	3,222	3,412	3,412	786	770	625	644	590	636
MINDEN BRACHFIELD WSC	1,382	-	-	1,925	1,925	1,925	-	-	-	175	136	176
MT ENTERPRISE WSC	1,404	1,512	1,512	1,512	1,512	1,512	199	245	193	196	188	188
NEW LONDON	2,239	2,295	2,285	2,285	2,280	2,300	338	363	340	337	328	325
NEW PROSPECT WSC	978	2,871	2,839	2,871	2,915	3,180	166	186	147	105	124	132

REGION I	Historical Population Estimates						Historical Net Use Estimates					
	2010	2011	2012	2013	2014	2015	2010	2011	2012	2013	2014	2015
OVERTON	2,326	2,173	2,302	2,302	2,338	2,302	-	529	479	479	421	456
SOUTH RUSK COUNTY WSC	1,473	1,520	1,633	1,570	1,632	1,632	165	167	155	217	189	257
SOUTHERN UTILITIES	358	364	364	368	373	358	67	75	65	66	60	63
TATUM	1,065	1,134	1,134	1,102	1,135	1,135	247	274	235	197	144	204
WEST GREGG SUD	170	173	175	177	182	179	16	17	15	15	12	16
WRIGHT CITY WSC	330	327	333	336	337	340	46	52	38	39	28	30
COUNTY-OTHER, RUSK	10,792	9,765	10,007	6,557	6,621	6,209	1,061	1,002	983	571	662	611
RUSK COUNTY TOTAL	53,330	53,805	54,224	53,545	53,782	53,976	7,419	8,799	7,581	7,090	5,569	7,196
SABINE COUNTY												
BROOKELAND FWSD	707	707	706	740	759	608	96	95	73	56	56	68
G M WSC	5,517	5,532	5,537	5,537	5,180	5,203	483	517	444	446	468	544
HEMPHILL	1,198	1,198	1,198	1,198	1,198	1,198	348	325	336	313	339	545
PINELAND	934	934	1,144	858	858	934	90	96	121	96	118	147
COUNTY-OTHER, SABINE	2,478	2,557	2,416	2,712	2,974	3,318	181	186	145	151	147	167
SABINE COUNTY TOTAL	10,834	10,928	11,001	11,045	10,969	11,261	1,198	1,219	1,119	1,062	1,128	1,471
SAN AUGUSTINE COUNTY												
G M WSC	538	539	540	540	505	507	47	50	43	44	46	53
SAN AUGUSTINE	2,108	1,795	1,795	1,795	1,795	1,795	780	537	518	637	396	467
SAN AUGUSTINE RURAL WSC	1,265	1,265	1,268	1,043	1,169	1,169	122	129	108	113	113	141
COUNTY-OTHER, SAN AUGUSTINE	4,954	5,309	5,447	5,528	5,220	5,093	507	587	572	563	453	433
SAN AUGUSTINE COUNTY TOTAL	8,865	8,908	9,050	8,906	8,689	8,564	1,456	1,303	1,241	1,357	1,008	1,094
SHELBY COUNTY												
CENTER	5,179	5,223	5,383	5,383	5,383	6,220	1,893	1,775	1,187	1,718	1,848	2,067
CHOICE WSC	945	945	945	945	945	945	-	115	115	115	115	115
EAST LAMAR WSC	791	833	791	787	833	774	93	111	89	93	85	90
FIVE WAY WSC	1,288	1,288	1,288	1,288	1,288	1,288	-	156	156	156	156	156
FLAT FORK WSC	1,147	1,147	1,147	1,183	1,183	1,183	173	140	136	169	153	137
HUXLEY	1,344	1,387	1,389	1,437	1,437	1,419	194	190	182	211	218	200
JOAQUIN	1,089	1,000	1,000	1,000	1,000	982	138	185	185	185	144	168
MCCLELLAND WSC	1,062	1,300	1,400	1,500	1,450	1,430	234	217	186	187	178	196
SAND HILLS WSC	1,350	1,400	1,450	1,450	1,461	1,475	206	256	248	120	158	152
TENAHA	1,160	1,259	1,259	1,259	1,760	1,880	182	226	239	239	219	259
TIMPSON	1,153	1,088	1,059	1,082	1,088	1,088	191	179	188	175	156	165
COUNTY-OTHER, SHELBY	8,940	8,916	8,747	8,673	8,292	6,588	1,112	1,229	1,127	1,054	930	730
SHELBY COUNTY TOTAL	25,448	25,786	25,858	25,987	26,120	25,272	4,416	4,779	4,038	4,422	4,360	4,435
SMITH COUNTY												
ALGONQUIN WATER RESOURCES OF TEXAS	536	536	621	622	622	623	86	86	198	211	202	189
ARP	1,034	1,030	995	995	993	995	176	173	155	177	191	162
BEN WHEELER WSC	14	14	14	14	14	14	1	1	1	1	1	1
BULLARD	2,700	3,052	2,343	2,314	2,314	2,314	453	576	498	518	534	576
CARROLL WSC	766	768	667	687	380	701	88	97	88	86	74	78
CRYSTAL SYSTEMS TEXAS	404	404	404	413	407	418	108	132	115	101	89	91
DEAN WSC	4,554	4,608	4,768	6,392	6,392	6,924	536	739	621	448	551	427
EMERALD BAY MUD	1,042	-	-	-	1,085	1,100	-	-	-	-	179	197
JACKSON WSC	2,068	2,071	2,140	2,215	2,267	2,305	196	210	198	183	144	177
LINDALE	1,751	1,909	1,925	1,925	1,952	1,962	252	398	359	340	323	325
LINDALE RURAL WSC	3,404	3,844	3,224	4,264	4,139	3,519	409	448	389	387	385	434

REGION I	Historical Population Estimates						Historical Net Use Estimates					
	2010	2011	2012	2013	2014	2015	2010	2011	2012	2013	2014	2015
OVERTON	133	124	132	132	134	132	-	30	27	27	24	26
R P M WSC	202	204	200	200	202	231	22	27	27	27	24	22
SOUTHERN UTILITIES	33,166	33,688	33,755	34,113	34,533	33,148	6,222	6,994	6,058	6,089	5,521	5,826
TROUP	1,895	1,920	1,865	1,840	1,840	1,978	317	372	359	351	335	331
TYLER	95,904	94,954	94,954	99,702	99,702	99,702	15,584	19,579	26,653	23,022	23,902	25,724
WALNUT GROVE WSC	7,260	7,375	7,440	7,500	7,700	7,770	805	993	826	808	774	844
WHITEHOUSE	7,665	7,527	7,527	7,527	7,527	7,527	947	1,063	872	919	862	900
WRIGHT CITY WSC	1,582	1,570	1,596	1,611	1,616	1,631	221	251	184	186	136	143
COUNTY-OTHER, SMITH	4,461	7,400	10,469	1,522	2,518	6,001	488	912	1,249	231	372	577
SMITH COUNTY TOTAL	170,541	172,998	175,039	173,988	176,337	178,995	26,911	33,081	38,877	34,112	34,623	37,050
TRINITY COUNTY												
CENTERVILLE WSC	784	784	784	784	784	784	93	105	98	76	90	90
GROVETON	502	479	479	479	479	479	61	60	51	55	64	63
PENNINGTON WSC	500	506	506	506	509	515	48	53	41	27	44	45
COUNTY-OTHER, TRINITY	1,522	1,604	1,620	1,453	1,467	1,490	148	181	147	182	177	186
TRINITY COUNTY TOTAL	3,308	3,373	3,389	3,222	3,239	3,268	350	399	337	340	375	384
TYLER COUNTY												
CHESTER WSC	772	772	724	724	724	724	130	142	122	122	122	122
COLMESNEIL	1,045	1,045	1,045	1,045	1,045	1,045	150	150	150	150	150	150
CYPRESS CREEK WSC	550	550	561	584	562	582	69	115	63	71	81	63
LAKE LIVINGSTON WSC	26	25	26	27	26	27	3	3	3	3	3	3
MOSCOW WSC	10	10	16	15	43	38	-	2	2	5	9	8
TYLER COUNTY WSC	4,559	4,600	4,189	4,184	4,367	4,379	693	709	662	518	473	512
WARREN WSC	1,273	1,316	1,316	1,359	1,359	1,339	180	188	105	200	341	476
WILDWOOD POA	480	427	377	423	462	509	71	97	64	68	60	62
WOODVILLE	3,484	3,770	3,774	4,065	3,112	3,003	1,191	1,226	1,172	1,181	1,175	1,154
COUNTY-OTHER, TYLER	9,567	9,367	10,085	9,835	10,548	10,541	1,184	1,248	1,269	1,148	1,130	1,368
TYLER COUNTY TOTAL	21,766	21,882	22,113	22,261	22,248	22,187	3,671	3,880	3,612	3,466	3,544	3,918
REGION I TOTAL	**1,071,752**	**1,080,821**	**1,088,299**	**1,087,548**	**1,088,693**	**1,090,962**	**166,769**	**193,584**	**184,617**	**179,952**	**168,382**	**174,727**

Appendix 3-A

Desired Future Conditions and Modeled Available Groundwater Reports

The TWDB Groundwater Resources Division's Groundwater Availability Modeling Section has prepared GAM Run reports for each Groundwater Management Area (GMA) in Texas. The East Texas Regional Water Planning Area 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 16-024 MAG: Modeled Available Groundwater for the Gulf Coast Aquifer System in Groundwater Management Area 14

Shirley C. Wade, Ph.D., P.G.
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Section
(512) 936-0883
December 15, 2016

Shirley C. Wade
12/15/16

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GAM RUN 16-024 MAG: MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 14

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Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Section
(512) 936-0883
December 15, 2016

EXECUTIVE SUMMARY:

The modeled available groundwater for Groundwater Management Area 14 and the projected groundwater pumpage in subsidence districts for the Gulf Coast Aquifer System ranges from approximately 1,020,000 acre-feet per year in 2010 to 950,000 acre-feet per year in 2070. Table 1 presents the modeled available groundwater summarized by the decades 2010 to 2070 for groundwater conservation districts. Table 2 presents the projected groundwater pumpage in regulatory plans adopted by subsidence districts and factored into the development of desired future conditions adopted by groundwater conservation districts. Table 3 summarizes the modeled available groundwater for groundwater conservation districts and non-district counties, and the projected groundwater pumpage for subsidence districts by the decades 2020 to 2070 for use in the regional water planning process. The estimates are based on the desired future conditions for the Gulf Coast Aquifer System adopted by groundwater conservation districts in Groundwater Management Area 14 on April 29, 2016. The explanatory report and other materials submitted to the Texas Water Development Board (TWDB) were determined to be administratively complete on July 12, 2016.

REQUESTOR:

Ms. Kathy Turner Jones, chair of Groundwater Management Area 14.

DESCRIPTION OF REQUEST:

In a letter dated May 5, 2016, Ms. Kathy Turner Jones provided the TWDB with the desired future conditions of the Gulf Coast Aquifer System adopted by the groundwater

conservation districts in Groundwater Management Area 14. The desired future conditions for the Gulf Coast Aquifer System, as described in Resolution No. 2016-01-01 and adopted April 29, 2016 by the groundwater conservation districts within Groundwater Management Area 14, are described below:

Groundwater Management Area 14 [all counties]

- From estimated year 2009 conditions, the average drawdown of the Chicot Aquifer should not exceed approximately 28.3 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Evangeline Aquifer should not exceed approximately 23.6 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Burkeville confining unit should not exceed approximately 18.5 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Jasper Aquifer should not exceed approximately 66.2 feet after 61 years.

Austin County [Bluebonnet Groundwater Conservation District]

- From estimated year 2009 conditions, the average drawdown of the Chicot Aquifer should not exceed approximately 39 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Evangeline Aquifer should not exceed approximately 23 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Burkeville confining unit should not exceed approximately 23 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Jasper Aquifer should not exceed approximately 76 feet after 61 years.
- From estimated year 1890 conditions, the maximum subsidence in Austin County should not exceed approximately 2.83 feet by the year 2070.

Brazoria County [Brazoria County Groundwater Conservation District]

- From estimated year 2009 conditions, the average drawdown of the Chicot Aquifer should not exceed approximately 23 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Evangeline Aquifer should not exceed approximately 27 feet after 61 years.

Chambers County

- From estimated year 2009 conditions, the average drawdown of the Chicot Aquifer should not exceed approximately 32 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Evangeline Aquifer should not exceed approximately 30 feet after 61 years.

Grimes County [Bluebonnet Groundwater Conservation District]

- From estimated year 2009 conditions, the average drawdown of the Chicot Aquifer should not exceed approximately 5 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Evangeline Aquifer should not exceed approximately 5 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Burkeville confining unit should not exceed approximately 6 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Jasper Aquifer should not exceed approximately 52 feet after 61 years.
- From estimated year 1890 conditions, the maximum subsidence in Grimes County should not exceed approximately 0.12 feet by the year 2070.

Hardin County [Southeast Texas Groundwater Conservation District]

- From estimated year 2009 conditions, the average drawdown of the Chicot Aquifer should not exceed approximately 21 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Evangeline Aquifer should not exceed approximately 27 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Burkeville confining unit should not exceed approximately 29 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Jasper Aquifer should not exceed approximately 89 feet after 61 years.

Jasper County [Southeast Texas Groundwater Conservation District]

- From estimated year 2009 conditions, the average drawdown of the Chicot Aquifer should not exceed approximately 23 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Evangeline Aquifer should not exceed approximately 41 feet after 61 years.

- From estimated year 2009 conditions, the average drawdown of the Burkeville confining unit should not exceed approximately 46 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Jasper Aquifer should not exceed approximately 40 feet after 61 years.

Jefferson County

- From estimated year 2009 conditions, the average drawdown of the Chicot Aquifer should not exceed approximately 15 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Evangeline Aquifer should not exceed approximately 17 feet after 61 years.

Liberty County

- From estimated year 2009 conditions, the average drawdown of the Chicot Aquifer should not exceed approximately 27 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Evangeline Aquifer should not exceed approximately 29 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Burkeville confining unit should not exceed approximately 25 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Jasper Aquifer should not exceed approximately 120 feet after 61 years.

Montgomery County [Lone Star Groundwater Conservation District]

- From estimated year 2009 conditions, the average drawdown of the Chicot Aquifer should not exceed approximately 26 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Evangeline Aquifer should not exceed approximately -4 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Burkeville confining unit should not exceed approximately -4 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Jasper Aquifer should not exceed approximately 34 feet after 61 years.

Newton County [Southeast Texas Groundwater Conservation District]

- From estimated year 2009 conditions, the average drawdown of the Chicot Aquifer should not exceed approximately 35 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Evangeline Aquifer should not exceed approximately 45 feet after 61 years.

- From estimated year 2009 conditions, the average drawdown of the Burkeville confining unit should not exceed approximately 44 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Jasper Aquifer should not exceed approximately 37 feet after 61 years.

Orange County

- From estimated year 2009 conditions, the average drawdown of the Chicot Aquifer should not exceed approximately 14 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Evangeline Aquifer should not exceed approximately 16 feet after 61 years.

Polk County [Lower Trinity Groundwater Conservation District]

- From estimated year 2009 conditions, the average drawdown of the Chicot Aquifer should not exceed approximately 26 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Evangeline Aquifer should not exceed approximately 10 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Burkeville confining unit should not exceed approximately 15 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Jasper Aquifer should not exceed approximately 73 feet after 61 years.

San Jacinto County [Lower Trinity Groundwater Conservation District]

- From estimated year 2009 conditions, the average drawdown of the Chicot Aquifer should not exceed approximately 22 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Evangeline Aquifer should not exceed approximately 19 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Burkeville confining unit should not exceed approximately 19 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Jasper Aquifer should not exceed approximately 108 feet after 61 years.

Tyler County [Southeast Texas Groundwater Conservation District]

- From estimated year 2009 conditions, the average drawdown of the Chicot Aquifer should not exceed approximately 42 feet after 61 years.

- From estimated year 2009 conditions, the average drawdown of the Evangeline Aquifer should not exceed approximately 35 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Burkeville confining unit should not exceed approximately 30 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Jasper Aquifer should not exceed approximately 62 feet after 61 years.

Walker County [Bluebonnet Groundwater Conservation District]

- From estimated year 2009 conditions, the average drawdown of the Evangeline Aquifer should not exceed approximately 9 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Burkeville confining unit should not exceed approximately 4 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Jasper Aquifer should not exceed approximately 42 feet after 61 years.
- From estimated year 1890 conditions, the maximum subsidence in Walker County should not exceed approximately 0.04 feet by the year 2070.

Waller County [Bluebonnet Groundwater Conservation District]

- From estimated year 2009 conditions, the average drawdown of the Chicot Aquifer should not exceed approximately 39 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Evangeline Aquifer should not exceed approximately 39 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Burkeville confining unit should not exceed approximately 40 feet after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Jasper Aquifer should not exceed approximately 101 feet after 61 years.
- From estimated year 1890 conditions, the maximum subsidence in Waller County should not exceed approximately 4.73 feet by the year 2070.

Washington County

- From estimated year 2009 conditions, the average drawdown of the Evangeline Aquifer should not exceed approximately 1 foot after 61 years.
- From estimated year 2009 conditions, the average drawdown of the Burkeville confining unit should not exceed approximately 16 feet after 61 years.

- From estimated year 2009 conditions, the average drawdown of the Jasper Aquifer should not exceed approximately 48 feet after 61 years.

Harris, Galveston, and Fort Bend Counties (Subsidence Districts)

Harris-Galveston Subsidence District and Fort Bend Subsidence District are not subject to the provisions of Section 36.108 of the Texas Water Code and therefore have not specified desired future conditions. Because desired future conditions were not adopted for the counties in the subsidence districts, modeled available groundwater values were not determined for those counties. The districts in Groundwater Management Area 14 incorporated the groundwater pumpage projections made by the subsidence districts in their regulatory plans so that all known regional groundwater pumping was factored into the joint planning process. The subsidence district groundwater pumpage projections are provided in Table 2 and are incorporated into the information relevant to regional water planning (Table 3).

METHODS:

The TWDB ran the groundwater availability model (version 3.01) for the northern part of the Gulf Coast Aquifer System (Figure 1) using the model files submitted with the explanatory report (GMA 14 and others, 2016; Appendix F) and an updated pumping file provided by the Groundwater Management Area 14 consultants on October 26, 2016. The modeled available groundwater values were determined by extracting pumping rates by decade from the model results using ZONEBUDGET Version 3.01 (Harbaugh, 2009). Annual pumping rates were divided by county, river basin, regional water planning area, and groundwater conservation district within Groundwater Management Area 14 (Figure 2 and Tables 1 through 3).

As part of the process to calculate modeled available groundwater, the TWDB checked the model files submitted by Groundwater Management Area 14 to determine if the groundwater pumping scenarios were compatible with the adopted desired future conditions. The TWDB used these model files to extract model-calculated water levels for 2009 and 2070, and drawdown was calculated as the difference between water levels in 2009 and water levels in 2070. The results of this evaluation are provided in the Appendix. Drawdown averages were calculated for each county by aquifer and for the entire groundwater management area by aquifer. As specified in the explanatory report (GMA 14 and others, 2016; Appendix F), drawdown for cells which became dry during the simulation (water level dropped below the base of the cell) were excluded from the averaging. The calculated drawdown averages compared well with the desired future conditions and verified that the pumping scenarios defined by the districts achieved the desired future conditions. The subsidence values were also extracted from the model

results and those were also compared to subsidence-based desired future conditions for the four counties where they were specified.

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. 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.

PARAMETERS AND ASSUMPTIONS:

The parameters and assumptions for the groundwater availability are described below:

- Version 3.01 of the groundwater availability model for the northern portion of the Gulf Coast Aquifer System was used for this analysis. See Kasmarek (2013) for assumptions and limitations of the model.
- The model has four layers which represent the Chicot Aquifer (Layer 1), the Evangeline Aquifer (Layer 2), the Burkeville Confining Unit (Layer 3), and the Jasper Aquifer and parts of the Catahoula Formation in direct hydrologic communication with the Jasper Aquifer (Layer 4).
- The model was run with MODFLOW-2000 (Harbaugh and others, 2000).
- Drawdown averages and modeled available groundwater values are based on the extent of the model area rather than official aquifer boundaries (Figures 1 and 2).
- Drawdown for cells with water levels below the base elevation of the cell ("dry" cells) were excluded from the averaging per Appendix F of the explanatory report.
- Cells with water levels below the base are "dry" in terms of water level. However, the transmissivity of those cells remains constant and pumping from those cells continues.
- For those cells where water levels have dropped below the base we include pumping in the modeled available groundwater values.
- Estimates of modeled available groundwater from the model simulation were rounded to whole numbers.

- Starting conditions were assumed reasonable since 2009 was the final year of the calibrated model.

- A model tolerance of up to one foot was assumed when comparing desired future condition average drawdown values per county to model results (Appendix).

- A model tolerance of 0.1 foot was assumed when comparing desired future condition maximum subsidence values per county to model results (Appendix).

- Average drawdown per county may include some model cells that represent portions of surface water such as bays, reservoirs, and the Gulf of Mexico.

RESULTS:

The modeled available groundwater for the Gulf Coast Aquifer System that achieves the desired future conditions adopted by Groundwater Management Area 14 decreases from 571,007 to 544,220 acre-feet per year between 2010 and 2070 (Table 1). Projected groundwater pumpage from the three counties in the Harris Galveston Subsidence District and Fort Bend Subsidence District range between 325,226 and 545,246 acre-feet per year during the period 2010 to 2070 (Table 2). The combination of modeled available groundwater and projected groundwater pumpage has been summarized by county, river basin, and regional water planning area for use in the regional water planning process (Table 3). The modeled available groundwater is also summarized by groundwater conservation district and county (Table 1).

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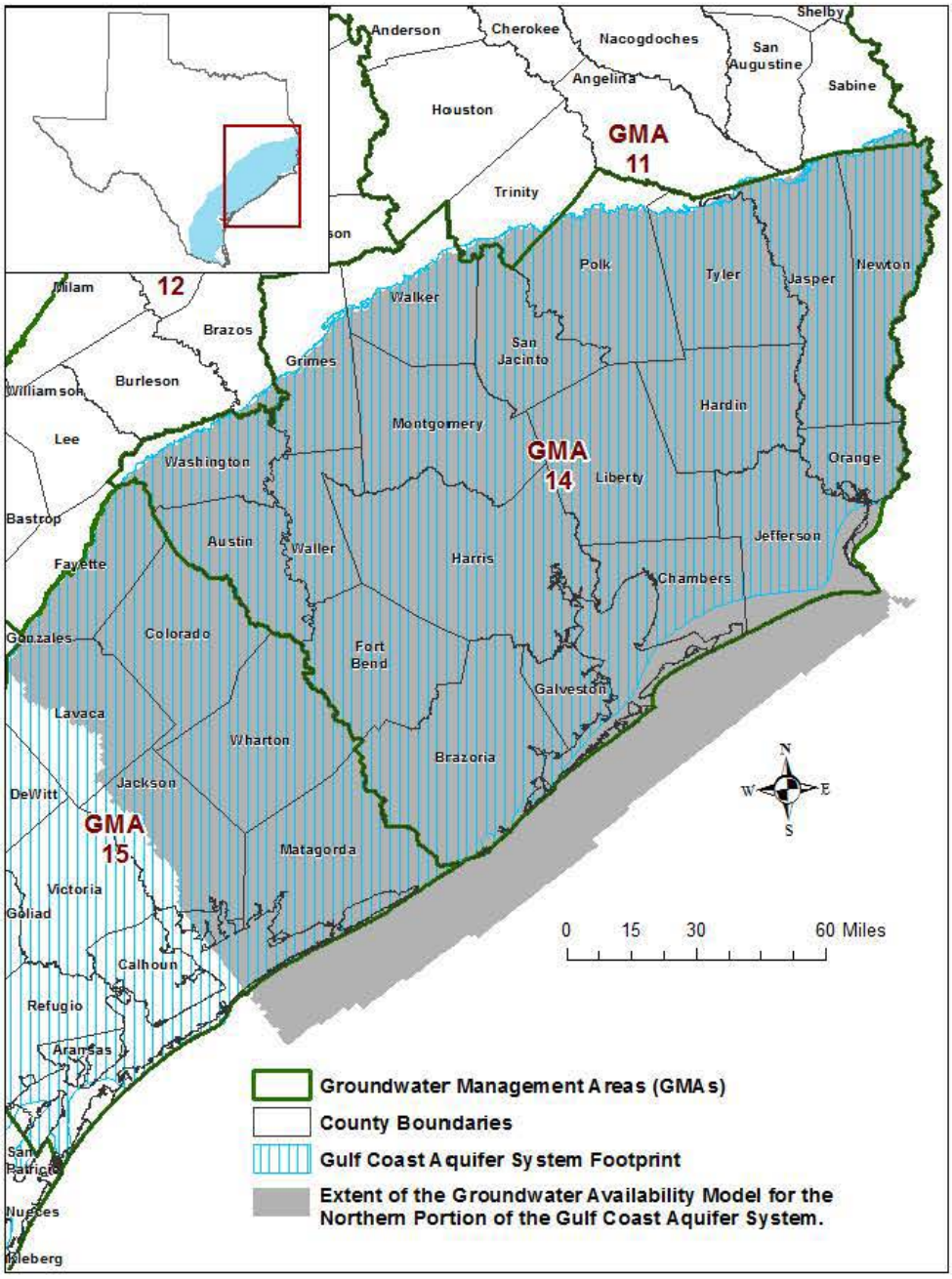

FIGURE 1. MAP SHOWING THE AREAS COVERED BY THE GROUNDWATER AVAILABILITY MODEL FOR THE NORTHERN PART OF THE GULF COAST AQUIFER SYSTEM.

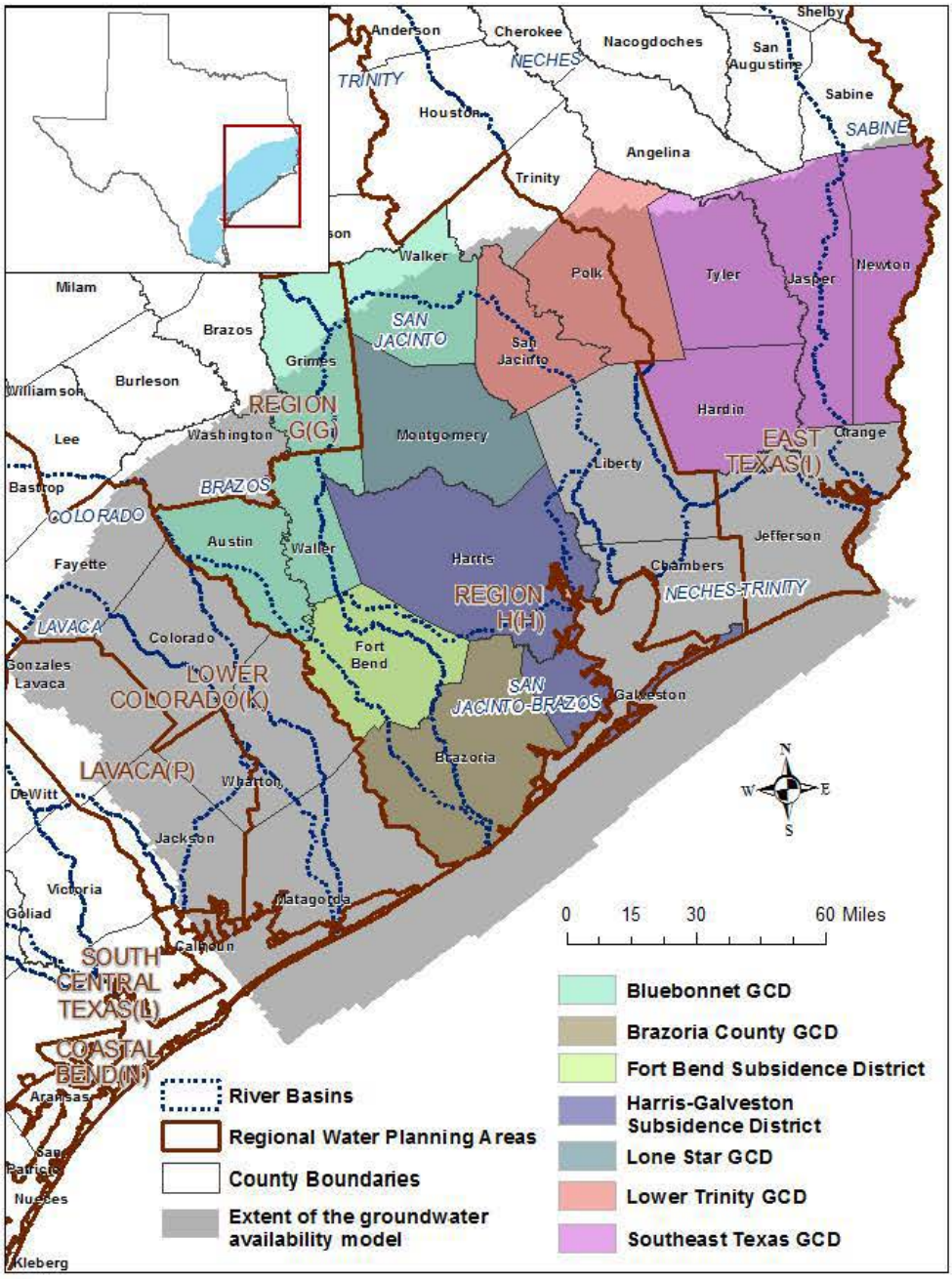

FIGURE 2. MAP SHOWING REGIONAL WATER PLANNING AREAS, GROUNDWATER CONSERVATION DISTRICTS (GCDS), SUBSIDENCE DISTRICTS, COUNTIES, AND RIVER BASINS IN GROUNDWATER MANAGEMENT AREA 14.

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TABLE 1. MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 14 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2010 AND 2070. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District	County	Aquifer	2010	2020	2030	2040	2050	2060	2070
Bluebonnet GCD	Austin	Chicot Aquifer	1,300	1,300	1,300	1,300	1,300	1,300	1,300
Bluebonnet GCD	Austin	Evangeline Aquifer	19,998	19,998	19,998	19,998	19,998	19,998	19,998
Bluebonnet GCD	Austin	Burkeville confining	0	0	0	0	0	0	0
Bluebonnet GCD	Austin	Jasper Aquifer	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Bluebonnet GCD	Grimes	Chicot Aquifer	0	0	0	0	0	0	0
Bluebonnet GCD	Grimes	Evangeline Aquifer	2,999	2,999	2,999	2,999	2,999	2,999	2,999
Bluebonnet GCD	Grimes	Burkeville confining	0	0	0	0	0	0	0
Bluebonnet GCD	Grimes	Jasper Aquifer	10,998	10,998	10,998	10,998	10,998	10,998	10,998
Bluebonnet GCD	Walker	Chicot Aquifer	0	0	0	0	0	0	0
Bluebonnet GCD	Walker	Evangeline Aquifer	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Bluebonnet GCD	Walker	Burkeville confining	0	0	0	0	0	0	0
Bluebonnet GCD	Walker	Jasper Aquifer	15,972	15,972	15,972	15,972	15,972	15,972	15,972
Bluebonnet GCD	Waller	Chicot Aquifer	300	300	300	300	300	300	300
Bluebonnet GCD	Waller	Evangeline Aquifer	40,994	40,994	40,994	40,994	40,994	40,994	40,994
Bluebonnet GCD	Waller	Burkeville confining	0	0	0	0	0	0	0
Bluebonnet GCD	Waller	Jasper Aquifer	300	300	300	300	300	300	300
Bluebonnet GCD Total		**Gulf Coast Aquifer System**	**95,859**	**95,859**	**95,859**	**95,859**	**95,859**	**95,859**	**95,859**
Brazoria County	Brazoria	Chicot Aquifer	38,994	39,042	39,164	39,208	39,251	39,295	39,345
Brazoria County	Brazoria	Evangeline Aquifer	11,376	11,376	11,376	11,376	11,376	11,375	11,376
Brazoria County GCD Total		**Gulf Coast Aquifer System**	**50,369**	**50,418**	**50,540**	**50,583**	**50,626**	**50,670**	**50,721**
Lone Star GCD	Montgomery	Chicot Aquifer	11,922	12,600	13,870	13,944	15,026	14,717	14,175
Lone Star GCD	Montgomery	Evangeline Aquifer	37,734	27,525	27,553	27,773	26,575	26,615	26,529

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Groundwater Conservation District	County	Aquifer	2010	2020	2030	2040	2050	2060	2070
Lone Star GCD	Montgomery	Burkeville confining	0	0	0	0	0	0	0
Lone Star GCD	Montgomery	Jasper Aquifer	41,491	23,880	22,582	22,288	22,404	22,673	23,301
Lone Star GCD Total		**Gulf Coast Aquifer System**	**91,146**	**64,004**	**64,004**	**64,004**	**64,004**	**64,004**	**64,004**
Lower Trinity GCD	Polk	Chicot Aquifer	0	0	0	0	0	0	0
Lower Trinity GCD	Polk	Evangeline Aquifer	8,302	8,302	8,302	8,302	8,302	8,302	8,302
Lower Trinity GCD	Polk	Burkeville confining	743	743	743	743	743	743	743
Lower Trinity GCD	Polk	Jasper Aquifer	27,663	27,663	27,663	27,663	27,663	27,663	27,663
Lower Trinity GCD	San Jacinto	Chicot Aquifer	0	0	0	0	0	0	0
Lower Trinity GCD	San Jacinto	Evangeline Aquifer	8,170	8,170	8,170	8,170	8,170	8,170	8,170
Lower Trinity GCD	San Jacinto	Burkeville confining	2,697	2,697	2,697	2,697	2,697	2,697	2,697
Lower Trinity GCD	San Jacinto	Jasper Aquifer	10,116	10,116	10,116	10,116	10,116	10,116	10,116
Lower Trinity GCD Total		**Gulf Coast Aquifer System**	**57,691**	**57,691**	**57,691**	**57,691**	**57,691**	**57,691**	**57,691**
Southeast Texas	Hardin	Chicot Aquifer	1,262	1,262	1,262	1,262	1,262	1,262	1,262
Southeast Texas	Hardin	Evangeline Aquifer	33,665	33,665	33,665	33,665	33,665	33,665	33,665
Southeast Texas	Hardin	Burkeville confining	0	0	0	0	0	0	0
Southeast Texas	Hardin	Jasper Aquifer	0	0	0	0	0	0	0
Southeast Texas	Jasper	Chicot Aquifer	10,827	10,827	10,827	10,827	10,827	10,827	10,827
Southeast Texas	Jasper	Evangeline Aquifer	40,648	40,648	40,648	40,648	40,648	40,648	40,648
Southeast Texas	Jasper	Burkeville confining	1	1	1	1	1	1	1
Southeast Texas	Jasper	Jasper Aquifer	16,008	16,008	16,008	16,008	16,008	16,008	16,008
Southeast Texas	Newton	Chicot Aquifer	500	500	500	500	500	500	500
Southeast Texas	Newton	Evangeline Aquifer	21,343	21,343	21,343	21,343	21,343	21,343	21,343
Southeast Texas	Newton	Burkeville confining	0	0	0	0	0	0	0
Southeast Texas	Newton	Jasper Aquifer	12,376	12,376	12,376	12,376	12,376	12,376	12,376
Southeast Texas	Tyler	Chicot Aquifer	0	0	0	0	0	0	0

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Groundwater Conservation District	County	Aquifer	2010	2020	2030	2040	2050	2060	2070
Southeast Texas	Tyler	Evangeline Aquifer	20,576	20,576	20,576	20,576	20,576	20,576	20,576
Southeast Texas	Tyler	Burkeville confining	1	1	1	1	1	1	1
Southeast Texas	Tyler	Jasper Aquifer	17,634	17,634	17,634	17,634	17,634	17,634	17,634
Southeast Texas GCD Total		**Gulf Coast Aquifer System**	**174,841**	**174,841**	**174,841**	**174,841**	**174,841**	**174,841**	**174,841**
Total (groundwater conservation districts)		**Gulf Coast Aquifer System**	**469,907**	**442,813**	**442936**	**442,979**	**443,022**	**443,066**	**443,117**
No District-County	Chambers	Chicot Aquifer	22,573	22,573	22,573	22,573	22,573	22,573	22,573
No District-County	Chambers	Evangeline Aquifer	378	378	378	378	378	378	378
No District-County	Jefferson	Chicot Aquifer	2,426	2,426	2,426	2,426	2,426	2,426	2,426
No District-County	Jefferson	Evangeline Aquifer	100	100	100	100	100	100	100
No District-County	Liberty	Chicot Aquifer	14,571	14,571	14,572	14,572	14,572	14,572	14,572
No District-County	Liberty	Evangeline Aquifer	27,654	27,654	27,656	27,655	27,656	27,656	27,656
No District-County	Liberty	Burkeville confining	215	215	215	215	215	215	215
No District-County	Liberty	Jasper Aquifer	787	787	787	787	787	787	787
No District-County	Orange	Chicot Aquifer	18,162	18,162	18,162	18,162	18,162	18,162	18,162
No District-County	Orange	Evangeline Aquifer	1,202	1,202	1,202	1,202	1,202	1,202	1,202
No District-County	Washington	Evangeline Aquifer	3,236	3,236	3,236	3,236	3,236	3,236	3,236
No District-County	Washington	Burkeville confining	367	367	367	367	367	367	367
No District-County	Washington	Jasper Aquifer	9,428	9,428	9,428	9,428	9,428	9,428	9,428
No District-County Total		**Gulf Coast Aquifer System**	**101,100**	**101,100**	**101,103**	**101,101**	**101,102**	**101,103**	**101,103**

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Groundwater Conservation District	County	Aquifer	2010	2020	2030	2040	2050	2060	2070
GMA 14	Total (all areas except subsidence districts)	Gulf Coast Aquifer System	571,007	543,913	544,039	544,080	544,124	544,169	544,020

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TABLE 2. GROUNDWATER PUMPAGE PROJECTIONS FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 14 FOR SUBSIDENCE DISTRICT COUNTIES FOR EACH DECADE BETWEEN 2010 AND 2070. VALUES ARE IN ACRE-FEET PER YEAR.

Subsidence District	County	Aquifer	2010	2020	2030	2040	2050	2060	2070
Fort Bend	Fort Bend	Chicot Aquifer	46,789	58,200	52,663	62,635	72,957	84,002	95,430
Fort Bend	Fort Bend	Evangeline Aquifer	75,249	71,572	51,072	56,656	61,875	66,942	71,651
Fort Bend	Fort Bend	Burkeville confining	0	0	0	0	0	0	0
Fort Bend	Fort Bend	Jasper Aquifer	0	0	0	0	0	0	0
Fort Bend Subsidence District Total		**Gulf Coast Aquifer System**	**122,038**	**129,772**	**103,735**	**119,291**	**134,832**	**150,944**	**167,081**
Harris-Galveston	Galveston	Chicot Aquifer	4,850	5,819	6,537	7,153	7,748	8,303	8,759
Harris-Galveston	Galveston	Evangeline Aquifer	167	215	254	284	314	346	371
Harris-Galveston	Harris	Chicot Aquifer	92,348	136,640	108,694	80,512	86,842	90,290	93,457
Harris-Galveston	Harris	Evangeline Aquifer	224,465	264,588	176,427	114,821	121,148	126,231	130,840
Harris-Galveston	Harris	Burkeville confining	0	0	0	0	0	0	0
Harris-Galveston	Harris	Jasper Aquifer	6,067	8,212	5,432	3,164	3,368	3,519	3,644
Harris-Galveston Subsidence District Total		**Gulf Coast Aquifer System**	**327,897**	**415,474**	**297,343**	**205,935**	**219,420**	**228,688**	**237,071**
GMA 14	**Total (subsidence districts)**	**Gulf Coast Aquifer System**	**449,935**	**545,246**	**401,078**	**325,226**	**354,252**	**379,632**	**404,152**

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TABLE 3. MODELED AVAILABLE GROUNDWATER AND PROJECTED GROUNDWATER PUMPAGE VALUES (*IN ITALICS*) BY DECADE FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 14. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), RIVER BASIN, AND AQUIFER.

County	RWPA	River Basin	Gulf Coast Aquifer System	2020	2030	2040	2050	2060	2070
Austin	H	Brazos-Colorado	Chicot Aquifer	1,005	1,005	1,005	1,005	1,005	1,005
Austin	H	Brazos-Colorado	Evangeline Aquifer	14,517	14,517	14,517	14,517	14,517	14,517
Austin	H	Brazos-Colorado	Burkeville confining unit	0	0	0	0	0	0
Austin	H	Brazos-Colorado	Jasper Aquifer	76	76	76	76	76	76
Austin	H	Brazos	Chicot Aquifer	295	295	295	295	295	295
Austin	H	Brazos	Evangeline Aquifer	5,458	5,458	5,458	5,458	5,458	5,458
Austin	H	Brazos	Burkeville confining unit	0	0	0	0	0	0
Austin	H	Brazos	Jasper Aquifer	826	826	826	826	826	826
Austin	H	Colorado	Chicot Aquifer	0	0	0	0	0	0
Austin	H	Colorado	Evangeline Aquifer	23	23	23	23	23	23
Austin	H	Colorado	Burkeville confining unit	0	0	0	0	0	0
Austin	H	Colorado	Jasper Aquifer	98	98	98	98	98	98
Brazoria	H	Brazos-Colorado	Chicot Aquifer	9,134	8,929	8,735	8,474	8,217	7,986
Brazoria	H	Brazos-Colorado	Evangeline Aquifer	1	1	2	2	2	2
Brazoria	H	Brazos	Chicot Aquifer	3,223	3,057	2,992	2,923	2,865	2,821
Brazoria	H	Brazos	Evangeline Aquifer	0	0	0	0	0	0
Brazoria	H	San Jacinto-Brazos	Chicot Aquifer	26,684	27,178	27,481	27,854	28,213	28,537
Brazoria	H	San Jacinto-Brazos	Evangeline Aquifer	11,375	11,374	11,374	11,374	11,374	11,374
Chambers	H	Neches-Trinity	Chicot Aquifer	10,798	10,798	10,798	10,798	10,798	10,798
Chambers	H	Neches-Trinity	Evangeline Aquifer	0	0	0	0	0	0
Chambers	H	Trinity-San Jacinto	Chicot Aquifer	1,671	1,671	1,671	1,671	1,671	1,671
Chambers	H	Trinity-San Jacinto	Evangeline Aquifer	378	378	378	378	378	378
Chambers	H	Trinity	Chicot Aquifer	10,104	10,104	10,104	10,104	10,104	10,104
Chambers	H	Trinity	Evangeline Aquifer	0	0	0	0	0	0
Fort Bend	*H*	*Brazos-Colorado*	*Chicot Aquifer*	*6,338*	*7,157*	*8,493*	*10,447*	*13,307*	*17,077*
Fort Bend	*H*	*Brazos-Colorado*	*Evangeline Aquifer*	*563*	*728*	*1,079*	*1,584*	*2,310*	*3,256*

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County	RWPA	River Basin	Gulf Coast Aquifer System	2020	2030	2040	2050	2060	2070
Fort Bend	*H*	*Brazos-Colorado*	*Burkeville confining unit*	*0*	*0*	*0*	*0*	*0*	*0*
Fort Bend	*H*	*Brazos-Colorado*	*Jasper Aquifer*	*0*	*0*	*0*	*0*	*0*	*0*
Fort Bend	*H*	*Brazos*	*Chicot Aquifer*	*25,117*	*24,308*	*30,446*	*36,552*	*42,837*	*49,006*
Fort Bend	*H*	*Brazos*	*Evangeline Aquifer*	*17,216*	*13,537*	*16,080*	*18,582*	*21,174*	*23,754*
Fort Bend	*H*	*Brazos*	*Burkeville confining unit*	*0*	*0*	*0*	*0*	*0*	*0*
Fort Bend	*H*	*Brazos*	*Jasper Aquifer*	*0*	*0*	*0*	*0*	*0*	*0*
Fort Bend	*H*	*San Jacinto-Brazos*	*Chicot Aquifer*	*17,810*	*15,117*	*17,542*	*19,801*	*21,707*	*23,191*
Fort Bend	*H*	*San Jacinto-Brazos*	*Evangeline Aquifer*	*35,680*	*25,524*	*28,118*	*30,370*	*32,165*	*33,366*
Fort Bend	*H*	*San Jacinto-Brazos*	*Burkeville confining unit*	*0*	*0*	*0*	*0*	*0*	*0*
Fort Bend	*H*	*San Jacinto-Brazos*	*Jasper Aquifer*	*0*	*0*	*0*	*0*	*0*	*0*
Fort Bend	*H*	*San Jacinto*	*Chicot Aquifer*	*8,936*	*6,081*	*6,153*	*6,157*	*6,151*	*6,156*
Fort Bend	*H*	*San Jacinto*	*Evangeline Aquifer*	*18,113*	*11,282*	*11,379*	*11,340*	*11,293*	*11,275*
Fort Bend	*H*	*San Jacinto*	*Burkeville confining unit*	*0*	*0*	*0*	*0*	*0*	*0*
Fort Bend	*H*	*San Jacinto*	*Jasper Aquifer*	*0*	*0*	*0*	*0*	*0*	*0*
Galveston	*H*	*Neches-Trinity*	*Chicot Aquifer*	*0*	*0*	*0*	*0*	*0*	*1*
Galveston	*H*	*San Jacinto-Brazos*	*Chicot Aquifer*	*5,819*	*6,537*	*7,153*	*7,748*	*8,303*	*8,759*
Galveston	*H*	*San Jacinto-Brazos*	*Evangeline Aquifer*	*215*	*254*	*284*	*314*	*346*	*371*
Grimes	G	Brazos	Chicot Aquifer	0	0	0	0	0	0
Grimes	G	Brazos	Evangeline Aquifer	2,256	2,256	2,256	2,256	2,256	2,256
Grimes	G	Brazos	Burkeville confining unit	0	0	0	0	0	0
Grimes	G	Brazos	Jasper Aquifer	8,624	8,624	8,624	8,624	8,624	8,624
Grimes	G	San Jacinto	Chicot Aquifer	0	0	0	0	0	0
Grimes	G	San Jacinto	Evangeline Aquifer	743	743	743	743	743	743
Grimes	G	San Jacinto	Burkeville confining unit	0	0	0	0	0	0
Grimes	G	San Jacinto	Jasper Aquifer	1,451	1,451	1,451	1,451	1,451	1,451
Grimes	G	Trinity	Jasper Aquifer	922	922	922	922	922	922
Hardin	I	Neches	Chicot Aquifer	1,262	1,262	1,262	1,262	1,262	1,262
Hardin	I	Neches	Evangeline Aquifer	33,527	33,527	33,527	33,527	33,527	33,527
Hardin	I	Neches	Burkeville confining unit	0	0	0	0	0	0

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County	RWPA	River Basin	Gulf Coast Aquifer System	2020	2030	2040	2050	2060	2070
Hardin	I	Neches	Jasper Aquifer	0	0	0	0	0	0
Hardin	I	Trinity	Chicot Aquifer	0	0	0	0	0	0
Hardin	I	Trinity	Evangeline Aquifer	138	138	138	138	138	138
Hardin	I	Trinity	Burkeville confining unit	0	0	0	0	0	0
Hardin	I	Trinity	Jasper Aquifer	0	0	0	0	0	0
Harris	*H*	*San Jacinto-Brazos*	*Chicot Aquifer*	*4,331*	*4,858*	*5,405*	*5,959*	*6,383*	*6,853*
Harris	*H*	*San Jacinto-Brazos*	*Evangeline Aquifer*	*1,975*	*2,096*	*2,211*	*2,323*	*2,435*	*2,544*
Harris	*H*	*San Jacinto*	*Chicot Aquifer*	*129,749*	*101,232*	*72,499*	*78,104*	*81,042*	*83,662*
Harris	*H*	*San Jacinto*	*Evangeline Aquifer*	*262,218*	*173,938*	*112,257*	*118,444*	*123,397*	*127,883*
Harris	*H*	*San Jacinto*	*Burkeville confining unit*	*0*	*0*	*0*	*0*	*0*	*0*
Harris	*H*	*San Jacinto*	*Jasper Aquifer*	*8,212*	*5,432*	*3,164*	*3,368*	*3,519*	*3,644*
Harris	*H*	*Trinity-San Jacinto*	*Chicot Aquifer*	*2,560*	*2,604*	*2,609*	*2,779*	*2,865*	*2,942*
Harris	*H*	*Trinity-San Jacinto*	*Evangeline Aquifer*	*395*	*393*	*353*	*382*	*398*	*412*
Harris	*H*	*Trinity-San Jacinto*	*B Burkeville confining unit*	*0*	*0*	*0*	*0*	*0*	*0*
Harris	*H*	*Trinity-San Jacinto*	*Jasper Aquifer*	*0*	*0*	*0*	*0*	*0*	*0*
Jasper	I	Neches	Chicot Aquifer	7,717	7,717	7,717	7,717	7,717	7,717
Jasper	I	Neches	Evangeline Aquifer	17,407	17,407	17,407	17,407	17,407	17,407
Jasper	I	Neches	Burkeville confining unit	0	0	0	0	0	0
Jasper	I	Neches	Jasper Aquifer	12,506	12,506	12,506	12,506	12,506	12,506
Jasper	I	Sabine	Chicot Aquifer	3,110	3,110	3,110	3,110	3,110	3,110
Jasper	I	Sabine	Evangeline Aquifer	23,241	23,241	23,241	23,241	23,241	23,241
Jasper	I	Sabine	Burkeville confining unit	1	1	1	1	1	1
Jasper	I	Sabine	Jasper Aquifer	3,502	3,502	3,502	3,502	3,502	3,502
Jefferson	I	Neches-Trinity	Chicot Aquifer	1,722	1,722	1,722	1,722	1,722	1,722
Jefferson	I	Neches-Trinity	Evangeline Aquifer	0	0	0	0	0	0
Jefferson	I	Neches	Chicot Aquifer	703	703	703	703	703	703
Jefferson	I	Neches	Evangeline Aquifer	100	100	100	100	100	100
Liberty	H	Neches-Trinity	Chicot Aquifer	327	327	327	327	327	327
Liberty	H	Neches-Trinity	Evangeline Aquifer	37	37	37	37	37	37

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County	RWPA	River Basin	Gulf Coast Aquifer System	2020	2030	2040	2050	2060	2070
Liberty	H	Neches	Chicot Aquifer	2,804	2,804	2,804	2,804	2,804	2,804
Liberty	H	Neches	Evangeline Aquifer	2,267	2,267	2,267	2,267	2,267	2,267
Liberty	H	Neches	Burkeville confining unit	0	0	0	0	0	0
Liberty	H	Neches	Jasper Aquifer	0	0	0	0	0	0
Liberty	H	San Jacinto	Chicot Aquifer	753	754	753	754	754	754
Liberty	H	San Jacinto	Evangeline Aquifer	4,322	4,323	4,322	4,323	4,323	4,323
Liberty	H	San Jacinto	Burkeville confining unit	215	215	215	215	215	215
Liberty	H	San Jacinto	Jasper Aquifer	787	787	787	787	787	787
Liberty	H	Trinity-San Jacinto	Chicot Aquifer	3,160	3,160	3,160	3,160	3,160	3,160
Liberty	H	Trinity-San Jacinto	Evangeline Aquifer	5,690	5,690	5,690	5,690	5,690	5,690
Liberty	H	Trinity-San Jacinto	Burkeville confining unit	0	0	0	0	0	0
Liberty	H	Trinity-San Jacinto	Jasper Aquifer	0	0	0	0	0	0
Liberty	H	Trinity	Chicot Aquifer	7,528	7,528	7,528	7,528	7,528	7,528
Liberty	H	Trinity	Evangeline Aquifer	15,339	15,339	15,339	15,339	15,339	15,339
Liberty	H	Trinity	Burkeville confining unit	0	0	0	0	0	0
Liberty	H	Trinity	Jasper Aquifer	0	0	0	0	0	0
Montgomery	H	San Jacinto	Chicot Aquifer	12,600	13,870	13,944	15,026	14,717	14,175
Montgomery	H	San Jacinto	Evangeline Aquifer	27,525	27,553	27,773	26,575	26,615	26,529
Montgomery	H	San Jacinto	Burkeville confining unit	0	0	0	0	0	0
Montgomery	H	San Jacinto	Jasper Aquifer	23,880	22,582	22,288	22,404	22,673	23,301
Newton	I	Neches	Jasper Aquifer	176	176	176	176	176	176
Newton	I	Sabine	Chicot Aquifer	500	500	500	500	500	500
Newton	I	Sabine	Evangeline Aquifer	21,343	21,343	21,343	21,343	21,343	21,343
Newton	I	Sabine	Burkeville confining unit	0	0	0	0	0	0
Newton	I	Sabine	Jasper Aquifer	12,200	12,200	12,200	12,200	12,200	12,200
Orange	I	Neches-Trinity	Chicot Aquifer	256	256	256	256	256	256
Orange	I	Neches-Trinity	Evangeline Aquifer	0	0	0	0	0	0
Orange	I	Neches	Chicot Aquifer	2,162	2,162	2,162	2,162	2,162	2,162
Orange	I	Neches	Evangeline Aquifer	1,125	1,125	1,125	1,125	1,125	1,125

County	RWPA	River Basin	Gulf Coast Aquifer System	2020	2030	2040	2050	2060	2070
Orange	I	Sabine	Chicot Aquifer	15,744	15,744	15,744	15,744	15,744	15,744
Orange	I	Sabine	Evangeline Aquifer	77	77	77	77	77	77
Polk	I	Neches	Chicot Aquifer	0	0	0	0	0	0
Polk	I	Neches	Evangeline Aquifer	3,582	3,582	3,582	3,582	3,582	3,582
Polk	I	Neches	Burkeville confining unit	118	118	118	118	118	118
Polk	I	Neches	Jasper Aquifer	11,197	11,197	11,197	11,197	11,197	11,197
Polk	H	Trinity	Chicot Aquifer	0	0	0	0	0	0
Polk	H	Trinity	Evangeline Aquifer	4,720	4,720	4,720	4,720	4,720	4,720
Polk	H	Trinity	Burkeville confining unit	625	625	625	625	625	625
Polk	H	Trinity	Jasper Aquifer	16,465	16,465	16,465	16,465	16,465	16,465
San Jacinto	H	San Jacinto	Chicot Aquifer	0	0	0	0	0	0
San Jacinto	H	San Jacinto	Evangeline Aquifer	5,744	5,744	5,744	5,744	5,744	5,744
San Jacinto	H	San Jacinto	Burkeville confining unit	0	0	0	0	0	0
San Jacinto	H	San Jacinto	Jasper Aquifer	4,636	4,636	4,636	4,636	4,636	4,636
San Jacinto	H	Trinity	Chicot Aquifer	0	0	0	0	0	0
San Jacinto	H	Trinity	Evangeline Aquifer	2,426	2,426	2,426	2,426	2,426	2,426
San Jacinto	H	Trinity	Burkeville confining unit	2,697	2,697	2,697	2,697	2,697	2,697
San Jacinto	H	Trinity	Jasper Aquifer	5,480	5,480	5,480	5,480	5,480	5,480
Tyler	I	Neches	Chicot Aquifer	0	0	0	0	0	0
Tyler	I	Neches	Evangeline Aquifer	20,576	20,576	20,576	20,576	20,576	20,576
Tyler	I	Neches	Burkeville confining unit	1	1	1	1	1	1
Tyler	I	Neches	Jasper Aquifer	17,634	17,634	17,634	17,634	17,634	17,634
Walker	H	San Jacinto	Chicot Aquifer	0	0	0	0	0	0
Walker	H	San Jacinto	Evangeline Aquifer	2,000	2,000	2,000	2,000	2,000	2,000
Walker	H	San Jacinto	Burkeville confining unit	0	0	0	0	0	0
Walker	H	San Jacinto	Jasper Aquifer	7,107	7,107	7,107	7,107	7,107	7,107
Walker	H	Trinity	Jasper Aquifer	8,866	8,866	8,866	8,866	8,866	8,866
Waller	H	Brazos	Chicot Aquifer	256	256	256	256	256	256
Waller	H	Brazos	Evangeline Aquifer	14,363	14,363	14,363	14,363	14,363	14,363

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County	RWPA	River Basin	Gulf Coast Aquifer System	2020	2030	2040	2050	2060	2070
Waller	H	Brazos	Burkeville confining unit	0	0	0	0	0	0
Waller	H	Brazos	Jasper Aquifer	300	300	300	300	300	300
Waller	H	San Jacinto	Chicot Aquifer	44	44	44	44	44	44
Waller	H	San Jacinto	Evangeline Aquifer	26,630	26,630	26,630	26,630	26,630	26,630
Waller	H	San Jacinto	Burkeville confining unit	0	0	0	0	0	0
Waller	H	San Jacinto	Jasper Aquifer	0	0	0	0	0	0
Washington	G	Brazos	Evangeline Aquifer	3,236	3,236	3,236	3,236	3,236	3,236
Washington	G	Brazos	Burkeville confining unit	367	367	367	367	367	367
Washington	G	Brazos	Jasper Aquifer	9,356	9,356	9,356	9,356	9,356	9,356
Washington	G	Colorado	Jasper Aquifer	72	72	72	72	72	72
GMA 14 Total			**Gulf Coast Aquifer System**	**1,089,160**	**945,116**	**869,306**	**898,377**	**923,801**	**948,373**

LIMITATIONS:

The groundwater model used in completing this analysis is the best available scientific tool that can be used to meet the stated objectives. 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 groundwater levels in 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.

Model "Dry" Cells

The predictive model run for this analysis results in water levels in some model cells dropping below the base elevation of the cell during the simulation. In terms of water level the cells have gone dry. However, as noted in the model assumptions the transmissivity of the cell remains constant and will produce water.

A total of 591cells out of 10,968 cells (five percent) go "dry" in the Chicot Aquifer (Layer 1) along the thinnest part of the outcrop. There are 19 dry cells out of 8,184 total cells (0.02 percent) in the thinnest part of the Burkeville confining unit (Layer 3), and 18 dry cells out of 10,815 total cells (0.02 percent) in the thinnest part of the Jasper Aquifer (Layer 4) outcrop. As noted in the model assumptions pumping from dry cells is included in the modeled available groundwater values. Total pumping from dry cells in the Chicot Aquifer in model year 2070 is 77 acre-feet in Montgomery County. There are no dry cells for the model run in the Evangeline Aquifer. Total pumping from dry cells in the Burkeville Confining unit in model year 2070 is 2,697 acre-feet in San Jacinto County. The total pumping from dry cells in the Jasper Aquifer in model year 2070 is 5,084 acre-feet in Grimes, Jasper, Newton, Polk, Trinity, Tyler, and Walker counties.

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APPENDIX

GAM Run 16-024 MAG: Modeled Available Groundwater for the Gulf Coast Aquifer System in Groundwater Management Area 14

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TABLE A.1 MODEL-CALCULATED AVERAGE DRAWDOWN VALUES (DDN) AND MODELED MAXIMUM SUBSIDENCE COMPARED WITH DESIRED FUTURE CONDITIONS (DFCS) BY COUNTY FOR THE NORTHERN PORTION OF THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 14. ALL VALUES ARE IN FEET.

County	Chicot Aquifer DDN	Evangeline Aquifer DDN	Burkeville Confining Unit DDN	Jasper Aquifer DDN	Maximum Subsidence (model estimate)	Chicot Aquifer DFC	Evangeline Aquifer DFC	Burkeville Unit DFC	Jasper Aquifer DFC	Maximum Subsidence DFC
Austin	40	23	23	76	2.82	39	23	23	76	2.83
Brazoria	23	28	na	na	na	23	27	na	na	ns
Chambers	33	30	na	na	na	32	30	na	na	ns
Fort Bend*	54	56	60	108	na	ns	ns	ns	ns	ns
Galveston*	34	31	na	na	na	ns	ns	ns	ns	ns
Grimes	5	5	6	53	0.10	5	5	6	52	0.12
Hardin	21	27	29	90	na	21	27	29	89	ns
Harris*	30	5	-15	63	na	ns	ns	ns	ns	ns
Jasper	24	42	46	40	na	23	41	46	40	ns
Jefferson	16	17	na	na	na	15	17	na	na	ns
Liberty	28	29	25	121	na	27	29	25	120	ns
Montgomery	26	-4	-4	35	na	26	-4	-4	34	ns
Newton	35	45	45	37	na	35	45	44	37	ns

County	Chicot Aquifer DDN	Evangeline Aquifer DDN	Burkeville Confining Unit DDN	Jasper Aquifer DDN	Maximum Subsidence (model estimate)	Chicot Aquifer DFC	Evangeline Aquifer DFC	Burkeville Unit DFC	Jasper Aquifer DFC	Maximum Subsidence DFC
Orange	14	16	na	na	na	14	16	na	na	ns
Polk	26	10	16	73	na	26	10	15	73	ns
San Jacinto	22	19	20	109	na	22	19	19	108	ns
Tyler	42	36	30	62	na	42	35	30	62	ns
Walker	0	9	4	42	0.10	na	9	4	42	0.04
Waller	39	40	40	102	4.71	39	39	40	101	4.73
Washington	na	1	16	48	na	na	1	16	48	ns
GMA average	**28.7**	**23.9**	**18.7**	**66.7**	**na**	**28.3**	**23.6**	**18.5**	**66.2**	**ns**

*Desired Future Conditions were not specified for counties located in the subsidence districts

na = not applicable

ns = not specified

DFC = adopted desired future condition

DDN = average model calculated drawdown based on pumping scenario provided by districts in GMA 14

GAM RUN 17-024 MAG: MODELED AVAILABLE GROUNDWATER FOR THE CARRIZO-WILCOX, QUEEN CITY, AND SPARTA AQUIFERS IN GROUNDWATER MANAGEMENT AREA 11

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Texas Water Development Board
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June 19, 2017

Shirley C. Wade
6/19/17

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GAM RUN 17-024 MAG: MODELED AVAILABLE GROUNDWATER FOR THE CARRIZO-WILCOX, QUEEN CITY, AND SPARTA AQUIFERS IN GROUNDWATER MANAGEMENT AREA 11

Shirley C. Wade, Ph.D., P.G.
Texas Water Development Board
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(512) 936-0883
June 19, 2017

EXECUTIVE SUMMARY:

The modeled available groundwater for Groundwater Management Area 11 for the Carrizo-Wilcox, Queen City, and Sparta aquifers is summarized by decade for the groundwater conservation districts (Tables 2 through 4 respectively) and for use in the regional water planning process (Tables 5 through 7 respectively). The modeled available groundwater estimates for the Carrizo-Wilcox Aquifer range from approximately 349,000 acre-feet per year in 2010 to approximately 341,000 acre-feet per year in 2070 (Table 2). The modeled available groundwater estimates for the Queen City Aquifer range from approximately 223,000 acre-feet per year in 2010 to approximately 222,000 acre-feet per year in 2070 (Table 3). The modeled available groundwater estimate for the Sparta Aquifer is approximately 2,700 acre-feet per year for each decade from 2010 to 2070 (Table 4). The estimates were extracted from results of a model run using the groundwater availability model for the northern part of the Carrizo-Wilcox, Queen City, and Sparta aquifers (version 2.01). The model run files, which meet the desired future conditions adopted by district representatives of Groundwater Management Area 11, were submitted to the Texas Water Development Board (TWDB) on February 15, 2017, as part of the Desired Future Conditions Explanatory Report for Groundwater Management Area 11. The explanatory report and other materials submitted to the Texas Water Development Board (TWDB) were determined to be administratively complete on March 13, 2017.

REQUESTOR:

Ms. Leah Adams, coordinator of Groundwater Management Area 11.

DESCRIPTION OF REQUEST:

In a letter dated February 15, 2017, Dr. William R. Hutchison, on behalf of Groundwater Management Area 11, provided the TWDB with the desired future conditions of the Carrizo-Wilcox, Queen City, and Sparta aquifers adopted by the groundwater conservation districts in Groundwater Management Area 11. The desired future conditions for the Carrizo-Wilcox, Queen City, and Sparta aquifers are described in Attachment B of the Resolution to Adopt Desired Future Conditions for Aquifers in Groundwater Management Area 11, adopted January 11, 2017, by the groundwater conservation districts within Groundwater Management Area 11. The desired future conditions, excerpted from Attachment B, are presented below:

"Table 5 [Table 1 below] from GMA 11 Technical Memorandum 16-02 (Draft 2), dated March 25, 2016 lists the proposed desired future conditions, and is presented below [Table 1]. As described in the technical memorandum, the proposed desired future conditions are average drawdowns (in feet) from year 2000 conditions to 2070 conditions were largely based on GAM Scenario 4. Based on an analysis of model output and model limitations, the output from the model was modified to develop the proposed desired future conditions as follows:

- Layers 2 and 4 (the confining units) were eliminated, and Table 5 includes only aquifer units. Areas that have no active cells are designated as NP (for not present).
- Layers 5, 6, 7, and 8 are combined, and a single drawdown value for the Carrizo-Wilcox Aquifer are [sic] listed.
- All areas that are less than 200 square miles are eliminated (noted as NRS, or not relevant for purposes of joint planning due to size of area).
- Areas with negative drawdown that are greater than 200 square miles have had the negative drawdown cells eliminated from the average drawdown calculation, effectively assuming that those cells have a zero drawdown, and that the negative drawdown areas are a result of model limitations, as discussed (designated in yellow).
- The desired future condition in Panola County for the Carrizo-Wilcox Aquifer is listed as 3 feet. The actual average using all data from the model is 2 feet. If the areas with negative drawdown are assumed to be zero, the revised average is 4 feet. As presented at the March 22, 2016 GMA 11 meeting, Mr. Wade Oliver (representing the Panola County GCD) evaluated the average drawdown under Scenario 4 using an alternative analytical modeling approach and concluded that the drawdown was 3 feet. Thus, Mr. Oliver's result is consistent with the midpoint between the two GAM-based drawdown approaches."

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TABLE 1. DRAWDOWN FOR USE AS DESIRED FUTURE CONDITIONS (2000 TO 2070 IN FEET) [TABLE 5 FROM GMA 11 TECHNICAL MEMORANDUM 16-02 (DRAFT 2), DATED MARCH 25, 2016].).

County	Sparta	Queen City	Carrizo-Wilcox
Anderson	NRS	9	90
Angelina	16	NRS	48
Bowie	NP	NP	5
Camp	NP	NRS	33
Cass	NP	10	68
Cherokee	NRS	14	99
Franklin	NP	NP	14
Gregg	NP	NRS	58
Harrison	NP	1	18
Henderson	NP	5	50
Hopkins	NP	NP	3
Houston	3	6	80
Marion	NP	24	45
Morris	NP	NRS	46
Nacogdoches	5	4	29
Panola	NP	NP	3
Rains	NP	NP	1
Rusk	NP	NRS	23
Sabine	1	NP	9
San Augustine	2	NP	7
Shelby	NP	NP	1
Smith	NP	17	119
Titus	NP	NRS	11
Trinity	9	NRS	51
Upshur	NP	9	77
Van Zandt	NP	NRS	21
Wood	NP	5	89
Grand Total	4	10	56

Notes: NP = Not present
NRS = Not relevant due to size (less than 200 square miles)
Yellow Cells represent average drawdown calculations that assume negative drawdown is zero (model artifact and model limitation)
Green Cell represents the recommended DFC for Panola County as described above

TWDB staff reviewed the model files associated with the desired future conditions and received clarification on procedures and assumptions from the Groundwater Management Area 11 Technical Coordinator on March 13 and 15, 2017. Questions included whether drawdown averages and modeled available groundwater values are based on official aquifer extent or model extent, whether to include dry cells in drawdown averaging, methods for calculating Panola County drawdown, and how to re-calculate average drawdowns for counties with net negative average drawdowns. The clarifications are included in the Parameters and Assumptions Section of this report.

The Groundwater Management Area 11 Technical Coordinator was notified on May 3, 2017 that the modeled available groundwater values for several counties would not necessarily match the pumping values presented in Technical Memorandum 16-02 (Hutchison, 2016). The pumping values presented in Technical Memorandum 16-02 appear to be based on the model extent, while the modeled available groundwater values have been extracted based on the official aquifer.

METHODS:

The groundwater availability model for the northern part of the Carrizo-Wilcox, Queen City, and Sparta aquifers (Figures 1 through 4) was run using the model files submitted with the explanatory report (Hutchison, 2017). Model-calculated drawdowns were extracted for the year 2070. Drawdown averages were calculated for each county by aquifer and for the entire Groundwater Management Area 11 by aquifer. As specified in the desired future condition resolution and further clarification, drawdown for cells that became dry during the simulation (water level dropped below the base of the cell) were excluded from the averaging. The calculated drawdown averages were compared with the desired future conditions to verify that the pumping scenario achieved the desired future conditions within one foot.

The modeled available groundwater values were determined by extracting pumping rates by decade from the model results using ZONEBUDGET Version 3.01 (Harbaugh, 2009). Annual pumping rates by aquifer are presented by county and groundwater conservation district, subtotaled by groundwater conservation district, and then summed for Groundwater Management Area 11 (Tables 2 through 4). Annual pumping rates by aquifer are also presented by county, river basin, and regional water planning area within Groundwater Management Area 11 (Tables 5 through 7).

Modeled Available Groundwater and Permitting

As defined in Chapter 36 of the Texas Water Code (2011), "modeled available groundwater" is the estimated average amount of water that may be produced annually to

achieve a desired future condition. 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.

PARAMETERS AND ASSUMPTIONS:

The parameters and assumptions for the modeled available groundwater estimates are described below:

- We used Version 2.01 of the groundwater availability model for the northern part of the Carrizo-Wilcox, Queen City, and Sparta aquifers. 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.

- This groundwater availability model includes eight layers, which generally represent the Sparta Aquifer (Layer 1), the Weches Confining Unit (Layer 2), the Queen City Aquifer (Layer 3), the Reklaw Confining Unit (Layer 4), the Carrizo (Layer 5), the Upper Wilcox (Layer 6), the Middle Wilcox (Layer 7), and the Lower Wilcox (Layer 8). Layers represent equivalent geologic units outside of the official aquifer extents. In the case of Layers 6 through 8 in areas where the Upper, Middle, or Lower Wilcox are not distinct, then the corresponding layer represents part of an adjoining Wilcox unit.

- In the Sabine Uplift area, the Simsboro Formation (Middle Wilcox Aquifer) is not distinguishable and the Wilcox Group is informally divided into the Upper Wilcox and the Lower Wilcox aquifers (Fryar and others, 2003). In the current version of the groundwater availability model, layers 6 and 7 represent the Upper Wilcox and Lower Wilcox aquifers in this area. Layer 8 is included in the model in this area, but it is of nominal thickness.

- The model was run with MODFLOW-96 (Harbaugh and others, 1996).

- Drawdown averages and modeled available groundwater values were based on the official aquifer boundaries rather than the extent of the model area (Figures 2, 3, and 4).

- Drawdown for cells where water levels dropped below the base elevation of the cell causing the cell to become inactive (dry cells) were excluded from the averaging.

- If a county with an area greater than 200 square miles had a net negative drawdown average the average was re-calculated by assuming all negative drawdowns were zero. The zero values were included in the averaging. This assumption applies to San Augustine County in the Sparta Aquifer and Wood County in the Queen City Aquifer as noted in Table 1. It also applies to Hopkins and Rains counties in the Carrizo-Wilcox Aquifer although those counties were not noted in Table 1 (Table 1 of the Resolution).

- A tolerance of one foot was assumed when comparing desired future conditions (Table 1, average drawdown values per county) to model drawdown results.

- Drawdown for Panola County was estimated from the groundwater availability modeling results and the average drawdown is within the one foot tolerance of the desired future condition for Panola County (model results drawdown = 2 feet and desired future condition drawdown= 3 feet).

- Estimates of modeled available groundwater from the model simulation were rounded to whole numbers.

RESULTS:

The modeled available groundwater estimates for the Carrizo-Wilcox Aquifer range from approximately 349,000 acre-feet per year in 2010 to approximately 341,000 acre-feet per year in 2070 (Table 2). The modeled available groundwater estimates for the Queen City Aquifer range from approximately 223,000 acre-feet per year in 2010 to approximately 222,000 acre-feet per year in 2070 (Table 3). The modeled available groundwater estimate for the Sparta Aquifer is approximately 2,700 acre-feet per year for each decade from 2010 to 2070 (Table 4). The modeled available groundwater is summarized by groundwater conservation district and county for the Carrizo-Wilcox, Queen City, and Sparta aquifers (Tables 2, 3, and 4 respectively). The modeled available groundwater has also been summarized by county, river basin, and regional water planning area for use in the regional water planning process for the Carrizo-Wilcox, Queen City, and Sparta aquifers (Tables 5, 6, and 7 respectively). Small differences of values between table summaries are due to rounding.

The Gulf Coast, Nacatoch, Trinity, and Yegua-Jackson aquifers were declared non-relevant for the purpose of adopting desired future conditions by the Groundwater Management Area 11 Districts; therefore, modeled available groundwater values were not calculated for those aquifers.

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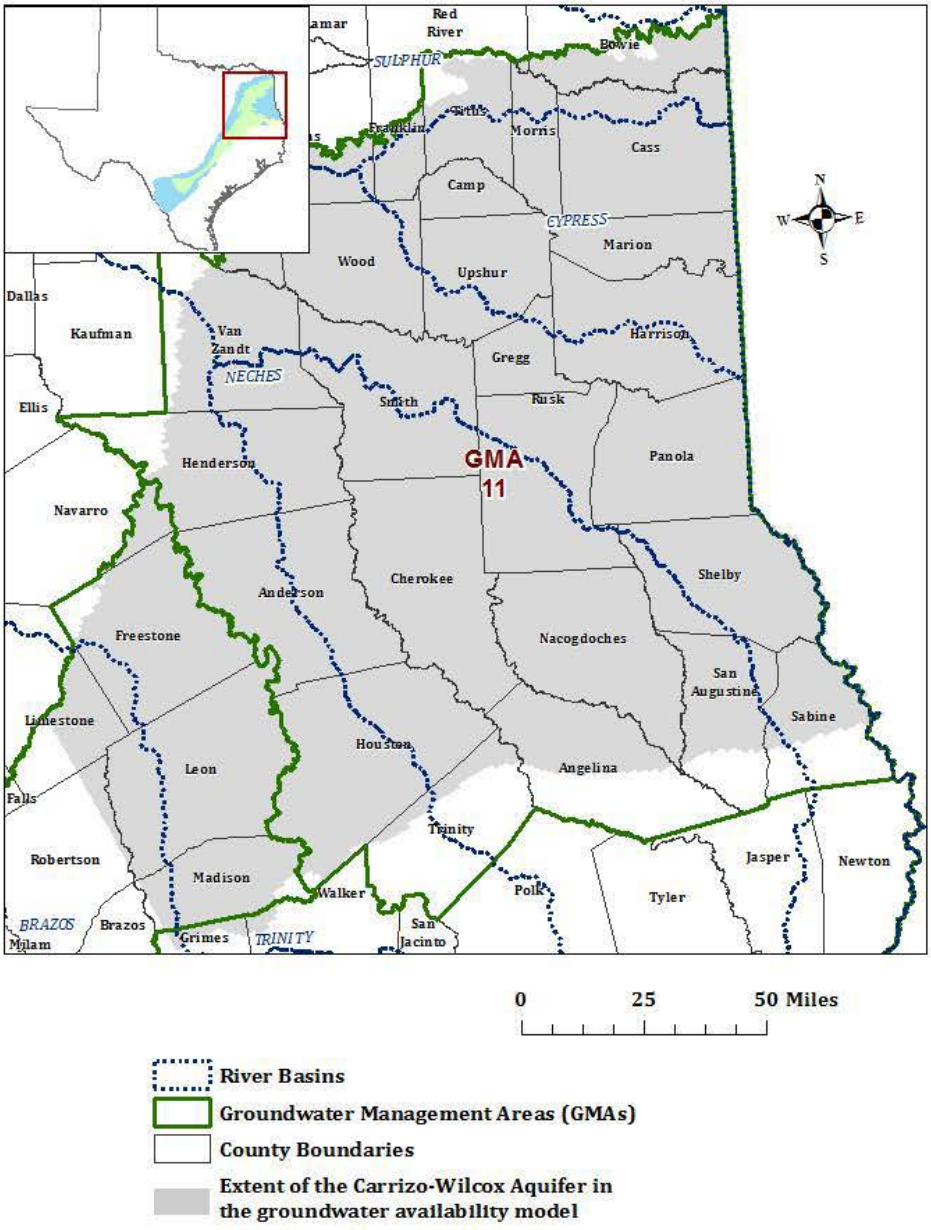

FIGURE 1. GROUNDWATER MANAGEMENT AREA (GMA) 11 BOUNDARY, RIVER BASINS, AND COUNTIES OVERLAIN ON THE EXTENT OF THE CARRIZO-WILCOX AQUIFER IN THE GROUNDWATER AVAILABILITY MODEL FOR THE NORTHERN PORTION OF THE CARRIZO-WILCOX, QUEEN CITY, AND SPARTA AQUIFERS.

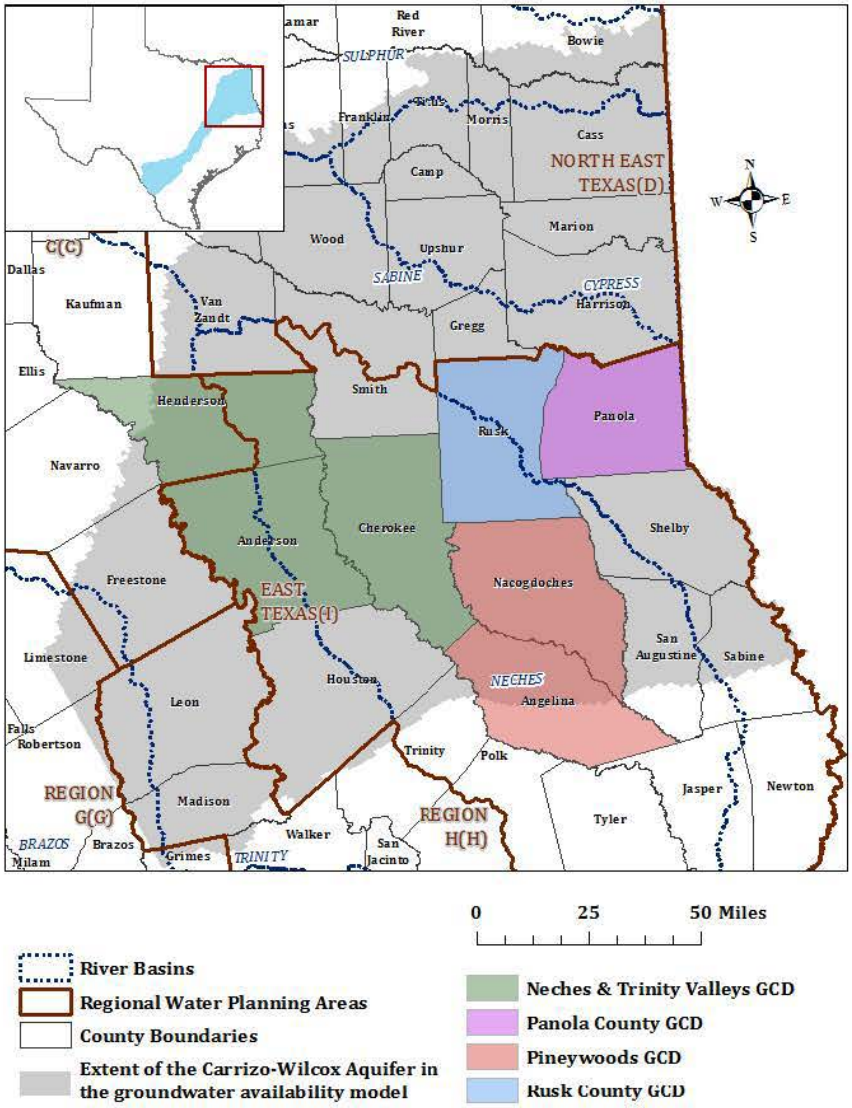

FIGURE 2. REGIONAL WATER PLANNING AREAS (RWPAS), RIVER BASINS, GROUNDWATER CONSERVATION DISTRICTS (GCDS), AND COUNTIES OVERLAIN ON THE EXTENT OF THE CARRIZO-WILCOX AQUIFER IN THE GROUNDWATER AVAILABILITY MODEL FOR THE NORTHERN PORTION OF THE CARRIZO-WILCOX, QUEEN CITY, AND SPARTA AQUIFERS.

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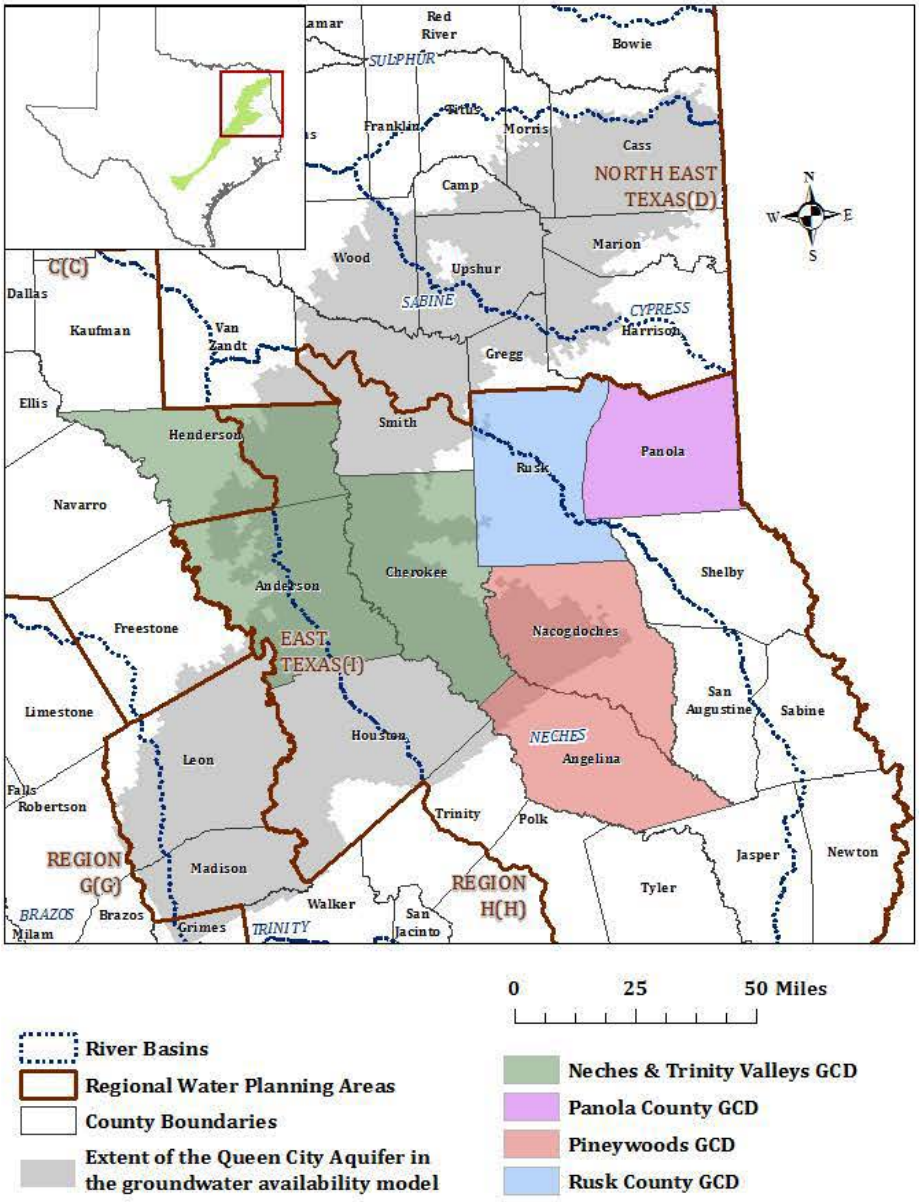

FIGURE 3. REGIONAL WATER PLANNING AREAS (RWPAS), RIVER BASINS, GROUNDWATER CONSERVATION DISTRICTS (GCDS), AND COUNTIES OVERLAIN ON THE EXTENT OF THE QUEEN CITY AQUIFER IN THE GROUNDWATER AVAILABILITY MODEL FOR THE NORTHERN PORTION OF THE CARRIZO-WILCOX, QUEEN CITY, AND SPARTA AQUIFERS.

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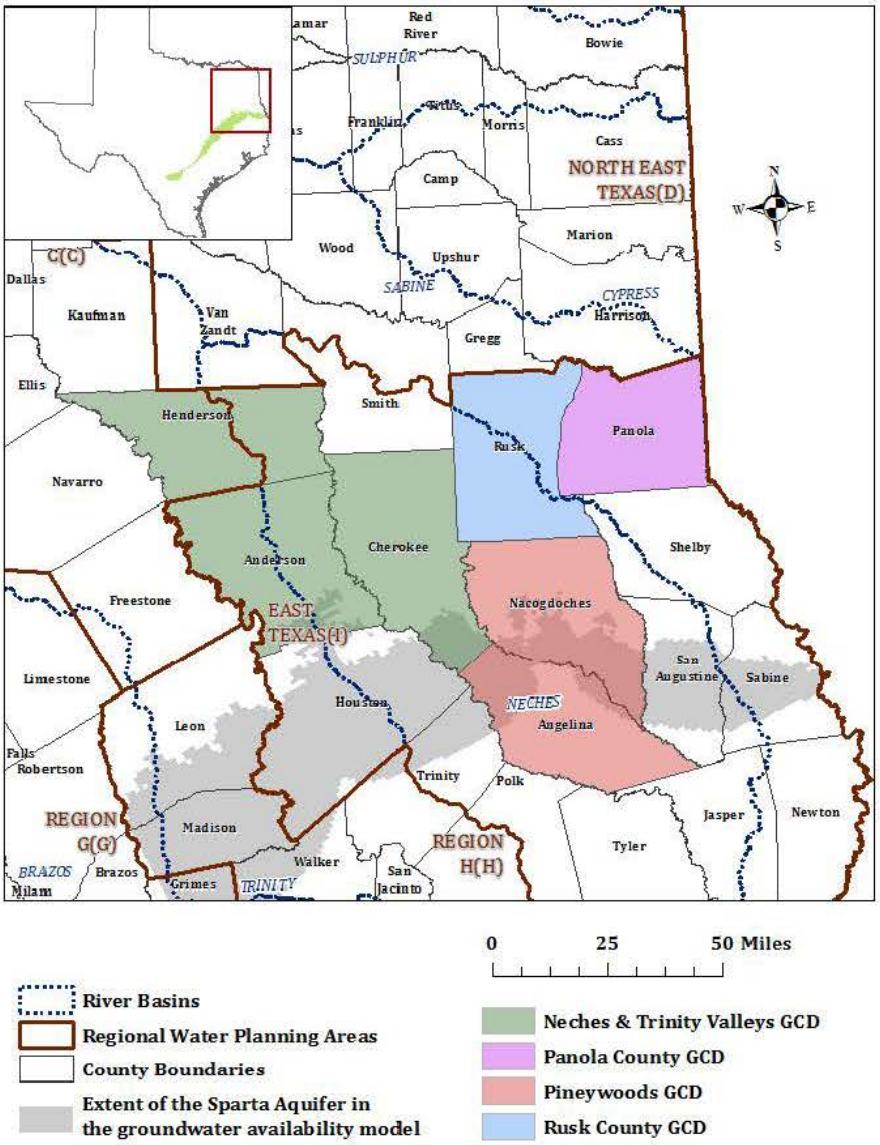

FIGURE 4. REGIONAL WATER PLANNING AREAS (RWPAS), RIVER BASINS, GROUNDWATER CONSERVATION DISTRICTS (GCDS), AND COUNTIES OVERLAIN ON THE EXTENT OF THE SPARTA AQUIFER IN THE GROUNDWATER AVAILABILITY MODEL FOR THE NORTHERN PORTION OF THE CARRIZO-WILCOX, QUEEN CITY, AND SPARTA AQUIFERS.

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TABLE 2. MODELED AVAILABLE GROUNDWATER FOR THE CARRIZO-WILCOX AQUIFER IN GROUNDWATER MANAGEMENT AREA 11 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2010 AND 2070. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District	County	Aquifer	2010	2020	2030	2040	2050	2060	2070
Neches & Trinity Valleys GCD	Anderson	Carrizo-Wilcox	29,088	29,088	29,088	29,088	29,088	29,088	29,088
Neches & Trinity Valleys GCD	Cherokee	Carrizo-Wilcox	20,933	20,933	20,933	20,933	20,933	20,933	20,470
Neches & Trinity Valleys GCD	Henderson	Carrizo-Wilcox	13,866	13,866	13,866	13,866	13,768	13,614	13,585
Neches & Trinity Valleys GCD Total		**Carrizo-Wilcox**	**63,886**	**63,886**	**63,886**	**63,886**	**63,789**	**63,634**	**63,143**
Panola County GCD	Panola	**Carrizo-Wilcox**	**8,376**	**8,376**	**8,218**	**8,218**	**8,218**	**8,068**	**8,068**
Pineywoods GCD	Angelina	Carrizo-Wilcox	27,591	27,591	27,591	27,591	27,591	27,591	27,591
Pineywoods GCD	Nacogdoches	Carrizo-Wilcox	24,181	24,181	24,181	24,181	24,181	24,181	24,181
Pineywoods GCD Total		**Carrizo-Wilcox**	**51,773**	**51,773**	**51,773**	**51,773**	**51,773**	**51,773**	**51,773**
Rusk County GCD Total	Rusk	**Carrizo-Wilcox**	**20,847**	**20,837**	**20,837**	**20,837**	**20,818**	**20,818**	**20,818**
Total (GCDs)		**Carrizo-Wilcox**	**144,882**	**144,872**	**144,714**	**144,714**	**144,598**	**144,293**	**143,801**
No District-County	Bowie	Carrizo-Wilcox	10,845	9,872	9,558	9,278	9,278	8,999	8,999
No District-County	Camp	Carrizo-Wilcox	4,050	4,050	4,050	4,050	4,050	4,050	4,050
No District-County	Cass	Carrizo-Wilcox	18,078	18,023	17,925	17,863	17,786	17,702	17,626
No District-County	Franklin	Carrizo-Wilcox	9,786	9,786	9,786	9,786	9,786	9,786	9,786
No District-County	Gregg	Carrizo-Wilcox	8,041	8,041	8,041	8,041	8,041	8,041	8,041
No District-County	Harrison	Carrizo-Wilcox	11,165	11,035	10,961	10,921	10,873	10,853	10,827
No District-County	Hopkins	Carrizo-Wilcox	6,392	6,392	6,392	6,392	6,392	6,392	6,392
No District-County	Houston	Carrizo-Wilcox	26,294	26,294	26,294	26,294	26,294	26,294	26,294
No District-County	Marion	Carrizo-Wilcox	2,729	2,726	2,726	2,726	2,726	2,726	2,726

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Groundwater Conservation District	County	Aquifer	2010	2020	2030	2040	2050	2060	2070
No District-County	Morris	Carrizo-Wilcox	2,627	2,569	2,569	2,569	2,569	2,569	2,569
No District-County	Rains	Carrizo-Wilcox	1,922	1,839	1,839	1,839	1,802	1,802	1,745
No District-County	Red River	Carrizo-Wilcox	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
No District-County	Sabine	Carrizo-Wilcox	3,606	3,606	3,606	3,606	3,606	3,606	3,606
No District-County	San Augustine	Carrizo-Wilcox	1,439	1,439	1,439	1,439	1,439	1,439	1,439
No District-County	Shelby	Carrizo-Wilcox	11,210	10,894	10,441	10,305	9,723	9,287	9,100
No District-County	Smith	Carrizo-Wilcox	35,951	35,951	35,925	35,925	35,925	35,912	35,889
No District-County	Titus	Carrizo-Wilcox	10,354	10,052	9,902	9,672	9,624	9,573	9,472
No District-County	Trinity	Carrizo-Wilcox	368	368	368	368	368	368	368
No District-County	Upshur	Carrizo-Wilcox	7,132	7,132	7,132	7,132	7,132	7,132	7,132
No District-County	Van Zandt	Carrizo-Wilcox	10,330	10,330	10,330	10,157	10,098	10,098	9,971
No District-County	Wood	Carrizo-Wilcox	21,544	21,457	21,413	21,338	21,316	21,292	21,237
No District-County Total		**Carrizo-Wilcox**	**203,863**	**201,856**	**200,696**	**199,700**	**198,827**	**197,920**	**197,268**
Total for GMA 11		**Carrizo-Wilcox**	**348,745**	**346,728**	**345,410**	**344,414**	**343,424**	**342,213**	**341,069**

[1]A desired future condition was not specified for the Carrizo-Wilcox Aquifer in Red River County; however, other counties with fewer than 200 square miles of aquifer were noted as not relevant due to size (NRS) in the desired future condition statement. Areas which are not relevant due to size are listed with a NULL value for modeled available groundwater.

TABLE 3. MODELED AVAILABLE GROUNDWATER FOR THE QUEEN CITY AQUIFER IN GROUNDWATER MANAGEMENT AREA 11 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2010 AND 2070. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District	County	Aquifer	2010	2020	2030	2040	2050	2060	2070
Neches & Trinity Valleys GCD	Anderson	Queen City	19,101	19,101	19,101	19,101	19,101	19,101	19,101
Neches & Trinity Valleys GCD	Cherokee	Queen City	23,211	23,211	23,211	23,211	23,211	23,039	22,866
Neches & Trinity Valleys GCD	Henderson	Queen City	15,412	15,412	15,412	15,412	15,412	15,412	15,412
Neches & Trinity Valleys GCD Total		**Queen City**	**57,725**	**57,725**	**57,725**	**57,725**	**57,725**	**57,552**	**57,380**
Pineywoods GCD	Angelina	Queen City	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
Pineywoods GCD	Nacogdoches	Queen City	2,985	2,985	2,985	2,985	2,985	2,985	2,985
Pineywoods GCD Total		**Queen City**	**2,985**	**2,985**	**2,985**	**2,985**	**2,985**	**2,985**	**2,985**
Rusk County GCD Total	**Rusk**	**Queen City**	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
Total (GCDs)		**Queen City**	**60,710**	**60,710**	**60,710**	**60,710**	**60,710**	**60,537**	**60,365**
No District-County	Camp	Queen City	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
No District-County	Cass	Queen City	38,509	38,509	38,509	38,509	38,509	38,509	38,509
No District-County	Gregg	Queen City	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
No District-County	Harrison	Queen City	10,071	10,071	10,071	10,071	10,071	10,071	10,071
No District-County	Houston	Queen City	2,301	2,301	2,301	2,301	2,301	2,301	2,301
No District-County	Marion	Queen City	15,407	15,407	15,407	15,407	15,407	15,338	15,271
No District-County	Morris	Queen City	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
No District-County	Smith	Queen City	59,034	59,034	59,034	59,034	58,904	58,709	58,578
No District-County	Titus	Queen City	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
No District-County	Trinity	Queen City	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
No District-County	Upshur	Queen City	27,391	27,391	27,391	27,197	27,197	27,197	27,145

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Groundwater Conservation District	County	Aquifer	2010	2020	2030	2040	2050	2060	2070
No District-County	Van Zandt	Queen City	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
No District-County	Wood	Queen City	10,046	10,046	10,046	10,046	10,046	10,046	10,046
No District-County Total		**Queen City**	**162,759**	**162,759**	**162,759**	**162,566**	**162,435**	**162,172**	**161,922**
Total for GMA 11		**Queen City**	**223,469**	**223,469**	**223,469**	**223,275**	**223,145**	**222,709**	**222,287**

[1]Counties with fewer than 200 square miles of aquifer were noted as not relevant due to size (NRS) in the desired future condition statement. Areas which are not relevant due to size are listed with a NULL value for modeled available groundwater. For additional information in pumping in the model run see Table 6 from Technical Memorandum 16-02 (Hutchison, 2016).

TABLE 4. MODELED AVAILABLE GROUNDWATER FOR THE SPARTA AQUIFER IN GROUNDWATER MANAGEMENT AREA 11 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2010 AND 2070. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District	County	Aquifer	2010	2020	2030	2040	2050	2060	2070
Neches & Trinity Valleys GCD	Anderson	Sparta	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
Neches & Trinity Valleys GCD	Cherokee	Sparta	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
Neches & Trinity Valleys GCD Total		**Sparta**	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
Pineywoods GCD	Angelina	Sparta	371	371	371	371	371	371	371
Pineywoods GCD	Nacogdoches	Sparta	365	365	365	365	365	365	365
Pineywoods GCD Total		**Sparta**	**737**	**737**	**737**	**737**	**737**	**737**	**737**
Total (GCDs)		**Sparta**	**737**	**737**	**737**	**737**	**737**	**737**	**737**
No District-County	Houston	Sparta	1,454	1,454	1,454	1,454	1,454	1,454	1,454
No District-County	Sabine	Sparta	197	197	197	197	197	197	197
No District-County	San Augustine	Sparta	166	166	166	166	166	166	166
No District-County	Trinity	Sparta	182	182	182	182	182	182	182
No District-County Total		**Sparta**	**1,999**	**1,999**	**1,999**	**1,999**	**1,999**	**1,999**	**1,999**
Total for GMA 11		**Sparta**	**2,736**	**2,736**	**2,736**	**2,736**	**2,736**	**2,736**	**2,736**

[1]Counties with fewer than 200 square miles of aquifer were noted as not relevant due to size (NRS) in the desired future condition statement. Areas which are not relevant due to size are listed with a NULL value for modeled available groundwater. For additional information in pumping in the model run see Table 6 from Technical Memorandum 16-02 (Hutchison, 2016).

GAM Run 17-024 MAG: Modeled Available Groundwater for the Carrizo-Wilcox, Queen City, and Sparta aquifers in Groundwater Management Area 11

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TABLE 5. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE CARRIZO-WILCOX AQUIFER IN GROUNDWATER MANAGEMENT AREA 11. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), RIVER BASIN, AND AQUIFER.

County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060	2070
Anderson	I	Neches	Carrizo-Wilcox	23,335	23,335	23,335	23,335	23,335	23,335
Anderson	I	Trinity	Carrizo-Wilcox	5,753	5,753	5,753	5,753	5,753	5,753
Angelina	I	Neches	Carrizo-Wilcox	27,591	27,591	27,591	27,591	27,591	27,591
Bowie	D	Sulphur	Carrizo-Wilcox	9,872	9,558	9,278	9,278	8,999	8,999
Camp	D	Cypress	Carrizo-Wilcox	4,050	4,050	4,050	4,050	4,050	4,050
Cass	D	Cypress	Carrizo-Wilcox	15,159	15,132	15,132	15,119	15,106	15,094
Cass	D	Sulphur	Carrizo-Wilcox	2,864	2,794	2,731	2,667	2,596	2,532
Cherokee	I	Neches	Carrizo-Wilcox	20,933	20,933	20,933	20,933	20,933	20,470
Franklin	D	Cypress	Carrizo-Wilcox	7,765	7,765	7,765	7,765	7,765	7,765
Franklin	D	Sulphur	Carrizo-Wilcox	2,021	2,021	2,021	2,021	2,021	2,021
Gregg	D	Cypress	Carrizo-Wilcox	862	862	862	862	862	862
Gregg	D	Sabine	Carrizo-Wilcox	7,179	7,179	7,179	7,179	7,179	7,179
Harrison	D	Cypress	Carrizo-Wilcox	6,183	6,109	6,070	6,036	6,016	5,990
Harrison	D	Sabine	Carrizo-Wilcox	4,851	4,851	4,851	4,837	4,837	4,837
Henderson	C	Trinity	Carrizo-Wilcox	7,829	7,829	7,829	7,732	7,577	7,548
Henderson	I	Neches	Carrizo-Wilcox	6,036	6,036	6,036	6,036	6,036	6,036
Hopkins	D	Cypress	Carrizo-Wilcox	313	313	313	313	313	313
Hopkins	D	Sabine	Carrizo-Wilcox	2,842	2,842	2,842	2,842	2,842	2,842
Hopkins	D	Sulphur	Carrizo-Wilcox	3,237	3,237	3,237	3,237	3,237	3,237
Houston	I	Neches	Carrizo-Wilcox	22,488	22,488	22,488	22,488	22,488	22,488
Houston	I	Trinity	Carrizo-Wilcox	3,806	3,806	3,806	3,806	3,806	3,806
Marion	D	Cypress	Carrizo-Wilcox	2,726	2,726	2,726	2,726	2,726	2,726
Morris	D	Cypress	Carrizo-Wilcox	2,166	2,166	2,166	2,166	2,166	2,166
Morris	D	Sulphur	Carrizo-Wilcox	402	402	402	402	402	402
Nacogdoches	I	Neches	Carrizo-Wilcox	24,181	24,181	24,181	24,181	24,181	24,181
Panola	I	Cypress	Carrizo-Wilcox	6	6	6	6	6	6

County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060	2070
Panola	I	Sabine	Carrizo-Wilcox	8,370	8,212	8,212	8,212	8,062	8,062
Rains	D	Sabine	Carrizo-Wilcox	1,839	1,839	1,839	1,802	1,802	1,745
Red River	D	Sulphur	Carrizo-Wilcox	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
Rusk	I	Neches	Carrizo-Wilcox	11,769	11,769	11,769	11,750	11,750	11,750
Rusk	I	Sabine	Carrizo-Wilcox	9,068	9,068	9,068	9,068	9,068	9,068
Sabine	I	Neches	Carrizo-Wilcox	356	356	356	356	356	356
Sabine	I	Sabine	Carrizo-Wilcox	3,249	3,249	3,249	3,249	3,249	3,249
San Augustine	I	Neches	Carrizo-Wilcox	1,149	1,149	1,149	1,149	1,149	1,149
San Augustine	I	Sabine	Carrizo-Wilcox	290	290	290	290	290	290
Shelby	I	Neches	Carrizo-Wilcox	2,577	2,288	2,151	2,018	2,018	2,018
Shelby	I	Sabine	Carrizo-Wilcox	8,317	8,154	8,154	7,705	7,269	7,081
Smith	D	Sabine	Carrizo-Wilcox	13,246	13,220	13,220	13,220	13,206	13,196
Smith	I	Neches	Carrizo-Wilcox	22,705	22,705	22,705	22,705	22,705	22,693
Titus	D	Cypress	Carrizo-Wilcox	7,215	7,064	6,834	6,786	6,735	6,634
Titus	D	Sulphur	Carrizo-Wilcox	2,838	2,838	2,838	2,838	2,838	2,838
Trinity	H	Trinity	Carrizo-Wilcox	99	99	99	99	99	99
Trinity	I	Neches	Carrizo-Wilcox	269	269	269	269	269	269
Upshur	D	Cypress	Carrizo-Wilcox	5,442	5,442	5,442	5,442	5,442	5,442
Upshur	D	Sabine	Carrizo-Wilcox	1,689	1,689	1,689	1,689	1,689	1,689
Van Zandt	D	Neches	Carrizo-Wilcox	4,317	4,317	4,317	4,317	4,317	4,317
Van Zandt	D	Sabine	Carrizo-Wilcox	4,629	4,629	4,456	4,397	4,397	4,270
Van Zandt	D	Trinity	Carrizo-Wilcox	1,384	1,384	1,384	1,384	1,384	1,384
Wood	D	Cypress	Carrizo-Wilcox	2,053	2,053	2,053	2,053	2,053	2,053
Wood	D	Sabine	Carrizo-Wilcox	19,404	19,360	19,285	19,263	19,239	19,184
GMA 11 Total			**Carrizo-Wilcox**	**346,728**	**345,410**	**344,414**	**343,424**	**342,213**	**341,069**

[1] A desired future condition was not specified for the Carrizo-Wilcox Aquifer in Red River County; however, other counties with fewer than 200 square miles of aquifer were noted as not relevant due to size (NRS) in the desired future condition statement. Areas which are not relevant due to size are listed with a NULL value for modeled available groundwater.

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TABLE 6. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE QUEEN CITY AQUIFER IN GROUNDWATER MANAGEMENT AREA 11. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), RIVER BASIN, AND AQUIFER.

County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060	2070
Anderson	I	Neches	Queen City	11,828	11,828	11,828	11,828	11,828	11,828
Anderson	I	Trinity	Queen City	7,274	7,274	7,274	7,274	7,274	7,274
Angelina	I	Neches	Queen City	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
Camp	D	Cypress	Queen City	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
Cass	D	Cypress	Queen City	35,499	35,499	35,499	35,499	35,499	35,499
Cass	D	Sulphur	Queen City	3,010	3,010	3,010	3,010	3,010	3,010
Cherokee	I	Neches	Queen City	23,211	23,211	23,211	23,211	23,039	22,866
Gregg	D	Cypress	Queen City	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
Gregg	D	Sabine	Queen City	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
Harrison	D	Cypress	Queen City	7,762	7,762	7,762	7,762	7,762	7,762
Harrison	D	Sabine	Queen City	2,310	2,310	2,310	2,310	2,310	2,310
Henderson	C	Trinity	Queen City	3,345	3,345	3,345	3,345	3,345	3,345
Henderson	I	Neches	Queen City	12,067	12,067	12,067	12,067	12,067	12,067
Houston	I	Neches	Queen City	2,043	2,043	2,043	2,043	2,043	2,043
Houston	I	Trinity	Queen City	258	258	258	258	258	258
Marion	D	Cypress	Queen City	15,407	15,407	15,407	15,407	15,338	15,271
Morris	D	Cypress	Queen City	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
Nacogdoches	I	Neches	Queen City	2,985	2,985	2,985	2,985	2,985	2,985
Rusk	I	Neches	Queen City	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
Rusk	I	Sabine	Queen City	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
Smith	D	Sabine	Queen City	28,343	28,343	28,343	28,213	28,018	27,887
Smith	I	Neches	Queen City	30,692	30,692	30,692	30,692	30,692	30,692
Titus	D	Cypress	Queen City	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
Trinity	H	Trinity	Queen City	0	0	0	0	0	0
Trinity	I	Neches	Queen City	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]

County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060	2070
Upshur	D	Cypress	Queen City	19,642	19,642	19,448	19,448	19,448	19,396
Upshur	D	Sabine	Queen City	7,749	7,749	7,749	7,749	7,749	7,749
Van Zandt	D	Neches	Queen City	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
Wood	D	Cypress	Queen City	986	986	986	986	986	986
Wood	D	Sabine	Queen City	9,060	9,060	9,060	9,060	9,060	9,060
GMA 11 Total			**Queen City**	**223,469**	**223,469**	**223,276**	**223,145**	**222,709**	**222,287**

[1]Counties with fewer than 200 square miles of aquifer were noted as not relevant due to size (NRS) in the desired future condition statement. Areas which are not relevant due to size are listed with a NULL value for modeled available groundwater. For additional information in pumping in the model run see Table 6 from Technical Memorandum 16-02 (Hutchison, 2016).

TABLE 7. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE SPARTA AQUIFER IN GROUNDWATER MANAGEMENT AREA 11. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), RIVER BASIN, AND AQUIFER.

County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060	2070
Anderson	I	Neches	Sparta Aquifer	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
Anderson	I	Trinity	Sparta Aquifer	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
Angelina	I	Neches	Sparta Aquifer	371	371	371	371	371	371
Cherokee	I	Neches	Sparta Aquifer	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]	NULL[1]
Houston	I	Neches	Sparta Aquifer	477	477	477	477	477	477
Houston	I	Trinity	Sparta Aquifer	977	977	977	977	977	977
Nacogdoches	I	Neches	Sparta Aquifer	365	365	365	365	365	365
Sabine	I	Neches	Sparta Aquifer	37	37	37	37	37	37
Sabine	I	Sabine	Sparta Aquifer	160	160	160	160	160	160
San Augustine	I	Neches	Sparta Aquifer	163	163	163	163	163	163
San Augustine	I	Sabine	Sparta Aquifer	3	3	3	3	3	3
Trinity	H	Trinity	Sparta Aquifer	29	29	29	29	29	29
Trinity	I	Neches	Sparta Aquifer	154	154	154	154	154	154
GMA 11 Total			**Sparta Aquifer**	**2,736**	**2,736**	**2,736**	**2,736**	**2,736**	**2,736**

[1] Counties with fewer than 200 square miles of aquifer were noted as not relevant due to size (NRS) in the desired future condition statement. Areas which are not relevant due to size are listed with a NULL value for modeled available groundwater. For additional information in pumping in the model run see Table 6 from Technical Memorandum 16-02 (Hutchison, 2016).

LIMITATIONS:

The groundwater model used in completing this analysis is the best available scientific tool that can be used to meet the stated objectives. 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 groundwater levels in 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.

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Appendix 3-B

Water Availability Technical Memorandum

The TWDB requires regional water planning groups to use Full Authorization Water Availability Models (WAM Run 3) maintained by the Texas Commission on Environmental Quality (TCEQ) to develop water availability for regional water plans (RWPs). The Region I Consultant Team, on behalf of the East Texas Regional Water Planning Group (Region I), utilized WAMs to calculate surface water availability for the three basins within Region I: the Trinity River, Neches River, and Sabine River Basins.

For the Trinity River Basin, Region I adopted the updated Trinity Basin WAM developed by the Region C Water Planning Group. Region I also includes part of the Neches-Trinity Coastal Basin. As no changes were proposed by Region I to the Neches-Trinity WAM, surface water supplies in that basin were developed using the unmodified Neches-Trinity Coastal Basin WAM Run 3. This memorandum included as Appendix 3-B describes the modifications made to the Neches River and Sabine River WAMs by Region I.

Run-of-river supplies were also calculated using the TCEQ WAM Run 3. The firm supply was determined as the minimum annual diversion from the river for all use types (municipal, industrial, mining, recreational, and irrigation). Since all municipal users in ETRWPA have multiple sources of water, it was assumed that the run-of-the-river supplies would be used conjunctively with these sources and a monthly analysis was not appropriate to determine availability. The run of river supplies associated with City of Beaumont (WR 4415) increase over time because of this reason. Appendix 3-B also includes a memorandum summarizing the WAM analysis for the City of Beaumont municipal water right.

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Summary of WAM Modifications in the Development of Surface Water Supplies for the East Texas 2021 Regional Water Plan

The Texas Water Development Board (TWDB) requires regional water planning groups (RWPG) to use Full Authorization Water Availability Models (WAM Run 3) maintained by the Texas Commission on Environmental Quality (TCEQ) in the development of surface water availability for regional water plans (RWPs). In a letter submitted to TWDB on July 3, 2018, the Region I Consultant Team on behalf of the East Texas Regional Water Planning Group (Region I) requested a hydrologic variance to use modified versions of the Run 3 WAMs for the Trinity River, Neches River, and Sabine River Basins to develop supplies for the Region I 2021 RWP. This hydrologic variance request is still pending approval.

For the Trinity River Basin, Region I adopted the updated Trinity Basin WAM developed by the Region C Water Planning Group. These changes are documented in Region C's hydrologic variance request to the TWDB. Region I also includes part of the Neches-Trinity Coastal Basin. As no changes were proposed by Region I to the Neches-Trinity WAM, surface water supplies in that basin were developed using the unmodified Neches-Trinity Coastal Basin WAM Run 3. This memorandum describes the modifications made to the Neches River and Sabine River WAMs by Region I.

Neches River Basin WAM for the 2021 Region I RWP

Changes to the WAM for the 2021 RWP are based on changes in previous cycles, as well as the inclusion of updated sedimentation of major reservoirs, as specified by Exhibit C ("Second Amended General Guidelines for Fifth Cycle of Regional Water Plan Development"). The following sections describe all changes made to the TCEQ Neches WAM Run 3 (2012) to develop the modified Neches WAM, which will be used to determine existing supplies in the Neches River Basin in the Region I 2021 RWP.

Area-Capacity Relationships

Exhibit C requires RWPGs to include anticipated sedimentation of all major reservoirs (those with a capacity greater than 5,000 ac-ft) in the WAM model runs. There are 12 such permitted reservoirs in the Neches Basin; information related to sedimentation of these reservoirs is shown in Table 1.

Lake Columbia has not yet been constructed, so to be conservative, Lake Columbia's full design capacity and original area-capacity curve was used when evaluating firm yields for all other reservoirs. Conversely, to estimate the yield from Lake Columbia, it was assumed that the reservoir would be built in 2020 and begin collecting sediment at that time.

Table 1. Sedimentation Rates and Projected Storage Capacity of Major Reservoirs in the Neches River Basin

Reservoir	Most Recent Survey		Sediment-Contributing Drainage Area (mi^2)	Sedimentation Rate ($ac\text{-}ft/yr/mi^2$)	Projected 2070 Capacity (ac-ft)
	Year	Conservation Pool Capacity (ac-ft)			
Lake Athens	1998	29,475	22	4.35	22,719
Lake Columbia**	*	195,500	277	0.19	192,910
Lake Jacksonville	2006	25,732	34	2.88	19,508
Lake Kurth	1996	14,769	4	8.57	12,265
Lake Nacogdoches	1994	39,523	89	1.75	27,664
Lake Naconiche	*	9,072	27	0.19	8,750
Lake Palestine	2012	367,310	817	0.76	331,689
Pinkston Lake	*	7,380	14	0.19	7,130
Sam Rayburn Reservoir	2004	2,876,033	3,010	0.18	2,839,698
Lake B. A. Steinhagen	2011	69,259	3,251	0.06	58,731
Lake Striker	1996	22,865	182	0.85	11,561
Lake Tyler	2013	77,284	107	1.00	71,192

** No survey available. Conservation pool capacity reflects design capacity.*

*** Permitted but not yet constructed. Projected 2070 capacity based on assumption of sedimentation beginning 1/1/2020.*

Subordination of Sam Rayburn Reservoir and B. A. Steinhagen Lake

Background

Special conditions 5C and 5D of Certificate of Adjudication 06-4411 require subordination of LNVA's rights in the Rayburn-Steinhagen system to (a) water rights upstream of the proposed Weches and Ponta Dam sites and (b) intervening municipal rights above Sam Rayburn Reservoir. These conditions were last amended in Amendment H, filed August 14, 2008, and granted July 20, 2010, which limited subordination to rights with priority dates between November 1963 and April 2008.

Several changes were implemented in the WAM related to dual simulation, output, and the refilling of Rayburn and Steinhagen.

a) Water rights benefiting from subordination were updated to run in both the first and second WRAP simulation.
b) FNI added additional rights for each water right benefiting from Rayburn/Steinhagen subordination, such that the original right does not have subordination, and the added right applies the subordination and backs up the original without subordination. In doing so, the effects of subordination can be distinguished in the model output.
c) Subordination rights at Rayburn and Steinhagen to back up other rights were modeled to not refill storage (Type 2 water rights) so that Rayburn and Steinhagen would not be refilling between multiple subordinations.
d) The 1963 rights for impoundment at Rayburn and Steinhagen were reordered so that Rayburn, the upstream reservoir, would be filled from available streamflow before Steinhagen is refilled.

Reservoir System Operations

UNRMWA – Lake Palestine and Rocky Point Dam

The Upper Neches River Municipal Water Authority operates Lake Palestine in conjunction with its downstream dam on the Neches River in Anderson and Cherokee Counties. The 2012 WAM Run 3 allows rights associated with the downstream dam to draw from both reservoirs, which limits the firm yield of Lake Palestine when it is used to back up the downstream dam. This set of rights was modified so that downstream diversions would first be backed up by the subordination agreement at Steinhagen Lake, and any remaining shortages would be backed up by Lake Palestine.

LNVA – Sam Rayburn Backup of Pine Island Bayou

The modified WAM approved by TWDB for the development of supplies in the 2011 RWP included "operation of LNVA's water rights [...] as a system by including backup of LNVA's Pine Island water rights with storage from Sam Rayburn."

Minimum Elevations – Sam Rayburn and B.A. Steinhagen

WS and OR records were used to set inactive pool capacity for Sam Rayburn Reservoir. The top elevation of inactive pool is 149 ft msl, and the inactive pool capacity was updated each decade based on updated area-capacity-elevation curves. The City of Lufkin has a right to a lakeside diversion of up to 28,000 ac-ft/yr from Sam Rayburn Reservoir; no inactive pool capacity was applied for this right. This diversion is lakeside and does not generate hydropower, so it is not limited by the inlet elevation.

A dead pool capacity was also set for B. A. Steinhagen using an inactive pool elevation of 81 ft msl. Inactive pools were not applied to subordination-related backup rights for either reservoir.

Lake Tyler

For the 2021 Region I WAM, Lake Tyler was modeled as a single reservoir, and associated water rights were adjusted accordingly. This is consistent with the development of the original Neches WAM, which treated this source as one reservoir.

Environmental Flows Standard for Permit 5585

The TCEQ Run 3 WAM included an incorrect target value for the instream flow record at Lake Naconiche (5585A) due to a unit conversion error. The target was corrected to 4744 ac-ft/yr (see `IF` record at 5585A).

Sabine River Basin WAM for the 2021 Region I RWP

The following sections describe all changes made to the TCEQ Sabine WAM Run 3 (2015) to develop the modified Sabine WAM, which will be used to determine existing supplies from the Sabine River Basin in the Region I 2021 RWP.

Area-Capacity Relationships

Exhibit C requires RWPGs to include anticipated sedimentation of all major reservoirs (those with a capacity greater than 5,000 ac-ft) in the WAM model runs. There are 12 such permitted reservoirs in the Sabine Basin; information related to sedimentation of these reservoirs is shown in Table 2. For each of the 12 reservoirs, sedimentation conditions were estimated based on an average annual sedimentation rate and the number of years since the last survey.

Table 2. Sedimentation Rates and Projected Storage Capacity of Major Reservoirs in the Sabine River Basin

Reservoir	Most Recent Survey		Sediment-Contributing Drainage Area (mi^2)	Sedimentation Rate (ac-ft/yr/mi^2)	Projected 2070 Capacity (ac-ft)
	Year	Conservation Pool Capacity (ac-ft)			
Lake Tawakoni	2009	871,693	756	2.96	736,428
Lake Fork Reservoir	2009	636,504	493	3.83	522,671
Lake Gladewater	2000	4,738	35	1.33	1,480
Lake Cherokee	2015	44,475	158	0.26	42,230
Brandy Branch Reservoir	*	29,513	4	0.24	29,429
Martin Lake	2014	75,726	130	0.37	73,097
Murvaul Lake	1998	38,284	115	1.64	24,873
Toledo Bend Reservoir	*	4,477,000	5,384	0.12	4,410,291
Lake Hawkins	1962	11,890	30	0.24	11,117
Lake Holbrook	*	7,990	15	0.24	7,604
Lake Quitman	*	7,440	31	0.24	6,639
Lake Winnsboro	*	8,100	27	0.24	7,403

** No recent survey available. Conservation pool capacity reflects design capacity.*

Firm Yield of Toledo Bend Reservoir

Hydropower operations at Toledo Bend were excluded during the determination of total available supply from the lake. However, hydropower operations were included in the evaluation of supplies for all other reservoirs and run-of-river supplies. The canal water rights owned by Sabine River Authority (SRA) in the lower basin modeled as being subordinate to diversions from Toledo Bend Reservoir for the purposes of determining firm yield. The remainder of the yield of Toledo Bend was evaluated assuming all diversions were taken lakeside. Within the WAM, all diversions from the lake are shared equally between SRA-Texas and SRA-Louisiana, including the additional unpermitted yield.

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).

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November 21, 2013
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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*	

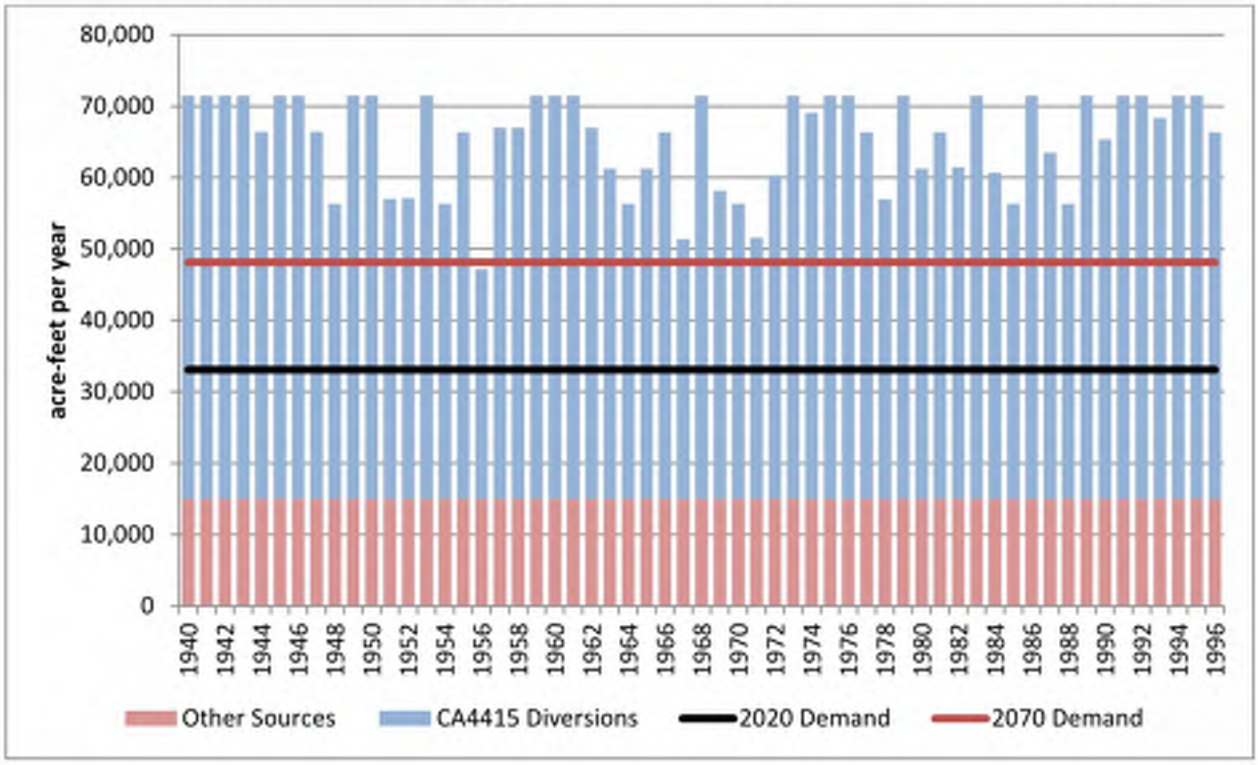
Available Supplies Using WAM

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



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November 21, 2013

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

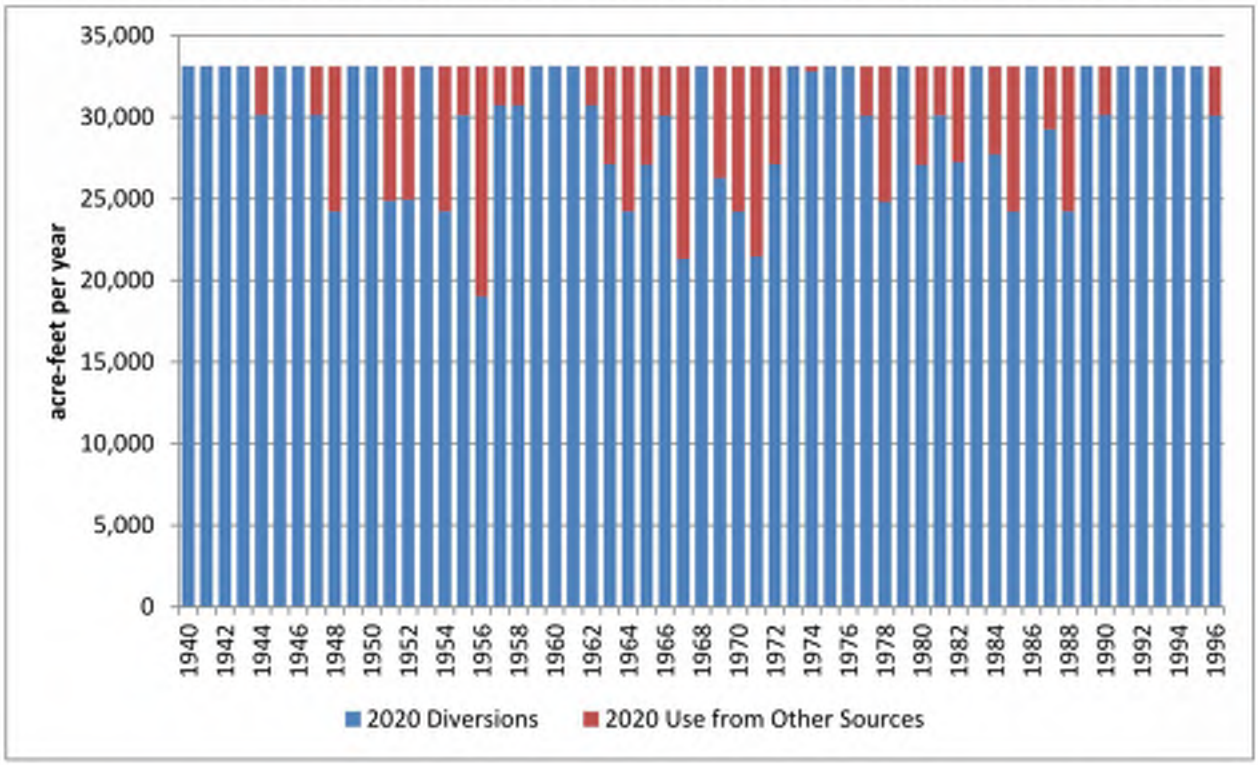
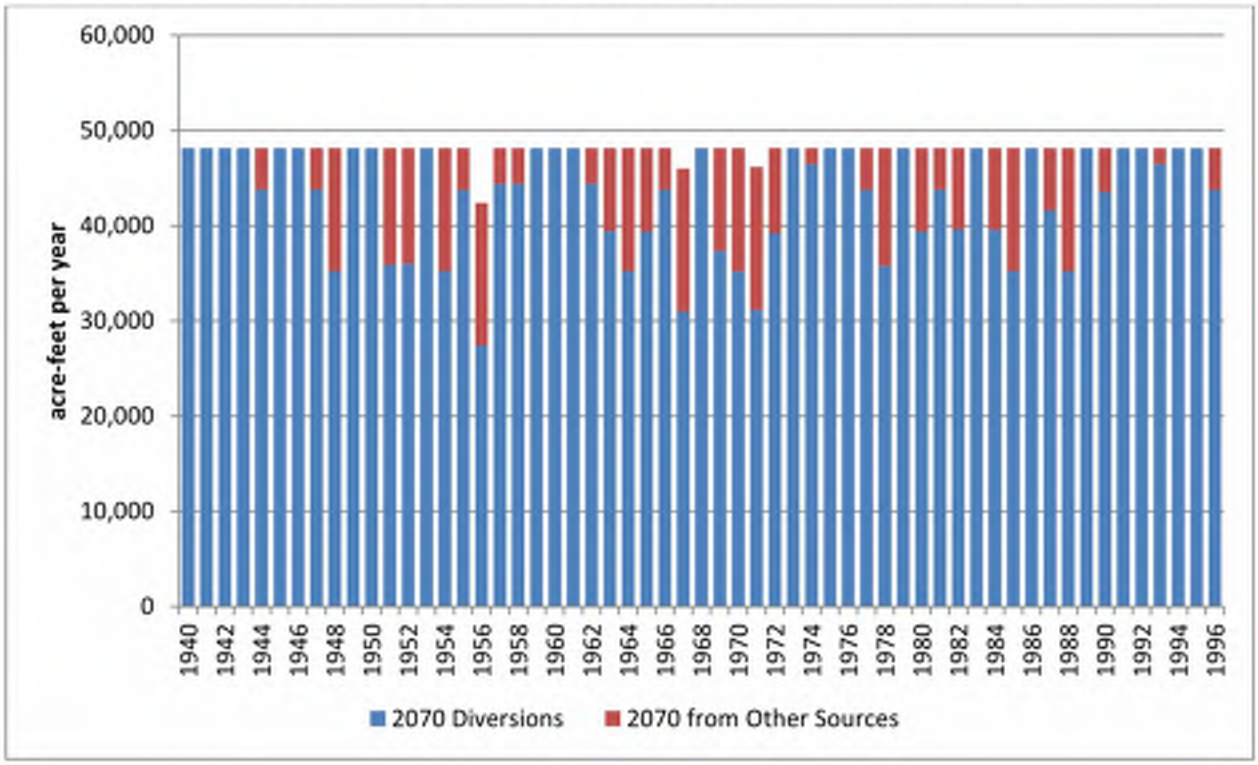


Figure 3b: Annual Source of Supply Based on Monthly Analysis using WAM – 2070 Conditions



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

Water Demands, Supplies, and Needs for Major Water Providers

The new designation of "Major Water Providers" (MWPs) was established in rules for the development of the 2022 State Water Plan. Defining MWPs enables RWPGs to establish a more static list of large water providers for which they report information and to provide regional water planning groups with more flexibility in deciding which large water provider(s) they want to report information on in their regional water plans. MWPs represent wholesale water providers (WWPs) and/or water user groups (WUGs) that use, are responsible for developing, and/or are delivering significant quantities of water in the region. It is up to each region to decide which entities are designated as MWPs.

The East Texas Regional Water Planning Group (ETRWPG) identified 16 MWPs for the 2021 regional water plan, including:

1) Angelina and Neches River Authority (ANRA)
2) Angelina-Nacogdoches Water Control & Improvement District (A-N WCID) No. 1
3) Athens Municipal Water Authority (AMWA)
4) City of Beaumont
5) City of Carthage
6) City of Center
7) City of Jacksonville
8) City of Lufkin
9) City of Nacogdoches
10) City of Port Arthur
11) City of Tyler
12) Houston County Water Control & Improvement District (WCID) No. 1
13) Lower Neches Valley Authority (LNVA)
14) Panola County Freshwater Supply District (FWSD) No. 1
15) Sabine River Authority (SRA)
16) Upper Neches River Municipal Water Authority (UNRMWA)

Regional water plans must present the following data for MWPs, in accordance with the following Texas Water Code(s):

a) Projected water demands by planning decade and category of use (31 TAC §357.31(b))
b) Existing water supply analysis by category of use (31 TAC §357.32(g))
c) Water supply needs analysis by category of use (31 TAC §357.33(b))
d) Secondary water needs analysis where demand reduction and direct reuse WMSs are recommended, by MWP and decade (31 TAC §357.33(e))
e) Recommended water management strategies (WMS) and recommended WMS projects, and results of all pfWMS evaluations (31 TAC §357.35(g)(1))

f) Calculated management supply factor by entity and decade (31 TAC §357.35(g)(2))

The following appendix includes a summary of a) – d) above (projected water demands, existing water supplies, and first and secondary needs analysis by planning decade and category of use) for each MWP in the ETRWPA. The other requirements will be addressed in Appendix 5B-C.

Angelina and Neches River Authority (ANRA)
Demands, Supplies, and Needs

Water Use Type	2020	2030	2040	2050	2060	2070
Demands						
Municipal	5,600	5,600	5,600	5,600	5,600	5,600
Irrigation	8,288	5,201	893	468	308	207
Livestock	65	36,838	45,389	45,389	45,389	75,470
Manufacturing	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Steam Electric Power	8,000	15,000	20,000	20,000	20,000	20,000
TOTAL	**21,953**	**62,639**	**71,882**	**71,457**	**71,297**	**101,277**
Supplies						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	65	70	70	70	70	70
Manufacturing	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
TOTAL	**65**	**70**	**70**	**70**	**70**	**70**
First Tier Needs						
Municipal	-5,600	-5,600	-5,600	-5,600	-5,600	-5,600
Irrigation	-8,288	-5,201	-893	-468	-308	-207
Livestock	0	-36,768	-45,319	-45,319	-45,319	-75,400
Manufacturing	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Steam Electric Power	-8,000	-15,000	-20,000	-20,000	-20,000	-20,000
TOTAL	**-21,888**	**-62,569**	**-71,812**	**-71,387**	**-71,227**	**-101,207**
Second Tier Needs						
Municipal	-5,600	-5,600	-5,600	-5,600	-5,600	-5,600
Irrigation	-8,288	-5,201	-893	-468	-308	-207
Livestock	0	-36,768	-45,319	-45,319	-45,319	-75,400
Manufacturing	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Steam Electric Power	-8,000	-15,000	-20,000	-20,000	-20,000	-20,000
TOTAL	**-21,888**	**-62,569**	**-71,812**	**-71,387**	**-71,227**	**-101,207**

Angelina and Nacogdoches Water Control & Improvement District (AN WCID) #1 Demands, Supplies, and Needs

Water Use Type	2020	2030	2040	2050	2060	2070
Demands						
Municipal	0	0	8,289	8,289	8,289	8,289
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Steam Electric Power	5,000	5,000	5,000	5,000	5,000	5,000
TOTAL	**5,000**	**5,000**	**13,289**	**13,289**	**13,289**	**13,289**
Supplies						
Municipal	0	0	8,289	8,289	8,289	8,289
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Steam Electric Power	5,000	5,000	5,000	5,000	5,000	5,000
Surplus (Unallocated)	15,340	14,635	13,890	13,150	11,715	9,690
TOTAL	**20,340**	**19,635**	**27,179**	**26,439**	**25,004**	**22,979**
First Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**
Second Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

Athens Municipal Water Authority (AMWA)
Demands, Supplies, and Needs

Water Use Type	2020	2030	2040	2050	2060	2070
Demands						
Municipal	2,962	3,233	3,461	3,795	6,462	9,556
Irrigation	170	170	170	170	170	170
Livestock	3,023	3,023	3,023	3,023	3,023	3,023
Manufacturing	484	591	591	591	591	591
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
TOTAL	**6,639**	**7,017**	**7,245**	**7,579**	**10,246**	**13,340**
Supplies						
Municipal	2,962	3,233	3,461	3,795	5,030	5,593
Irrigation	170	170	170	170	119	85
Livestock	3,023	3,023	3,023	3,023	2,120	1,505
Manufacturing	484	591	591	591	591	591
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
TOTAL	**6,639**	**7,017**	**7,245**	**7,579**	**7,860**	**7,774**
First Tier Needs						
Municipal	0	0	0	0	-1,432	-3,963
Irrigation	0	0	0	0	-51	-85
Livestock	0	0	0	0	-903	-1,518
Manufacturing	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
TOTAL	**0**	**0**	**0**	**0**	**-2,386**	**-5,566**
Second Tier Needs						
Municipal	0	0	0	0	-926	-3,183
Irrigation	0	0	0	0	-51	-85
Livestock	0	0	0	0	-903	-1,518
Manufacturing	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
TOTAL	**0**	**0**	**0**	**0**	**-1,880**	**-4,786**

City of Beaumont
Demands, Supplies, and Needs

Water Use Type	2020	2030	2040	2050	2060	2070
Demands						
Municipal	32,827	34,793	37,098	39,676	42,173	45,018
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	1,642	1,658	1,675	1,692	1,709	1,726
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
TOTAL	**34,469**	**36,451**	**38,773**	**41,368**	**43,882**	**46,743**
Supplies						
Municipal	32,827	34,793	35,904	35,990	36,064	36,140
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	1,642	1,658	1,621	1,535	1,461	1,385
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
TOTAL	**34,469**	**36,451**	**37,525**	**37,525**	**37,525**	**37,525**
First Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	-54	-157	-248	-340
Livestock	0	0	0	0	0	0
Manufacturing	0	0	-1,194	-3,685	-6,109	-8,878
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
TOTAL	**0**	**0**	**-1,248**	**-3,843**	**-6,357**	**-9,218**
Second Tier Needs						
Municipal	0	0	0	0	0	-1,496
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	0	0	-54	-157	-248	-340
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
TOTAL	**0**	**0**	**-54**	**-157**	**-248**	**-1,837**

City of Carthage
Demands, Supplies, and Needs

Water Use Type	2020	2030	2040	2050	2060	2070
Demands						
Municipal	1,950	1,951	1,944	1,948	1,959	1,969
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	906	945	984	1,017	1,084	1,115
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
TOTAL	**2,856**	**2,896**	**2,928**	**2,965**	**3,043**	**3,084**
Supplies						
Municipal	1,950	1,951	1,944	1,948	1,959	1,969
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	906	945	984	1,017	1,084	1,115
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
Surplus (Unallocated)	2,708	2,668	2,636	2,599	2,522	2,481
TOTAL	**5,564**	**5,564**	**5,564**	**5,564**	**5,565**	**5,565**
First Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	0	0	0	0	0	0
Second Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

City of Center
Demands, Supplies, and Needs

Water Use Type	2020	2030	2040	2050	2060	2070
Demands						
Municipal	1,944	2,057	2,159	2,265	2,373	2,474
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	1,696	1,696	1,696	1,696	1,696	1,696
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
TOTAL	**3,640**	**3,753**	**3,855**	**3,961**	**4,069**	**4,170**
Supplies						
Municipal	1,944	2,057	2,159	2,265	2,373	2,474
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	1,696	1,696	1,696	1,696	1,696	1,696
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
Surplus (Unallocated)	1,620	1,507	1,405	1,299	1,191	1,090
TOTAL	**5,260**	**5,260**	**5,260**	**5,260**	**5,260**	**5,260**
First Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**
Second Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

Houston County Water Control & Improvement District (WCID) #1
Demands, Supplies, and Needs

Water Use Type	2020	2030	2040	2050	2060	2070
Demands						
Municipal	2,097	2,097	2,097	2,097	2,097	2,097
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	169	232	232	232	232	232
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
TOTAL	**2,266**	**2,329**	**2,329**	**2,329**	**2,329**	**2,329**
Supplies						
Municipal	2,097	2,097	2,097	2,097	2,097	2,097
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	169	232	232	232	232	232
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
Surplus (Unallocated)	1,234	1,171	1,171	1,171	1,171	1,171
TOTAL	**3,500**	**3,500**	**3,500**	**3,500**	**3,500**	**3,500**
First Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**
Second Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

City of Jacksonville
Demands, Supplies, and Needs

Water Use Type	2020	2030	2040	2050	2060	2070
Demands						
Municipal	4,462	4,739	5,031	5,443	5,921	6,448
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	115	129	129	129	129	129
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
TOTAL	**4,577**	**4,868**	**5,160**	**5,572**	**6,050**	**6,577**
Supplies						
Municipal	4,462	4,739	5,031	5,443	5,921	6,448
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	115	129	129	129	129	129
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
Surplus (Unallocated)	2,814	2,523	2,231	1,819	1,341	814
TOTAL	**7,391**	**7,391**	**7,391**	**7,391**	**7,391**	**7,391**
First Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**
Second Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

Lower Neches Valley Authority (LNVA)
Demands, Supplies, and Needs

Water Use Type	2020	2030	2040	2050	2060	2070
Demands						
Municipal	56,285	57,902	59,626	61,764	63,812	64,549
Irrigation	200,000	200,000	200,000	200,000	200,000	200,000
Livestock	0	0	0	0	0	0
Manufacturing	147,754	147,754	147,754	147,754	147,754	147,754
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
TOTAL	**404,039**	**405,656**	**407,380**	**409,518**	**411,566**	**412,303**
Supplies						
Municipal	56,285	57,902	59,626	61,764	63,812	64,549
Irrigation	200,000	200,000	200,000	200,000	200,000	200,000
Livestock	0	0	0	0	0	0
Manufacturing	147,754	147,754	147,754	147,754	147,754	147,754
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
Surplus (Unallocated)	797,837	768,221	766,496	764,358	762,310	761,573
TOTAL	**1,201,876**	**1,173,876**	**1,173,876**	**1,173,876**	**1,173,876**	**1,173,876**
First Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**
Second Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

City of Lufkin
Demands, Supplies, and Needs

Water Use Type	2020	2030	2040	2050	2060	2070
Demands						
Municipal	38,243	10,535	10,782	11,063	11,372	11,658
Irrigation	779	779	779	779	779	779
Livestock	0	0	0	0	0	0
Manufacturing	732	776	776	776	776	776
Mining	0	0	0	0	0	0
Steam Electric Power	16,802	16,802	16,802	16,802	16,802	16,802
TOTAL	**56,555**	**28,891**	**29,138**	**29,419**	**29,728**	**30,014**
Supplies						
Municipal	20,414	10,535	10,782	11,063	11,372	11,658
Irrigation	779	779	779	779	779	779
Livestock	0	0	0	0	0	0
Manufacturing	732	776	776	776	776	776
Mining	0	0	0	0	0	0
Steam Electric Power	16,802	16,802	16,802	16,802	16,802	16,802
Surplus (Unallocated)	0	9,836	9,589	9,308	8,999	8,713
TOTAL	**38,727**	**38,727**	**38,727**	**38,727**	**38,727**	**38,727**
First Tier Needs						
Municipal	-17,097	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**-17,097**	**0**	**0**	**0**	**0**	**0**
Second Tier Needs						
Municipal	-16,946	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**-16,946**	**0**	**0**	**0**	**0**	**0**

City of Nacogdoches
Demands, Supplies, and Needs

Water Use Type	2020	2030	2040	2050	2060	2070
Demands						
Municipal	7,323	7,969	8,632	9,400	10,273	11,197
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	2,508	2,529	2,529	2,529	2,529	2,529
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
TOTAL	**9,831**	**10,498**	**11,161**	**11,929**	**12,802**	**13,726**
Supplies						
Municipal	7,323	7,969	8,632	9,400	10,273	11,197
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	2,508	2,529	2,529	2,529	2,529	2,529
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
Surplus (Unallocated)	12,861	11,794	10,731	9,563	8,290	6,966
TOTAL	**22,692**	**22,292**	**21,892**	**21,492**	**21,092**	**20,692**
First Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**
Second Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

Panola County Freshwater Supply District (FWSD) 1
Demands, Supplies, and Needs

Water Use Type	2020	2030	2040	2050	2060	2070
Demands						
Municipal	13,452	13,452	13,452	13,452	13,452	13,452
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0
Mining	3,550	3,515	3,029	2,561	2,172	2,363
Steam Electric Power	0	0	0	0	0	0
TOTAL	**17,002**	**16,967**	**16,481**	**16,013**	**15,624**	**15,815**
Supplies						
Municipal	13,452	13,452	13,452	13,452	13,452	13,452
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0
Mining	3,550	3,515	3,029	2,561	2,172	2,363
Steam Electric Power	0	0	0	0	0	0
Surplus (Unallocated)	4,365	3,719	3,525	3,312	3,020	2,148
TOTAL	**21,367**	**20,686**	**20,006**	**19,325**	**18,644**	**17,963**
First Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**
Second Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

City of Port Arthur
Demands, Supplies, and Needs

Water Use Type	2020	2030	2040	2050	2060	2070
Demands						
Municipal	19,239	19,210	18,989	18,944	18,925	18,924
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	6,443	6,443	6,443	6,443	6,443	6,443
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
TOTAL	**25,682**	**25,653**	**25,432**	**25,387**	**25,368**	**25,367**
Supplies						
Municipal	19,239	19,210	18,989	18,944	18,925	18,924
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Manufacturing	6,443	6,443	6,443	6,443	6,443	6,443
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
TOTAL	**25,682**	**25,653**	**25,432**	**25,387**	**25,368**	**25,367**
First Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**
Second Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

Sabine River Authority (SRA)
Demands, Supplies, and Needs

Water Use Type	2020	2030	2040	2050	2060	2070
Demands						
Municipal	2,020	2,020	2,020	2,020	2,020	2,020
Irrigation	1,255	1,255	1,255	1,255	1,255	1,255
Livestock	0	0	0	0	0	0
Manufacturing	57,111	57,111	57,111	57,111	57,111	57,111
Mining	7,500	7,500	7,500	7,500	7,500	7,500
Steam Electric Power	35,845	35,845	35,845	35,845	35,845	35,845
TOTAL	**103,731**	**103,731**	**103,731**	**103,731**	**103,731**	**103,731**
Supplies						
Municipal	2,020	2,020	2,020	2,020	2,020	2,020
Irrigation	1,255	1,255	1,255	1,255	1,255	1,255
Livestock	0	0	0	0	0	0
Manufacturing	57,111	57,111	57,111	57,111	57,111	57,111
Mining	7,500	7,500	7,500	7,500	7,500	7,500
Steam Electric Power	35,845	35,845	35,845	35,845	35,845	35,845
Surplus (Unallocated)	999,279	999,279	999,279	999,279	999,279	999,279
TOTAL	**1,103,010**	**1,103,010**	**1,103,010**	**1,103,010**	**1,103,010**	**1,103,010**
First Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**
Second Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

City of Tyler
Demands, Supplies, and Needs

Water Use Type	2020	2030	2040	2050	2060	2070
Demands						
Municipal	23,002	24,315	25,716	27,397	29,261	31,216
Irrigation	400	400	400	400	400	400
Livestock	0	0	0	0	0	0
Manufacturing	1,774	2,009	2,009	2,009	2,009	2,009
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
TOTAL	**25,176**	**26,724**	**28,124**	**29,806**	**31,670**	**33,625**
Supplies						
Municipal	23,002	24,315	25,716	27,397	29,261	31,216
Irrigation	400	400	400	400	400	400
Livestock	0	0	0	0	0	0
Manufacturing	1,774	2,009	2,009	2,009	2,009	2,009
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
Surplus (Unallocated)	15,580	14,032	12,632	10,950	9,086	7,131
TOTAL	**40,756**	**40,756**	**40,756**	**40,756**	**40,756**	**40,756**
First Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**
Second Tier Needs						
Municipal	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

Upper Neches River Municipal Water Authority (UNRMWA)
Demands, Supplies, and Needs

Water Use Type	2020	2030	2040	2050	2060	2070
Demands						
Municipal	209,537	209,537	209,537	209,537	209,537	209,537
Irrigation	610	587	565	547	532	532
Livestock	0	0	0	0	0	0
Manufacturing	100	100	100	100	100	100
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
TOTAL	**210,247**	**210,224**	**210,202**	**210,184**	**210,169**	**210,169**
Supplies						
Municipal	197,000	195,423	193,945	192,363	190,678	188,378
Irrigation	610	587	565	547	532	532
Livestock	0	0	0	0	0	0
Manufacturing	100	100	100	100	100	100
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
TOTAL	**197,710**	**196,110**	**194,610**	**193,010**	**191,310**	**189,010**
First Tier Needs						
Municipal	-12,537	-14,114	-15,592	-17,174	-18,859	-21,159
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**-12,537**	**-14,114**	**-15,592**	**-17,174**	**-18,859**	**-21,159**
Second Tier Needs						
Municipal	-12,537	-14,114	-15,592	-17,174	-18,859	-21,159
Irrigation	0	0	0	0	0	0
Livestock	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
TOTAL	**-12,537**	**-14,114**	**-15,592**	**-17,174**	**-18,859**	**-21,159**

Appendix 5A-A

Screening Criteria for Potentially Feasible Water Management Strategies

The screening criteria used to assess the feasibility of potential water management strategies (WMS) in the East Texas Regional Planning Area (ETRWPA) are provided as follows. These criteria were adopted as guidelines, and strategies could be retained or dismissed at the discretion of the East Texas Regional Water Planning Group (ETRWPG).

5A-A.1 General Guidelines

The ETRWPG identified a series of general guidelines when considering the potential feasibility of WMSs for the region. The guidelines are as follows:

- 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 357.34, 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 all municipal WUGs that have a current per capita water use greater than 140 gpcd. This is the recommended goal for municipal users by the State of Texas Water Conservation Implementation Task Force. Municipal conservation will not be evaluated for WUGs with current usage less than 140 gpcd.

- The ETRWPG does not recommend water conservation for manufacturing WUGs. Although it is expected that manufacturers will implement water conservation measures during the planning period, the ETRWPG does not have the industry and site-specific information necessary to identify the current status of manufacturing water conservation or to recommend which measures should be implemented. In addition, changes to processes and equipment required for effective water conservation may be costly for manufacturing users, especially considering that water is readily available in the ETRWPA.

- The ETRWP does not recommend further water conservation beyond the irrigation conservation measures already implemented within the region. The ETRWPG encourages the implementation of irrigation water conservation measures; however, it does not have the farm-specific information necessary to identify the current status of on-farm water conservation or to recommend what measures should be implemented.

- Conservation was considered for steam electric power, livestock or mining water demands. However, the cost of water in these industries comprises a small percentage of the overall business cost, and it is not expected that these industries will see an economic benefit to water conservation. Based on these considerations, water conservation strategies have not been recommended for steam-electric, livestock and mining WUGs.

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.

Area-Capacity Relationships. 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:

- Define groupings or common areas with supply deficiencies.
- Develop comprehensive list of potentially feasible strategies, per screening process.
- Contact potential suppliers/WUGs to determine current strategies under consideration.
- 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.
- Select one or more strategies as appropriate for each need or group.
- Contact each WUG with a need and confirm the selected strategies are acceptable.
- Present proposed WMSs to the ETRWPG in a public meeting for discussion, modification, and approval.

Appendix 5A-B

Potentially Feasible Water Management Strategies

The appendix 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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Every WUG Entity with an Identified Need			WMSs REQUIRED TO BE CONSIDERED BY STATUTE										ADDITIONAL						
Water User Group 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
Manufacturing	Angelina	1,625	☐	☐	☐	☐	■	☐	■	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Mining	Angelina	572	☐	☐	☐	☐	■	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Alto Rural WSC	Cherokee	215	■	☐	☐	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Rusk	Cherokee	122	■	☐	☐	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Wright City WSC	Cherokee	99	☐	☐	☐	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Mining	Cherokee	238	☐	☐	☐	☐	■	☐	■	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Athens	Henderson	40	■	☐	☐	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Edom WSC	Henderson	9	☐	☐	☐	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Chandler	Henderson	118	■	☐	☐	☐	☐	☐	■	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Moore Station WSC	Henderson	111	☐	☐	☐	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Mining	Henderson	19	☐	☐	☐	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Irrigation	Henderson	167	☐	☐	☐	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
R P M WSC	Henderson	48	☐	☐	☐	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Livestock	Houston	201	☐	☐	☐	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Livestock	Jasper	8,932	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Beaumont	Jefferson	9,218	■	☐	☐	☐	■	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
County Other	Jefferson	1,950	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Manufacturing	Jefferson	143,513	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Steam Electric Power	Jefferson	2,391	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Cushing	Nacogdoches	30	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
D & M WSC	Nacogdoches	374	☐	☐	☐	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Livestock	Nacogdoches	9,113	☐	☐	☐	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Mining	Nacogdoches	5,475	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Mining	Newton	115	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Irrigation	Orange	526	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Livestock	Panola	982	☐	☐	☐	☐	☐	☐	■	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Jacobs WSC	Rusk	22	☐	☐	☐	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Wright City WSC	Rusk	22	☐	☐	☐	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Overton	Rusk	384	■	☐	☐	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Mining	Rusk	305	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Livestock	Rusk	83	☐	☐	☐	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Steam Electric Power	Rusk	1,103	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
San Augustine	San Augustine	120	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Livestock	San Augustine	2,349	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Mining	San Augustine	2,102	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Sand Hills WSC	Shelby	117	☐	☐	☐	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Livestock	Shelby	19,006	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Bullard	Smith	1,182	■	☐	☐	☐	■	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Crystal Systems Texas	Smith	435	■	☐	☐	☐	■	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Lindale	Smith	696	■	☐	☐	☐	■	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
R P M WSC	Smith	17	■	☐	☐	☐	■	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Overton	Smith	32	■	☐	☐	☐	■	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Southern Utilities	Smith	90	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Manufacturing	Smith	84	☐	☐	☐	☐	■	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Whitehouse	Smith	257	☐	☐	☐	☐	■	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

ETRWPA - Potentially Feasible Water Management Strategies for WUGs 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)
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 Rusk	News Wells in Carrizo Wilcox
Cherokee County Wright City WSC	News Wells in Carrizo Wilcox
Cherokee County Mining	Purchase from Provider (Voluntary Transfer)
Henderson County Athens	Municipal conservation
Henderson County Athens	Purchase from Provider (Voluntary Transfer)
Henderson County Edom WSC	News Wells in Carrizo Wilcox
Henderson County Chandler	Municipal conservation
Henderson County Chandler	Purchase from Provider (Voluntary Transfer)
Henderson County Moore Station WSC	News Wells in Carrizo Wilcox
Henderson County Mining	News Wells in Carrizo Wilcox
Henderson County Irrigation	News Wells in Carrizo Wilcox
Henderson County R P M WSC	News Wells in Carrizo Wilcox
Houston County Irrigation	New Wells in Yegua-Jackson
Jasper County Livestock	New Wells in Gulf Coast Aquifer
Jefferson County Beaumont	Municipal conservation
Jefferson County Beaumont	Purchase from Provider (Voluntary Transfer)
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 Cushing	Municipal conservation
Nacogdoches County D & M WSC	New Wells in Carrizo Wilcox
Nacogdoches County Livestock	New Wells in Carrizo Wilcox
Nacogdoches County Mining	Purchase from Provider (Voluntary Transfer)
Newton County Mining	Purchase from Provider (Voluntary Transfer)
Orange County Irrigation	Purchase from Provider (Voluntary Transfer)
Panola County Livestock	New Wells in Carrizo Wilcox
Rusk County Jacobs WSC	New Wells in Carrizo Wilcox
Rusk County Overton	Municipal conservation
Rusk County Overton	New Wells in Carrizo Wilcox
Rusk County Wright City WSC	New Wells in Carrizo Wilcox
Rusk County Livestock	New Wells in Carrizo Wilcox
Rusk County Mining	Purchase from Provider (Voluntary Transfer)
Rusk County Steam Electric Power	Purchase from Provider (Voluntary Transfer)
San Augustine	Purchase from Provider (Voluntary Transfer)
San Augustine County Mining	Purchase from Provider (Voluntary Transfer)
San Augustine County Livestock	Purchase from Provider (Voluntary Transfer)
Shelby County Sand Hills WSC	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 Crystal Systems Texas	Municipal conservation
Smith County Crystal Systems Texas	New Wells in Carrizo Wilcox
Smith County Lindale	Municipal conservation

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

Sponsor	WMS
Smith County Lindale	New Wells in Carrizo Wilcox
Smith County R P M WSC	Municipal conservation
Smith County R P M WSC	New Wells in Carrizo Wilcox
Smith County Manufacturing	Purchase from Provider (Voluntary Transfer)
Smith County Whitehouse	Purchase from Provider (Voluntary Transfer)
Smith County Southern Utilities	Municipal conservation

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Appendix 5B-A

Technical Memorandums of Water Management Strategy Analysis

The 2021 Plan includes a total of 64 recommended water management strategies (WMS) sponsored by entities located within the East Texas Regional Water Planning Area (ETRWPA) as summarized in Tables 5B.1 and 5B.2 in Chapter 5B. Of these strategies, 50 include a capital cost that was broken down further into 61 separate Water Management Strategy Projects (WMSP). All strategies were developed to ensure the ETRWPA will continue to meet the water demands for the area's communities and industries. This Appendix 5B-A provides the required evaluation of each strategy, contained in 64 separate technical memorandums.

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 2021 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, Second Amended General Guidelines for Fifth Cycle of Regional Water Plan Development – April 2018), 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.

TECHNICAL MEMORANDUM TABLE OF CONTENTS BY ENTITY

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 1. ANGELINA MANUFACTURING

Water User Group Name:	**Angelina - Manufacturing**
Strategy Name:	**Purchase from Lufkin (Sam Rayburn)**
Strategy ID:	**ANGL-MFG**
Strategy Type:	**Existing Surface Water Source**
Potential Supply Quantity:	**1,625 ac-ft/yr (1.5 MGD)**
Implementation Decade:	**2020**
Development Timeline:	**2020**
Capital Cost:	**$0**
Project Annual Cost:	**$530,000 (Sam Rayburn to Kurth) (September 2018)**
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/yr to meet manufacturing demands in Angelina County. The quantity of supply from this strategy represents a contract increase of 1,449 ac-ft/yr, beginning in 2020, and increases to 1,625 ac-ft/yr, beginning in 2030. 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.

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 2021 East Texas Regional Water Plan.

WUG NAME:	**Angelina Manufacturing**				
STRATEGY:	**Purchase from Lufkin**				
Raw Water Quantity:	**1,625**	AF/Y		2.17 MGD	
Treated Water Quantity:	**0**	AF/Y		0.00 MGD	
ANNUAL CONTRACT COSTS		**Size**	**Quantity**	**Unit**	**Cost**
Operational Costs*			530,000	1000 gal	$530,000
ANNUAL COSTS					
TOTAL ANNUAL COST					**$530,000**
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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 1,625 ac-ft/yr
Reliability	5	High
Cost	4	$0 to $500/ac-ft (Low)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	1	No sponsor readily identifiable
Implementation Issues	4	Low Implementation Issues

REFERENCES

2016 East Texas Regional Water Plan.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 2. ANGELINA MINING

Water User Group Name:	**Angelina - Mining**
Strategy Name:	**Purchase from Angelina Neches River Authority (Neches Run of River, Mud Creek)**
Strategy ID:	**ANGL-MIN**
Strategy Type:	**Existing Surface Water Source**
Potential Supply Quantity:	**167 - 572 ac-ft/yr (varies) (0.15 - 0.5 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**2030**
Project Capital Cost:	**$7,927,000 (September 2018)**
Annual Cost:	**$1,245,000**
Unit Water Cost (Rounded):	**$2,177 per ac-ft ($6.68 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 Mud Creek as their permit allows. The cost for supply from the Neches 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 Neches River using the Texas Commission on Environmental Quality (TCEQ) Water Availability Models. However, this strategy is dependent on sales with the Angelina Neches River Authority and their application for 10,000 ac-ft/yr from the Neches River (Strategy ID: ANRA-ROR). The quantity of supply from this strategy represents a contract of 473 ac-ft/yr, beginning in 2020, and increase to 572 ac-ft/yr in 2030, and decreases to 167 ac-ft/yr, 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 6 miles of pipeline (the approximate distance from the Neches 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 cost compared to other strategies in the 2021 East Texas Regional Water Plan due to the length of pipeline required.

WUG NAME:	**Angelina Mining**				
STRATEGY:	**Purchase from ANRA**				
Quantity:	**572** AF/Y		0.77	MGD	
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	8 in.	31,680	LF	$40	$1,257,787
Right of Way Easements Rural (ROW)		31,680	LF	$18	$578,970
Land and Surveying (10%)					$58,000
Engineering and Contingencies (30%)					$377,000
Subtotal of Pipeline	**6**	**miles**			**$2,271,757**
Pump Station(s)					
Pump with intake	53 HP	1	LS	$3,547,000	$3,547,000
Booster Pump Station		0	LS		
Engineering and Contingencies (35%)					$1,241,000
Subtotal of Pump Station(s)					**$4,788,000**
Storage Tank(s)					
Storage Tank	0.10 MG	1	LS	$430,669	$430,669
Engineering and Contingencies (35%)					$151,000
Subtotal of Storage Tank(s)					**$581,669**
Permitting and Mitigation					$178,000
Interest During Construction			6	Months	$100,000
TOTAL COST					**$7,927,000**
ANNUAL COSTS					
Debt Service (3.5% for 20 years)					$558,000
Operational Costs*					$687,000
TOTAL ANNUAL COST					**$1,245,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$2,177
Per 1,000 Gallons					$6.68
UNIT COSTS (After Amortization)					
Per Acre-Foot					$1,201
Per 1,000 Gallons					$3.69

* 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 Neches 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 572 ac-ft/yr
Reliability	3	Medium
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	1	No sponsor readily identifiable
Implementation Issues	4	Low Implementation Issues

REFERENCES

2016 East Texas Regional Water Plan.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 3. 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:	**191 ac-ft/yr (0.2 MGD)**
Implementation Decade:	**2050**
Development Timeline:	**2050**
Project Capital Cost:	**$2,426,000 (September 2018)**
Annual Cost:	**$202,000**
Unit Water Cost (Rounded):	**$1,058 per ac-ft ($3.25 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/yr. 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 two wells located within the Carrizo-Wilcox Aquifer as this aquifer has been identified as a potential source of water in Cherokee County. The wells will provide approximately 191 ac-ft/yr and are assumed to have a depth of 800 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 wells will provide sufficient ac-ft/yr 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, two wells, a peaking factor of two, and a maximum well yield of 250 gpm for each well. This equates to $1,058 per acre-foot ($3.25 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $162 per acre-foot ($0.50 per 1,000 gallons). Overall, this strategy has a medium cost compared to other strategies in the 2021 East Texas Regional Water Plan.

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

Supply	191	Ac-ft/yr	118	gpm
Well Depth	800	ft		
Wells Needed	2			

CAPITAL COSTS	
Transmission Pipeline (6 in dia., 1.2 miles)	$161,000
Primary Pump Stations (0.2 MGD)	$417,000
Well Fields (Wells, Pumps, and Piping)	$1,113,000
TOTAL COST OF FACILITIES	**$1,691,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$583,000
Environmental & Archaeology Studies and Mitigation	$59,000
Land Acquisition and Surveying (6 acres)	$28,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$65,000
TOTAL COST OF PROJECT	**$2,426,000**
ANNUAL COSTS	
Debt Service (3.5 percent, 20 years)	$171,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$13,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$10,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (95483 kW-hr @ 0.08 $/kW-hr)	$8,000
Purchase of Water (ac-ft/yr @ $/ac-ft)	$0
TOTAL ANNUAL COST	**$202,000**
Available Project Yield (ac-ft/yr)	191
Annual Cost of Water ($ per ac-ft), based on PF=1.2	$1,058
Annual Cost of Water After Debt Service ($ per ac-ft), based on PF=1.2	$162
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.2	$3.25
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.2	$0.50

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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 191 ac-ft/yr
Reliability	4	Medium to High
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	3	Sponsor identified; commitment level uncertain. Local sponsorship by Alto Rural WSC
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with the East Texas Regional Water Planning Group (Region I).

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 4. CHEROKEE RUSK

Water User Group Name:	**Cherokee - Rusk**
Strategy Name:	**New wells in Carrizo-Wilcox Aquifer**
Strategy ID:	**CHER-RUS**
Strategy Type:	**New Groundwater Source**
Potential Supply Quantity:	**122 ac-ft/yr (0.11 MGD)**
Implementation Decade:	**2070**
Development Timeline:	**2070**
Project Capital Cost:	**$2,361,000 (September 2018)**
Annual Cost:	**$192,000**
Unit Water Cost (Rounded):	**$1,574 per ac-ft ($4.83 per 1,000 gallons)**

PROJECT DESCRIPTION

Rusk is a municipal water user in Cherokee County. This water user currently relies on groundwater in the Carrizo Wilcox aquifer in Cherokee County. Rusk has a small need starting in 2070 of approximately 122 ac-ft/yr. To meet this need, it is recommended that Rusk continue to use supplies from Carrizo Wilcox by drilling additional wells. This strategy is a recommended strategy for Rusk in Cherokee 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 Cherokee County. The wells will provide approximately 122 ac-ft/yr and are assumed to have a depth of 800 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 the decade of 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 wells will provide sufficient ac-ft/yr to meet Rusk'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 mile of pipeline, two wells, a peaking factor of two, and a maximum well yield of 250 gpm for each well. This equates to $1,574 per acre-foot ($4.83 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $213 per acre-foot ($0.65 per 1,000 gallons). Overall, this strategy has a medium cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WUG: Cherokee County – Rusk
STRATEGY: New wells - Carrizo Aquifer Wells

Supply	122	Ac-ft/yr	62	gpm
Well Depth	800	ft		
Wells Needed	2			

CAPITAL COSTS	
Transmission Pipeline (6 in dia., 1 miles)	$134,000
Primary Pump Stations (0.2 MGD)	$399,000
Well Fields (Wells, Pumps, and Piping)	$1,113,000
TOTAL COST OF FACILITIES	**$1,646,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$569,000
Environmental & Archaeology Studies and Mitigation	$54,000
Land Acquisition and Surveying (6 acres)	$28,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$64,000
TOTAL COST OF PROJECT	**$2,361,000**
ANNUAL COSTS	
Debt Service (3.5 percent, 20 years)	$166,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$12,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$10,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (55507 kW-hr @ 0.08 $/kW-hr)	$4,000
Purchase of Water (ac-ft/yr @ $/ac-ft)	$0
TOTAL ANNUAL COST	**$192,000**
Available Project Yield (ac-ft/yr)	122
Annual Cost of Water ($ per ac-ft), based on PF=1.2	$1,574
Annual Cost of Water After Debt Service ($ per ac-ft), based on PF=1.2	$213
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.2	$4.83
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.2	$0.65

PROJECT EVALUATION

This strategy benefits municipal 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. Developing groundwater 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 County Rusk WUG recommended strategy to develop

new wells in Carrizo Wilcox was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 122 ac-ft/yr
Reliability	4	Medium to High
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	3	Sponsor identified; commitment level uncertain. Local sponsorship by the City of Rusk
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with the East Texas Regional Water Planning Group (Region I).

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 5. CHEROKEE WRIGHT CITY WSC

Water User Group Name:	**Cherokee - Wright City WSC**
Strategy Name:	**New wells in Carrizo-Wilcox Aquifer**
Strategy ID:	**CHER-WCW**
Strategy Type:	**New Groundwater Source**
Potential Supply Quantity:	**25 - 121 ac-ft/yr (varies) (0.02 - 0.11 MGD)**
Implementation Decade:	**2050**
Development Timeline:	**2050**
Project Capital Cost:	**$2,361,000 (September 2018)**
Annual Cost:	**$192,000**
Unit Water Cost (Rounded):	**$1,574 per ac-ft ($4.83 per 1,000 gallons)**

PROJECT DESCRIPTION

Wright City WSC is a municipal water user in Cherokee and Rusk Counties. This water user currently relies on groundwater in the Carrizo Wilcox aquifer in Cherokee County. Wright City has a small need starting in 2050 of approximately 25 ac-ft/yr, and increases to 121 ac-ft/yr in 2070. To meet this need, it is recommended that Wright City WSC continue to use supplies from Carrizo Wilcox by drilling additional wells. This strategy is a recommended strategy for Rusk in Cherokee 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 Cherokee County. The wells will provide approximately 122 ac-ft/yr and are assumed to have a depth of 800 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 the decades 2050 through 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 wells will provide sufficient ac-ft/yr to meet Rusk'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 mile of pipeline, two wells, a peaking factor of two, and a maximum well yield of 250 gpm for each well. This equates to $1,574 per acre-foot ($4.83 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $213 per acre-foot ($0.65 per 1,000 gallons). Overall, this strategy has a medium cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WUG: Cherokee County – Wright City WSC
STRATEGY: New wells - Carrizo Aquifer Wells

Supply	122	Ac-ft/yr	62	gpm
Well Depth	800	ft		
Wells Needed	2			

CAPITAL COSTS	
Transmission Pipeline (6 in dia., 1 miles)	$134,000
Primary Pump Stations (0.2 MGD)	$399,000
Well Fields (Wells, Pumps, and Piping)	$1,113,000
TOTAL COST OF FACILITIES	**$1,646,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$569,000
Environmental & Archaeology Studies and Mitigation	$54,000
Land Acquisition and Surveying (6 acres)	$28,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$64,000
TOTAL COST OF PROJECT	**$2,361,000**
ANNUAL COSTS	
Debt Service (3.5 percent, 20 years)	$166,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$12,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$10,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (55507 kW-hr @ 0.08 $/kW-hr)	$4,000
Purchase of Water (ac-ft/yr @ $/ac-ft)	$0
TOTAL ANNUAL COST	**$192,000**
Available Project Yield (ac-ft/yr)	122
Annual Cost of Water ($ per ac-ft), based on PF=1.2	$1,574
Annual Cost of Water After Debt Service ($ per ac-ft), based on PF=1.2	$213
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.2	$4.83
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.2	$0.65

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. Developing new wells in Carrizo Wilcox 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 County Wright City WSC WUG recommended strategy to develop new wells in Carrizo Wilcox was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 121 ac-ft/yr
Reliability	4	Medium to High
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	3	Sponsor identified; commitment level uncertain. Local sponsorship by Wright City WSC
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with the East Texas Regional Water Planning Group (Region I).

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 6. CHEROKEE MINING

Water User Group Name:	**Cherokee - Mining**
Strategy Name:	**Purchase from Angelina Neches River Authority (Neches Run of River, Mud Creek)**
Strategy ID:	**CHER-MIN**
Strategy Type:	**Existing Surface Water Source**
Potential Supply Quantity:	**40 - 247 ac-ft/yr (varies) (0.03 - 0.22 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**2030**
Project Capital Cost:	**$7,013,000 (September 2018)**
Annual Cost:	**$853,000**
Unit Water Cost (Rounded):	**$3,453 per ac-ft ($10.60 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 Mud Creek as their permit allows. The cost for supply from the Neches 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 Neches River using the Texas Commission on Environmental Quality (TCEQ) Water Availability Models. However, this strategy is dependent on sales with the Angelina Neches River Authority and their application for 30,000 ac-ft/yr from the Neches River (Strategy ID: ANGL-ROR). The quantity of supply from this strategy represents a contract of 247 ac-ft/yr, beginning in 2030, and decreases to 40 ac-ft/yr, 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 Neches 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 cost compared to other strategies in the 2021 East Texas Regional Water Plan due to the length of pipeline required.

WUG	Cherokee Mining		
STRATEGY:	Purchase from ANRA		
Quantity:	247	AF/Y	0.33 MGD

CAPITAL COSTS

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	6 in.	36,960	LF	$25	$939,000
Right of Way Easements Rural (ROW)		36,960	LF	$18	$675,000
Land and Surveying (10%)					$68,000
Engineering and Contingencies (30%)					$282,000
Subtotal of Pipeline	**7**	**miles**			**$1,964,000**
Pump Station(s)					
Pump with intake	23 HP	1	LS	$3,048,869	$3,049,000
Engineering and Contingencies (35%)					$1,067,000
Subtotal of Pump Station(s)					**$4,116,000**
Storage Tank(s)					
Storage Tank	0.20 MG	1	LS	$470,060	$470,000
Engineering and Contingencies (35%)					$164,500
Subtotal of Storage Tank(s)					**$634,500**
Permitting and Mitigation					$203,000
Construction Total					**$6,918,000**
Interest During Construction			6	Months	$95,000
TOTAL COST					**$7,013,000**

ANNUAL COSTS

Debt Service (3.5% for 20 years)	$493,000
Operational Costs*	$360,000
TOTAL ANNUAL COST	**$853,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot of treated water	$3,453
Per 1,000 Gallons	$10.60

UNIT COSTS (After Amortization)

Per Acre-Foot	$1,457
Per 1,000 Gallons	$4.47

* 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

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 Neches 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 247 ac-ft/yr
Reliability	4	Medium to High
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	3	Sponsor(s) identified; commitment level uncertain
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with Angelina Neches River Authority.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 7. HENDERSON EDOM WSC

Water User Group Name:	**Henderson County – EDOM WSC**
Strategy Name:	**New wells in Carrizo-Wilcox Aquifer**
Strategy ID:	**HDSN- EDOM**
Strategy Type:	**New Groundwater Source**
Potential Supply Quantity:	**2 - 9 ac-ft/yr (varies) (0.002 - 0.01 MGD)**
Implementation Decade:	**2020**
Development Timeline:	**2020**
Project Capital Cost:	**$1,088,000 (September 2018)**
Annual Cost:	**$136,000**
Unit Water Cost (Rounded):	**$2,125 per ac-ft ($6.52 per 1,000 gallons)**

PROJECT DESCRIPTION

Edom WSC provides water service in Van Zandt and Henderson Counties. The WUG population is projected to be 1,395 by 2020 and increases to 2,025 by 2070. Edom WSC supplies its customers with groundwater from the Carrizo-Wilcox aquifer with water wells in Van Zandt County. Edom WSC is projected to have a total deficit of 13 ac-ft/yr in 2020 and increasing to a deficit of 64 ac-ft/yr by 2070; the shortage projected to occur in Van Zandt County is 11 ac-ft/yr in 2020 increasing to 55 ac-ft/yr by 2070. The shortage in Henderson County is 2 ac-ft/yr in 2020, increasing to 9 ac-ft/yr in 2070.

SUPPLY DEVELOPMENT

There are sufficient supplies available in the Henderson County Carrizo Wilcox to develop the supply needed for this water management strategy. It is assumed that the wells will provide sufficient ac-ft/yr to meet Edom WSC's needs in Henderson 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 Henderson 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 cost includes wells, pumps, and piping. This equates to $2,125 per acre-foot ($6.52 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $922 per acre-foot ($2.83 per 1,000 gallons). Overall, this strategy has a medium cost compared to other strategies in the 2021 East Texas Regional

Water Plan.

WUG: Henderson County – EDOM WSC
WMS: New wells in Carrizo-Wilcox Aquifer

	Supply	64	Ac-ft/yr
	Well Depth	560	

CAPITOL COSTS	
Well Fields (Wells, Pumps, and Piping)	$715,000
Water Treatment Plant (0.2 MGD)	$28,000
TOTAL COST OF FACILITIES	**$743,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$260,000
Environmental & Archaeology Studies and Mitigation	$36,000
Land Acquisition and Surveying (3 acres)	$19,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$30,000
TOTAL COST OF PROJECT	**$1,088,000**
ANNUAL COSTS	
Debt Service (3.5 percent, 20 years)	$77,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$7,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$17,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (41446 kW-hr @ 0.08 $/kW-hr)	$3,000
Purchase of Water (64 ac-ft/yr @ 500 $/ac-ft)	$32,000
TOTAL ANNUAL COST	**$136,000**
Available Project Yield (ac-ft/yr)	64
Annual Cost of Water ($ per ac-ft), based on PF=1	$2,125
Annual Cost of Water After Debt Service ($ per ac-ft), based on PF=1	$922
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$6.52
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$2.83

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 Edom WSC recommended strategy to develop new Groundwater wells was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 9 ac-ft/yr
Reliability	4	Medium to High
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	3	Sponsor identified; commitment level uncertain. Local sponsorship by Edom WSC
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with Region D.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 8. HENDERSON CHANDLER

Water User Group Name:	**Henderson County – City of Chandler**
Strategy Name:	**New wells in Carrizo-Wilcox Aquifer**
Strategy ID:	**HDSN-CHN**
Strategy Type:	**New Groundwater Source**
Potential Supply Quantity:	**101 ac-ft/yr (0.1 MGD)**
Implementation Decade:	**2070**
Development Timeline:	**2070**
Project Capital Cost:	**$1,397,000 (September 2018)**
Annual Cost:	**$113,000**
Unit Water Cost (Rounded):	**$1,119 per ac-ft ($3.43 per 1,000 gallons)**

PROJECT DESCRIPTION

The City of Chandler is a municipal water user in Henderson County. The City currently relies on groundwater in the Carrizo Wilcox aquifer in Henderson County. The City has a small need starting in 2070 of approximately 118 ac-ft/yr. To meet this need, it is recommended that the City of Chandler continue to use supplies from Carrizo Wilcox by drilling additional wells. This strategy is a recommended strategy for the City of Chandler in Henderson 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 Henderson County. The wells will provide approximately 101 ac-ft/yr and are assumed to have a depth of 700 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 the decade of 2070. Currently, all of the existing needs are being met by supplies from the Carrizo Wilcox aquifer. There are sufficient supplies available in the Henderson County Carrizo Wilcox to develop the supply needed for this water management strategy. It is assumed that the wells along with municipal conservation will provide sufficient ac-ft/yr to meet the City's needs in Henderson County. 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 Henderson 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 mile of pipeline, two wells, a peaking factor of two, and a maximum well yield of 100 gpm for each well. This equates to $1,119 per acre-foot ($3.43 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $149 per acre-foot ($0.46 per 1,000 gallons). Overall, this strategy has a medium cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WUG: Henderson County – City of Chandler
WMS: New wells in Carrizo-Wilcox Aquifer

Supply	101	Ac-ft/yr	63	gpm
Well Depth	700			
Wells Needed	2			

CAPITAL COSTS	
Transmission Pipeline (6 in dia., 1 miles)	$134,000
Primary Pump Stations (0.1 MGD)	$180,000
Well Fields (Wells, Pumps, and Piping)	$637,000
TOTAL COST OF FACILITIES	**$951,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$326,000
Environmental & Archaeology Studies and Mitigation	$54,000
Land Acquisition and Surveying (6 acres)	$28,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$38,000
TOTAL COST OF PROJECT	**$1,397,000**
ANNUAL COSTS	
Debt Service (3.5 percent, 20 years)	$98,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$8,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$4,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (32509 kW-hr @ 0.08 $/kW-hr)	$3,000
Purchase of Water (ac-ft/yr @ $/ac-ft)	$0
TOTAL ANNUAL COST	**$113,000**
Available Project Yield (ac-ft/yr)	101
Annual Cost of Water ($ per ac-ft), based on PF=1	$1,119
Annual Cost of Water After Debt Service ($ per ac-ft), based on PF=1	$149
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$3.43
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.46

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 develop new wells

in Carrizo Wilcox was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 101 ac-ft/yr
Reliability	4	Medium to High
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	3	Sponsor identified; commitment level uncertain. Local sponsorship by City of Chandler
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with the East Texas Regional Water Planning Group (Region I).

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 9. HENDERSON MOORE STATION WSC

Water User Group Name:	**Henderson County – Moore Station WSC**
Strategy Name:	**New wells in Carrizo-Wilcox Aquifer**
Strategy ID:	**HDSN-MSW**
Strategy Type:	**New Groundwater Source**
Potential Supply Quantity:	**38 - 111 ac-ft/yr (varies) (0.03 - 0.1 MGD)**
Implementation Decade:	**2060**
Development Timeline:	**2060**
Project Capital Cost:	**$1,417,000 (September 2018)**
Annual Cost:	**$116,000**
Unit Water Cost (Rounded):	**$1,045 per ac-ft ($3.21 per 1,000 gallons)**

PROJECT DESCRIPTION

Moore Station WSC is a municipal water user in Henderson County. Moore Station WSC currently relies on groundwater in the Carrizo Wilcox aquifer in Henderson County. This water user has a small need starting in 2060 of approximately 38 ac-ft/yr, and increases to 111 ac-ft/yr beginning in 2070. To meet this need, it is recommended that Moore Station WSC continue to use supplies from Carrizo Wilcox by drilling additional wells. This strategy is a recommended strategy for Moore Station WSC in Henderson 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 Henderson County. The wells will provide approximately 111 ac-ft/yr and are assumed to have a depth of 700 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 2060 through 2070. Currently, all of the existing needs are being met by supplies from the Carrizo Wilcox aquifer. There are sufficient supplies available in the Henderson County Carrizo Wilcox to develop the supply needed for this water management strategy. It is assumed that the wells will provide sufficient ac-ft/yr to meet the City's needs in Henderson County. 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 Henderson 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 mile of pipeline, two wells, a peaking factor of two, and a maximum well yield of 100 gpm for each well. This equates to $1,045 per acre-foot ($3.21 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $144 per acre-foot ($0.44 per 1,000 gallons). Overall, this strategy has a medium cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WUG: Henderson County – Moore Station WSC
WMS: New wells in Carrizo-Wilcox Aquifer

Supply	111	Ac-ft/yr	69	gpm
Well Depth	700			
Wells Needed	2			

CAPITAL COSTS	
Transmission Pipeline (6 in dia., 1 miles)	$134,000
Primary Pump Stations (0.1 MGD)	$195,000
Well Fields (Wells, Pumps, and Piping)	$637,000
TOTAL COST OF FACILITIES	**$966,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$331,000
Environmental & Archaeology Studies and Mitigation	$54,000
Land Acquisition and Surveying (6 acres)	$28,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$38,000
TOTAL COST OF PROJECT	**$1,417,000**
ANNUAL COSTS	
Debt Service (3.5 percent, 20 years)	$100,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$8,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$5,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (35811 kW-hr @ 0.08 $/kW-hr)	$3,000
Purchase of Water (ac-ft/yr @ $/ac-ft)	$0
TOTAL ANNUAL COST	**$116,000**
Available Project Yield (ac-ft/yr)	111
Annual Cost of Water ($ per ac-ft), based on PF=1	$1,045
Annual Cost of Water After Debt Service ($ per ac-ft), based on PF=1	$144
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$3.21
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.44

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 Moore Station WSC recommended strategy to develop new

groundwater wells was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 111 ac-ft/yr
Reliability	4	Medium to High
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	3	Sponsor identified; commitment level uncertain. Local sponsorship by Moore Station WSC
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with the East Texas Regional Water Planning Group (Region I).

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 10. HENDERSON MINING

Water User Group Name:	**Henderson County – Mining**
Strategy Name:	**New wells in Carrizo-Wilcox Aquifer**
Strategy ID:	**HDSN-MIN**
Strategy Type:	**New Groundwater Source**
Potential Supply Quantity:	**10 - 19 ac-ft/yr (varies) (0.01 - 0.02 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**2030**
Project Capital Cost:	**$201,000 (September 2018)**
Annual Cost:	**$15,000**
Unit Water Cost (Rounded):	**$789 per ac-ft ($2.42 per 1,000 gallons)**

PROJECT DESCRIPTION

Mining users in Henderson County show a projected need in the early decades of the planning cycle. To meet this need, it is recommended that mining users utilize additional supplies from Carrizo Wilcox by drilling additional wells. This strategy is a recommended strategy for mining users in Henderson 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 Henderson County. The wells will provide approximately 19 ac-ft/yr and are assumed to have a depth of 200 feet. A peaking factor of two was assumed for the wells.

SUPPLY DEVELOPMENT

The supply is required only in the early part of the planning cycle, for decades 2020 through 2040. Currently, all of the existing needs are being met by supplies from the Carrizo Wilcox aquifer. However, because this project will likely not be online before January 2023, it must be given an online decade of 2030. There are sufficient supplies available in the Henderson County Carrizo Wilcox to develop the supply needed for this water management strategy. It is assumed that the wells will provide sufficient ac-ft/yr to meet the City's needs in Henderson County. 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 Henderson 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 wells, a peaking factor of two, and a maximum well yield of 50 gpm for each well. This equates to $789 per acre-foot ($2.42 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $53 per acre-foot ($0.16 per 1,000 gallons). Overall, this strategy has a low cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WUG: Henderson County – Mining
WMS: New wells in Carrizo-Wilcox Aquifer

Supply	19	Ac-ft/yr	12	gpm
Well Depth	200			
Wells Needed	2			

CAPITAL COSTS	
Well Fields (Wells, Pumps, and Piping)	$135,000
TOTAL COST OF FACILITIES	**$135,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$47,000
Environmental & Archaeology Studies and Mitigation	$8,000
Land Acquisition and Surveying (1 acres)	$5,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$6,000
TOTAL COST OF PROJECT	**$201,000**
ANNUAL COSTS	
Debt Service (3.5 percent, 20 years)	$14,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (5038 kW-hr @ 0.08 $/kW-hr)	$0
Purchase of Water (ac-ft/yr @ $/ac-ft)	$0
TOTAL ANNUAL COST	**$15,000**
Available Project Yield (ac-ft/yr)	19
Annual Cost of Water ($ per ac-ft), based on PF=1	$789
Annual Cost of Water After Debt Service ($ per ac-ft), based on PF=1	$53
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$2.42
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.16

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 Henderson County Mining recommended strategy to develop new groundwater wells was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 19 ac-ft/yr
Reliability	4	Medium to High
Cost	3	Medium Cost
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	1	No sponsor readily identifiable
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with the East Texas Regional Water Planning Group (Region I).

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 11. HOUSTON LIVESTOCK

Water User Group Name:	**Houston - Livestock**
Strategy Name:	**New wells in Yegua-Jackson**
Strategy ID:	**HOUS-LTK**
Strategy Type:	**New Groundwater Source**
Potential Supply Quantity:	**201 ac-ft/yr (0.2 MGD)**
Implementation Decade:	**2070**
Development Timeline:	**2070**
Project Capital Cost:	**$399,000 (September 2018)**
Annual Cost:	**$39,000**
Unit Water Cost (Rounded):	**$194 per ac-ft ($0.60 per 1,000 gallons)**

PROJECT DESCRIPTION

This strategy is a recommended strategy for Livestock in Houston County and involves the development of four 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 201 ac-ft/yr and are assumed to have a depth of 200 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 50 ac-ft/yr to meet livestock demands in Houston County providing a total strategy yield of 201 ac-ft/yr beginning in 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 four wells, a peaking factor of two, and a maximum well yield of 50 gpm for each well. This equates to $194 per acre-foot ($0.60 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $55 per acre-foot ($0.17 per 1,000 gallons). Overall, this strategy has a low cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WUG: Houston County - Livestock
Strategy: New wells - Yegua-Jackson

Supply	201	Ac-ft/yr	125	gpm
Well Depth	200			
Wells Needed	4			

CAPITAL COSTS	
Well Fields (Wells, Pumps, and Piping)	$270,000
TOTAL COST OF FACILITIES	**$270,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$94,000
Environmental & Archaeology Studies and Mitigation	$15,000
Land Acquisition and Surveying (2 acres)	$9,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$11,000
TOTAL COST OF PROJECT	**$399,000**
ANNUAL COSTS	
Debt Service (3.5 percent, 20 years)	$28,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$3,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (100751 kW-hr @ 0.08 $/kW-hr)	$8,000
Purchase of Water (ac-ft/yr @ $/ac-ft)	$0
TOTAL ANNUAL COST	**$39,000**
Available Project Yield (ac-ft/yr)	201
Annual Cost of Water ($ per ac-ft), based on PF=1	$194
Annual Cost of Water After Debt Service ($ per ac-ft), based on PF=1	$55
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$0.60
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.17

PROJECT EVALUATION

This strategy benefits livestock 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 livestock use was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 201 ac-ft/yr
Reliability	4	Medium to High
Cost	4	$0 to $500/ac-ft (Low)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	5	High Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	1	No sponsor readily identifiable
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with the East Texas Regional Water Planning Group (Region I).

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 12. JASPER LIVESTOCK

Water User Group Name:	**Jasper - Livestock**
Strategy Name:	**Purchase from Lower Neches Valley Authority (Sam Rayburn)**
Strategy ID:	**JASP-LTK**
Strategy Type:	**Existing Surface Water Source**
Potential Supply Quantity:	**8,932 ac-ft/yr (8 MGD)**
Implementation Decade:	**2020**
Development Timeline:	**2020**
Project Capital Cost:	**$0 (September 2018)**
Annual Cost:	**$2,911,000**
Unit Water Cost (Rounded):	**$326 per ac-ft ($1.00 per 1,000 gallons)**

PROJECT DESCRIPTION

Livestock water demands are projected to be 10,000 ac-ft/yr from 2020 to 2070. Current supplies for Livestock in Jasper County include groundwater from the Gulf Coast aquifer and local surface water supplies; however, these supplies are not sufficient to meet this relatively large demand and needs are shown to be nearly 9,000 ac-ft/yr throughout the planning horizon (2020 to 2070). It is recommended that any large-scale livestock user should obtain surface water from the Sam Rayburn Reservoir through a contract with Lower Neches Valley Authority. This strategy is a recommended strategy for livestock users in Jasper County and involves a contract between livestock water users and the Lower Neches Valley Authority for raw water from the Sam Rayburn Reservoir, as their permit allows. The only cost for supply from the Sam Rayburn Reservoir includes the contractual cost of raw water. 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 Livestock in Jasper 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 8,932 ac-ft/yr, beginning in 2020, and continuing at this volume through 2070. The reliability of this water supply is considered high due to the availability of water projected in the Sam Rayburn Reservoir using the Texas Commission on Environmental Quality (TCEQ) 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 2021 East Texas Regional Water Plan.

ENVIRONMENTAL CONSIDERATIONS

There are not any significant environmental considerations associated with this strategy. A contract between livestock users 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 to the Sam Rayburn Reservoir.

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 2021 East Texas Regional Water Plan.

WUG	**Jasper County - Livestock**				
STRATEGY:	**Purchase from LNVA (Sam Rayburn)**				
Raw Water Quantity:	**8,932**	AF/Y		12.0 MGD	
ANNUAL CONTRACT COSTS		**Size**	**Quantity**	**Unit**	**Cost**
Operational Costs*			2,911,000	1000 gal	$2,911,000
ANNUAL COSTS					
TOTAL ANNUAL COST					**$2,911,000**
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 livestock 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.

Based on the analyses provided above, the Jasper County Livestock 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 8,932 ac-ft/yr
Reliability	4	Medium to High
Cost	4	$0 to $500/ac-ft (Low)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	5	High Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	1	No sponsor readily identifiable
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with the East Texas Regional Water Planning Group (Region I).

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 13. 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:	**855 - 1,950 ac-ft/yr (0.8 - 1.7 MGD)**
Implementation Decade:	**2060**
Development Timeline:	**2060**
Project Capital Cost:	**$21,665,000 (September 2018)**
Annual Cost:	**$2,402,000**
Unit Water Cost (Rounded):	**$1,232 per ac-ft ($3.78 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 855 ac-ft/yr, beginning in 2060, and increases over time to 1,950 ac-ft/yr, 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 Commission on Environmental Quality (TCEQ) 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 2021 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 cost compared to other strategies in the 2021 East Texas Regional Water Plan due to the length of pipeline required.

WUG **Jefferson County-Other**
STRATEGY: **Purchase from Lower Neches Valley Authority (Sam Rayburn)**
Raw Water Quantity: **1,950** AF/Y 2.6 MGD

CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	18 in.	63,360	LF	$135	$8,562,000
Right of Way Easements Rural (ROW)		63,360	LF	$30	$2,092,530
Engineering and Contingencies (30%)					$2,569,000
Pump Station(s)					
Pump with intake	57 HP	1	LS	$3,614,000	$3,614,000
Booster Pump Station	57 HP	1	LS	$930,000	$930,000
Engineering and Contingencies (35%)					$1,590,400
Subtotal of Pump Station(s)					**$6,134,400**
Storage Tank(s)					
Storage Tank	1.7 MG	1	LS	$1,036,300	$1,036,300
Engineering and Contingencies (35%)					$362,705
Subtotal of Storage Tank(s)					**$1,399,005**
Permitting and Mitigation					$328,000
Construction Total					**$21,084,935**
Interest During Construction			12	Months	$580,000
TOTAL CAPITAL COST					**$21,665,000**

ANNUAL COSTS	
Debt Service (3.5% for 20 years)	$1,524,000
Operational Costs*	$878,000
TOTAL ANNUAL COST	**$2,402,000**

UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$1,232
Per 1,000 Gallons	$3.78

UNIT COSTS (After Amortization)	
Per Acre-Foot	$450
Per 1,000 Gallons	$1.38

WUG **Jefferson County-Other**

* 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 1,950 ac-ft/yr
Reliability	4	Medium to High
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	1	No sponsor readily identifiable
Implementation Issues	4	Low Implementation Issues

REFERENCES

2016 East Texas Regional Water Plan.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 14. 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:	**143,446 - 143,513 ac-ft/yr (varies) (126.08 - 128.14 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**2030**
Project Capital Cost:	**$279,210,000 (September 2018)**
Annual Cost:	**$69,673,000**
Unit Water Cost (Rounded):	**$485 per ac-ft ($1.49 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 is from 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/yr beginning in 2020; this supply increases through 2070. The strategy recommended for Jefferson Manufacturing is equal to the need projected for this entity during the planning period (2030-2070). The contract required for this strategy increases their supply by 143,513 ac-ft/yr beginning in 2030 continuing until 2070. Of this total supply, it is estimated that Manufacturing entities have the current infrastructure in place to accept 93,513 ac-ft/yr of additional water without constructing additional infrastructure. However, it is estimated that the manufacturing entities in Jefferson County will need to construct additional treatment and distribution infrastructure to access the other 50,000 ac-ft/yr to be supplied by LNVA. The cost estimate provided for this strategy represents the total cost of individual projects required by manufacturing entities throughout Jefferson County to access the additional 50,000 ac-ft/yr, though it is shown below as a single project. 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 high cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WUG	**Jefferson County - Manufacturing**		
STRATEGY:	**Purchase from Lower Neches Valley Authority (Sam Rayburn)**		
Infrastructure Quantity:	**50,000** AF/Y	67 MGD	
Purchased Water Quantity:	**93,513** AF/Y		

CAPITAL COSTS

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	84 in.	89,760	2	$867	$155,604,000
Right of Way Easements Rural (ROW)		89,760	LF	$30	$2,695,000
Land and Surveying (10%)					$270,000
Engineering and Contingencies (30%)					$46,681,000
Subtotal of Pipeline	**17**	**miles**			**$205,250,000**
Pump Station(s)					
Pump with intake	1585 HP	1	LS	$28,726,000	$28,726,000
Booster Pump Station	1858 HP	1	LS	$9,403,000	$9,403,000
Engineering and Contingencies (35%)					$13,345,000
Subtotal of Pump Station(s)					**$51,474,000**
Storage Tank(s)					
Storage Tank	1.4 MG	6	LS	$920,702	$5,524,000
Engineering and Contingencies (35%)					$1,933,000
Subtotal of Storage Tank(s)					**$7,457,000**
Permitting and Mitigation					$473,000
Construction Total					**$264,654,000**
Interest During Construction			24	Months	$14,556,000
TOTAL CAPITAL COST					**$279,210,000**

ANNUAL COSTS

Debt Service (3.5% for 20 years)	$19,646,000
Operational Costs*	$50,027,000
TOTAL ANNUAL COST	**$69,673,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot of treated water	$485
Per 1,000 Gallons	$1.49

UNIT COSTS (After Amortization)

Per Acre-Foot	$349
Per 1,000 Gallons	$1.07

WUG **Jefferson County - Manufacturing**

* 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 143,513 ac-ft/yr
Reliability	4	Medium to High
Cost	3	$500 to $1,000/ac-ft (Medium)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	1	No sponsor readily identifiable
Implementation Issues	4	Low Implementation Issues

REFERENCES

2016 East Texas Regional Water Plan.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 15. 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:	**2,391 ac-ft/yr (2.13 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**2030**
Project Capital Cost:	**$32,302,000 (September 2018)**
Annual Cost:	**$3,464,000**
Unit Water Cost (Rounded):	**$1,449 per ac-ft ($4.45 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 (2030-2070). The quantity of supply from this strategy represents a contract of 2,391 ac-ft/yr, beginning in 2030, and remains constant over time to 2070. The reliability of this water supply is considered high due to the availability of water projected in Sam Rayburn using the Texas Commission on Environmental Quality (TCEQ) 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 2021 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 cost compared to other strategies in the 2021 East Texas Regional Water Plan due to the length of pipeline required.

WUG:	**Jefferson County - Steam Electric Power**				
STRATEGY:	**Purchase from Lower Neches Valley Authority**				
Raw Water Quantity:	**2,391** AF/Y			3.20 MGD	
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	16 in.	89,760	LF	$118	$10,562,000
Right of Way Easements Rural (ROW)		89,760	LF	$30	$2,695,000
Land and Surveying (10%)					$269,500
Engineering and Contingencies (30%)					$3,169,000
Subtotal of Pipeline	**17**	**miles**			**$16,695,500**
Pump Station(s)					
Pump with intake	296 HP	1	LS	$7,542,000	$7,542,000
Booster Pump Station	296 HP	1	LS	$1,875,000	$1,875,000
Engineering and Contingencies (35%)					$3,295,950
Subtotal of Pump Station(s)					**$12,712,950**
Storage Tank(s)					
Storage Tank	0.4 MG	1	LS	$545,540	$545,540
Engineering and Contingencies (35%)					$190,939
Subtotal of Storage Tank(s)					**$736,479**
Permitting and Mitigation					$473,000
Construction Total					**$30,618,000**
Interest During Construction			24	Months	$1,684,000
TOTAL CAPITAL COST					**$32,302,000**
ANNUAL COSTS					
Debt Service (3.5% for 20 years)					$2,273,000
Operational Costs*					$1,191,000
TOTAL ANNUAL COST					**$3,464,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$1,449
Per 1,000 Gallons					$4.45
UNIT COSTS (After Amortization)					
Per Acre-Foot					$526
Per 1,000 Gallons					$1.61

* 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 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 Steam Electric Power 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 2,391 ac-ft/yr
Reliability	4	Medium to High
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	1	No sponsor readily identifiable
Implementation Issues	4	Low Implementation Issues

REFERENCES

2016 East Texas Regional Water Plan.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 16. NACOGDOCHES COUNTY-OTHER

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/yr (1.5 mgd)**
Implementation Decade:	**2030**
Development Timeline:	**2030**
Project Capital Cost:	**$42,117,000 (September 2018)**
Annual Cost:	**$5,363,000**
Unit Water Cost (Rounded):	**$3,155 per ac-ft ($9.68 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 acre-feet 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/yr. 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 $9.68 per 1,000 gallons during amortization. After amortization, costs will decrease to $4.41 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.

COST ANALYSIS

Detailed cost estimates for this strategy are 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 2021 East Texas Regional Water Plan.

WUG:	**Nacogdoches County-Other**		
WMS:	**Lake Naconiche Regional Water System - Phase 1**		
AMOUNT (ac-ft/yr):	**1,700**	1.5 MGD	3.0 MGD

CAPITAL COSTS

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline		147,840		Varies	$9,153,000
Right of Way Easements Rural (ROW)		147,840	LF	$30	$4,883,000
Engineering and Contingencies (30%)					$2,746,000
Subtotal of Pipeline					**$16,782,000**
Pump Station(s)					
Pump Station	200 HP	1	LS	$1,281,000	$1,281,000
Lake Intake	200 HP	1	LS		$500,000
Engineering and Contingencies (35%)					$623,000
Subtotal of Pump Station(s)					**$2,404,000**
Storage Tank(s)					
Storage Tank	0.38 MG	1	LS	$538,000	$538,000
Engineering and Contingencies (35%)					$188,000
Subtotal of Storage Tank(s)					**$726,000**
Water Treatment Plant					
Water Treatment Plant	3.0 MGD	1	LS	$13,912,000	$13,912,000
Engineering and Contingencies (35%)					$4,869,000
Subtotal of Pump Station(s)					**$18,781,000**
Permitting and Mitigation - infrastructure					$754,000
Construction Total					**$39,447,000**
Water rights Permitting					$500,000
Interest During Construction			24	Months	$2,170,000
TOTAL COST					**$42,117,000**

ANNUAL COSTS	
Debt Service (3.5% for 20 years)	$2,963,000
Operational Costs*	$2,400,000
TOTAL ANNUAL COST	**$5,363,000**

UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$3,155
Per 1,000 Gallons	$9.68

UNIT COSTS (After Amortization)	
Per Acre-Foot	$1,436
Per 1,000 Gallons	$4.41

* 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 the 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 1,700 ac-ft/yr
Reliability	4	Medium to High
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	1	No sponsor readily identifiable
Implementation Issues	4	Low Implementation Issues

REFERENCES

2016 East Texas Regional Plan.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 17. 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:	**32 - 374 ac-ft/yr (varies) (0.03 - 0.33 MGD)**
Implementation Decade:	**2040**
Development Timeline:	**2040**
Project Capital Cost:	**$4,567,000 (September 2018)**
Annual Cost:	**$373,000**
Unit Water Cost (Rounded):	**$997 per ac-ft ($3.06 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 2040 and the maximum need is approximately 374 ac-ft/yr. 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/yr and are assumed to have a 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 2040 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 provide 200 ac-ft/yr 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 ten miles of pipeline, two wells, a peaking factor of two, and a maximum well yield of 250 gpm for each well. This equates to $997 per acre-foot ($3.06 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $139 per acre-foot ($0.43 per 1,000 gallons). Overall, this strategy has a medium cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WUG: Nacogdoches County - D & M WSC
WMS: New wells in Carrizo-Wilcox Aquifer

Supply	374	Ac-ft/yr	232	gpm
Well Depth	600			
Wells Needed	2			

CAPITAL COSTS	
Transmission Pipeline (6 in dia., 10 miles)	$1,339,000
Primary Pump Stations (0.2 MGD)	$819,000
Well Fields (Wells, Pumps, and Piping)	$956,000
TOTAL COST OF FACILITIES	**$3,114,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,023,000
Environmental & Archaeology Studies and Mitigation	$279,000
Land Acquisition and Surveying (6 acres)	$28,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$123,000
TOTAL COST OF PROJECT	**$4,567,000**
ANNUAL COSTS	
Debt Service (3.5 percent, 20 years)	$321,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$23,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$20,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (115018 kW-hr @ 0.08 $/kW-hr)	$9,000
Purchase of Water (ac-ft/yr @ $/ac-ft)	$0
TOTAL ANNUAL COST	**$373,000**
Available Project Yield (ac-ft/yr)	374
Annual Cost of Water ($ per ac-ft), based on PF=1.2	$997
Annual Cost of Water After Debt Service ($ per ac-ft), based on PF=1.2	$139
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.2	$3.06
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.2	$0.43

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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 374 ac-ft/yr
Reliability	4	Medium to High
Cost	3	$500 to $1,000/ac-ft (Medium)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	2	Sponsor identifiable, but uncommitted
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with the East Texas Regional Water Planning Group (Region I).

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 18. 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:	**6,399 - 9,113 ac-ft/yr (varies) (5.71 - 8.1 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**2030**
Project Capital Cost:	**$26,677,000 (September 2018)**
Annual Cost:	**$2,695,000**
Unit Water Cost (Rounded):	**$296 per ac-ft ($0.91 per 1,000 gallons)**

PROJECT DESCRIPTION

This strategy is a recommended strategy for livestock users in Nacogdoches County and involves the development of 27 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 9,100 ac-ft/yr and are assumed to have a depth of 500 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 340 ac-ft/yr 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, 27 wells, a peaking factor of two, and a maximum well yield of 250 gpm for each well. This equates to $296 per acre-foot ($0.91 per 1,000 gallons); after the infrastructure is fully

paid (30 years), the cost drops to $90 per acre-foot ($0.28 per 1,000 gallons). Overall, this strategy has a medium cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WUG: Nacogdoches County – Livestock
WMS: New wells in Carrizo-Wilcox Aquifer

Supply	9,113	Ac-ft/yr	5,650	Gpm
Well Depth	500			
Wells Needed	27			

CAPITAL COSTS	
Transmission Pipeline (24 in dia., 10 miles)	$8,112,000
Primary Pump Stations (9.8 MGD)	$3,406,000
Well Fields (Wells, Pumps, and Piping)	$7,670,000
TOTAL COST OF FACILITIES	**$19,188,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$6,311,000
Environmental & Archaeology Studies and Mitigation	$376,000
Land Acquisition and Surveying (19 acres)	$88,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$714,000
TOTAL COST OF PROJECT	**$26,677,000**
ANNUAL COSTS	
Debt Service (3.5 percent, 20 years)	$1,877,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$158,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$85,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (7182267 kW-hr @ 0.08 $/kW-hr)	$575,000
Purchase of Water (ac-ft/yr @ $/ac-ft)	$0
TOTAL ANNUAL COST	**$2,695,000**
Available Project Yield (ac-ft/yr)	9,113
Annual Cost of Water ($ per ac-ft), based on PF=1.2	$296
Annual Cost of Water After Debt Service ($ per ac-ft), based on PF=1.2	$90
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.2	$0.91
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.2	$0.28

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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 9,113 ac-ft/yr
Reliability	4	Medium to High
Cost	4	$0 to $500/ac-ft (Low)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	5	High Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	1	No sponsor readily identifiable
Implementation Issues	4	Low Implementation Issues

REFERENCES

2016 East Texas Regional Plan.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 19. NACOGDOCHES MINING

Water User Group Name:	**Nacogdoches County - Mining**
Strategy Name:	**Purchase from Angelina Neches River Authority (Neches Run of River, Mud Creek)**
Strategy ID:	**NACW-MIN**
Strategy Type:	**New Surface Water Source**
Potential Supply Quantity:	**118 - 2,975 ac-ft/yr (varies) (0.15 - 2.66 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**2030**
Project Capital Cost:	**$14,557,000 (September 2018)**
Annual Cost:	**$4,159,000**
Unit Water Cost (Rounded):	**$1,398 per ac-ft ($4.29 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 Mud Creek 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 Neches River to the project location. The cost for supply from the Neches 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 Neches 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 Neches River using the Texas Commission on Environmental Quality (TCEQ) Water Availability Models. However, this strategy is dependent on sales with the Angelina Neches River Authority and their application for 30,000 ac-ft/yr from the Neches River (Strategy ID: ANRA-ROR). The quantity of supply from this strategy represents a contract of 2,975 ac-ft/yr, beginning in 2030 and decreases to 118 ac-ft/yr 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 6 miles of pipeline (approximate distance from the potential location for run-of-river diversions on Neches 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 2021 East Texas Regional Water Plan due to the length of pipeline required.

WUG:	**Nacogdoches County Mining**				
STRATEGY:	**Purchase from ANRA**				
Raw Water Quantity:	**2,975** AF/Y			5.31 MGD	
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	24 in.	31,680	LF	$154	$4,879,000
Right of Way Easements Rural (ROW)		31,680	LF	$18	$579,000
Land and Surveying (10%)					$58,000
Engineering and Contingencies (30%)					$1,464,000
Subtotal of Pipeline	**6**	**miles**			**$6,980,000**
Pump Station(s)					
Pump with intake	114 HP	1	LS	$4,547,000	$4,547,000
Engineering and Contingencies (35%)					$1,591,000
Subtotal of Pump Station(s)					**$6,138,000**
Storage Tank(s)					
Storage Tank	0.7 MG	1	LS	$645,025	$645,000
Engineering and Contingencies (35%)					$226,000
Subtotal of Storage Tank(s)					**$871,000**
Permitting and Mitigation					$178,000
Construction Total					**$14,167,000**
Interest During Construction			12	Months	$390,000
TOTAL CAPITAL COST					**$14,557,000**
ANNUAL COSTS					
Debt Service (3.5% for 20 years)					$1,024,000
Operational Costs*					$3,135,000
TOTAL ANNUAL COST					**$4,159,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot of treated water	$1,398
Per 1,000 Gallons	$4.29

UNIT COSTS (After Amortization)

Per Acre-Foot	$1,054
Per 1,000 Gallons	$3.23

* 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 Neches 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 2,975 ac-ft/yr
Reliability	3	Medium
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor(s) are identified and committed to the strategy
Implementation Issues	4	Low Implementation Issues

REFERENCES

2016 East Texas Regional Water Plan.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 20. 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:	**115 - 59 ac-ft/yr (0.1 - 0.05 MGD)**
Implementation Decade:	**2020**
Development Timeline:	**2020**
Project Capital Cost:	**$0 (September 2018)**
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/yr beginning in 2020 and decreases to 59 ac-ft/yr 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 low cost

compared to other strategies in the 2021 East Texas Regional Water Plan.

WUG NAME:	**Newton Mining**		
STRATEGY:	**Purchase from Sabine River Authority (Toledo Bend)**		
Raw Water Quantity:	**115** AF/Y	0.15 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 115 ac-ft/yr
Reliability	4	Medium to High
Cost	3	$500 to $1,000/ac-ft (Medium)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	1	No sponsor readily identifiable
Implementation Issues	4	Low Implementation Issues

REFERENCES

2016 East Texas Regional Water Plan.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 21. 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:	**526 ac-ft/yr (0.47 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**2030**
Project Capital Cost:	**$14,624,000 (September 2018)**
Annual Cost:	**$1,355,000**
Unit Water Cost (Rounded):	**$2,576 per ac-ft ($7.91 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 (2030-2070). The quantity of supply from this strategy represents a contract of 526 ac-ft/yr, beginning in 2030 and continuing to 2070. The reliability of this water supply is considered high due to the availability of water projected in the Sabine River using the Texas Commission on Environmental Quality (TCEQ) 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 2021 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 (0.1 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 medium cost compared to other strategies in the 2021 East Texas Regional Water Plan due to the length of pipeline required and the large supply volume.

WUG:	**Orange County – Irrigation**				
STRATEGY:	**Purchase from Sabine River Authority (Sabine River)**				
Raw Water Quantity:	**526** AF/Y			0.9 MGD	
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	10 in.	68,640	LF	$65	$4,481,000
Right of Way Easements Rural (ROW)		68,640	LF	$30	$2,060,900
Land and Surveying (10%)					$206,090
Engineering and Contingencies (30%)					$1,344,000
Subtotal of Pipeline	**13**	**miles**			**$8,091,990**
Pump Station(s)					
Pump with intake	20 HP	1	LS	$2,997,000	$2,997,000
Booster Pump Station	20 HP	1	LS	$837,000	$837,000
Engineering and Contingencies (35%)					$1,341,900
Subtotal of Pump Station(s)					**$5,175,900**
Storage Tank(s)					
Storage Tank	0.1 MG	1	LS	$438,839	$438,839
Engineering and Contingencies (35%)					$153,594
Subtotal of Storage Tank(s)					**$592,433**
Permitting and Mitigation					$373,000
Construction Total					**$14,233,000**
Interest During Construction			12	Months	$391,000
TOTAL CAPITAL COST					**$14,624,000**
ANNUAL COSTS					
Debt Service (3.5% for 20 years)					$1,029,000
Operational Costs*					$326,000
TOTAL ANNUAL COST					**$1,355,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$2,576
Per 1,000 Gallons					$7.91
UNIT COSTS (After Amortization)					
Per Acre-Foot					$639
Per 1,000 Gallons					$1.96

* 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 526 ac-ft/yr
Reliability	4	Medium to High
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	5	High Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	1	No sponsor readily identifiable
Implementation Issues	4	Low Implementation

REFERENCES

Discussions with the East Texas Regional Water Planning Group (Region I).

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 22. PANOLA LIVESTOCK

Water User Group Name:	**Panola County – Livestock**
Strategy Name:	**New wells in Carrizo-Wilcox Aquifer**
Strategy ID:	**PANL-LTK**
Strategy Type:	**New Groundwater Source**
Potential Supply Quantity:	**982 ac-ft/yr (0.88 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**2030**
Project Capital Cost:	**$1,172,000 (September 2018)**
Annual Cost:	**$122,000**
Unit Water Cost (Rounded):	**$124 per ac-ft ($0.38 per 1,000 gallons)**

PROJECT DESCRIPTION

This strategy is a recommended strategy for livestock users in Panola County and involves the development of four wells located within the Carrizo-Wilcox Aquifer as this aquifer has been identified as a potential source of water in Panola County. These wells will provide approximately 982 ac-ft/yr and are assumed to have a depth of 200 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 245 ac-ft/yr to meet livestock demands in Panola County providing a total strategy yield of 982 ac-ft/yr beginning in 2030. 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 2020 and continues throughout the planning period. However, this project will not be online before January 2023, so the online decade will be 2030. 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 Panola 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 wells, a peaking factor of two, and a maximum well yield of 275 gpm for each well. This equates to $124 per acre-foot ($0.38 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $40 per acre-foot ($0.12 per 1,000 gallons). Overall, this strategy has a low cost

compared to other strategies in the 2021 East Texas Regional Water Plan.

WUG: Panola County – Livestock
WMS: New wells in Carrizo-Wilcox Aquifer

Supply	982	Ac-ft/yr	609	gpm
Well Depth	200			
Wells Needed	4			

CAPITAL COSTS	
Well Fields (Wells, Pumps, and Piping)	$827,000
TOTAL COST OF FACILITIES	**$827,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$289,000
Environmental & Archaeology Studies and Mitigation	$15,000
Land Acquisition and Surveying (2 acres)	$9,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$32,000
TOTAL COST OF PROJECT	**$1,172,000**
ANNUAL COSTS	
Debt Service (3.5 percent, 20 years)	$83,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$8,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (391758 kW-hr @ 0.08 $/kW-hr)	$31,000
Purchase of Water (ac-ft/yr @ $/ac-ft)	$0
TOTAL ANNUAL COST	**$122,000**
Available Project Yield (ac-ft/yr)	982
Annual Cost of Water ($ per ac-ft), based on PF=1	$124
Annual Cost of Water After Debt Service ($ per ac-ft), based on PF=1	$40
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$0.38
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.12

PROJECT EVALUATION

This strategy benefits livestock 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. Developing new groundwater wells 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 livestock recommended strategy to develop groundwater wells was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage, 982 ac-ft/yr
Reliability	4	Medium to High
Cost	4	$0 to $500/ac-ft (Low)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	5	High Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	1	No sponsor readily identifiable
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with Regional Water Planning Group and Groundwater Management Areas.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 23. RUSK JACOBS WSC

Water User Group Name:	**Rusk – Jacobs WSC**
Strategy Name:	**New wells in Carrizo-Wilcox Aquifer**
Strategy ID:	**RUSK-JAW**
Strategy Type:	**New Groundwater Source**
Potential Supply Quantity:	**22 ac-ft/yr (0.02 MGD)**
Implementation Decade:	**2070**
Development Timeline:	**2070**
Project Capital Cost:	**$1,795,000 (September 2018)**
Annual Cost:	**$140,000**
Unit Water Cost (Rounded):	**$6,364 per ac-ft ($19.53 per 1,000 gallons)**

PROJECT DESCRIPTION

Jacobs WSC has a small need starting in 2070 of approximately 22 ac-ft/yr. This strategy is a recommended strategy for Jacobs WSC in Rusk 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 Rusk County. The wells will provide approximately 22 ac-ft/yr and are assumed to have a depth of 400 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 beginning in 2070. Currently, all of the existing needs are being met by supplies from the Carrizo Wilcox aquifer. There are sufficient supplies available in the Rusk County Carrizo Wilcox to develop the supply needed for this water management strategy. It is assumed that the wells will provide sufficient ac-ft/yr to meet Jacobs WSC's needs in Rusk 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 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 1 mile of pipeline, two wells, a peaking factor of two, and a maximum well yield of 350 gpm for each well. This equates to $6,364 per acre-foot ($19.53 per 1,000 gallons); after the infrastructure is fully

paid (30 years), the cost drops to $636 per acre-foot ($1.95 per 1,000 gallons). Overall, this strategy has a medium cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WUG: Rusk – Jacobs WSC
WMS: New wells in Carrizo-Wilcox Aquifer

Supply	22	Ac-ft/yr	14	gpm
Well Depth	400			
Wells Needed	2			

CAPITAL COSTS	
Transmission Pipeline (6 in dia., 1 miles)	$134,000
Primary Pump Stations (0 MGD)	$76,000
Well Fields (Wells, Pumps, and Piping)	$1,028,000
TOTAL COST OF FACILITIES	**$1,238,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$426,000
Environmental & Archaeology Studies and Mitigation	$54,000
Land Acquisition and Surveying (6 acres)	$28,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$49,000
TOTAL COST OF PROJECT	**$1,795,000**
ANNUAL COSTS	
Debt Service (3.5 percent, 20 years)	$126,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$12,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$2,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (6151 kW-hr @ 0.08 $/kW-hr)	$0
Purchase of Water (ac-ft/yr @ $/ac-ft)	$0
TOTAL ANNUAL COST	**$140,000**
Available Project Yield (ac-ft/yr)	22
Annual Cost of Water ($ per ac-ft), based on PF=1	$6,364
Annual Cost of Water After Debt Service ($ per ac-ft), based on PF=1	$636
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$19.53
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$1.95

PROJECT EVALUATION

This strategy benefits Jacobs WSC municipal 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. Developing new groundwater supplies Rusk County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this new supply will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Rusk Jacobs WSC recommended strategy to develop new groundwater wells was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 22 ac-ft/yr
Reliability	3	Medium
Cost	1	>$5,000/ac-ft (High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor is identified and committed to strategy. Local sponsorship by Jacobs WSC
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with the East Texas Regional Water Planning Group (Region I).

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 24. RUSK LIVESTOCK

Water User Group Name:	**Rusk County - Livestock**
Strategy Name:	**New wells in Carrizo-Wilcox Aquifer**
Strategy ID:	**RUSK-LTK**
Strategy Type:	**New Groundwater Source**
Potential Supply Quantity:	**20 - 83 ac-ft/yr (varies) (0.02 - 0.07 MGD)**
Implementation Decade:	**2040**
Development Timeline:	**2040**
Project Capital Cost:	**$283,000 (September 2018)**
Annual Cost:	**$24,000**
Unit Water Cost (Rounded):	**$289 per ac-ft ($0.89 per 1,000 gallons)**

PROJECT DESCRIPTION

This strategy is a recommended strategy for livestock users in Rusk 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 Rusk County. These wells will provide approximately 83 ac-ft/yr and are assumed to have a depth of 190 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 approximately 42 ac-ft/yr to meet irrigation demands in Rusk County providing a total strategy yield of 83 ac-ft/yr beginning in 2040. A target yield for this strategy was set to the highest need projected by the East Texas Regional Water Planning Group; the highest needs occurs beginning in 2060. 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 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 two wells, a peaking factor of two, and a maximum well yield of 200 gpm for each well. This equates to $289 per acre-foot ($0.89 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $48 per acre-foot ($0.15 per 1,000 gallons). Overall, this strategy has a low cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WUG: Rusk County - Livestock
WMS: New wells in Carrizo-Wilcox Aquifer

Supply	83	Ac-ft/yr	51	gpm
Well Depth	190			
Wells Needed	2			

CAPITAL COSTS	
Well Fields (Wells, Pumps, and Piping)	$194,000
TOTAL COST OF FACILITIES	**$194,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$68,000
Environmental & Archaeology Studies and Mitigation	$8,000
Land Acquisition and Surveying (1 acres)	$5,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$8,000
TOTAL COST OF PROJECT	**$283,000**
ANNUAL COSTS	
Debt Service (3.5 percent, 20 years)	$20,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$2,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (19000 kW-hr @ 0.08 $/kW-hr)	$2,000
Purchase of Water (ac-ft/yr @ $/ac-ft)	$0
TOTAL ANNUAL COST	**$24,000**
Available Project Yield (ac-ft/yr)	83
Annual Cost of Water ($ per ac-ft), based on PF=1	$289
Annual Cost of Water After Debt Service ($ per ac-ft), based on PF=1	$48
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$0.89
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.15

PROJECT EVALUATION

This strategy benefits livestock 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. Developing new groundwater wells in Rusk County will have no other apparent impact on other State water resources. From a third party social and economic perspective, this new supply will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Rusk Livestock 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 83 ac-ft/yr
Reliability	3	Medium
Cost	4	$0 to $500/ac-ft (Low)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	5	High Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	1	No sponsor readily identifiable
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with the East Texas Regional Water Planning Group (Region I).

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 25. RUSK MINING

Water User Group Name:	**Rusk Mining**
Strategy Name:	**Purchase from Angelina Neches River Authority (Neches Run of River, Mud Creek)**
Strategy ID:	**RUSK-MIN**
Strategy Type:	**Existing Surface Water Source**
Potential Supply Quantity:	**22 - 305 ac-ft/yr (varies) (0.02 - 0.27 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**2030**
Project Capital Cost:	**$14,808,000 (September 2018)**
Annual Cost:	**$1,291,000**
Unit Water Cost (Rounded):	**$4,233 per ac-ft ($12.99 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 Mud Creek as their permit allows. The cost for supply from the Neches 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 Neches River using the Texas Commission on Environmental Quality (TCEQ) Water Availability Models. However, this strategy is dependent on sales with the Angelina Neches River Authority and their application for 10,000 ac-ft/yr from the Neches River (Strategy ID: ANRA-ROR). The quantity of supply from this strategy represents a contract of 305 ac-ft/yr, beginning in 2030, and decreases to 22 ac-ft/yr in 2050.

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 2021 East Texas Regional Water Plan due to the length of pipeline required.

WUG:	**Rusk County - Mining**				
STRATEGY:	**Purchase from Angelina Neches River Authority**				
Raw Water Quantity:	**305** AF/Y		0.5 MGD		
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	8 in.	84,480	LF	$48	$4,040,000
Right of Way Easements Rural (ROW)		84,480	LF	$30	$2,536,000
Land and Surveying (10%)					$253,600
Engineering and Contingencies (30%)					$1,212,000
Subtotal of Pipeline	**16**	**miles**			**$8,041,600**
Pump Station(s)					
Pump with intake	25 HP	1	LS	$3,087,000	$3,087,000
Booster Pump Station	25 HP	1	LS	$880,000	$880,000
Engineering and Contingencies (35%)					$1,388,450
Subtotal of Pump Station(s)					**$5,355,450**
Storage Tank(s)					
Storage Tank	0.1 MG	1	LS	$420,238	$420,000
Engineering and Contingencies (35%)					$147,000
Subtotal of Storage Tank(s)					**$567,000**
Permitting and Mitigation					$448,000
Construction Total					**$14,412,050**
Interest During Construction			12	Months	$396,000
TOTAL CAPITAL COST					**$14,808,000**
ANNUAL COSTS					
Debt Service (3.5% for 20 years)					$1,042,000
Operational Costs*					$249,000
TOTAL ANNUAL COST					**$1,291,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$4,233
Per 1,000 Gallons					$12.99
UNIT COSTS (After Amortization)					
Per Acre-Foot					$839
Per 1,000 Gallons					$2.58

* 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

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 Neches 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 305 ac-ft/yr
Reliability	3	Medium
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor(s) are identified and committed to strategy
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with Angelina Neches River Authority.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 26. RUSK STEAM ELECTRIC POWER

Water User Group Name:	**Rusk Steam Electric Power**
Strategy Name:	**Purchase from Sabine River Authority (Toledo Bend)**
Strategy ID:	**RUSK-SEP**
Strategy Type:	**Existing Surface Water Source**
Potential Supply Quantity:	**1,103 ac-ft/yr (0.98 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**2030**
Project Capital Cost:	**$30,008,000 (September 2018)**
Annual Cost:	**$2,795,000**
Unit Water Cost (Rounded):	**$2,534 per ac-ft ($7.78 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 1,103 ac-ft/yr, beginning in 2030, and continuing throughout the planning period to 2070. This project will not be completed prior to January 2023, therefore the TWDB requires the project to come online in the 2030 decade. The reliability of this water supply is considered high due to the availability of water projected in the Sabine River using the Texas Commission on Environmental Quality (TCEQ) 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 2021 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 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 medium cost compared to other strategies in the 2021 East Texas Regional Water Plan due to the length of pipeline required.

WUG:	**Rusk County - Steam Electric Power**				
STRATEGY:	**Purchase from Sabine River Authority (Sabine River)**				
Raw Water Quantity:	**1,103** AF/Y		2.0 MGD		
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	12 in.	132,000	LF	$83	$10,922,000
Right of Way Easements Rural (ROW)		132,000	LF	$30	$3,963,200
Land and Surveying (10%)					$396,320
Engineering and Contingencies (30%)					$3,277,000
Subtotal of Pipeline	**25**	**miles**			**$18,558,520**
Pump Station(s)					
Pump Station with intake	183 HP	1	LS	$5,673,000	$5,673,000
Booster Pump Station	183 HP	1	LS	$1,227,000	$1,227,000
Engineering and Contingencies (35%)					$2,415,000
Subtotal of Pump Station(s)					**$9,315,000**
Storage Tank(s)					
Storage Tank	0.2 MG	1	LS	$487,422	$487,422
Engineering and Contingencies (35%)					$170,598
Subtotal of Storage Tank(s)					**$658,020**
Permitting and Mitigation					$673,000
Construction Total					**$29,204,540**
Interest During Construction			12	Months	$803,000
TOTAL CAPITAL COST					**$30,008,000**
ANNUAL COSTS					
Debt Service (3.5% for 20 years)					$2,111,000
Operational Costs*					$684,000
TOTAL ANNUAL COST					**$2,795,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$2,534
Per 1,000 Gallons					$7.78
UNIT COSTS (After Amortization)					
Per Acre-Foot					$655
Per 1,000 Gallons					$2.01

* 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 1,103 ac-ft/yr
Reliability	4	Medium to High
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	1	No sponsor readily identifiable
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with Sabine River Authority.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 27. SAN AUGUSTINE SAN AUGUSTINE

Water User Group Name:	**San Augustine County - San Augustine**
Strategy Name:	**New wells in Carrizo-Wilcox Aquifer**
Strategy ID:	**SAUG-SAG**
Strategy Type:	**New Groundwater Source**
Potential Supply Quantity:	**89 - 105 ac-ft/yr (varies) (0.08 - 0.09 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**2030**
Project Capital Cost:	**$1,045,000 (September 2018)**
Annual Cost:	**$88,000**
Unit Water Cost (Rounded):	**$838 per ac-ft ($2.57 per 1,000 gallons)**

PROJECT DESCRIPTION

San Augustine has needs throughout the planning period, with the maximum need of approximately 120 ac-ft/yr occurring in 2020. To meet this need, it is recommended that San Augustine continue to use supplies from Carrizo Wilcox by drilling additional wells. This strategy is a recommended strategy for San Augustine in San Augustine 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 Cherokee County. The wells will provide approximately 60 ac-ft/yr and are assumed to have a depth of 250 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. Though the maximum need occurs in the 2020 decade, this project will not be completed prior to January 2023, so it must be shifted to have an online decade of 2030, according to TWDB planning requirements.

SUPPLY DEVELOPMENT

The supply is required throughout the planning cycle, for decades 2030 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 San Augustine County Carrizo Wilcox to develop the supply needed for this water management strategy. It is assumed that each well provide 60 ac-ft/yr to meet San Augustine's needs in San Augustine 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 San Augustine 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 mile of pipeline, two wells, a peaking factor of two, and a maximum well yield of 100 gpm for each well. This equates to $807 per acre-foot ($2.48 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $128 per acre-foot ($0.39 per 1,000 gallons). Overall, this strategy has a low cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WUG: San Augustine County - San Augustine
WMS: New wells in Carrizo-Wilcox Aquifer

Supply	105	Ac-ft/yr	65 gpm
Well Depth	250		
Wells Needed	2		

CAPITAL COSTS	
Transmission Pipeline (6 in dia., 1 miles)	$134,000
Primary Pump Stations (0.1 MGD)	$186,000
Well Fields (Wells, Pumps, and Piping)	$378,000
TOTAL COST OF FACILITIES	**$698,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$237,000
Environmental & Archaeology Studies and Mitigation	$54,000
Land Acquisition and Surveying (6 acres)	$28,000
Interest During Construction (3% for 1 years with a 0.5% ROI)	$28,000
TOTAL COST OF PROJECT	**$1,045,000**
ANNUAL COSTS	
Debt Service (3.5 percent, 20 years)	$74,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$5,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$5,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (54366 kW-hr @ 0.08 $/kW-hr)	$4,000
Purchase of Water (ac-ft/yr @ $/ac-ft)	$0
TOTAL ANNUAL COST	**$88,000**
Available Project Yield (ac-ft/yr)	105
Annual Cost of Water ($ per ac-ft), based on PF=1	$838
Annual Cost of Water After Debt Service ($ per ac-ft), based on PF=1	$133
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$2.57
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.41

PROJECT EVALUATION

This strategy benefits municipal 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. Developing new groundwater wells in San Augustine County will have no other apparent impact on other State water resources.

Based on the analyses provided above, the recommended strategy for municipal 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 105 ac-ft/yr
Reliability	4	Medium to High
Cost	3	$500 to $1,000/ac-ft (Medium)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor(s) are identified and committed to strategy
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with the East Texas Regional Water Planning Group (Region I).

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 28. SAN AUGUSTINE LIVESTOCK

Water User Group Name:	**San Augustine County - Livestock**
Strategy Name:	**Purchase from SRA (Toledo Bend)**
Strategy ID:	**SAUG-LTK**
Strategy Type:	**Existing Surface Water Source**
Potential Supply Quantity:	**1,539 - 2,349 ac-ft/yr (varies) (1.37 - 2.1 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**2030**
Project Capital Cost:	**$41,302,000 (September 2018)**
Annual Cost:	**$4,121,000**
Unit Water Cost (Rounded):	**$1,754 per ac-ft ($5.38 per 1,000 gallons)**

PROJECT DESCRIPTION

This strategy is a recommended strategy for livestock users in San Augustine County and involves the purchase of supplies from Sabine River Authority's Toledo Bend Reservoir. The cost estimate includes conveyance infrastructure in order to capture the peak annual supply.

SUPPLY DEVELOPMENT

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 2060. Overall, the reliability of this supply is considered high, based on the supply availability from Toledo Bend. Though there is a need in 2020, this project will not be completed prior to January 2023 due to time constraints, so the online decade for this project will be 2030 because of TWDB planning requirements.

ENVIRONMENTAL CONSIDERATIONS

The environmental impacts from this strategy are expected to be low. The impact to the environment due to pipeline construction is expected to be temporary and minimal. Impacts to environmental water needs, habitat, and cultural resources are expected to be low. There are no bays or estuaries in close proximity of San Augustine 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. This equates to $1,754 per acre-foot ($5.38 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $542 per acre-foot ($1.66 per 1,000 gallons). Overall, this strategy has a medium cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WUG:	**San Augustine County - Livestock**				
STRATEGY:	**Purchase from Sabine River Authority (Sabine River)**				
Raw Water Quantity:	**2,349** AF/Y			4.2 MGD	
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	18 in.	132,000	LF	$135	$17,837,000
Right of Way Easements Rural (ROW)		132,000	LF	$30	$4,359,520
Engineering and Contingencies (30%)					$5,351,000
Subtotal of Pipeline	**25**	**miles**			**$27,547,520**
Pump Station(s)					
Pump Station with intake	246 HP	1	LS	$6,714,000	$6,714,000
Booster Pump Station	246 HP	1	LS	$1,565,000	$1,565,000
Engineering and Contingencies (35%)					$2,897,650
Subtotal of Pump Station(s)					**$11,176,650**
Storage Tank(s)					
Storage Tank	0.5 MG	1	LS	$592,331	$592,331
Engineering and Contingencies (35%)					$207,316
Subtotal of Storage Tank(s)					**$799,647**
Permitting and Mitigation					$673,000
Construction Total					**$40,196,817**
Interest During Construction			12	Months	$1,105,000
TOTAL CAPITAL COST					**$41,302,000**
ANNUAL COSTS					
Debt Service (3.5% for 20 years)					$2,906,000
Operational Costs*					$1,215,000
TOTAL ANNUAL COSTS					**$4,121,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$1,754
Per 1,000 Gallons					$5.38
UNIT COSTS (After Amortization)					
Per Acre-Foot					$542

PROJECT EVALUATION

This strategy benefits livestock 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 Toledo Bend 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 livestock users in San Augustine 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 2,349 ac-ft/yr
Reliability	4	Medium to High
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	5	High Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	1	No sponsor readily identifiable
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with the East Texas Regional Water Planning Group (Region I).

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 29. SAN AUGUSTINE MINING

Water User Group Name:	**San Augustine County - Mining**
Strategy Name:	**Purchase from Angelina Neches River Authority (Neches Run of River, Mud Creek)**
Strategy ID:	**SAUG-MIN**
Strategy Type:	**Existing Surface Water Source**
Potential Supply Quantity:	**1,102 ac-ft/yr (0.98 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**2030**
Project Capital Cost:	**$36,269,000 (September 2018)**
Annual Cost:	**$3,911,000**
Unit Water Cost (Rounded):	**$3,549 per ac-ft ($10.89 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 aquifers 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 Mud Creek. The cost for supply from the Neches 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. Though there is a need in 2020, this project will not be completed prior to January 2023 due to time constraints, so the online decade for this project will be 2030 because of TWDB planning requirements.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the water need projected for mining in San Augustine 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 1,102 ac-ft/yr in 2030. Angelina Neches River Authority put in an application for 10,000 ac-ft/yr of run-of-river supplies and the application is administratively complete. Angelina Neches River Authority has a water management strategy in the 2021 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 2021 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 Neches 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 Neches 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 high cost compared to other strategies in the 2021 East Texas Regional Water Plan due to the length of pipeline required and the quantity of supply delivered for the infrastructure.

WUG: **San Augustine County - Mining**
STRATEGY: **Purchase from Angelina Neches River Authority**
Quantity: **1,102** AF/Y 1.48 MGD

CAPITAL COSTS

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	16 in.	158,400	LF	$118	$18,638,000
Right of Way Easements Rural (ROW)		158,400	LF	$18	$3,184,000
Engineering and Contingencies (30%)					$5,591,000
Subtotal of Pipeline					**$27,413,000**
Pump Station(s)					
Pump Station with intake	79 HP	1	LS	$3,965,000	$3,965,000
Engineering and Contingencies (35%)					$1,888,000
Subtotal of Pump Station(s)					**$5,853,000**
Storage Tank(s)					
Storage Tank	0.2 MG	1	LS	$939,000	$939,000
Engineering and Contingencies (35%)					$329,000
Subtotal of Storage Tank(s)					**$1,268,000**
Permitting and Mitigation					$778,000
Construction Total					**$35,312,000**
Interest During Construction			12	Months	$957,000
TOTAL COST					**$36,269,000**

ANNUAL COSTS

Debt Service (3.5% for 20 years)	$2,517,000
Operational Costs*	$1,394,000
TOTAL ANNUAL COST	**$3,911,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot of treated water	$3,549
Per 1,000 Gallons	$10.89

UNIT COSTS (After Amortization)

Per Acre-Foot	$1,286
Per 1,000 Gallons	$3.95

* 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 Neches 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	**4**	**Meets 75-100% of Shortage. 1,102 ac-ft/yr**
Reliability	**4**	**Medium to High**
Cost	**2**	**$1,000 to $5,000/ac-ft (Medium-High)**
Environmental Factors	**4**	**Low Negative Impacts / Some Positive Impacts**
Impact on Other State Water Resources	**4**	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	**4**	**Low Negative Impacts / Some Positive Impacts**
Interbasin Transfers		**No**
Other Natural Resources	**4**	**Low Negative Impacts / Some Positive Impacts**
Major Impacts on Key Water Quality Parameters	**4**	**Low Negative Impacts / Some Positive Impacts**
Political Feasibility	**4**	**Sponsor(s) identified and committed to strategy**
Implementation Issues	**4**	**Low Implementation Issues**

REFERENCES

Discussions with Angelina Neches River Authority.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 30. SHELBY SAND HILLS WSC

Water User Group Name:	**Shelby County - Sand Hills WSC**
Strategy Name:	**Purchase from Center**
Strategy ID:	**SHEL-SHW**
Strategy Type:	**Existing Surface Water Source**
Potential Supply Quantity:	**61 - 105 ac-ft/yr (varies) (0.05 - 0.09 MGD)**
Implementation Decade:	**2020**
Development Timeline:	**2020 - 2070**
Project Capital Cost:	**$0 (September 2018)**
Annual Cost:	**$102,000**
Unit Water Cost (Rounded):	**$971 per ac-ft ($2.98 per 1,000 gallons)**

PROJECT DESCRIPTION

This strategy is a recommended strategy for the Sand Hills WSC in Shelby County and involves a contract between Sand Hills WSC and the City of Center for raw water. As the Sand Hills WSC already purchases water from the City of Center, the only cost for additional supply from the City of Center is the cost of raw water. Ultimately, this cost will need to be negotiated with the City of Center 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 Center currently supplies approximately 3,000 ac-ft/yr to meet the municipal demands of the Sand Hills WSC in Shelby County. The quantity of supply from this strategy represents a contract increase of 61 ac-ft/yr, beginning in 2020, and increases to 105 ac-ft/yr, beginning in 2070. From 2020 through 2070, the supply is limited to the Sand Hills WSC's need projected by the East Texas Regional Water Planning Group. These supplies are considered highly reliable.

ENVIRONMENTAL CONSIDERATIONS

There are not any significant environmental considerations associated with this strategy. A contract between the Sand Hills WSC and the City of Center 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 within Shelby 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 2021 East Texas Regional Water Plan.

WUG:	**Shelby County - Sand Hills WSC**				
STRATEGY:	**Purchase from Center**				
Raw Water Quantity:	**105** AF/Y			0.14 MGD	
CONSTRUCTION COSTS					
ANNUAL CONTRACT COSTS					
ANNUAL COSTS					
O&M and Other Costs*	34,000	34,000	1000 gal	$3.00	$102,000
Treatment		0	1000 gal	$3.00	$0
Operational Costs*					**$102,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$971
Per 1,000 Gallons					$2.98
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 municipal users in Sand Hills WSC 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 City of Center reservoirs 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 Sand Hills WSC in Shelby County to purchase water from the City of Center was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 105 ac-ft/yr
Reliability	4	Medium to High
Cost	3	$500 to $1,000/ac-ft (Medium)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor is identified and committed to strategy. Local sponsorship by Sand Hills WSC
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with the East Texas Regional Water Planning Group (Region I).

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 31. SHELBY LIVESTOCK

Water User Group Name:	**Shelby County - Livestock**
Strategy Name:	**Purchase from Sabine River Authority (Toledo Bend)**
Strategy ID:	**SHEL-LTK**
Strategy Type:	**Existing Surface Water Source**
Potential Supply Quantity:	**6,491 - 19,006 ac-ft/yr (varies) (5.8 - 17.0 MGD)**
Implementation Decade:	**2020**
Development Timeline:	**2020 - 2070**
Project Capital Cost:	**$0 (September 2018)**
Annual Cost:	**$18,582,000**
Unit Water Cost (Rounded):	**$978 per ac-ft ($3.00 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. 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 6,491 ac-ft/yr, beginning in 2020, and increases over time to 19,006 ac-ft/yr, 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 Commission on Environmental Quality (TCEQ) 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 2021 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 Shelby 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 Shelby 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 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 2021 East Texas Regional Water Plan due to the length of pipeline required and the large quantity of supply.

WUG:	**Shelby County - Livestock**				
STRATEGY:	**Purchase from Sabine River Authority (Toledo Bend)**				
Raw Water Quantity:	**19,006** AF/Y		25.43 MGD		
CONSTRUCTION COSTS					
ANNUAL CONTRACT COSTS					
ANNUAL COSTS					
O&M and Other Costs*	6,194,000	6,194,000	1000 gal	$3.00	$18,582,000
Treatment		0	1000 gal	$3.00	$0
Operational Costs*					**$18,582,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$978
Per 1,000 Gallons					$3.00
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 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 19,006 ac-ft/yr
Reliability	4	Medium to High
Cost	3	$500 to $1,000/ac-ft (Medium)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	5	High Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	1	No sponsor readily identifiable
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with Sabine River Authority.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 32. 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:	**322 - 1,145 ac-ft/yr (varies) (0.29 - 1.00 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**2030 - 2070**
Project Capital Cost:	**$14,264,000 (September 2018)**
Annual Cost:	**$1,615,000**
Unit Water Cost (Rounded):	**$1,410 per ac-ft ($4.33 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. Though there is a need in 2020, this project will not be completed prior to January 2023 due to time constraints, so the online decade for this project will be 2030 because of TWDB planning requirements.

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 322 ac-ft/yr in 2030, increasing to 1,182 ac-ft/yr 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 a 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 2021 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 medium cost compared to other strategies in the 2021 East Texas Regional Water Plan due to the yield generated by the infrastructure required.

WUG: **Smith County - Bullard**
STRATEGY: **Purchase from City of Tyler**
Quantity: **1,145** AF/Y 1.53 MGD

CAPITAL COSTS

Pipeline	**Size**	**Qty**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	10 in.	52,800	LF	$54	$2,851,000
Right of Way Easements Rural (ROW)		52,800	LF	$18	$964,900
Land and Surveying (10%)					$96,000
Engineering and Contingencies (30%)					$855,000
Subtotal of Pipeline					**$4,766,900**
Pump Station(s)					
Pump with intake	178 HP	1	LS	$5,604,000	$5,604,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$1,961,400
Subtotal of Pump Station(s)					**$7,565,400**
Storage Tank(s)					
Storage Tank	0.2 MG	1	LS	$942,000	$942,000
Engineering and Contingencies (35%)					$330,000
Subtotal of Storage Tank(s)					**$1,272,000**
Permitting and Mitigation					$278,000
Construction Total					**$13,882,300**
Interest During Construction			12	Months	$382,000
TOTAL COST					**$14,264,000**

ANNUAL COSTS

Debt Service (3.5% for 20 years)	$1,004,000
Operational Costs*	$611,000
TOTAL ANNUAL COST	**$1,615,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot of treated water	$1,410
Per 1,000 Gallons	$4.33

UNIT COSTS (After Amortization)

Per Acre-Foot	$573
Per 1,000 Gallons	$1.76

* 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. 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 1,145 ac-ft/yr
Reliability	4	Medium to High
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	3	Sponsor identified; commitment level uncertain. Local sponsorship by the City of Tyler
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with City of Tyler.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 33. SMITH CRYSTAL SYSTEMS TEXAS

Water User Group Name:	**Smith County - Crystal Systems Texas**
Strategy Name:	**New wells in Carrizo-Wilcox Aquifer**
Strategy ID:	**SMTH-CYS**
Strategy Type:	**New Groundwater Source**
Potential Supply Quantity:	**78 - 538 ac-ft/yr (varies) (0.07 - 0.48 MGD)**
Implementation Decade:	**2040**
Development Timeline:	**2040**
Project Capital Cost:	**$2,531,000 (September 2018)**
Annual Cost:	**$231,000**
Unit Water Cost (Rounded):	**$429 per ac-ft ($1.32 per 1,000 gallons)**

PROJECT DESCRIPTION

The Crystal Systems Texas system is located in northwestern Smith County and serves the un-incorporated area surrounding Hideaway Lake. In 2018, the system had 2050 residential connections. The population is projected to increase from 4,343 persons in 2020 to 8,881 persons in 2070. The System is included as a WUG. in Smith County. The system's current water supply consists of five water wells from the Carrizo-Wilcox Aquifer. The total rated capacity of these wells is 3,560 GPM, or 1,914 ac-ft/yr. The system is bounded on the north and southeast by the Lindale Rural WSC and on the east by the City of Lindale. The System does have a water conservation plan. The System is projected to have a water supply surplus of 558 ac-ft/yr in 2020 decreasing to a deficit of 816 ac-ft/yr in 2070.

SUPPLY DEVELOPMENT

Below tables show the detail of water supply and demand analysis:

	2020	2030	2040	2050	2060	2070
Population	3026	3384	3812	4324	4950	5715
Projected Water Demand	945	1045	1175	1331	1522	1757
Current Water Supply	1376	1376	1376	1376	1376	1376
Projected Supply Surplus (+)/Deficit (-)	431	331	201	45	-146	-381

Neches River Basin:

	2020	2030	2040	2050	2060	2070
Population	1317	1657	2000	2372	2758	3166
Projected Water Demand	411	512	616	730	848	973
Current Water Supply	538	538	538	538	538	538
Projected Supply Surplus (+)/Deficit(-)	127	26	-78	-192	-310	-435

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 Smith County.

PERMITTING AND DEVELOPMENT

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

PLANNING LEVEL OPINION OF COST

A planning Four alternative strategies were considered to meet the Crystal System's water supply shortages as summarized in the following table. Advanced conservation was not considered because the per capita use per day was below the 140 gpcd threshold set by the planning group. Water reuse was not considered because the system does not have a sewer collection system. Surface water alternatives were omitted since there is not a supply source within close proximity to the system and surface water treatment is not economically feasible for a system of this size. Wells in the Carrizo-Wilcox Aquifer (Sabine and Neches River Basins) were identified as a potentially feasible strategy for the WUG.

Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Envr.* Impact
Advanced Water Conservation					
Water Reuse					
Groundwater (Sabine)	538	$ 2,531,000	$ 231,000	$ 429	1
Groundwater (Neches)	538	$ 2,531,000	$ 231,000	$ 429	1
Surface Water					

*Environmental Impact

Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Carrizo-Wilcox Aquifer, Sabine; ac-ft/yr)	0	0	135	135	269	538
Drill New Wells (Carrizo-Wilcox Aquifer, Neches; ac-ft/yr)	0	0	135	135	269	538

The recommended strategy for Crystal Systems to meet their projected deficit of 78 ac-ft/yr in 2040 and 816 ac-ft/yr in 2070 would be to construct four additional water wells similar to their existing wells just prior to each decade as the deficits occur. The recommended supply source will be the Carrizo Wilcox Aquifer in Smith County. Four wells with rated capacity of 500 gpm each would provide approximately 269 acre-feet each. The Carrizo Wilcox Aquifer in Smith County is projected to have a more than ample supply availability to meet the needs of Crystal Systems for the planning period. During the planning period two wells will be drilled in the Carrizo Wilcox formation of the Sabine River Basin while two wells will be drilled into the Carrizo Wilcox formation of the Neches River Basin.

Given the increasing costs to comply with more stringent regulations and the decreasing reliability of groundwater as a future supply source due to quality issues in this region, it is recommended that groundwater supply systems consider combining resources and/or soliciting future water supply from neighboring systems and/or major water providers in the region. If a feasible alternative becomes available, then the recommendations previously discussed should be disregarded and a re-evaluation completed.

PROJECT EVALUATION

This strategy benefits municipal 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. Developing groundwater wells in Region D portion of Smith County will have no other apparent impact on other State water resources.

Based on the analyses provided above, the recommended strategy for Crystal Systems to develop new groundwater wells was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 538 ac-ft/yr
Reliability	4	Medium to High
Cost	4	$0 to $500/ac-ft (Low)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	3	Sponsor identified; commitment level uncertain. Local sponsorship by Crystal Systems
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with Region D.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 34. SMITH LINDATE

Water User Group Name:	**Smith County - Lindale**
Strategy Name:	**New wells in Carrizo-Wilcox Aquifer**
Strategy ID:	**SMTH-LIN**
Strategy Type:	**New Groundwater Source**
Potential Supply Quantity:	**25 - 696 ac-ft/yr (varies) (0.02 - 0.62 MGD)**
Implementation Decade:	**2020**
Development Timeline:	**2020**
Project Capital Cost:	**$7,592,000 (September 2018)**
Annual Cost:	**$714,000**
Unit Water Cost (Rounded):	**$370 per ac-ft ($1.13 per 1,000 gallons)**

PROJECT DESCRIPTION

The City of Lindale is located in northern Smith County and serves the incorporated city limits and an area immediately northwest of the City of Lindale. The population is projected to increase from 5,806 persons in 2020 to 13,985 persons in 2070. The City is included as a WUG. in Smith County. The system's current water supply consists of four water wells from the Carrizo-Wilcox Aquifer. The total rated capacity of these wells is 2,320 GPM, or 1,247 ac-ft/yr. The system is bounded on the west, north, and east by the Lindale Rural WSC and on the south by the City of Tyler. The City does have a water conservation plan. The City of Lindale is projected to have a water supply deficit of 70 ac-ft/yr in 2020 increasing to a deficit of 1,833 ac-ft/yr in 2070. The Sabine River Basin is included in Region D and the Neches River Basin is included in Region I.

SUPPLY DEVELOPMENT

Below tables show the detail of water supply and demand analysis:

Sabine River Basin (Region D)	2020	2030	2040	2050	2060	2070
Population	3707	4499	5396	6107	7280	8674
Projected Water Demand	841	1005	1195	1347	1607	1910
Current Water Supply	796	779	773	756	762	773
Projected Supply Surplus (+)/Deficit(-)	-45	-226	-422	-591	-842	-1137

Neches River Basin (Region I)	2020	2030	2040	2050	2060	2070
Population	2099	2704	3311	3964	4629	5311
Projected Water Demand	476	604	733	875	1020	1170
Current Water Supply	451	468	474	491	485	474
Projected Supply Surplus (+)/Deficit(-)	-25	-136	-259	-384	-535	-696

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 Smith County.

PERMITTING AND DEVELOPMENT

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

PLANNING LEVEL OPINION OF COST

Four alternative strategies were considered to meet the City of Lindale's water supply shortages as summarized in the following table. Advanced conservation was not considered because the per capita use per day was below the 140 gpcd threshold set by the planning group. Water reuse was not considered because the City does not have a demand for non-potable water. Surface water alternatives were omitted since there is not a supply source within close proximity to the City and surface water treatment is not economically feasible for a system of this size. Groundwater wells in the Carrizo-Wilcox Aquifer in the Neches Basin were identified as a potentially feasible strategy for the City.

Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Envr.* Impact
Advanced Water Conservation					
Water Reuse					
Groundwater	1,932	$ 7,592,000	$ 714,000	$ 370	1
Surface Water					

***Environmental Impact**

Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Carrizo-Wilcox Aquifer, Neches; ac-ft/yr)	**322**	**644**	**966**	**1288**	**1610**	**1932**

The recommended strategy for the City of Lindale to meet their projected deficit of 70 ac-ft/yr in 2020 and 1,833 ac-ft/yr in 2070 would be to construct six additional water wells similar to their existing wells just prior to each decade as the deficits occur. The recommended supply source will be the Carrizo Wilcox Aquifer in Smith County. Six wells with rated capacity of 600 gpm each would provide approximately 322 acre-feet each. The Carrizo Wilcox Aquifer in Smith County (Neches River Basin) is projected to have a more than ample supply availability to meet the needs of the City of Lindale for the planning period.

Given the increasing costs to comply with more stringent regulations and the decreasing reliability of groundwater as a future supply source due to quality issues in this region, it is recommended that groundwater supply systems consider combining resources and/or soliciting future water supply from neighboring systems and/or major water providers in the region. If a feasible alternative becomes available, then the recommendations previously discussed should be disregarded and a re-evaluation completed.

PROJECT EVALUATION

This strategy benefits municipal 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. Developing new groundwater wells in Smith County will have no other apparent impact on other State water resources.

Based on the analyses provided above, the recommended strategy for Lindale to develop new groundwater wells was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 696 ac-ft/yr (Region I portion of Shortage)
Reliability	4	Medium to High
Cost	4	$0 to $500/ac-ft (Low)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	3	Sponsor identified; commitment level uncertain. Local Sponsorship by the City of Lindale
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with Region D.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 35. SMITH OVERTON

Water User Group Name:	**Smith - Overton**
Strategy Name:	**New wells in Carrizo-Wilcox Aquifer**
Strategy ID:	**SMTH-OVN**
Strategy Type:	**New Groundwater Source**
Potential Supply Quantity:	**129 - 416 ac-ft/yr (varies) (0.11 - 0.37 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**2030 - 2070**
Project Capital Cost:	**$8,914,000 (September 2018)**
Annual Cost:	**$846,000**
Unit Water Cost (Rounded):	**$2,034 per ac-ft ($6.24 per 1,000 gallons)**

PROJECT DESCRIPTION

This strategy is a recommended strategy for the City of Overton located in both Rusk and Smith Counties with Smith County being the primary county of the City. The strategy involves the development of new wells in the Carrizo Wilcox aquifer. Overton currently obtains most of its supply from Carrizo Wilcox. In addition to new wells, municipal conservation is another recommended strategy. Discussion on Conservation strategies is included in a separate technical memorandum. Overton has a small need starting in 2020 of approximately 70 ac-ft/yr, and this need increases to 416 ac-ft/yr by 2070. To meet this need, it is recommended that Overton continue to use supplies from Carrizo Wilcox by drilling additional wells. This strategy is a recommended strategy for Overton in Smith 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 Smith County. The wells will provide approximately 407 ac-ft/yr and are assumed to have a depth of 600 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 would be required for the entirety of the planning cycle. Currently, all of the existing needs are being met by supplies from the Carrizo Wilcox aquifer. There are sufficient supplies available in the Smith County Carrizo Wilcox to develop the supply needed for this water management strategy. It is assumed that the wells along with municipal conservation will provide sufficient ac-ft/yr to meet Overton's needs in Smith 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 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 4 miles of pipeline, a pump station, and a terminal storage tank (0.09 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 2021 East Texas Regional Water Plan due to the yield generated by the infrastructure required.

WUG: Smith/Rusk County - Overton

WMS: Nacogdoches County - Carrizo Aquifer Wells

Supply	416	Ac-ft/yr	258	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	$461,866	$923,732
Connection to Transmission System	2	$50,000	$100,000
Engineering and Contingencies (30% for pipelines, 35% for other items)			$353,000
Subtotal of Well(s)			**$1,376,732**

Transmission System	Size	Quantity	Unit	Unit Cost	Total Cost
Pipeline - Rural	8 in.	21,120	LF	$40	$839,000
Pump Station	71 HP	1	EA	$3,844,000	$3,844,000
Ground Storage Tank	0.09 MG	1	EA	$429,605	$429,605
Easement - Rural		21,120	LF	$18	$424,600
Engineering and Contingencies (30% for pipelines, 35% for other items)					$1,747,000
Subtotal for Transmission		**4**	**miles**		**7,284,205**

Permitting and Mitigation			$132,000
Construction Total			**$8,793,000**
Interest During Construction	6	Months	$121,000
TOTAL CAPITAL COST			**$8,914,000**

ANNUAL COSTS	
Debt Service (3.5% for 20 years)	$627,000
Operational Costs*	$218,700
TOTAL ANNUAL COST	**$846,000**

UNIT COSTS (Until Amortized)	
Cost per ac-ft	$2,034
Cost per 1000 gallons	$6.24

UNIT COSTS (After Amortization)	
Cost per ac-ft	$526
Cost per 1000 gallons	$1.61

* 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 Overton 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. Developing groundwater wells in Overton will have no other apparent impact on other State water resources.

Based on the analyses provided above, the recommended strategy for Overton to develop new groundwater wells was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 416 ac-ft/yr
Reliability	4	Medium to High
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	3	Sponsor identified; commitment level uncertain
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with the East Texas Regional Water Planning Group (Region I).

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 36. SMITH R P M WSC

Water User Group Name:	**Smith County - R P M WSC**
Strategy Name:	**New wells in Carrizo-Wilcox Aquifer**
Strategy ID:	**PRM_WSC**
Strategy Type:	**New Groundwater Source**
Potential Supply Quantity:	**2 - 17 ac-ft/yr (varies) (0.01 - 0.02 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**2030**
Project Capital Cost:	**$3,469,000 (September 2018)**
Annual Cost:	**$428,000**
Unit Water Cost (Rounded):	**$1,972 per ac-ft ($6.05 per 1,000 gallons)**

PROJECT DESCRIPTION

R P M WSC provides water service in Van Zandt, Henderson, and Smith Counties. The WUG population is projected to be 2,957 by 2020 and increases to 5,530 by 2070. R P M WSC supplies its customers with groundwater from the Carrizo-Wilcox and Queen City aquifers with five water wells in Van Zandt County. R P M WSC is projected to have a total deficit of 34 ac-ft/yr in 2030 increasing to a deficit of 217 ac-ft/yr by 2070; the shortage projected to occur in Van Zandt County is 25 ac-ft/yr in 2030 increasing to 152 ac-ft/yr by 2070. The shortage in Henderson County is 7 ac-ft/yr in 2030, increasing to 48 ac-ft/yr in 2070. Shortages in Smith County range from 2 ac-ft/yr in 2030 up to 17 ac-ft/yr in 2070.

SUPPLY DEVELOPMENT

Below tables show the detail of water supply and demand analysis:

RPM WSC	2020	2030	2040	2050	2060	2070
Population	2,957	3,602	4,112	4,653	5,116	5,530
Projected Water Demand	323	378	423	475	519	561
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	344	344	344	344	344	344
Projected Supply Surplus (+) / Deficit (-)	21	-34	-79	-131	-175	-217

Neches River Basin

Projected Supply Surplus (+) / Deficit (-) by County	2020	2030	2040	2050	2060	2070
Van Zandt	14	-25	-58	-93	-124	-152
Henderson	5	-7	-16	-27	-38	-48
Smith	2	-2	-5	-11	-13	-17
Total	21	-34	-79	-131	-175	-217

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 Smith County.

PERMITTING AND DEVELOPMENT

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

PLANNING LEVEL OPINION OF COST

Four alternative strategies were considered to meet the WSC's water supply shortages as summarized in the following table. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcd threshold set by the water planning group. Water reuse was not considered because the WSC does not have a demand for non-potable water. Surface water was not considered because the WSC does not currently have surface water treatment. Groundwater has been identified as a potential strategy for R P M WSC.

Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Envr.* Impact
Demand Reduction					
Water Reuse					
Drill New Wells (Carrizo-Wilcox Aquifer, Neches Basin)	217	$3,469,000	$428,000	$1,972	1
Drill New Wells (Queen City Aquifer, Neches Basin)					

***Environmental Impact**

Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Carrizo-Wilcox, Neches Basin; ac-ft/yr)	0	34	79	131	175	217

The recommended strategy for R P M WSC to meet their projected deficit of 34 ac-ft/yr in 2030 and 217 ac-ft/yr in 2070 would be to construct nine additional water wells similar to their existing wells just prior to each decade as the deficits occur. The recommended supply source will be the Carrizo-Wilcox Aquifer in the Neches Basin in Van Zandt County. Nine wells with rated capacity of 50 gpm each, pumping at an approximately depth of 560 ft., would provide approximately 27 acre-feet each.

PROJECT EVALUATION

This strategy benefits municipal 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. Developing supplies in Smith County will have no other apparent impact on other State water resources.

Based on the analyses provided above, the recommended strategy for R P M WSC to develop new groundwater wells was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 217 ac-ft/yr
Reliability	4	Medium to High
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	3	Sponsor identified; commitment level uncertain. Local sponsorship by R P M WSC
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with Region D

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 37. SMITH WHITEHOUSE

Water User Group Name:	**Smith County - Whitehouse**
Strategy Name:	**Purchase from City of Tyler (Lake Palestine/Lake Tyler/Carrizo-Wilcox)**
Strategy ID:	**SMTH-WTH**
Strategy Type:	**Existing Surface Water Source**
Potential Supply Quantity:	**39 - 257 ac-ft/yr (varies) (0.03 - 0.23 MGD)**
Implementation Decade:	**2060**
Development Timeline:	**2060 - 2070**
Project Capital Cost:	**$7,666,000 (September 2018)**
Annual Cost:	**$737,000**
Unit Water Cost (Rounded):	**$2,868 per ac-ft ($8.80 per 1,000 gallons)**

PROJECT DESCRIPTION

This strategy is a recommended strategy for Whitehouse in Smith County and involves a contract between Whitehouse and the City of Tyler for raw water. The cost for supply from the City of Tyler 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 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 Whitehouse 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 39 ac-ft/yr in 2060, increasing to 257 ac-ft/yr 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 a 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.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between Whitehouse 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 seven miles of pipeline (the approximate distance from the City of Tyler supplies to Whitehouse's

service area in Smith County), a pump station with an intake, and a terminal storage tank (0.05 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 2021 East Texas Regional Water Plan due to the yield generated by the infrastructure required.

WUG:	**Smith County - Whitehouse**				
STRATEGY:	**Purchase from City of Tyler**				
Quantity:	**257** AF/Y		0.34	MGD	
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	6 in.	36,960	LF	$25	$939,000
Right of Way Easements Rural (ROW)		36,960	LF	$18	$675,500
Land and Surveying (10%)					$68,000
Engineering and Contingencies (30%)					$282,000
Subtotal of Pipeline					**$1,964,500**
Pump Station(s)					
Pump with intake	25 HP	1	LS	$3,087,000	$3,087,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$1,080,000
Subtotal of Pump Station(s)					**$4,167,000**
Storage Tank(s)					
Storage Tank	0.05 MG	1	LS	$834,000	$834,000
Engineering and Contingencies (35%)					$292,000
Subtotal of Storage Tank(s)					**$1,126,000**
Permitting and Mitigation					$203,000
Construction Total					**$7,460,500**
Interest During Construction			12	Months	$205,000
TOTAL COST					**$7,666,000**
ANNUAL COSTS					
Debt Service (3.5% for 20 years)					$539,000
Operational Costs*					$198,000
TOTAL ANNUAL COST					**$737,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$2,868
Per 1,000 Gallons					$8.80
UNIT COSTS (After Amortization)					
Per Acre-Foot					$798
Per 1,000 Gallons					$2.45

* 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 Whitehouse in Smith County and is expected to have a positive impact on their water supply security. 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 Whitehouse 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 257 ac-ft/yr
Reliability	4	Medium to High
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor is identified and committed to strategy. Local sponsorship by the City of Whitehouse
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with City of Tyler.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 38. SMITH MANUFACTURING

Water User Group Name:	**Smith Manufacturing**
Strategy Name:	**Purchase from City of Tyler (Lake Palestine/Lake Tyler/Carrizo-Wilcox)**
Strategy ID:	**SMTH-MFG**
Strategy Type:	**Existing Surface Water Source**
Potential Supply Quantity:	**84 ac-ft/yr (0.08 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**2030**
Project Capital Cost:	**$6,198,000 (September 2018)**
Annual Cost:	**$545,000**
Unit Water Cost (Rounded):	**$6,488 per ac-ft ($19.91 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 84 ac-ft/yr in 2030 continuing throughout the planning cycle to 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 2021 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 seven 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 (0.05 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 2021 East Texas Regional Water Plan due to the yield generated by the infrastructure required.

WUG:	**Smith County – Manufacturing**				
STRATEGY:	**Purchase from City of Tyler**				
Quantity:	**84** AF/Y			0.11	MGD
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	6 in.	36,960	LF	$25	$939,000
Right of Way Easements Rural (ROW)		36,960	LF	$18	$675,500
Land and Surveying (10%)					$68,000
Engineering and Contingencies (30%)					$282,000
Subtotal of Pipeline					**$1,964,500**
Pump Station(s)					
Pump with intake	5 HP	1	LS	$2,028,000	$2,028,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$710,000
Subtotal of Pump Station(s)					**$2,738,000**
Storage Tank(s)					
Storage Tank	0.05 MG	1	LS	$834,000	$834,000
Engineering and Contingencies (35%)					$292,000
Subtotal of Storage Tank(s)					**$1,126,000**
Permitting and Mitigation					$203,000
Construction Total					**$6,031,500**
Interest During Construction			12	Months	$166,000
TOTAL COST					**$6,198,000**
ANNUAL COSTS					
Debt Service (3.5% for 20 years)					$436,000
Operational Costs*					$109,000
TOTAL ANNUAL COST					**$545,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$6,488
Per 1,000 Gallons					$19.91

UNIT COSTS (After Amortization)

Per Acre-Foot	$1,310
Per 1,000 Gallons	$4.02

* 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 84 ac-ft/yr
Reliability	4	Medium to High
Cost	1	>$5,000/ac-ft (High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	1	No sponsor readily identifiable
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with City of Tyler.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 39. ANRA LAKE COLUMBIA

Project Name:	**Lake Columbia**
Project ID:	**ANRA-COL**
Project Type:	**New Surface Water Source**
Potential Supply Quantity (Rounded):	**75,400 - 75,720 ac-ft/yr (varies) (67.3 - 67.6 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**5-10 years**
Project Capital Cost:	**$402,862,000 (September 2018)**
Annual Cost:	**$23,509,000**
Unit Water Cost (Rounded):	**$311 per ac-ft ($0.95 per 1,000 gallons)**

PROJECT DESCRIPTION

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 this round of planning. Angelina Neches River Authority has been granted a water right permit (Permit No. 4228) by the TCEQ to impound 195,500 ac-ft/yr and to divert 85,507 ac-ft/yr (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/yr 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/yr 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 ac-ft/yr 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 below along with the current participation percentage. Also included below is a table 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/yr)**
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

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 75,720 ac-ft/yr in 2030 and reducing to 75,400 ac-ft/yr 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.

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 measurable effect on the freshwater 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 United States 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 ac-ft/yr) 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 75,720 ac-ft/yr. 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. Overall, this strategy has a high cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WWP NAME: ANRA
STRATEGY: Lake Columbia
AMOUNT (ac-ft/yr): 75,720

Dam	**Cost**
Embankment	$32,037,700
Internal Drainage	$769,107
Slope Protection & Crest Roadway	$5,411,955
Service Spillway	$7,476,287
Outlet Works	$1,532,309
Instrumentation	$812,378
Miscellaneous Items	$6,226,744
Engineering	$8,856,606
Contingencies	$10,853,320
Sub Total for Dam	**$73,976,406**
Transportation Conflicts	
Roads	$3,850,237
Highways	$42,063,937
Railroads	$35,612,042
Erosion Protection	$5,183,911
Engineering	$13,603,352
Contingencies	$17,341,977
Subtotal for Transportation Conflicts	**$117,655,457**
Utility Conflicts	
Communications	$3,158,631
Electric Utilities	$18,945,279
Oil and Gas	$4,735,054
Water Utilities	$199,961
Engineering	$81,117
Contingencies	$5,407,737
Subtotal for Utility Conflicts	**$32,527,778**
Project Site Acquisition	
Property Purchase	$28,698,031
Conservation Easement	$2,079,519

Survey and Appraisal	$1,627,287
Professional Fees	$944,721
Engineering	$1,024,994
Contingencies	$6,669,936
Sub Total for Project Site Acquisition	**$41,044,488**
Mitigation	
Mitigation	$107,357,398
Contingencies	$9,098,150
Sub Total for Mitigation	**$116,455,548**
Cultural Resources	
Archeological/Historical Resources	$17,379,101
Engineering	$347,611
Contingencies	$3,475,868
Sub Total for Cultural Resources	**$21,202,580**
TOTAL CONSTRUCTION COST	**$402,862,000**
ANNUAL COSTS	
Debt Service for Reservoirs (3.5% for 40 years)	$11,832,272
Debt Service for Relocations (3.5% for 20 years)	$10,567,054
Operation & Maintenance	$1,109,600
TOTAL ANNUAL COST	**$23,509,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$311
Per 1,000 Gallons	$0.95
UNIT COSTS (After Amortization)	
Per Acre-Foot	$14.7
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	Meets 75-100% of Shortage. 75,720 ac-ft/yr
Reliability	4	Medium to High
Cost	4	$0 to $500/ac-ft (Low)
Environmental Factors	3	Low Negative Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	3	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		Yes, if Dallas uses the Supplies
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor is identified and committed to strategy. Local sponsorship by ANRA
Implementation Issues	3	Low Implementation Issues. Contract with City of Dallas

REFERENCES

October 2014 Draft Dallas Long Range Water Supply Plan.

2016 East Texas Regional Plan.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 40. ANRA WATER TREATMENT PLANT

Project Name:	**ANRA Treatment Plant and Distribution System**
Project ID:	**ANRA-WTP**
Project Type:	**Existing Surface Water Source**
Potential Supply Quantity (Rounded):	**0 ac-ft/yr (0 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**5 years**
Project Capital Cost:	**$228,001,000 (September 2018)**
Project Annual Cost:	**$49,839,000**
Unit Water Cost (Rounded):	**$2,242 per ac-ft (during loan period) $6.88 per 1,000 gallons**

PROJECT DESCRIPTION

Angelina Nacogdoches 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 this round of regional water planning. Angelina Neches River Authority has been granted a water right permit (Permit No. 4228) by the TCEQ to impound 195,500 ac-ft/yr and to divert 85,507 ac-ft/yr (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/yr 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.

SUPPLY DEVELOPMENT

The cities of Nacogdoches, Jacksonville, and Rusk are assumed to purchase raw water from Lake Columbia and develop their own raw water transmission and treatment facilities. Most of the municipal water users (and current customers of Angelina Neches River Authority) in Cherokee, Rusk, and Smith Counties will be purchasing treated water from Angelina Neches River Authority. Costs for water treatment and transmission system are shared among currently contracted entities that are assumed to buy treated water from Angelina Neches River Authority. This project will not provide any additional raw water, and therefore, has a supply of 0 ac-ft/yr. Instead, the strategy will provide treatment capacity for 22,232 ac-ft/yr of raw water 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 3.5% 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. Overall, this strategy has a high cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WWP NAME: **ANRA**
STRATEGY: **Regional Water Treatment Facilities**
Quantity: **22,232 AF/Y** 30 MGD Peak

CONSTRUCTION COSTS

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Segment A: WTP to Troup	30 in.	57,771	LF	$197	$11,374,000
Segment B: Troup to Arp	12 in.	36,610	LF	$68	$2,500,000
Segment C: Troup to Whitehouse & Jackson WSC	24 in.	40,879	LF	$154	$6,296,000
Segment D: Arp to New London & Blackjack WSC	8 in.	42,398	LF	$40	$1,683,000
Segment E: WTP to New Summerfield	18 in.	1,916	LF	$111	$213,000
Pipeline Segments Subtotal					$22,066,000
Right of Way Easements Rural (ROW)		179,573	LF	$30	$5,391,500
Land and Surveying (10%)					$539,150
Engineering and Contingencies (30%)					$6,620,000
Subtotal of Pipeline					**$34,616,650**
Pump Station(s)					
Pump with intake & building	3157 HP	2	LS	$37,283,000	$74,566,000
Engineering and Contingencies (35%)					$26,098,100
Subtotal of Pump Station(s)					**$100,664,100**
Water Treatment Plant	30 MGD	1	LS	$61,736,000	$61,736,000
Storage Tanks	3.7 MG	1	LS	$1,715,865	$1,716,000
Engineering and Contingencies (35%)					$22,208,200
Subtotal					**$85,660,200**

Permitting and Mitigation			$957,746
Construction Total			**$221,898,696**
Interest During Construction	12 Months		$6,102,000
TOTAL COST			**$228,001,000**

ANNUAL COSTS			
Debt Service (3.5% for 20 years)			$16,042,000
Electricity ($0.08 kWh)			$1,149,000
Operational Costs*			$33,797,300
Raw Water Purchase	1000 gal	$1.00	$7,244,000
Treatment	1000 gal	$3.00	$21,733,000
TOTAL ANNUAL COST			**$49,839,000**

UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$2,242
Per 1,000 Gallons	$6.88

UNIT COSTS (After Amortization)	
Per Acre-Foot	$1,520
Per 1,000 Gallons	$4.67

* 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	Meets 75-100% of Shortage. Enables usage of 22,232 ac-ft/yr of raw water from Lake Columbia
Reliability	4	Medium to High
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor is identified and committed to strategy. Local sponsorship by ANRA
Implementation Issues	3	Low Implementation Issues. Dependent on Lake Columbia Construction

REFERENCES

2016 East Texas Regional Plan

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 41. ANRA GROUNDWATER WELLS

Project Name:	**ANRA Groundwater Wells**
Project ID:	**ANRA-GW**
Project Type:	**New Groundwater Source**
Potential Supply Quantity (Rounded):	**4,500 - 5,600 ac-ft/yr (4 - 5 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**3 years**
Project Capital Cost:	**$29,775,000 (September 2018)**
Annual Cost:	**$3,185,000**
Unit Water Cost (Rounded):	**$569 per ac-ft ($1.75 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. Angelina Neches River Authority will develop approximately 5,600 ac-ft/yr. The supply will reduce to 4,500 ac-ft/yr by 2070 due to lack of water availability in the Carrizo-Wilcox Aquifer.

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 constructing new wells, transmission system and storage is included below. The annual costs were estimated assuming 3.5% interest rate over a period of 20 years. Overall, this strategy has a medium cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WWP: 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	**Quantity**	**Unit**	**Unit Cost**	**Total Cost**
Water Wells	18	EA	$559,437	$10,069,861
Connection to Transmission System	18	EA	$50,000	$900,000
Engineering and Contingencies (30% for pipelines, 35% for other items)				$3,794,000
Subtotal of Well(s)				**$14,763,861**

Transmission System	**Size**	**Quantity**	**Unit**	**Unit Cost**	**Total Cost**
Pipeline - Rural	24 in.	26,400	LF	$154	$4,066,000
Pump Station	890 HP	1	EA	$5,450,000	$5,450,000
Ground Storage Tank	0.63 MG	1	EA	$630,505	$630,505
Easement - Rural		26,400	LF	$18	$482,500
Land and Surveying Rural (10%)					$48,250
Engineering and Contingencies (30% for pipelines, 35% for other items)					$3,348,000
Subtotal for Transmission		**5**	**miles**		**14,025,255**

Permitting and Mitigation				$189,000
Construction Total				**$28,978,116**
Interest During Construction	12	Months		$797,000
TOTAL CAPITAL COST				**$29,775,000**

ANNUAL COSTS	
Debt Service (3.5% for 20 years)	$2,095,000
Operational Costs*	$1,090,490
TOTAL ANNUAL COST	**$3,185,000**

UNIT COSTS (Until Amortized)	
Cost per ac-ft	$569
Cost per 1000 gallons	$1.75

UNIT COSTS (After Amortization)	
Cost per ac-ft	$195
Cost per 1000 gallons	$0.60

* 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	Meets 75-100% of Shortage. 5,600 ac-ft/yr
Reliability	3	Medium
Cost	3	
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor is identified and committed to strategy. Local Sponsorship by ANRA
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with Angelina Neches River Authority.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 42. 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/yr (27 MGD)**
Implementation Decade:	**2020**
Development Timeline:	**5 years**
Project Capital Cost:	**N/A**
Annual Cost:	**N/A**
Unit Water Cost (Rounded):	**N/A**

PROJECT DESCRIPTION

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/yr 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/yr of run-of-the-river supplies in Cherokee County for a total project supply of 30,000 ac-ft/yr for ANRA. 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	5,474	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	27,659	28,351	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/yr and will monitor the application status for the current permit for run-of-river supplies of 10,000 ac-ft/yr.

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. Environmental flow needs were considered for in calculation of the supply yield through the use of the TCEQ WAM Run 3 scenario, which includes Senate Bill 3 environmental flow criteria.

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	Meets 75-100% of Shortage. 30,000 ac-ft/yr (Permit Application for 10,000 ac-ft/yr already administratively complete, 20,000 ac-ft/yr new run-of-river supplies)
Reliability	3	Medium
Cost	5	No Cost (Other than Administrative and Lawyer Fees)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor is identified and committed to strategy. Local sponsorship by ANRA
Implementation Issues	4	Low Implementation Issues

REFERENCES

2016 East Texas Regional Water Plan.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 43. AN WCID#1 HYDRAULIC DREDGING

Project Name:	**Hydraulic Dredging (Volumetric Survey and Normal Pool Elevation Adjustment)**
Project ID:	**ANCD-VOL**
Project Type:	**Existing Surface Water Source**
Potential Supply Quantity (Rounded):	**5,600 ac-ft/yr (5 MGD)**
Implementation Decade:	**2040**
Development Timeline:	**5 years**
Project Capital Cost:	**$23,716,000**
Unit Water Cost (Rounded):	**$476 per ac-ft $1.46 per 1,000 gal**

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. 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. The timing for the volumetric surveys and potential normal pool elevation adjustment is 2040.

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 5,600 ac-ft/yr.

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

The process for volumetric survey and 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. 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	-	NA
Reliability	3	Medium
Cost	5	No Cost
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor is identified and committed to strategy. Local sponsorship by AN WCID#1
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with Angelina Nacogdoches WCID #1.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 44. 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/yr (2.6 MGD)**
Implementation Decade:	**2020**
Development Timeline:	**2020**
Project Capital Cost:	**$0 (September 2018)**
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 ac-ft/yr 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/yr 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 ac-ft/yr 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 2,872 ac-ft/yr
Reliability	4	Medium to High
Cost	5	No Cost (Other than Administrative and Lawyer Fees)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor is identified and committed to strategy. Local sponsorship by Athens MWA
Implementation Issues	3	Low Implementation Issues. Requires agreement with Fish Hatcheries

REFERENCES

2016 East Texas Regional Water Plan.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 45. ATHENS MWA NEW GROUNDWATER WELLS

Water User Group Name:	**Athens MWA - Additional Carrizo-Wilcox Groundwater**
Strategy Name:	**New Wells in Carrizo-Wilcox Aquifer (Region C)**
Strategy ID:	**AMWA-AGW**
Strategy Type:	**New Groundwater Source**
Potential Supply Quantity:	**2,000 ac-ft/yr (varies) (1.78 MGD)**
Implementation Decade:	**2060**
Development Timeline:	**2060**
Project Capital Cost:	**$15,151,000 (September 2018)**
Annual Cost:	**$1,885,000 per ac-ft**
Unit Water Cost (Rounded):	**$943 per ac-ft ($ 2.89 per 1,000 gallons)**

PROJECT DESCRIPTION

Athens MWA is currently pursuing developing groundwater from the Carrizo-Wilcox aquifer on property near Lake Athens. It is anticipated that 17 new wells (with a capacity of 250 gallons per minute each) will be drilled to provide around 1.78 MGD of groundwater supply. The water would be transported directly from the well field to the distribution system. It should be noted that although Athens MWA has permits to develop the wells, this strategy cannot be included in the 2021 Regional Plan as a recommended strategy because of the MAG limitations.

SUPPLY DEVELOPMENT

Current use in the Carrizo-Wilcox aquifer in Henderson County (both in Region C and I) is near the MAG for the county. The strategy will be changed to a recommended strategy when the MAG volumes are updated in the near future. Currently there is an unmet need of 5,567 ac-ft/yr in 2070 for Athens MWA. Since this is a primary strategy for Athens MWA, the 2021 Regional Plan will show shortages for Athens MWA, which in reality will be addressed by the well field development.

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. Overall, this strategy has a medium cost compared to other strategies in the 2021 East Texas Regional Water Plan.

Cost Estimate Summary
Water Supply Project Option
September 2018 Prices
Athens - New Well(s) in Carrizo-Wilcox Aquifer

Cost based on ENR CCI 11170.28 for September 2018 and a PPI of 201.9 for September 2018

Item	*Estimated Costs for Facilities*
CAPITAL COSTS	
Transmission Pipeline (16 in dia., 5 miles)	$2,551,000
Primary Pump Stations (3.6 MGD)	$50,000
Well Fields (Wells, Pumps, and Piping)	$8,025,000
Disinfection Facilities (3.6 MGD)	$225,000
TOTAL COST OF FACILITIES	**$10,851,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$3,670,000
Environmental & Archaeology Studies and Mitigation	$312,000
Land Acquisition and Surveying (36 acres)	$112,000
Interest During Construction (3% for 0.5 years with a 0.5% ROI)	$206,000
TOTAL COST OF PROJECT	**$15,151,000**
ANNUAL COSTS	
Debt Service (3.5 percent, 20 years)	$1,066,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$106,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$1,000
Disinfection Facilities	$135,000
Pumping Energy Costs (1097876 kW-hr @ 0.08 $/kW-hr)	$88,000
Purchase of Water (2000 ac-ft/yr @ 244.38825 $/ac-ft)	$489,000
TOTAL ANNUAL COST	**$1,885,000**
Available Project Yield (ac-ft/yr)	2,000
Annual Cost of Water ($ per ac-ft), based on PF=2	$943
Annual Cost of Water After Debt Service ($ per ac-ft), based on PF=2	$410
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$2.89
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$1.26

PROJECT EVALUATION

The recommended strategy for infrastructure improvements was evaluated across eleven different criteria for the purpose of quick comparison against projects incorporated into the 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 2,000 ac-ft/yr
Reliability	2	Low to Medium. Not reliable because of MAG overallocation
Cost	3	$500 to $1,000/ac-ft (Medium)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor is identified and committed to strategy. Local sponsorship by the City of Athens
Implementation Issues	1	High Implementation Issues. Supply from this strategy reaches or exceeds MAG limits for Henderson County in Regions C and I

REFERENCES

Discussions with Region C.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 46. ATHENS MWA EXPANDED GROUNDWATER SUPPLY

Water User Group Name:	**Athens MWA**
Strategy Name:	**Expanded Groundwater Supply**
Strategy ID:	**AMWA-GWE**
Strategy Type:	**New Groundwater Source**
Potential Supply Quantity:	**200 ac-ft/yr (0.18 MGD)**
Implementation Decade:	**2020**
Development Timeline:	**2020**
Project Capital Cost:	**$2,573,000 (September 2018)**
Annual Cost:	**$218,000 per ac-ft**
Unit Water Cost (Rounded):	**$1,090 per ac-ft ($3.35 per 1,000 gallons)**

PROJECT DESCRIPTION

This strategy is a recommended 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. The water would be transported directly from the well field to the distribution system. The Carrizo Wilcox in Henderson County (both in Region C and I) is severely limited by its availability for additional wells.

SUPPLY DEVELOPMENT

The City of Athens and Athens MWA are considering increasing the groundwater supply capacity that pumps directly into their distribution system. This strategy consists of developing infrastructure to increase this groundwater supply, including a new well (with a capacity of 250 gallons per minute), ground storage tank, and booster pump station.

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. Overall, this strategy has a medium cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WWP:	**Athens MWA**				
WMS:	**Groundwater Supply Expansion**				
Supply:	**200**	Ac-ft/yr		250	gpm

Construction Costs	**Size**	**Quantity**	**Unit Cost**	**Total Cost**
New Well	250 gpm	1	$500,000	$500,000
Booster Pump Station, Connection to Distribution System		1	$128,000	$128,000
Ground Storage Tank	0.30 MG	1	$565,000	$565,000
Contingencies (35%)				$418,000
Subtotal of Well, Pump Station, and Storage Tank				**$1,611,000**
Construction Allowance (5%)				$80,550
Mobilization (5%)				$84,578
Overhead and Profit (18%)				$320,000
Construction Total				**$2,096,000**
Professional Services/Engineering, Construction (20%)				$419,000
Interest During Construction		12	Months	$58,000
TOTAL CAPITAL COST				**$2,573,000**
ANNUAL COSTS				
Debt Service (3.5% for 20 years)				$181,000
Operational Costs*				$36,600
Disinfection	65,170	$0.30	per 1000 gal	$19,600
TOTAL ANNUAL COST				**$218,000**
UNIT COSTS (First 30 Years)				
Cost per ac-ft				$1,090
Cost per 1000 gallons				$3.35
UNIT COSTS (After 30 Years)				
Cost per ac-ft				$183
Cost per 1000 gallons				$0.56

* 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 projects incorporated into the 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 200 ac-ft/yr
Reliability	4	Medium to High
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor is identified and committed to strategy. Local sponsorship by Athens MWA
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with Athens Municipal Water Authority.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 47. ATHENS BOOSTER PUMP STATION

Water User Group Name:	**Athens MWA**
Alternative Strategy Name:	**WTP Booster PS Improvement**
Alternative Strategy ID:	**AMWA-BSI**
Alternative Strategy Type:	**Existing Surface Water Source**
Potential Supply Quantity:	**450 ac-ft/yr (0.4 MGD)**
Implementation Decade:	**2020**
Development Timeline:	**2020**
Project Capital Cost:	**$65,000 (September 2018)**
Annual Cost:	**$57,000 per ac-ft**
Unit Water Cost (Rounded):	**$127 per ac-ft ($0.39 per 1,000 gallons)**

PROJECT DESCRIPTION

This strategy is an alternative 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 alternative 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. Overall, this strategy has a low cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WWP:	**Athens MWA**			
WMS:	**Booster PS Improvements at WTP**			
Amount	450	Ac-ft/yr	0.60	MGD

Construction Costs	**Size**	**Quantity**	**Unit Cost**	**Total Cost**
Pump Replacement at WTP	1600 gpm	1	$30,000	$30,000
Contingencies (35%)				$11,000
Subtotal of Well(s)				**$41,000**
Construction Allowance (5%)				$2,000
Mobilization (5%)				$2,000
Overhead and Profit (18%)				$8,000
Construction Total				**$53,000**
Professional Services/Engineering, Construction (20%)				$11,000
Interest During Construction		12	Months	$1,000
TOTAL CAPITAL COST				**$65,000**
ANNUAL COSTS				
Debt Service (3.5% for 20 years)				$5,000
Operational Costs*				$52,000
TOTAL ANNUAL COST				**$57,000**
UNIT COSTS (First 30 Years)				
Cost per ac-ft				$127
Cost per 1000 gallons				$0.39
UNIT COSTS (After 30 Years)				
Cost per ac-ft				$116
Cost per 1000 gallons				$0.36

* 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

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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 450 ac-ft/yr
Reliability	4	Medium to High
Cost	4	$0 to $500/ac-ft (Low)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	5	Sponsor is identified and strategy is in development. Local sponsorship by Athens MWA
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with Athens Municipal Water Authority.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 48. CITY OF BEAUMONT CONTRACT AMENDMENT

Water User Group Name:	**Jefferson - Beaumont**
Strategy Name:	**Amendment to Supplemental Contract with LNVA**
Strategy ID:	**JEFF-BEA**
Strategy Type:	**Existing Surface Water Source**
Potential Supply Quantity:	**228 - 2,249 ac-ft/yr (varies) (0.05 - 2.01 MGD)**
Implementation Decade:	**2060**
Development Timeline:	**2060**
Project Capital Cost:	**$0 (September 2018)**
Annual Cost:	**$2,199,000**
Unit Water Cost (Rounded):	**$977 per ac-ft ($3.00 per 1,000 gallons)**

PROJECT DESCRIPTION

This strategy is a recommended strategy for the City of Beaumont in Jefferson County and involves an amendment to an existing supplement contract between the City and the Lower Neches Valley Authority for additional water supply. Beginning in 2040, the City of Beaumont will have an additional need of 1,248 ac-ft/yr. The City's need increases each decade of the planning cycle, with a maximum need of 9,218 ac-ft/yr in 2070. The City of Beaumont already has in place existing infrastructure and transmission lines for their existing supply from the Lower Neches Valley Authority. Therefore, the only cost for additional supply from the Lower Neches Valley Authority is the cost of raw water. Ultimately, this cost will need to be negotiated with the Lower Neches Valley Authority 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 Lower Neches Valley Authority currently supplies approximately 3,000 ac-ft/yr to meet the City of Beaumont's demands in Jefferson County. The quantity of supply from this strategy represents a contract increase of 1,248 ac-ft/yr, beginning in 2040, and increases to 9,218 ac-ft/yr, beginning in 2070. In 2040 through 2070, the supply is limited to the municipal need projected by the East Texas Regional Water Planning Group. These supplies are considered highly reliable.

ENVIRONMENTAL CONSIDERATIONS

There are not any significant environmental considerations associated with this strategy. A contract between the City of Beaumont 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. As there is no new infrastructure required for this strategy, there will be no impacts to bays or estuaries in close proximity to the City of Beaumont.

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 medium cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WUG:	**City of Beaumont**		
STRATEGY:	**Amendment to Supplemental Contract with LNVA**		
Raw Water Quantity:	**2,249** AF/Y	3.01 MGD	

ANNUAL CONTRACT COSTS	
ANNUAL COSTS	
Operational Costs*	**$2,199,000**

UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$978
Per 1,000 Gallons	$3.00

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 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 Beaumont 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 2,249 ac-ft/yr
Reliability	4	Medium to High
Cost	3	$500 to $1,000/ac-ft (Medium)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor is identified and committed to strategy. Local sponsorship by the City of Beaumont
Implementation Issues	4	Low Implementation Issues

REFERENCES

2016 East Texas Regional Water Plan.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 49. 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):	**1,121 ac-ft/yr (1 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**5 years**
Project Capital Cost:	**$2,456,000 (September 2018)**
Project Annual Cost:	**$262,000**
Unit Water Cost (Rounded):	**$234 per ac-ft (during loan period) $0.72 per 1,000 gallons.**

PROJECT DESCRIPTION

City of Center owns water rights for supplies in Lake Center and Pinkston Reservoir. 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 City has already received wastewater discharge permits necessary to allow alternative discharge of current flow for this reuse project. The portion of the project remaining is final design, funding, and construction with no land acquisition anticipated. The total capacity for the indirect reuse project will be approximately 1 MGD (1,121 ac-ft/yr) and the project will be online in 2030.

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. Overall, this strategy has a medium cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WWP NAME: **City of Center**
STRATEGY: **Pipeline from East Bank WWTP to Lake Center**
Quantity: **1,121** AF/Y 1.50 MGD

CAPITAL COSTS					
Pipeline to Lake Nacogdoches	**Size**	**Qty**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	10 in.	30,188	LF	$31	$945,000
Pipeline Urban	10 in.	500	LF	$44	$22,000
Engineering and Contingencies (30%)					$290,000
Subtotal of Pipeline					**$1,257,000**
Pump Station(s)					
Pump with intake & building	98 HP	1	LS	$827,000	$827,000
Engineering and Contingencies (35%)					$289,450
Subtotal of Pump Station(s)					**$1,116,450**
Construction Total					**$2,373,000**
Interest During Construction			12	Months	$83,000
TOTAL COST					**$2,456,000**

ANNUAL COSTS	
Debt Service (5.5% for 20 years)	$206,000
Electricity ($0.09 kWh)	$25,000
Operational Costs*	$56,000
TOTAL ANNUAL COST	**$262,000**

UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$234
Per 1,000 Gallons	$0.72

UNIT COSTS (After Amortization)	
Per Acre-Foot	$50
Per 1,000 Gallons	$0.15

* 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 1,121 ac-ft/yr 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 1,121 ac-ft/yr
Reliability	4	Medium to High
Cost	4	$0 to $500/ac-ft (low)
Environmental Factors	3	Low Negative Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	3	Low Negative Impacts. Impact of the return flows on the quality of the receiving bodies
Political Feasibility	4	Sponsor is identified and committed to strategy. Local sponsorship by the City of Center
Implementation Issues	4	Low Implementation Issues

REFERENCES

October 2020 correspondence with the City of Center.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 50. 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/yr (5 MGD)**
Implementation Decade:	**2040**
Development Timeline:	**5 years**
Project Capital Cost:	**$27,865,000 (September 2018)**
Project Annual Cost:	**$3,462,000**
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. The feasibility study for this project is ongoing as construction of this new pipeline is awaiting a demand trigger for design and construction to proceed. For planning purposes, it is assumed that the pipeline will be delivering approximately 2 MGD (2,242 ac-ft/yr).

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. Overall, this strategy has a high cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WWP NAME: **City of Center**
STRATEGY: **Pipeline from Toledo Bend to Lake Center**
Quantity: **2,242** AF/Y 3.00 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	$2,839,000
Engineering and Contingencies (30%)					$1,736,000
Subtotal of Pipeline	**19**	**Miles**			**$10,361,000**
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	$127,000	$127,000
Engineering and Contingencies (35%)					$1,105,000
Subtotal of Pump Station(s)					**$4,006,000**
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					$530,000
Construction Total					**$26,048,000**
Interest During Construction			24	Months	$1,817,000
TOTAL COST					**$27,865,000**

ANNUAL COSTS

Debt Service (5.5% for 20 years)	$2,324,000
Operational Costs*	$1,138,000
TOTAL ANNUAL COST	**$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	$508
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

The addition of the additional 2,242 ac-ft/yr 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 2,242 ac-ft/yr.
Reliability	4	Medium to High
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	3	Low Negative Impacts. Minor impact of the addition of raw water on the quality of the receiving bodies
Political Feasibility	4	Sponsor is identified and committed to strategy. Local sponsorship by the City of Center
Implementation Issues	4	Low Implementation Issues

REFERENCES

October 2020 correspondence with the City of Center.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 51. CITY OF CENTER VOLUMETRIC SURVEYS

Project Name:	**Volumetric Surveys of Lake Center and Pinkston Reservoir**
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 water management strategy. City of Center is considering a recommended strategy to conduct volumetric survey of Lake Center and Pinkston Reservoir to develop an accurate estimate of the lake yields. Based on the volumetric survey report, subsequent dredging may be required to increase the lake yields of the two bodies of water. City of Center will coordinate with TWDB to get on a schedule for the lake volumetric survey. TWDB will charge a fixed fee for conducting volumetric surveys.

SUPPLY DEVELOPMENT

There may be some potential for additional yield at Pinkston Reservoir, 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.

COST ANALYSIS

No cost was 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 Pinkston Reservoir 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity		NA
Reliability	4	Medium to High
Cost	4	$0 to $500/ac-ft (Low)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor is identified and committed to strategy. Local sponsorship by the City of Center
Implementation Issues	4	Low Implementation Issues

REFERENCES

2016 East Texas Regional Water Plan. October 2020 correspondence with the City of Center.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 52. 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/yr (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/yr from Houston County Lake in addition to the 3,500 ac-ft/yr included in their existing permit.

SUPPLY DEVELOPMENT

Houston County WCID #1 was originally permitted for 7,000 ac-ft/yr from Houston County Lake; in 1987, this supply was reduced by the Texas Commission on Environmental Quality (TCEQ) to 3,500 ac-ft/yr. 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/yr, 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. Environmental flow needs were considered for in calculation of the supply yield through the use of the TCEQ WAM Run 3 scenario, which includes Senate Bill 3 environmental flow criteria. 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 3,500 ac-ft/yr
Reliability	3	Medium
Cost	5	No Cost (Other than Administrative and Lawyer Fees)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor is identified and committed to strategy. Local sponsorship by Houston County WCID #1
Implementation Issues	4	Low Implementation Issues

REFERENCES

2016 East Texas Regional Water Plan.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 53. 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**
Alternative Strategy Type:	**New Groundwater Source**
Potential Supply Quantity:	**3,500 ac-ft/yr (3.1 MGD)**
Implementation Decade:	**2020**
Development Timeline:	**2020**
Project Capital Cost:	**$22,793,000**
Annual Cost:	**$1,827,000 per ac-ft**
Unit Water Cost (Rounded):	**$522 per ac-ft ($1.60 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/yr from Houston County Lake (Strategy ID: HCWC-PA).

SUPPLY DEVELOPMENT

It is assumed that each well will have a maximum yield of 500 ac-ft/yr to meet both municipal and non-municipal demands in Houston County providing a total strategy yield of 3,500 ac-ft/yr 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 $709 per acre-foot ($2.17 per 1,000 gallons); after the infrastructure if fully paid for (30 years), the cost drops to $201 per acre-foot ($0.62 per 1,000 gallons). Overall, this strategy has a low cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WUG: Houston County WCID #1
STRATEGY: Cherokee County - GW Wells

Supply	3,500	Ac-ft/yr	2,170	gpm
Well Depth	820	ft		
Wells Needed	19			

CAPITAL COSTS	
Water Wells (19 wells)	$9,122,807
Connection to Transmission System	$950,000
Transmission Pipeline (20 in., 15,128 LF)	$1,898,000
Pump Station (3.12 MGD)	$3,122,000
Ground Storage Tank (0.78 MG)	$689,481
Easement – Rural (15,840 LF)	$304,150
TOTAL COST OF FACILITIES	**$16,086,438**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$5,381,000
Permitting and Mitigation	$137,629
Interest During Construction (3% for 1 years with a 0.5% ROI)	$1,188,000
TOTAL COST OF PROJECT	**$22,793,000**
ANNUAL COSTS	
Debt Service (3.5 percent, 20 years)	$1,604,000
Operation and Maintenance	$223,000
TOTAL ANNUAL COST	**$1,827,000**
Available Project Yield (ac-ft/yr)	3.500
Annual Cost of Water ($ per ac-ft), based on PF=1.2	$522
Annual Cost of Water After Debt Service ($ per ac-ft), based on PF=1.2	$1.60
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.2	$201
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.2	$0.62

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 2021 East Texas Regional

Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 3,500 ac-ft/yr
Reliability	3	Medium
Cost	3	$500 to $1,000/ac-ft (Medium)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor is identified and committed to strategy. Local sponsorship by Houston County WCID #1
Implementation Issues	4	Low Implementation Issues. Dependent on HC WCID #1 permit amendment application and the TCEQ

REFERENCES

2016 East Texas Regional Water Plan.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 54. CITY OF JACKSONVILLE SUPPLY FROM LAKE COLUMBIA

Project Name:	**Supply from Lake Columbia**
Project ID:	**JACK-COL**
Project Type:	**Existing Surface Water Source**
Potential Supply Quantity (Rounded):	**1,700 ac-ft/yr (3 MGD)**
Implementation Decade:	**2040**
Development Timeline:	**5 years**
Project Capital Cost:	**$29,390,000 (September 2018)**
Project Annual Cost:	**$3,150,000**
Unit Water Cost (Rounded):	**$1,853 per ac-ft (during loan period)** **$5.69 (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 ac-ft/yr (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 3.5% interest rate and 20 years of return period. The estimate includes the cost for the purchase of raw water from Angelina Neches River Authority. Overall, this strategy has a medium cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WWP NAME: **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	12 in.	23,544	LF	$68	$1,608,000
Pipeline Urban	12 in.	3,000	LF	$87	$262,000
Right of Way Easements Rural (ROW)		23,544	LF	$18	$430,000
Right of Way Easements Urban (ROW)		3,000	LF	$108	$325,000
Land and Surveying Rural (10%)					$43,000
Land and Surveying Urban (10%)					$33,000
Engineering and Contingencies (30%)					$561,000
Subtotal of Pipeline					**$3,262,000**
Pump Station(s)					
Pump with intake & building	100 HP	1	LS	$4,315,000	$4,315,000
Storage Tanks	0.28 MG	1	EA	$502,000	$502,000
Engineering and Contingencies (35%)					$1,686,000
Subtotal of Pump Station(s)					**$6,503,000**
Water Treatment Facility					
New Water Treatment Plant	3 MGD	1	LS	$13,837,000	$13,837,000
Engineering and Contingencies (35%)					$4,842,950
Subtotal of WTP					**$18,679,950**
Permitting and Mitigation					$158,231
Construction Total					**$28,603,000**
Interest During Construction			12	Months	$787,000
TOTAL COST					**$29,390,000**

ANNUAL COSTS

Debt Service (3.5% for 20 years)	$2,068,000
Operational Costs*	$1,082,000
TOTAL ANNUAL COST	**$3,150,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot of treated water	$1,853
Per 1,000 Gallons	$5.69

UNIT COSTS (After Amortization)

Per Acre-Foot	$636
Per 1,000 Gallons	$1.95

* 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	Meets 75-100% of Shortage. 1,700 ac-ft/yr
Reliability	4	Medium to High
Cost	2	$1,000 to $5,000/ac-ft (Medium-High)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor is identified and committed to strategy. Local sponsorship by the City of Jacksonville
Implementation Issues	3	Low Implementation Issues. Dependent on the completion of Lake Columbia construction

REFERENCES

2016 East Texas Regional Water Plan.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 55. 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/yr (178.4 MGD)**
Implementation Decade:	**2040**
Development Timeline:	**2040**
Project Capital Cost:	**$529,606,000 (September 2018)**
Annual Cost:	**$110,157,000**
Unit Water Cost (Rounded):	**$551 per ac-ft ($1.69 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/yr 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 3.5% for 20 years and 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 2021 East Texas Regional Water Plan.

WWP: **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**	**Qty**	**Unit**	**Unit Price**	**Cost**
Pipeline/Canal Rural	144 in.	158,400	LF	$1,806	$286,117,000
Right of Way Easements Rural (ROW)		158,400	LF	$30	$4,755,800
Land and Surveying (10%)					$475,580
Engineering and Contingencies (30%)					$85,835,000
Subtotal of Pipeline/Canal	**30**	**miles**			**$377,183,380**
Pump Station(s)					
Pump with intake	3150 HP	1	LS	$37,274,000	$37,274,000
Booster Pump Station	3150 HP	2	LS	$18,002,000	$36,004,000
Engineering and Contingencies (35%)					$25,647,300
Subtotal of Pump Station(s)					**$98,925,300**
Storage Tank(s)					
Storage Tanks	7.0 MG	3	LS	$3,037,231	$9,111,694
Engineering and Contingencies (35%)					$3,189,093
Subtotal of Storage Tank(s)					**$12,300,787**
Permitting and Mitigation					$834,000
Construction Total					**$489,243,467**
Interest During Construction			36	Months	$40,363,000
TOTAL CAPITAL COST					**$529,606,000**
ANNUAL COSTS					
Debt Service (3.5% for 20 years)					$37,264,000
Operational Costs*					$72,893,000
TOTAL ANNUAL COST					**$110,157,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot of treated water	$551
Per 1,000 Gallons	$1.69

UNIT COSTS (After Amortization)

Per Acre-Foot	$364
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 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 200,000 ac-ft/yr
Reliability	4	Medium to High
Cost	3	$500 to $1,000/ac-ft (Medium)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor is identified and committed to strategy. Local sponsorship by Lower Neches Valley Authority
Implementation Issues	3	Low Implementation Issues. Contract with SRA

REFERENCES

2016 East Texas Regional Water Plan.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 56. LNVA BEAUMONT WEST REGIONAL RESERVOIR

Water User Group Name:	**Lower Neches Valley Authority**
Strategy Name:	**Beaumont West Regional Reservoir**
Strategy ID:	**LNVA-WRR**
Strategy Type:	**New Surface Water Source**
Potential Supply Quantity:	**7,700 ac-ft/yr (6.9 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**5 Years**
Project Capital Cost:	**$37,538,000 (September 2018)**
Project Annual Cost:	**$1,970,00**
Unit Water Cost (Rounded):	**$256 per ac-ft ($0.79 per 1,000 gallons)**

PROJECT DESCRIPTION

This recommended strategy involves the construction of an approximate 1,100-acre reservoir on the northwest end of Beaumont. In addition, the location of the reservoir provides a significant advantage to provide water in case of an emergency fire water demand, source pollution in the Neches River or Pine Island Bayou, or losses of either of the Lower Neches Valley Authority pumping stations in severe events, such as what occurred during Hurricane Harvey.

SUPPLY DEVELOPMENT

The reservoir is anticipated to have an approximate capacity of 7,700 acre-feet, which is equivalent to approximately three (3) weeks of water supply to meet municipal and industrial demands downstream. This reservoir is located so that stored water can be sent to all industrial and municipal customers on the LNVA system.

ENVIRONMENTAL CONSIDERATIONS

With the construction of any new reservoir several environmental impacts will be considered. A summary of environmental considerations would be developed based on the known environmental factors such as habitat and aquatic resources for threatened or endangered species within surrounding the reservoir footprint. Environmental flow considerations and how the construction of a reservoir effects the surrounding hydrologic environment is also a consideration. Environmental flow needs were considered for in the calculation of the supply yield through the use of the TCEQ WAM Run 3 scenario, which includes Senate Bill 3 environmental flow criteria.

PERMITTING AND DEVELOPMENT

If this strategy is implemented, the Lower Neches Valley Authority will need a water rights permit as well as a 404 permit before construction can begin.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for the construction of a new reservoir for this strategy includes costs from all aspects of planning to design to construction. Overall, this strategy has a high cost compared to other strategies in the 2021 East Texas Regional Water Plan due to the yield generated by the infrastructure required.

WWP:	**Lower Neches Valley Authority**			
STRATEGY:	**Beaumont West Regional Reservoir**			
Raw Water Quantity	**7,700** acre-feet	2,509	MG	
RESERVOIR STORAGE CAPACITY (1 day of storage = 2,509 MG)				

PROJECT COSTS			**Cost**
Planning			$350,000
Design			$1,700,000
Real Estate			$9,000,000
Environmental			$150,000
Permitting			$150,000
Construction			$13,800,000
Engineering and Contingencies (30%)			$7,545,000
TOTAL COST			**$33,000,000**
Interest During Construction	60	Months	$4,538,000
TOTAL CAPITAL COST			**$37,538,000**

ANNUAL COSTS	
Debt Service (3.5% for 40 years)	$1,758,000
Operational Costs*	$212,000
TOTAL ANNUAL COST	**$1,970,000**

UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$256
Per 1,000 Gallons	$0.79

UNIT COSTS (After Amortization)	
Per Acre-Foot	$28
Per 1,000 Gallons	$0.08

* 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

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. The strategy 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 7,700 ac-ft/yr
Reliability	5	High
Cost	4	$0 to $500/ac-ft (Low)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor is identified and committed to strategy. Local sponsorship by Lower Neches Valley Authority
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with the Lower Neches Valley Authority.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 57. LNVA NECHES-TRINITY BASIN INTERCONNECT

Water User Group Name:	**Lower Neches Valley Authority**
Strategy Name:	**Neches-Trinity Basin Interconnect**
Strategy ID:	**LNVA-RGH**
Strategy Type:	**Existing Surface Water Source**
Potential Supply Quantity:	**67,000 ac-ft/yr (60 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**5 Years**
Project Capital Cost:	**$102,375,000 (September 2018)**
Project Annual Cost:	**$8,907,000**
Unit Water Cost (Rounded):	**$133 per ac-ft ($0.41 per 1,000 gallons)**

PROJECT DESCRIPTION

The Lower Neches Valley Authority is planning to construct an approximate 13 mile, single 84-inch pipeline that runs in an east-west direction, as well as a 62,000 gpm pump station. The proposed pipeline enables the movement of Neches River water westward toward the upper reaches of the Devers Canal system and potentially back into the Trinity River. The water from this strategy will enable LNVA to provide water for irrigation customers in Region H, as well as to serve new industries as they emerge along the IH-10 corridor.

SUPPLY DEVELOPMENT

The purpose of this water management strategy is to allow the Lower Neches Valley Authority to divert existing supply to areas with greater water need and plan for water needs in areas of future development.

ENVIRONMENTAL CONSIDERATIONS

The pipeline construction is expected to be have a moderate impact to the environment, the route would be chosen as to minimize impacts. In addition, the transport of water towards the Devers Canal system 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 may need to perform additional studies to identify environmental impacts associated with the project.

PERMITTING AND DEVELOPMENT

The Lower Neches Valley Authority may need to apply for a bed and banks permit to put supplies in the Devers Canal system and possibly the Trinity River.

PLANNING LEVEL OPINION OF COST

Included below is a planning level opinion of cost (PLOC) for the interconnect pipeline and pump station for the Lower Neches Valley Authority. Overall, this strategy has a high cost compared to other strategies in the 2021 East Texas Regional Water Plan due to the yield generated by the infrastructure required.

WWP:	**Lower Neches Valley Authority**			
STRATEGY:	**Neches-Trinity Basin Interconnect**			
Raw Water Quantity:	**67,000** AF/Y	89.7	MGD	

PROJECT COSTS				**Cost**
Planning				$1,500,000
Design				$6,800,000
Real Estate				$3,500,000
Environmental				$2,000,000
Permitting				$2,000,000
Construction	13-mile 84" pipeline, 62,000 gpm pump station			$53,500,000
Engineering and Contingencies (30%)				$20,790,000
TOTAL COST				**$90,000,000**
Interest During Construction		60	Months	$12,375,000
TOTAL CAPITAL COST				**$102,375,000**

ANNUAL COSTS	
Debt Service (3.5% for 20 years)	$7,203,000
Operational Costs*	$1,704,000
TOTAL ANNUAL COST	**$8,907,000**

UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$133
Per 1,000 Gallons	$0.41

UNIT COSTS (After Amortization)	
Per Acre-Foot	$25
Per 1,000 Gallons	$0.08

* 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

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.

Based on the analyses provided above, the Lower Neches Valley Authority recommended strategy for an interconnect was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 67,000 ac-ft/yr
Reliability	5	High
Cost	4	$0 to $500/ac-ft (Low)
Environmental Factors	3	Low Negative Impacts
Impact on Other State Water Resources	3	Low Negative Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		Yes
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	3	Low Negative Impacts
Political Feasibility	4	Sponsor is identified and committed to strategy. Local sponsorship by Lower Neches Valley Authority
Implementation Issues	4	Low Implementation Issues

REFERENCES

Discussions with the Lower Neches Valley Authority.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 58. CITY OF LUFKIN CONVEYANCE

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:	**11,210 - 28,000 ac-ft/yr (10 - 25 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**2030-2050**
Project Capital Cost:	**Phase 1: $78,220,000** **Phase 2: $78,199,000** **Phase 3: $8,834,000 (September 2018)**
Annual Cost:	**Phase 1: $14,413,000** **Phase 2: $27,911,000** **Phase 3: $25,722,000**
Unit Water Cost (Rounded):	**Phase 1: $1,286 per ac-ft ($3.95 per 1,000 gallons)** **Phase 2: $1,255 per ac-ft ($3.85 per 1,000 gallons)** **Phase 3: $919 per ac-ft ($2.82 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/yr. 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/yr (10 MGD), 22,420 ac-ft/yr (20 MGD) in 2040, and 28,000 ac-ft/yr (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 3.5% 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 2021 East Texas Regional Water Plan.

WWP NAME:	**Lufkin**				
STRATEGY:	**Develop Water from Sam Rayburn**				
Water Quantity	**28,000** AF/Y			37.5 MGD	
PHASE 1 - 2030 DECADE		**Total Capacity (ac-ft/yr)**			**11,210**
Treated Water Quantity	**11,210** AF/Y		**15** MGD		
Pipeline & Treatment Facility	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline from Sam Rayburn	30 in.	65,500	LF	$197	$12,896,000
Right of Way Easements Rural (ROW)		65,500	LF	$30	$1,967,000
Land and Surveying (10%)					$197,000
Engineering and Contingencies (30%)					$3,869,000
Subtotal of Pipeline	**12.4**	**Miles**			**$18,929,000**
Pump Station(s)					
Lake Intake and Pump Station	900 HP	1	LS	$17,465,000	$17,465,000
Engineering and Contingencies (35%)					$6,113,000
Subtotal of Pump Station(s)					**$23,578,000**
Water Treatment Facility					
Storage	5.00 MG	1	EA	$2,282,000	$2,282,000
Water Treatment Facility	10 MGD	1	LS	$20,886,000	$20,886,000
Engineering and Contingencies (35%)					$8,108,800
Subtotal of WTP					**$31,277,000**

Permitting and Mitigation				$358,133
Construction Total				**$74,142,000**
Interest During Construction		24	Months	$4,078,000
PHASE I TOTAL CAPITAL COST				**$78,220,000**
ANNUAL COSTS				
Debt Service (3.5% for 20 years)				$5,504,000
Debt Service from Previous Phase				$0
Electricity ($0.08 kWh)				$229,000
Operational Costs*				$5,027,000
Raw Water Treatment	3,653,000	1000 gal	$1.00	$3,653,000
TOTAL ANNUAL COST				**$14,413,000**
UNIT COSTS (Until Amortized)				
Per Acre-Foot of treated water				$1,286
Per 1,000 Gallons				$3.95
UNIT COSTS (After Amortization)				
Per Acre-Foot				$795
Per 1,000 Gallons				$2.44

* 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/yr)**			**22,240**
Treated Water Quantity	**11,210**	AF/Y		**15**	MGD
Expand Treated Water Supply	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline from Sam Rayburn	30 in.	65,500	LF	$197	$12,896,000
Right of Way Easements Rural (ROW)		65,500	LF	$30	$1,967,000
Land and Surveying (10%)					$197,000
Engineering and Contingencies (30%)					$3,869,000
Subtotal of Pipeline	**12.4**	**Miles**			**$0**
Upgrades to Pump Stations					
Lake Intake and Pump Station	900 HP	1	LS	$17,465,000	$17,465,000
Engineering and Contingencies (35%)					$6,112,750
Subtotal of Pump Station(s)					**$23,577,750**
Water Treatment Facility					
Storage	0.00 MG	0	EA	$0	$0
Upgrade Treatment Facility	22 MGD	1	LS	$37,162,000	$37,162,000
Engineering and Contingencies (35%)					$13,006,700
Subtotal of WTP					**$50,168,700**
Permitting and Mitigation					$375,066
Construction Total					**$74,122,000**
Interest During Construction			24	Months	$4,077,000
PHASE 2 TOTAL CAPITAL COST					**$78,199,000**
ANNUAL COSTS					
Debt Service (3.5% for 20 years)					$5,502,000
Debt Service from Previous Phase					$5,504,000
Electricity ($0.08 kWh)					$458,000
Operational Costs*					$9,200,000
Raw Water Treatment		7,248,000	1000 gal	$1.00	$7,247,000
TOTAL ANNUAL COST					**$27,911,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$1,255
Per 1,000 Gallons					$3.85
UNIT COSTS (After Amortization)					
Per Acre-Foot					$760
Per 1,000 Gallons					$2.33

* 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/yr)**			**28,000**
Treated Water Quantity	**5,580**	AF/Y		**7**	MGD
Expand Pump Stations	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline from Sam Rayburn	30 in.	65,500	LF	$197	$12,896,000
Right of Way Easements Rural (ROW)		65,500	LF	$30	$1,967,000
Land and Surveying (10%)					$197,000
Engineering and Contingencies (30%)					$3,869,000
Subtotal of Pipeline	**12.4**	**Miles**			**$0**
Pump Station(s)					
Lake Intake and Pump Station	200 HP	1	LS	$5,958,000	$5,958,000
Engineering and Contingencies (35%)					$2,085,300
Subtotal of Pump Station(s)					**$8,043,300**
Water Treatment Facility					
Storage	0.00 MG	0	EA	$0	$0
Water Treatment Facility	0 MGD	0	LS	$0	$0
Engineering and Contingencies (35%)					$0
Subtotal of WTP					**$0**
Permitting and Mitigation					$330,133
Construction Total					**$8,373,000**
Interest During Construction			24	Months	$461,000
PHASE 3 TOTAL CAPITAL COST					**$8,834,000**
ANNUAL COSTS					
Debt Service (3.5% for 20 years)					$622,000
Debt Service from Previous Phase					$5,502,000
Electricity ($0.08 kWh)					$536,000
Operational Costs*					$9,938,000
Raw Water Treatment		9,125,000	1000 gal	$1.00	$9,124,000
TOTAL ANNUAL COST					**$25,722,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$919
Per 1,000 Gallons					$2.82

UNIT COSTS (After Amortization)

Per Acre-Foot	$700
Per 1,000 Gallons	$2.15

* 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 2021 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	Meets 75-100% of Shortage. 28,000 ac-ft/yr
Reliability	4	Medium to High
Cost	3	$500 to $1,000/ac-ft
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor is identified and committed to strategy. Local sponsorship by the City of Lufkin
Implementation Issues	4	Low Implementation Issues

REFERENCES

2016 East Texas Regional Water Plan.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 59. CITY OF 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):	**8,551 ac-ft/yr (7.6 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**2 years**
Project Capital Cost:	**$50,754,000 (September 2018)**
Project Annual Cost:	**$6,739,000**
Unit Water Cost (Rounded):	**$788 per ac-ft (during loan period) $2.42 (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 8,551 ac-ft/yr (7.6 MGD). It is assumed that the transmission strategy will be developed for a potential supply of 8,551 ac-ft/yr. 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. The transmission system cost estimate also includes the cost of 324 HP intake pump station and a 12 MGD water treatment plant for treating the raw water. The annual costs are calculated assuming 3.5% interest rate and 20 years of return period. The estimate includes the cost for the purchase of raw water from Angelina Neches River Authority. Overall, this strategy has a high cost compared to other strategies in the 2021 East Texas Regional Water Plan.

WWP NAME: **Nacogdoches**
STRATEGY: **Lake Columbia Transmission System**
Quantity: **8,551** AF/Y 11.44 MGD

CAPITAL COSTS					
Pipeline to Lake Nacogdoches	**Size**	**Qty**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	30 in.	18,117	LF	$197	$3,567,000
Right of Way Easements Rural (ROW)		18,117	LF	$30	$544,000
Land and Surveying (10%)					$54,000
Engineering and Contingencies (30%)					$1,070,000
Subtotal of Pipeline					**$5,235,000**
Pump Station(s)					
Pump with intake & building	324 HP	1	LS	$7,991,000	$7,991,000
Engineering and Contingencies (35%)					$2,797,000
Subtotal of Pump Station(s)					**$10,788,000**
Water Treatment Facility					
Expand Existing Water Treatment Plant	12 MGD	1	LS	$22,731,000	$22,731,000
Storage Tanks	1.43 MG	1	LS	$934,000	$934,000
Engineering and Contingencies (35%)					$8,283,000
Subtotal of WTP					**$31,948,000**
Permitting and Mitigation					$136,665
Construction Total					**$48,108,000**
Interest During Construction			24	Months	$2,646,000
TOTAL COST					**$50,754,000**

ANNUAL COSTS	
Debt Service (3.5% for 20 years)	$3,571,000
Operational Costs*	$3,168,000
TOTAL ANNUAL COST	**$6,739,000**

UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$788
Per 1,000 Gallons	$2.42

UNIT COSTS (After Amortization)	
Per Acre-Foot	$370
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

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	Meets 75-100% of Shortage. 8,551 ac-ft/yr
Reliability	4	Medium to High
Cost	3	$500 to $1,000/ac-ft (Medium)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	4	Sponsor is identified and committed to strategy. Local sponsorship by the City of Nacogdoches
Implementation Issues	3	Low Implementation Issues. Dependent on the completion of Lake Columbia project

REFERENCES

2016 East Texas Regional Water Plan

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 60. 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/yr (15 MGD)**
Implementation Decade:	**2030**
Development Timeline:	**1 years**
Project Capital Cost:	**$111,190,000 (September 2018)**
Project Annual Cost:	**$15,385,000**
Unit Water Cost (Rounded):	**$915 per ac-ft (during loan period) $2.81 (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 Texas, 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 2021 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/yr 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.

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 3.5% 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 2021 East Texas Regional Water Plan.

WWP NAME: **City of Tyler**
STRATEGY: **Lake Palestine Expansion**
Quantity: **16,815** AF/Y 30 MGD

CAPITAL COSTS

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	42 in.	23,400	LF	$283	$6,613,000
Pipeline Urban	42 in.	3,000	LF	$370	$1,109,000
Right of Way Easements Rural (ROW)		23,400	LF	$30	$703,000
Right of Way Easements Urban (ROW)		3,000	LF	$180	$540,000
Land and Surveying Rural (10%)					$70,000
Land and Surveying Urban (10%)					$54,000
Engineering and Contingencies (30%)					$2,317,000
Subtotal of Pipeline		**5**	**mile**		**$11,406,000**
Pump Station(s)					
Ground Storage Tanks	2 MG	1	LS	$1,102,000	$1,102,000
Booster Pump Station	1400 HP	1	LS	$8,357,000	$8,357,000
Engineering and Contingencies (35%)					$3,311,000
Subtotal of Pump Station(s)					**$12,770,000**
Water Treatment Facility					
Expand Water Treatment Plant	30 MGD	1	LS	$62,137,000	$62,137,000
Engineering and Contingencies (35%)					$21,748,000
Subtotal of WTP					**$83,885,000**
Permitting and Mitigation					$153,000
Construction Total					**$108,214,000**
Interest During Construction			12	Months	$2,976,000
TOTAL COST					**$111,190,000**

ANNUAL COSTS

Debt Service (3.5% for 20 years)			$7,823,000
Electricity ($0.08 kWh)			$216,000
Operational Costs*			$7,562,000
Raw Water Purchase	1000 gal	$1.00	$5,479,000
TOTAL ANNUAL COST			**$15,385,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot of treated water	$915
Per 1,000 Gallons	$2.81

UNIT COSTS (After Amortization)

Per Acre-Foot	$788
Per 1,000 Gallons	$2.42

* 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 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	Meets 75-100% of Shortage. 16,815 ac-ft/yr
Reliability	4	Medium to High
Cost	3	$500 to $1,000/ac-ft (Medium)
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	3	Sponsor is identified and committed to strategy. Local sponsorship by the City of Tyler
Implementation Issues	4	Low Implementation Issues

REFERENCES

2016 East Texas Regional Water Plan.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 61. UNRMWA NECHES RUN-OF-RIVER WITH LAKE PALESTINE

WMS Name:	**Run of River, Neches with Lake Palestine**
WMS Project ID:	**UNM-LP**
WMS Type:	**New Surface Water Source**
Potential Supply Quantity (Rounded):	**68,625 ac-ft/yr (61.2 MGD)**
Implementation Decade:	**2020**
Development Timeline:	**2-4 years**
Strategy Capital Cost:	**$518,977,000 (September 2018)**
Strategy Annual Cost:	**$47,246,000**
Unit Water Cost (Rounded):	**$688 per ac-ft (during loan period) $2.11 (per 1,000 gallons)**

STRATEGY DESCRIPTION

The Upper Neches River Municipal Water Authority (UNRMWA) owns and operates the Lake Palestine system in the Neches River Basin. Upper Neches River Municipal Water Authority has a water right for 238,110 ac-ft/yr from Lake Palestine and a downstream run-of-river diversion. City of Palestine, City of Tyler, and City of Dallas have contracts for supplies from Lake Palestine for amounts of 28,000 ac-ft/yr, 67,200 ac-ft/yr, and 114,337 ac-ft/yr, respectively. After supplying the contracted amounts to these three contracted customers, Upper Neches River Municipal Water Authority is expected to have 28,573 ac-ft/yr available to supply to other entities in ETRWPA.

Based on current contracts and the available supplies from the Neches Basin WAM, the UNRMWA shows a small shortage during the planning period for Lake Palestine supplies. UNRMWA does not think the shortages to be real as the shortage is primarily associated with the reduced firm yield of Lake Palestine due to projected sediment accumulation in the lake. UNRMWA believes that the storage-area-elevation curves used in the Water Availability Models are severely under-predicting the storage volumes available in various parts of the lake. UNRMWA believes that the sedimentation studies did not perform a thorough evaluation of the storage volumes of the lake and left out major portions of the lake without surveying as there were access issues. Therefore, UNRMWA believes that the lake yield is much larger than what is projected by the Water Availability Models.

To address the shortages for the planning period UNRMWA has evaluated multiple potentially feasible WMSs and have various recommendation for the 2021 ETRWPA Regional Plan. UNRMWA and City of Dallas are considering development of a water supply project from the run-of-river diversions on Upper Neches River and using Lake Palestine, tributary storage, and/or groundwater as system resources. 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*.

STRATEGY DEVELOPMENT

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. Run-of-river diversions with a 108-inch transmission pipeline and a pump station capacity of 317 cfs was selected as the recommended transmission system to yield 68,625 ac-ft/yr of firm yield at Lake Palestine. It should be noted that the project configuration for the recommended WMS for UNRMWA in the 2021 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/yr (42 MGD) that is projected to meet Dallas needs starting 2070. A project configuration with a larger firm yield was recommended in ETRWPA Regional Plan so as to meet the projected needs for City of Dallas, shortages for UNRMWA associated with reduced Lake Palestine yield due to sedimentation, and needs for other potential customers in ETRWPA. For regional planning purposes, the WMS is expected to be online in 2020 to address the shortages projected for the current contracted customers for Lake Palestine and potential steam electric power customers in Anderson County. The WMS timing can be changed to a later date if the timing of needs for the current contracted customers and steam-electric power customers changes. City of Dallas is expected to use their share of supplies from this WMS starting in 2060.

SUPPLY DEVELOPMENT

Availability of the Run-of-River supplies was determined using the Neches Basin Water Availability Model and reported in the 2015 Report *Upper Neches River Water Supply Project Feasibility Study.* Environmental flow needs were considered through the use of the TCEQ WAM Run 3 scenario, which includes Senate Bill 3 environmental flow criteria, as the basis for the calculation of yield for the Run-of-River supplies.

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 2015 Report *Upper Neches River Water Supply Project Feasibility Study.* Additional details of the cost estimates can be obtained from the report.

PROJECT 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	Meets 75-100% of Shortage. 68,625 ac-ft/yr
Reliability	4	Medium to High
Cost	3	$500 to $1,000/ac-ft (Medium)
Environmental Factors	3	Low Negative Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	3	Sponsor identified; commitment level uncertain. Local sponsorship by UNRMWA
Implementation Issues	2	Medium High Implementation Issues. 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.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 62. UNRMWA NECHES RUN-OF-RIVER WITH TRIBUTARY STORAGE

WMS Name:	**Run of River, Neches with Tributary Storage**
Alternative WMS Project ID:	**UNM-TS**
Alternative WMS Type:	**New Surface Water Source**
Alternative Potential Supply Quantity (Rounded):	**75,000 ac-ft/yr (67 MGD)**
Implementation Decade:	**2020**
Development Timeline:	**2-4 years**
Strategy Capital Cost:	**$404,497,000 (September 2018)**
Strategy Annual Cost:	**$26,598,000**
Unit Water Cost (Rounded):	**$355 per ac-ft (during loan period)** **$1.09 (per 1,000 gallons)**

STRATEGY DESCRIPTION

The Upper Neches River Municipal Water Authority (UNRMWA) owns and operates the Lake Palestine system in the Neches River Basin. Upper Neches River Municipal Water Authority has a water right for 238,110 ac-ft/yr from Lake Palestine and a downstream run-of-river diversion. City of Palestine, City of Tyler, and City of Dallas have contracts for supplies from Lake Palestine for amounts of 28,000 ac-ft/yr, 67,200 ac-ft/yr, and 114,337 ac-ft/yr, respectively. After supplying the contracted amounts to these three contracted customers, Upper Neches River Municipal Water Authority is expected to have 28,573 ac-ft/yr available to supply to other entities in ETRWPA.

Based on current contracts and the available supplies from the Neches Basin WAM, the UNRMWA shows a small shortage during the planning period for Lake Palestine supplies. UNRMWA does not think the shortages to be real as the shortage is primarily associated with the reduced firm yield of Lake Palestine due to projected sediment accumulation in the lake. UNRMWA believes that the storage-area-elevation curves used in the Water Availability Models are severely under-predicting the storage volumes available in various parts of the lake. Therefore, UNRMWA believes that the lake yield is much larger than what is projected by the Water Availability Models.

To address the shortages for the planning period UNRMWA has evaluated multiple potentially feasible WMSs and have various recommendation for the 2021 ETRWPA Regional Plan. UNRMWA and City of Dallas are considering development of a water supply project from the run-of-river diversions on Upper Neches River and using Lake Palestine, tributary storage, and/or groundwater as system resources. Using the run-of-river diversions operated as a system with Lake Palestine is the alternative 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*.

STRATEGY DEVELOPMENT

The first alternative strategy for UNRMWA 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. 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. The alternative infrastructure combinations for this WMS can provide a firm yield of 75,000 ac-ft/yr (67 MGD).

SUPPLY DEVELOPMENT

Availability of the Run-of-River supplies was determined using the Neches Basin Water Availability Model and reported in the 2015 Report *Upper Neches River Water Supply Project Feasibility Study.* Environmental flow needs were considered through the use of the TCEQ WAM Run 3 scenario, which includes Senate Bill 3 environmental flow criteria, as the basis for the calculation of yield for the Run-of-River supplies.

PERMITTING AND DEVELOPMENT

The Neches River Run-of-the-River Diversion would require a new water rights permit and an interbasin transfer permit.

ENVIRONMENTAL CONSIDERATIONS

The cost estimates for the Run-of-River strategy were obtained from the 2015 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 with Tributary Storage 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	Meets 75-100% of Shortage. 75,000 ac-ft/yr
Reliability	4	Medium to High
Cost	4	$0 to $500/ac-ft (Low)
Environmental Factors	3	Low Negative Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	3	Sponsor identified; commitment level uncertain. UNRMWA is the local sponsor for this strategy
Implementation Issues	2	Medium High Implementation Issues. Need to secure the run-of-river rights

WATER USER GROUP APPLICATION

The Neches River Run-of-the-River Tributary Storage 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.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 63. UNRMWA NECHES RUN-OF-RIVER WITH GROUNDWATER

WMS Name:	**Run of River, Neches with Groundwater**
Alternative WMS Project ID:	**UNM-GW**
Alternative WMS Type:	**New Surface Water Source**
Alternative Potential Supply Quantity (Rounded):	**84,875 ac-ft/yr (76 MGD)**
Implementation Decade:	**2020**
Development Timeline:	**2-4 years**
Strategy Capital Cost:	**$326,646,000 (September 2018)**
Strategy Annual Cost:	**$38,237,000**
Unit Water Cost (Rounded):	**$451 per ac-ft (during loan period)** **$1.38 (per 1,000 gallons)**

STRATEGY DESCRIPTION

The Upper Neches River Municipal Water Authority (UNRMWA) owns and operates the Lake Palestine system in the Neches River Basin. Upper Neches River Municipal Water Authority has a water right for 238,110 ac-ft/yr from Lake Palestine and a downstream run-of-river diversion. City of Palestine, City of Tyler, and City of Dallas have contracts for supplies from Lake Palestine for amounts of 28,000 ac-ft/yr, 67,200 ac-ft/yr, and 114,337 ac-ft/yr, respectively. After supplying the contracted amounts to these three contracted customers, Upper Neches River Municipal Water Authority is expected to have 28,573 ac-ft/yr available to supply to other entities in ETRWPA.

Based on current contracts and the available supplies from the Neches Basin WAM, the UNRMWA shows a small shortage during the planning period for Lake Palestine supplies. UNRMWA does not think the shortages to be real as the shortage is primarily associated with the reduced firm yield of Lake Palestine due to projected sediment accumulation in the lake. UNRMWA believes that the storage-area-elevation curves used in the Water Availability Models are severely under-predicting the storage volumes available in various parts of the lake. Therefore, UNRMWA believes that the lake yield is much larger than what is projected by the Water Availability Models.

To address the shortages for the planning period UNRMWA has evaluated multiple potentially feasible WMSs and have various recommendation for the 2021 ETRWPA Regional Plan. UNRMWA and City of Dallas are considering development of a water supply project from the run-of-river diversions on Upper Neches River and using Lake Palestine, tributary storage, and/or groundwater as system resources. 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*.

STRATEGY DEVELOPMENT

A conjunctive use WMS is the second proposed alternative strategy for UNRMWA. 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. 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. The recommended infrastructure combinations for this WMS can provide a firm yield of 84,875 ac-ft/yr (76 MGD).

SUPPLY DEVELOPMENT

Availability of the Run-of-River supplies was determined using the Neches Basin Water Availability Model and reported in the 2015 Report *Upper Neches River Water Supply Project Feasibility Study.* Environmental flow needs were considered through the use of the TCEQ WAM Run 3 scenario, which includes Senate Bill 3 environmental flow criteria, as the basis for the calculation of yield for the Run-of-River supplies.

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 2015 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 groundwater supply 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	Meets 75-100% of Shortage. 84,875 ac-ft/yr
Reliability	4	Medium to High
Cost	4	$0 to $500/ac-ft (Low)
Environmental Factors	3	Low Negative Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	3	Sponsor is identified, commitment level uncertain. UNRMWA is the local sponsor for this strategy
Implementation Issues	2	Medium High Implementation Issues. Need to secure groundwater rights

WATER USER GROUP APPLICATION

The groundwater 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.

WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR 64. MUNICIPAL 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:	**Varies, Specific to WUG**
Development Timeline:	**Varies, Specific to WUG**
Project Capital Cost:	**Varies, Specific to WUG**
Annual Cost:	**Varies, Specific to WUG**
Unit Water Cost (Rounded):	**Varies, Specific to WUG**

STRATEGY 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. In addition to this basic and advanced conservation strategies are proposed for the following wholesale water providers with municipal customers. 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.

City of Beaumont. The City is projected to have a water shortage beginning in 2040. In 2011, the City had an average per capita consumption of 217 gpcd, well over the statewide goal of 140 gpcd. The City's per capita consumption reduced over the years to 162 gpcd in 2015. 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 in 2040 and 2050. However, an additional water management strategy is necessary in 2060 and 2070.

City of Port Arthur. 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. Below is a table showing the conservation savings for the municipal water user groups.

ENVIRONMENTAL CONSIDERATIONS, PERMITTING AND DEVELOPMENT

No environmental considerations associated with this strategy. No additional permitting required for this strategy.

WUG	Conservation Amount (Acre-ft/yr)						Capital Costs	Annual Costs	Unit Cost Before Amortization	
	2020	2030	2040	2050	2060	2070			$/ac-ft	$/1000 gal
ALTO	4	6	7	7	9	10	$0	$3,000	$325.58	$1.00
ALTO RURAL WSC	9	16	18	21	25	28	$0	$8,000	$316.24	$0.97
APPLEBY WSC	9	17	20	23	27	32	$0	$9,000	$335.94	$1.03
ARP	2	0	0	0	0	0	$0	$2,000	$1,000.00	$3.07
ATHENS	7	13	16	20	23	27	$786,000	$25,000	$1,155.70	$3.55
BEAUMONT	2,027	3,425	4,202	5,112	6,171	7,382	$60,175,000	$2,076,000	$370.87	$1.14
BLACKJACK WSC	2	3	4	5	5	6	$0	$2,000	$360.00	$1.10
BROWNSBORO	3	0	0	0	0	0	$0	$2,000	$666.67	$2.05
BULLARD	11	22	28	36	44	54	$0	$14,000	$297.44	$0.91
CARTHAGE	23	39	41	44	47	50	$0	$11,000	$266.39	$0.82
CENTER	26	45	52	57	64	70	$0	$11,000	$187.90	$0.58
CHANDLER	9	17	21	26	32	36	$0	$11,000	$361.70	$1.11
CHESTER WSC	2	5	5	5	6	6	$0	$2,000	$413.79	$1.27
COLMESNEIL	4	6	6	7	7	8	$0	$2,000	$315.79	$0.97
COUNTY-OTHER, HOUSTON	2	3	3	4	4	4	$0	$1,000	$300.00	$0.92
COUNTY-OTHER, JEFFERSON	34	0	0	0	0	0	$0	$20,000	$588.24	$1.80
CROCKETT	19	29	30	32	34	36	$0	$11,000	$366.67	$1.13
CRYSTAL SYSTEMS TEXAS	18	38	52	71	92	118	$954,000	$39,000	$471.16	$1.45
CUSHING	10	19	24	30	37	45	$1,030,000	$42,000	$1,083.14	$3.32
CYPRESS CREEK WSC	2	3	3	3	3	4	$0	$1,000	$333.33	$1.02
DEAN WSC	11	18	0	0	0	0	$0	$7,000	$482.76	$1.48
ELKHART	4	6	6	7	7	8	$0	$2,000	$315.79	$0.97
FRANKSTON	4	6	7	7	7	8	$0	$2,000	$307.69	$0.94
GARRISON	4	6	8	9	10	12	$0	$3,000	$285.71	$0.88
HEMPHILL	4	8	7	7	8	8	$0	$2,000	$285.71	$0.88
HENDERSON	83	148	179	235	283	334	$9,900,000	$370,000	$1,430.53	$4.39
JACKSONVILLE	50	85	110	129	152	178	$0	$42,000	$291.19	$0.89

WUG	Conservation Amount (Acre-ft/yr)						Capital Costs	Annual Costs	Unit Cost Before Amortization	
	2020	2030	2040	2050	2060	2070			$/ac-ft	$/1000 gal
JASPER	75	124	141	158	178	196	$15,444,000	$532,000	$3,007.61	$9.23
KILGORE	10	19	21	25	28	32	$0	$8,000	$288.89	$0.89
KIRBYVILLE	6	9	10	11	11	12	$0	$3,000	$305.08	$0.94
LINDALE	7	14	18	23	29	36	$0	$8,000	$259.84	$0.80
LOVELADY	2	3	3	3	4	4	$0	$1,000	$315.79	$0.97
LUFKIN	151	239	273	0	0	0	$0	$60,000	$271.49	$0.83
MT ENTERPRISE WSC	4	8	0	0	0	0	$0	$3,000	$500.00	$1.53
NACOGDOCHES	247	426	532	656	802	966	$27,720,000	$986,000	$1,349.27	$4.14
NEW LONDON	13	22	26	30	36	40	$0	$6,000	$173.65	$0.53
NEWTON	6	10	10	11	12	12	$0	$4,000	$393.44	$1.21
NORWOOD WSC	2	0	0	0	0	0	$0	$1,000	$500.00	$1.53
OVERTON	8	15	18	21	24	28	$0	$7,000	$289.47	$0.89
PALESTINE	81	129	140	150	161	172	$0	$30,000	$212.48	$0.65
PANOLA-BETHANY WSC	0	0	0	0	1	2	$0	$0	$0.00	$0.00
PLEASANT SPRINGS WSC	2	4	5	5	5	6	$0	$2,000	$407.41	$1.25
PORT ARTHUR	2,708	4,449	5,222	6,029	6,844	7,664	$51,618,000	$1,981,000	$295.29	$0.91
RUSK	15	26	30	34	40	46	$0	$14,000	$361.26	$1.11
SAN AUGUSTINE	10	17	18	20	22	23	$2,297,000	$79,000	$3,660.77	$11.23
SAND HILLS WSC	4	8	8	9	10	12	$0	$3,000	$352.94	$1.08
SOUTHERN UTILITIES	514	866	1,058	1,279	1,527	1,803	$33,264,000	$1,249,000	$807.75	$2.48
TATUM	4	8	9	10	12	14	$0	$4,000	$315.79	$0.97
TDCJ BETO GURNEY & POWLEDGE UNITS	16	27	29	30	32	34	$0	$6,000	$208.33	$0.64
TDCJ COFFIELD MICHAEL	44	75	80	85	91	96	$0	$8,000	$101.91	$0.31
TDCJ EASTHAM UNIT	15	25	27	29	30	32	$0	$4,000	$151.90	$0.47
TENAHA	4	6	6	7	8	8	$0	$2,000	$307.69	$0.94
TROUP	6	11	12	14	17	18	$0	$5,000	$320.51	$0.98
TYLER	657	1,101	1,338	1,613	1,924	2,268	$58,766,000	$2,026,000	$1,123.06	$3.45

WUG	Conservation Amount (Acre-ft/yr)						Capital Costs	Annual Costs	Unit Cost Before Amortization	
	2020	2030	2040	2050	2060	2070			$/ac-ft	$/1000 gal
WELLS	2	0	0	0	0	0	$0	$1,000	$500.00	$1.53
WILDWOOD POA	4	6	7	7	8	8	$0	$2,000	$300.00	$0.92
WOODVILLE	17	28	30	32	34	36	$0	$9,000	$305.08	$0.94

COST ANALYSIS

Capital costs were identified for some of the conservation strategies. Table above includes a summary of capital costs, annual costs, and the unit costs for the water users with conservation strategies.

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	Medium to High
Cost	3	Varies, Specific to Entities
Environmental Factors	4	Low Negative Impacts / Some Positive Impacts
Impact on Other State Water Resources	4	Low Negative Impacts / Some Positive Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Negative Impacts / Some Positive Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low Negative Impacts / Some Positive Impacts
Major Impacts on Key Water Quality Parameters	4	Low Negative Impacts / Some Positive Impacts
Political Feasibility	2	Varies, Specific to Entities
Implementation Issues	4	Low Implementation Issues, Limited Risk

REFERENCES

2021 East Texas Regional Water Plan.

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Appendix 5B-B

Quantification of Environmental Impacts of Water Management Strategies and Strategy Evaluation Matrix

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 assessed and assigned a ranking from 1 to 5 to maintain consistency in the scoring process. The ranks were developed based on the range identified in each one of the categories and an attempt to distribute the range into five categories. 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.

In accordance with TAC 357.34 (e)(10), other factors, such as recreational impacts, were considered when evaluating potentially feasible WMSs and associated WMS projects (WMSPs). The ETRWPG did not deem any other factors as relevant for inclusion as a specific criteria in the WMS evaluation rating criteria matrix. However, other factors were considered and evaluated on an individual basis for WMSs and associated WMSPs, and are discussed in greater detail in their technical memoranda, found in Appendix 5B-A.

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	Minimal or No Negative Impacts	High Positive Impacts
Impact on Other State Water Resources	Significant Negative Impacts	Medium Negative Impacts	Low Negative Impacts	Minimal or No Negative Impacts	High Positive Impacts
Threat to Agricultural Resources/Rural Areas	Significant Negative Impacts	Medium Negative Impacts	Low Negative Impacts	Minimal or No Negative Impacts	High Positive Impacts
Interbasin Transfers	Yes/No				
Other Natural Resources	Significant Negative Impacts	Medium Negative Impacts	Low Negative Impacts	Minimal or No Negative Impacts	High Positive Impacts
Major Impacts on Key Water Quality Parameters	Significant Negative Impacts	Medium Negative Impacts	Low Negative Impacts	Minimal or No Negative 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	Medium Implementation Issues	Low Implementation Issues	Low to No Implementation Issues

Quantification of Environmental Impacts of Water Management Strategies and Strategy Evaluation Matrix

Table 5B-B.3 – ETRWPA WMS Evaluation Matrix Rankings for Recommended and Alternative Water Management Strategies (Alternative strategies are identified in italics)

											Impacts of Strategy on:							
	County	Entity	Basin Used	Strategy	Strategy Key	Quantity (Ac-Ft/Yr)	Quantity	Reliability	Cost ($/Ac-Ft)	Cost	Environmental Factors	Water Resources and Other WMS	Agricultural Resources/ Rural Areas	Interbasin Transfers	Other Natural Resources	Key Water Quality Parameters	Political Feasibility	Implementation Issues
#	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	Angelina	Manufacturing	Neches	Purchase from Lufkin	ANGL-MFG	1,625	4	5	$326	4	4	4	4	No	4	4	1	4
2	Angelina	Mining	Neches	Purchase from ANRA	ANGL-MIN	572	4	3	$2,177	2	4	4	4	No	4	4	4	4
3	Cherokee	Alto Rural WSC	Neches	New wells in Carrizo-Wilcox Aquifer	CHER-ALT	191	4	4	$1,058	2	4	4	4	No	4	4	3	4
4	Cherokee	Rusk	Neches	New wells in Carrizo-Wilcox Aquifer	CHER-RUS	122	4	4	$1,574	2	4	4	4	No	4	4	3	4
5	Cherokee	Wright City WSC	Neches	New wells in Carrizo-Wilcox Aquifer	CHER-WCW	121	4	4	$1,574	2	4	4	4	No	4	4	3	4
6	Cherokee	Mining	Neches	Purchase from ANRA	CHER-MIN	247	4	4	$3,453	2	4	4	4	No	4	4	4	4
7	Henderson	Edom-WSC	Neches	New wells in Carrizo-Wilcox Aquifer	HDSN-EDOM	9	4	4	$2,125	2	4	4	4	No	4	4	3	4
8	Henderson	Chandler	Neches	New wells in Carrizo-Wilcox Aquifer	HDSN-CHN	101	4	4	$1,119	2	4	4	4	No	4	4	3	4
9	Henderson	Moore Station WSC	Neches	New wells in Carrizo-Wilcox Aquifer	HDSN-MSW	111	4	4	$1,045	2	4	4	4	No	4	4	3	4
10	Henderson	Mining	Neches	New wells in Carrizo-Wilcox Aquifer	HDSN-MIN	19	4	4	$789	3	4	4	4	No	4	4	1	4
11	Houston	Livestock	Neches	New wells in Yegua-Jackson Aquifer	HOUS-LTK	201	4	4	$194	4	4	4	5	No	4	4	1	4
12	Jasper	Livestock	Neches	Purchase from LNVA	JASP-LTK	8,932	4	4	$326	4	4	4	5	No	4	4	1	4
13	Jefferson	County-Other	Neches	Purchase from LNVA	JEFF-CTR	1,950	4	4	$1,232	2	4	4	4	No	4	4	1	4
14	Jefferson	Manufacturing	Neches	Purchase from LNVA	JEFF-MFG	143,513	4	4	$485	3	4	4	4	No	4	4	1	4
15	Jefferson	Steam Electric Power	Neches	Purchase from LNVA	JEFF-SEP	2,391	4	4	$1,449	2	4	4	4	No	4	4	1	4
16	Nacogdoches	County-Other	Neches	Lake Naconiche Regional Water System	NACN-LK	1,700	4	4	$3,155	2	4	4	4	No	4	4	1	4
17	Nacogdoches	D & M WSC	Neches	New wells in Carrizo-Wilcox Aquifer	NACW-DMW	374	4	4	$997	3	4	4	4	No	4	4	2	4
18	Nacogdoches	Livestock	Neches	New wells in Carrizo-Wilcox Aquifer	NACW-LTK	9,113	4	4	$296	4	4	4	4	No	4	4	1	4
19	Nacogdoches	Mining	Neches	Purchase from ANRA	NACW-MIN	2,975	4	3	$1,398	2	4	4	4	No	4	4	4	4
20	Newton	Mining	Neches	Purchase from SRA	NEWT-MIN	115	4	4	$965	3	4	4	4	No	4	4	1	4
21	Orange	Irrigation	Sabine	Purchase from SRA	ORAN-IRR	526	4	4	$2,576	2	4	4	5	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)																			
											Impacts of Strategy on:								
	County	Entity	Basin Used	Strategy	Strategy Key	Quantity (Ac-Ft/Yr)	Quantity	Reliability	Cost ($/Ac-Ft)	Cost	Environmental Factors	Water Resources and Other WMS	Agricultural Resources/ Rural Areas	Interbasin Transfers	Other Natural Resources	Key Water Quality Parameters	Political Feasibility	Implementation Issues
#	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)
22	Panola	Livestock	Sabine	New wells in Carrizo-Wilcox Aquifer	PANL-LTK	982	4	4	$124	4	4	4	5	No	4	4	1	4
23	Rusk	Jacobs WSC	Sabine	New wells in Carrizo Wilcox Aquifer	RUSK-JAW	22	4	3	$6,364	1	4	4	4	No	4	4	4	4
24	Rusk	Livestock	Sabine	New wells in Carrizo Wilcox Aquifer	RUSK-LTK	83	4	3	$289	4	4	4	5	No	4	4	1	4
25	Rusk	Mining	Neches	Purchase from ANRA	RUSK-MIN	305	4	3	$4,233	2	4	4	4	No	4	4	4	4
26	Rusk	Steam Electric Power	Neches	Purchase from SRA	RUSK-SEP	1,103	4	4	$2,534	2	4	4	4	No	4	4	1	4
27	San Augustin	San Augustine	Neches	New wells in Carrizo Wilcox Aquifer	SAUG-SAG	120	4	4	$838	3	4	4	4	No	4	4	4	4
28	San Augustine	Livestock	Neches	Purchase from SRA	SAUG-LTK	2,349	4	4	$1,754	2	4	4	5	No	4	4	1	4
29	San Augustine	Mining	Neches	Purchase from ANRA	SAUG-MIN	1,102	4	4	$3,549	2	4	4	4	No	4	4	4	4
30	Shelby	Sand Hills WSC	Neches	Purchase from Center	SHEL-SHW	105	4	4	$971	3	4	4	4	No	4	4	4	4
31	Shelby	Livestock	Sabine	Purchase from SRA	SHEL-LTK	19,006	4	4	$978	3	4	4	5	No	4	4	1	4
32	Smith	Bullard	Neches/ Trinity	Purchase from City of Tyler	SMTH-BLD	1,145	4	4	$1,410	2	4	4	4	No	4	4	3	4
33	Smith	Crystal Systems Texas	Neches/ Trinity	New wells in Carrizo Wilcox Aquifer	SMTH-CYS	538	4	4	$429	4	4	4	4	No	4	4	3	4
34	Smith	Lindale	Neches/ Trinity	New wells in Carrizo Wilcox Aquifer	SMTH-LIN	696	4	4	$370	4	4	4	4	No	4	4	3	4
35	Smith	Overton	Neches/ Trinity	New wells in Carrizo Wilcox Aquifer	SMTH-OVN	416	4	4	$2,034	2	4	4	4	No	4	4	3	4
36	Smith	R P M WSC	Neches/ Trinity	New wells in Carrizo Wilcox Aquifer	RPM-WSC	17	4	4	$1,972	2	4	4	4	No	4	4	3	4
37	Smith	Whitehouse	Neches/ Trinity	New wells in Carrizo Wilcox Aquifer	SMTH-WHIT	257	4	4	$2,868	2	4	4	4	No	4	4	4	4
38	Smith	Manufacturing	Neches/ Trinity	Purchase from City of Tyler	SMTH-MFG	84	4	4	$6,488	1	4	4	4	No	4	4	1	4
39	Angelina	Angelina Neches River Authority	Neches	Lake Columbia	ANRA-COL	75,720	4	4	$311	4	3	4	3	Yes	4	4	4	3

Table 5B-B.3 – ETRWPA WMS Evaluation Matrix Rankings for Recommended and Alternative Water Management Strategies (Alternative strategies are identified in italics)

											Impacts of Strategy on:							
	County	Entity	Basin Used	Strategy	Strategy Key	Quantity (Ac-Ft/Yr)	Quantity	Reliability	Cost ($/Ac-Ft)	Cost	Environmental Factors	Water Resources and Other WMS	Agricultural Resources/ Rural Areas	Interbasin Transfers	Other Natural Resources	Key Water Quality Parameters	Political Feasibility	Implementation Issues
#	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)
40	Angelina	Angelina Neches River Authority	Neches	ANRA Water Treatment Plant and Distribution System	ANRA-WTP	0	4	4	$2,242	2	4	4	4	No	4	4	4	3
41	Angelina	Angelina Neches River Authority	Neches	ANRA Groundwater wells	ANRA-GW	5,600	4	3	$569	3	4	4	4	No	4	4	4	4
42	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
43	Henderson	Angelina Nacogdoches WCID#1	Neches	Volumetric Surveys and Normal Pool Elevation Adjustment of Lake Striker	ANCD-VOL	5,600	-	3	$476	5	4	4	4	No	4	4	4	4
44	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
45	Henderson	Athens MWA	Trinity	Additional Groundwater wells in Carrizo Wilcox	AMWA-AGW	2,000	4	2	$943	3	4	4	4	No	4	4	4	1
46	Henderson	Athens MWA	Trinity	Groundwater Expansion	AMWA-GWE	200	4	4	$1,090	2	4	4	4	No	4	4	4	4
47	Henderson	Athens MWA	Trinity	Pump Station Improvements	AMWA-BSI	450	4	4	$127	4	4	4	4	No	4	4	5	4
48	Jefferson	Beaumont	Neches	Amendment to Contract with LNVA	JEFF-BEA	2,249	4	4	$977	3	4	4	4	No	4	4	4	4
49	Shelby	Center	Sabine	Reuse Pipeline from WWTP to Lake Center	CENT-REU	1,121	4	4	$234	2	3	4	4	No	4	3	4	4
50	Shelby	Center	Sabine	Pipeline from Toledo Bend to Lake Center	CENT-TOL	2,242	4	4	$1,544	2	4	4	4	No	4	3	4	4
51	Shelby	Center	Sabine	Volumetric Surveys of Lake Center and Lake Pinkston	CENT-VOL	--	-		-	4	4	4	4	No	4	4	4	4
52	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
53	*Houston*	*Houston County WCID#1*	*Neches*	*New wells in Carrizo-Wilcox Aquifer*	*HCWC-GW*	*3,500*	*4*	*3*	*$522*	*3*	*4*	*4*	*4*	*No*	*4*	*4*	*4*	*3*
54	Cherokee	Jacksonville	Neches	Supply from Lake Columbia	JACK-COL	1,700	4	4	$1,853	2	4	4	4	No	4	4	4	3
55	Jefferson	Lower Neches Valley Authority	Neches-Trinity	Purchase from SRA	LNVA-SRA	200,000	4	4	$551	3	4	4	4	No	4	4	4	3

Quantification of Environmental Impacts of Water Management Strategies and Strategy Evaluation Matrix

Table 5B-B.3 – ETRWPA WMS Evaluation Matrix Rankings for Recommended and Alternative Water Management Strategies (Alternative strategies are identified in italics)

											Impacts of Strategy on:							
	County	Entity	Basin Used	Strategy	Strategy Key	Quantity (Ac-Ft/Yr)	Quantity	Reliability	Cost ($/Ac-Ft)	Cost	Environmental Factors	Water Resources and Other WMS	Agricultural Resources/ Rural Areas	Interbasin Transfers	Other Natural Resources	Key Water Quality Parameters	Political Feasibility	Implementation Issues
#	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)
56	Jefferson	Lower Neches Valley Authority	Neches-Trinity	Beaumont West Regional Reservoir	LNVA-WRR	7,700	4	5	$256	4	4	4	4	No	4	4	4	4
57	Jefferson	Lower Neches Valley Authority	Neches-Trinity	Neches Trinity Basin Interconnect	LNVA-RGH	67,000	4	5	$133	4	3	3	4	Yes	4	3	4	4
58	Angelina	Lufkin	Neches	Conveyance from Sam Rayburn to Kurth Lake	LUFK-RAY	28,000	4	4	$919	3	4	4	4	No	4	4	4	4
59	Nacogdoches	Nacogdoches	Neches	Lake Columbia to Nacogdoches Raw Water Transmission System	NACP-COL	8,551	4	4	$788	3	4	4	4	No	4	4	4	3
60	Smith	Tyler	Neches	City of Tyler - Lake Palestine Expansion	TYLR-PAL	16,815	4	4	$915	3	4	4	4	No	4	4	3	4
61	Anderson	Upper Neches River Municipal Water Authority	Neches	Neches Run-of-River Diversion, Neches with Lake Palestine	UNM-LP	68,625	4	4	$688	3	3	4	4	No	4	4	3	2
62	*Anderson*	*Upper Neches River Municipal Water Authority*	*Neches*	*Neches Run-of-River Diversion, Neches with Tributary Storage*	*UNM-TS*	*75,000*	*4*	*4*	*$355*	*4*	*3*	*4*	*4*	*No*	*4*	*4*	*3*	*2*
63	*Anderson*	*Upper Neches River Municipal Water Authority*	*Neches*	*Neches Run-of-River Diversion, Neches with Groundwater*	*UNM-GW*	*84,875*	*4*	*4*	*$451*	*4*	*3*	*4*	*4*	*No*	*4*	*4*	*3*	*2*
64	Multiple	Multiple	-	Conservation	WUG-CONS	-	-	4	-	3	4	4	4	No	4	4	2	4

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Appendix 5B-C

Management Supply Factors for Major Water Providers

Regional water plans must present the following data for Major Water Providers (MWPs), in accordance with the following Texas Water Code(s):

a) Projected water demands by planning decade and category of use (31 TAC §357.31(b))
b) Existing water supply analysis by category of use (31 TAC §357.32(g))
c) Water supply needs analysis by category of use (31 TAC §357.33(b))
d) Secondary water needs analysis where demand reduction and direct reuse WMSs are recommended, by MWP and decade (31 TAC §357.33(e))
e) Recommended water management strategies (WMS) and recommended WMS projects, and results of all WMS evaluations (31 TAC §357.35(g)(1))
f) Calculated management supply factor by entity and decade (31 TAC §357.35(g)(2))

The following appendix includes a summary of f) above (management supply factor by entity and decade) for each MWP in the ETRWPA. The other requirements are be addressed in Appendix 4-E.

Management supply factors (MSF) 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.

MSF is calculated as follows for each decade:

$$MSF = \frac{Ve + Vr}{D}$$

Where:

Ve = total volume of all existing supplies associated with a MWP in each decade

Vr = total volume of all decadal recommended WMS supplies associated with a MWP in each decade

D = total identified current water demand volume for a MWP in each decade

Major Water Provider Management Supply Factor by Decade

WWP	2020	2030	2040	2050	2060	2070
ANRA	1.62	1.78	1.55	1.56	1.56	1.10
A-N WCID 1	4.07	3.93	1.84	1.79	1.68	1.53
Athens MWA	1.70	1.62	1.68	1.60	1.20	1.02
Beaumont	1.06	1.09	1.08	1.03	1.00	1.01
Carthage	1.96	1.93	1.91	1.89	1.84	1.82
Center	1.76	1.71	2.25	2.19	2.13	2.08
Houston Co. WCID 1	3.09	3.01	3.01	3.01	3.01	3.00
Jacksonville	1.63	1.54	1.78	1.65	1.53	1.41
LNVA	2.97	3.08	3.56	3.54	3.52	3.51
Lufkin	1.18	2.32	2.30	2.27	2.24	2.22
Nacogdoches	2.33	2.98	2.78	2.57	2.38	2.20
Panola Co. FWSD 1	1.26	1.22	1.21	1.21	1.19	1.14
Port Arthur	1.11	1.17	1.21	1.24	1.27	1.30
SRA	10.63	10.63	10.63	10.63	10.63	10.63
Tyler	1.64	2.18	2.08	1.98	1.87	1.77
UNRMWA	1.27	1.26	1.25	1.24	1.24	1.23

Appendix 5C-A

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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WUG ID	County	WUG Name	Basin	Passive Conservation (acre-feet/year)					
				2020	2030	2040	2050	2060	2070
70	ANDERSON	ANDERSON COUNTY CEDAR CREEK WSC	TRINITY	10	15	18	20	20	20
127	ANDERSON	B B S WSC	TRINITY	14	19	24	27	27	27
128	ANDERSON	B C Y WSC	TRINITY	21	29	35	39	39	39
334	ANDERSON	BRUSHY CREEK WSC	NECHES	23	34	42	46	47	47
334	ANDERSON	BRUSHY CREEK WSC	TRINITY	13	20	24	27	27	27
	ANDERSON	COUNTY-OTHER, ANDERSON	NECHES	6	9	12	13	13	13
	ANDERSON	COUNTY-OTHER, ANDERSON	TRINITY	60	88	109	120	123	123
822	ANDERSON	ELKHART	TRINITY	14	21	26	29	29	29
964	ANDERSON	FOUR PINES WSC	TRINITY	31	43	52	57	58	58
972	ANDERSON	FRANKSTON	NECHES	14	20	25	28	28	28
973	ANDERSON	FRANKSTON RURAL WSC	NECHES	13	19	25	27	27	27
1907	ANDERSON	NECHES WSC	NECHES	15	22	27	30	31	31
1997	ANDERSON	NORWOOD WSC	NECHES	8	12	15	16	16	16
1997	ANDERSON	NORWOOD WSC	TRINITY	1	1	1	1	1	1
2075	ANDERSON	PALESTINE	NECHES	103	152	190	210	213	213
2075	ANDERSON	PALESTINE	TRINITY	97	144	181	199	202	202
2168	ANDERSON	PLEASANT SPRINGS WSC	TRINITY	10	14	18	20	20	20
2528	ANDERSON	SLOCUM WSC	NECHES	24	34	42	45	46	46
2528	ANDERSON	SLOCUM WSC	TRINITY	3	4	4	5	5	5
2681	ANDERSON	TDCJ BETO GURNEY & POWLEDGE UNITS	TRINITY	36	53	65	72	73	73
2683	ANDERSON	TDCJ COFFIELD MICHAEL	TRINITY	51	76	95	104	106	106
2727	ANDERSON	THE CONSOLIDATED WSC	TRINITY	11	16	21	23	23	24
2809	ANDERSON	TUCKER WSC	TRINITY	12	18	21	23	24	24
2901	ANDERSON	WALSTON SPRINGS WSC	NECHES	26	39	47	52	53	53
2901	ANDERSON	WALSTON SPRINGS WSC	TRINITY	10	15	19	21	21	21
75	ANGELINA	ANGELINA WSC	NECHES	35	55	68	73	77	80
454	ANGELINA	CENTRAL WCID OF ANGELINA COUNTY	NECHES	81	105	112	116	122	126
	ANGELINA	COUNTY-OTHER, ANGELINA	NECHES	64	102	128	137	145	150
725	ANGELINA	DIBOLL	NECHES	65	101	130	139	147	152
968	ANGELINA	FOUR WAY SUD	NECHES	43	61	74	85	90	93
1302	ANGELINA	HUDSON WSC	NECHES	86	92	97	102	106	110
1311	ANGELINA	HUNTINGTON	NECHES	26	41	53	61	64	66
1650	ANGELINA	LUFKIN	NECHES	468	716	923	1,056	1,117	1,159
1656	ANGELINA	M & M WSC	NECHES	37	57	72	79	84	87
2178	ANGELINA	POLLOK-REDTOWN WSC	NECHES	18	27	34	39	40	42
2275	ANGELINA	REDLAND WSC	NECHES	32	51	55	59	62	64
2840	ANGELINA	UPPER JASPER COUNTY WATER AUTHORITY	NECHES	1	1	2	2	2	2
3061	ANGELINA	WOODLAWN WSC	NECHES	19	30	38	43	44	46
3089	ANGELINA	ZAVALLA	NECHES	9	14	18	21	21	22
26	CHEROKEE	AFTON GROVE WSC	NECHES	13	20	26	30	34	37
53	CHEROKEE	ALTO	NECHES	14	21	28	33	37	41
54	CHEROKEE	ALTO RURAL WSC	NECHES	41	67	74	83	92	100
232	CHEROKEE	BLACKJACK WSC	NECHES	8	14	16	20	22	24
346	CHEROKEE	BULLARD	NECHES	1	1	1	1	1	1
	CHEROKEE	COUNTY-OTHER, CHEROKEE	NECHES	20	32	42	52	59	64
598	CHEROKEE	CRAFT TURNEY WSC	NECHES	58	93	123	146	163	177
1111	CHEROKEE	GUM CREEK WSC	NECHES	13	22	28	33	36	40
1353	CHEROKEE	JACKSONVILLE	NECHES	196	307	404	482	535	586
1923	CHEROKEE	NEW SUMMERFIELD	NECHES	11	17	22	26	29	31
1952	CHEROKEE	NORTH CHEROKEE WSC	NECHES	47	70	92	109	121	132
2178	CHEROKEE	POLLOK-REDTOWN WSC	NECHES	2	3	3	4	3	3
2383	CHEROKEE	RUSK	NECHES	64	100	130	155	172	188
2384	CHEROKEE	RUSK RURAL WSC	NECHES	32	49	64	76	85	93
2561	CHEROKEE	SOUTH RUSK COUNTY WSC	NECHES	1	1	1	1	2	2
2573	CHEROKEE	SOUTHERN UTILITIES	NECHES	44	67	89	104	115	125
2806	CHEROKEE	TROUP	NECHES	1	2	2	2	3	3
2928	CHEROKEE	WELLS	NECHES	10	15	20	24	27	29
2947	CHEROKEE	WEST JACKSONVILLE WSC	NECHES	13	20	25	29	32	35
3071	CHEROKEE	WRIGHT CITY WSC	NECHES	6	9	12	14	15	17
	HARDIN	COUNTY-OTHER, HARDIN	NECHES	68	99	125	129	131	132
	HARDIN	COUNTY-OTHER, HARDIN	TRINITY	1	2	2	2	2	2
1140	HARDIN	HARDIN COUNTY WCID 1	NECHES	14	22	28	31	33	34
1456	HARDIN	KOUNTZE	NECHES	22	32	41	45	45	46
1500	HARDIN	LAKE LIVINGSTON WSC	TRINITY	1	1	2	2	2	2
1652	HARDIN	LUMBERTON MUD	NECHES	272	420	539	617	653	671
1959	HARDIN	NORTH HARDIN WSC	NECHES	79	103	107	111	113	115
2508	HARDIN	SILSBEE	NECHES	75	110	140	156	160	161
2544	HARDIN	SOUR LAKE	NECHES	20	30	38	42	44	44
2942	HARDIN	WEST HARDIN WSC	NECHES	31	31	31	32	32	32
2942	HARDIN	WEST HARDIN WSC	TRINITY	1	1	1	1	1	1
3009	HARDIN	WILDWOOD POA	NECHES	8	12	15	17	18	18
110	HENDERSON	ATHENS	NECHES	3	4	6	7	8	8
207	HENDERSON	BERRYVILLE	NECHES	12	19	24	28	31	33
211	HENDERSON	BETHEL ASH WSC	NECHES	32	49	62	75	82	89
326	HENDERSON	BROWNSBORO	NECHES	13	23	29	36	41	46
334	HENDERSON	BRUSHY CREEK WSC	NECHES	9	15	19	24	25	27
462	HENDERSON	CHANDLER	NECHES	41	67	88	110	125	140

WUG ID	County	WUG Name	Basin	Passive Conservation (acre-feet/year)					
				2020	2030	2040	2050	2060	2070
	HENDERSON	COUNTY-OTHER, HENDERSON	NECHES	78	112	133	122	95	59
804	HENDERSON	EDOM WSC	NECHES	2	4	5	4	6	5
972	HENDERSON	FRANKSTON	NECHES	1	1	1	2	3	4
1555	HENDERSON	LEAGUEVILLE WSC	NECHES	21	31	38	45	58	74
1844	HENDERSON	MOORE STATION WSC	NECHES	14	21	27	31	41	52
1886	HENDERSON	MURCHISON	NECHES	6	9	11	13	13	12
2237	HENDERSON	R P M WSC	NECHES	7	11	14	17	20	23
2880	HENDERSON	VIRGINIA HILL WSC	NECHES	19	30	40	49	55	60
	HOUSTON	COUNTY-OTHER, HOUSTON	NECHES	8	11	13	13	13	13
	HOUSTON	COUNTY-OTHER, HOUSTON	TRINITY	1	2	2	2	2	2
613	HOUSTON	CROCKETT	TRINITY	75	108	136	150	153	153
1076	HOUSTON	GRAPELAND	NECHES	6	8	11	13	13	13
1076	HOUSTON	GRAPELAND	TRINITY	9	14	17	18	19	19
1637	HOUSTON	LOVELADY	TRINITY	7	11	13	14	15	15
2129	Houston	PENNINGTON WSC	Neches	4	5	5	6	6	6
2129	Houston	PENNINGTON WSC	Trinity	6	8	10	10	11	11
2684	HOUSTON	TDCJ EASTHAM UNIT	TRINITY	24	34	43	47	48	48
2727	HOUSTON	THE CONSOLIDATED WSC	NECHES	28	40	51	56	57	57
2727	HOUSTON	THE CONSOLIDATED WSC	TRINITY	78	111	136	150	153	153
319	JASPER	BROOKELAND FWSD	NECHES	3	5	6	7	7	7
	JASPER	COUNTY-OTHER, JASPER	NECHES	83	120	149	163	167	167
	JASPER	COUNTY-OTHER, JASPER	SABINE	78	113	139	153	156	156
1361	JASPER	JASPER	NECHES	97	142	177	196	199	199
1362	JASPER	JASPER COUNTY WCID 1	SABINE	31	49	54	54	54	54
1444	JASPER	KIRBYVILLE	SABINE	23	33	41	45	46	46
1717	JASPER	MAURICEVILLE SUD	SABINE	4	4	5	5	5	5
2262	JASPER	RAYBURN COUNTRY MUD	NECHES	18	27	32	35	35	35
2382	JASPER	RURAL WSC	NECHES	11	15	19	20	21	21
2555	JASPER	SOUTH JASPER COUNTY WSC	NECHES	4	6	8	8	8	8
2555	JASPER	SOUTH JASPER COUNTY WSC	SABINE	12	18	21	21	21	21
2840	JASPER	UPPER JASPER COUNTY WATER AUTHORITY	NECHES	12	18	22	24	24	24
2840	JASPER	UPPER JASPER COUNTY WATER AUTHORITY	SABINE	5	7	8	9	10	10
181	JEFFERSON	BEAUMONT	NECHES	456	703	921	1,080	1,178	1,272
181	JEFFERSON	BEAUMONT	NECHES-TRINITY	943	1,450	1,901	2,229	2,430	2,624
215	JEFFERSON	BEVIL OAKS	NECHES	15	24	31	35	38	41
484	JEFFERSON	CHINA	NECHES	0	0	0	0	1	1
484	JEFFERSON	CHINA	NECHES-TRINITY	14	21	26	31	33	36
	JEFFERSON	COUNTY-OTHER, JEFFERSON	NECHES	11	22	35	48	60	74
	JEFFERSON	COUNTY-OTHER, JEFFERSON	NECHES-TRINITY	133	269	418	569	716	877
1100	JEFFERSON	GROVES	NECHES	5	8	10	10	11	11
1100	JEFFERSON	GROVES	NECHES-TRINITY	162	236	299	324	329	329
1365	JEFFERSON	JEFFERSON COUNTY WCID 10	NECHES	10	15	19	22	24	27
1365	JEFFERSON	JEFFERSON COUNTY WCID 10	NECHES-TRINITY	48	72	95	111	121	130
1751	JEFFERSON	MEEKER MWD	NECHES	8	13	16	19	20	22
1751	JEFFERSON	MEEKER MWD	NECHES-TRINITY	24	36	47	54	60	64
1908	JEFFERSON	NEDERLAND	NECHES	7	11	15	17	18	21
1908	JEFFERSON	NEDERLAND	NECHES-TRINITY	197	301	394	462	504	544
2186	JEFFERSON	PORT ARTHUR	NECHES	2	2	3	3	3	3
2186	JEFFERSON	PORT ARTHUR	NECHES-TRINITY	620	898	1,118	1,163	1,182	1,183
2189	JEFFERSON	PORT NECHES	NECHES	79	122	161	188	204	220
2189	JEFFERSON	PORT NECHES	NECHES-TRINITY	73	113	148	173	189	204
2948	JEFFERSON	WEST JEFFERSON COUNTY MWD	NECHES-TRINITY	83	125	162	189	206	224
85	NACOGDOCHES	APPLEBY WSC	NECHES	38	60	80	95	106	117
411	NACOGDOCHES	CARO WSC	NECHES	28	45	59	70	79	86
	NACOGDOCHES	COUNTY-OTHER, NACOGDOCHES	NECHES	93	126	143	162	181	199
640	NACOGDOCHES	CUSHING	NECHES	11	18	23	27	30	34
655	NACOGDOCHES	D & M WSC	NECHES	53	83	106	127	142	156
848	NACOGDOCHES	ETOILE WSC	NECHES	23	38	49	59	67	73
1017	NACOGDOCHES	GARRISON	NECHES	12	20	27	32	36	40
1585	NACOGDOCHES	LILLY GROVE SUD	NECHES	26	39	51	61	69	76
1755	NACOGDOCHES	MELROSE WSC	NECHES	30	48	63	76	85	94
1894	NACOGDOCHES	NACOGDOCHES	NECHES	414	667	890	1,065	1,189	1,308
2665	NACOGDOCHES	SWIFT WSC	NECHES	33	52	70	83	92	102
3040	NACOGDOCHES	WODEN WSC	NECHES	31	49	66	78	88	96
319	NEWTON	BROOKELAND FWSD	SABINE	9	13	15	17	17	17
	NEWTON	COUNTY-OTHER, NEWTON	SABINE	87	127	161	169	172	172
1717	NEWTON	MAURICEVILLE SUD	SABINE	4	5	5	5	5	5
1931	NEWTON	NEWTON	SABINE	23	33	41	45	46	46
2559	NEWTON	SOUTH NEWTON WSC	SABINE	0	0	0	0	0	0
310	ORANGE	BRIDGE CITY	NECHES	15	23	29	31	32	33
310	ORANGE	BRIDGE CITY	NECHES-TRINITY	10	16	20	21	21	21
310	ORANGE	BRIDGE CITY	SABINE	76	114	147	155	160	161
	ORANGE	COUNTY-OTHER, ORANGE	NECHES	131	204	215	222	230	233
	ORANGE	COUNTY-OTHER, ORANGE	NECHES-TRINITY	2	2	2	2	2	2
	ORANGE	COUNTY-OTHER, ORANGE	SABINE	155	241	255	265	273	276
1406	ORANGE	KELLY G BREWER	NECHES	3	4	6	5	5	6
1406	ORANGE	KELLY G BREWER	SABINE	2	4	4	5	5	5

WUG ID	County	WUG Name	Basin	Passive Conservation (acre-feet/year)					
				2020	2030	2040	2050	2060	2070
1717	ORANGE	MAURICEVILLE SUD	NECHES	6	8	8	8	8	9
1717	ORANGE	MAURICEVILLE SUD	SABINE	71	98	102	103	105	106
2052	ORANGE	ORANGE	SABINE	216	326	416	459	473	479
2053	ORANGE	ORANGE COUNTY WCID 1	NECHES	119	178	224	242	250	253
2054	ORANGE	ORANGE COUNTY WCID 2	SABINE	35	53	66	71	73	74
2057	ORANGE	ORANGEFIELD WSC	NECHES	14	19	22	24	25	25
2057	ORANGE	ORANGEFIELD WSC	SABINE	22	29	35	38	39	39
2153	ORANGE	PINEHURST	SABINE	25	39	48	50	52	52
2186	ORANGE	PORT ARTHUR	NECHES	0	0	0	0	0	0
2559	ORANGE	SOUTH NEWTON WSC	SABINE	0	0	0	0	0	0
183	PANOLA	BECKVILLE	SABINE	11	18	22	25	27	28
420	PANOLA	CARTHAGE	SABINE	72	106	135	150	154	156
	PANOLA	COUNTY-OTHER, PANOLA	CYPRESS	0	0	1	1	1	1
	PANOLA	COUNTY-OTHER, PANOLA	SABINE	168	254	321	361	375	380
1030	PANOLA	GILL WSC	SABINE	9	13	17	18	19	19
1795	PANOLA	MINDEN BRACHFIELD WSC	SABINE	0	1	0	0	0	1
2089	Panola	PANOLA-BETHANY WSC	Sabine	1	2	3	3	4	4
2677	PANOLA	TATUM	SABINE	3	6	8	9	10	10
478	POLK	CHESTER WSC	NECHES	2	3	4	5	5	5
574	POLK	CORRIGAN	NECHES	23	35	47	51	55	57
	POLK	COUNTY-OTHER, POLK	NECHES	39	61	79	89	95	97
671	POLK	DAMASCUS-STRYKER WSC	NECHES	17	26	33	38	40	42
1500	POLK	LAKE LIVINGSTON WSC	NECHES	10	12	14	15	17	18
1859	POLK	MOSCOW WSC	NECHES	4	6	8	8	9	10
2538	POLK	SODA WSC	NECHES	1	2	3	3	4	3
457	RUSK	CHALK HILL SUD	SABINE	39	61	80	95	105	115
	RUSK	COUNTY-OTHER, RUSK	NECHES	56	91	121	143	158	172
	RUSK	COUNTY-OTHER, RUSK	SABINE	53	86	116	137	151	164
622	RUSK	CROSS ROADS SUD	SABINE	32	52	69	82	92	100
629	RUSK	CRYSTAL FARMS WSC	SABINE	12	18	24	29	31	34
793	RUSK	EBENEZER WSC	NECHES	10	15	19	23	25	27
817	RUSK	ELDERVILLE WSC	SABINE	0	0	0	0	0	0
1020	RUSK	GASTON WSC	NECHES	18	29	38	45	50	54
1058	RUSK	GOODSPRINGS WSC	NECHES	32	51	67	79	87	96
1222	RUSK	HENDERSON	NECHES	132	209	274	327	364	397
1222	RUSK	HENDERSON	SABINE	23	36	48	57	63	69
1355	RUSK	JACOBS WSC	NECHES	1	1	2	2	3	2
1355	RUSK	JACOBS WSC	SABINE	24	39	50	60	66	73
1432	RUSK	KILGORE	SABINE	35	55	74	88	98	107
1795	RUSK	MINDEN BRACHFIELD WSC	NECHES	3	4	4	4	5	6
1795	RUSK	MINDEN BRACHFIELD WSC	SABINE	1	2	2	2	2	2
1878	RUSK	MT ENTERPRISE WSC	NECHES	21	33	43	51	57	62
1920	RUSK	NEW LONDON	NECHES	16	25	34	40	44	48
1920	RUSK	NEW LONDON	SABINE	13	21	27	32	36	39
1922	RUSK	NEW PROSPECT WSC	SABINE	13	20	26	31	34	37
2062	RUSK	OVERTON	NECHES	3	5	6	7	8	10
2062	RUSK	OVERTON	SABINE	25	40	53	63	70	76
2561	RUSK	SOUTH RUSK COUNTY WSC	NECHES	19	31	41	49	55	59
2573	RUSK	SOUTHERN UTILITIES	SABINE	4	7	8	11	11	12
2677	RUSK	TATUM	SABINE	13	21	28	32	36	40
2941	RUSK	WEST GREGG SUD	SABINE	2	3	4	4	5	6
3071	RUSK	WRIGHT CITY WSC	NECHES	5	8	10	12	13	15
319	SABINE	BROOKELAND FWSD	NECHES	5	8	10	11	11	11
319	SABINE	BROOKELAND FWSD	SABINE	1	1	1	1	1	1
	SABINE	COUNTY-OTHER, SABINE	NECHES	0	1	1	1	1	1
	SABINE	COUNTY-OTHER, SABINE	SABINE	17	24	30	31	31	31
995	SABINE	G M WSC	NECHES	0	0	0	0	0	0
995	SABINE	G M WSC	SABINE	0	0	0	0	0	0
1220	SABINE	HEMPHILL	SABINE	14	19	24	26	27	27
2155	SABINE	PINELAND	NECHES	11	15	19	20	20	20
	SAN AUGUSTINE	COUNTY-OTHER, SAN AUGUSTINE	NECHES	46	65	81	90	92	92
	SAN AUGUSTINE	COUNTY-OTHER, SAN AUGUSTINE	SABINE	1	2	2	2	2	2
995	SAN AUGUSTINE	G M WSC	SABINE	0	0	0	0	0	0
2406	SAN AUGUSTINE	SAN AUGUSTINE	NECHES	23	34	43	44	44	44
2407	SAN AUGUSTINE	SAN AUGUSTINE RURAL WSC	NECHES	13	18	22	24	24	24
2407	SAN AUGUSTINE	SAN AUGUSTINE RURAL WSC	SABINE	0	1	1	1	1	1
443	SHELBY	CENTER	SABINE	61	95	124	142	151	159
487	SHELBY	CHOICE WSC	NECHES	4	5	7	7	8	8
487	SHELBY	CHOICE WSC	SABINE	9	14	19	21	22	24
	SHELBY	COUNTY-OTHER, SHELBY	NECHES	18	28	35	40	43	45
	SHELBY	COUNTY-OTHER, SHELBY	SABINE	68	104	133	154	164	172
778	SHELBY	EAST LAMAR WSC	SABINE	9	15	18	21	23	23
889	SHELBY	FIVE WAY WSC	SABINE	17	25	33	37	40	42
892	SHELBY	FLAT FORK WSC	SABINE	13	19	26	29	30	32
1318	SHELBY	HUXLEY	SABINE	24	38	49	55	58	61
1370	SHELBY	JOAQUIN	SABINE	14	21	27	30	32	33
1728	SHELBY	MCCLELLAND WSC	SABINE	15	23	30	34	36	37

WUG ID	County	WUG Name	Basin	Passive Conservation (acre-feet/year)					
				2020	2030	2040	2050	2060	2070
2424	SHELBY	SAND HILLS WSC	NECHES	9	15	18	21	22	23
2424	SHELBY	SAND HILLS WSC	SABINE	9	14	19	20	22	23
2694	SHELBY	TENAHA	SABINE	13	21	27	31	32	34
2758	SHELBY	TIMPSON	NECHES	1	0	1	1	2	1
2758	SHELBY	TIMPSON	SABINE	12	20	26	29	31	33
46	SMITH	ALGONQUIN WATER RESOURCES OF TEXAS	NECHES	8	10	10	12	13	14
102	SMITH	ARP	NECHES	11	17	22	24	26	27
200	SMITH	BEN WHEELER WSC	NECHES	1	0	0	0	0	0
346	SMITH	BULLARD	NECHES	33	57	78	97	116	133
417	SMITH	CARROLL WSC	NECHES	9	14	18	21	24	26
	SMITH	COUNTY-OTHER, SMITH	NECHES	40	74	109	140	169	195
633	SMITH	CRYSTAL SYSTEMS TEXAS	NECHES	18	28	36	43	51	59
684	SMITH	DEAN WSC	NECHES	47	69	88	100	106	110
831	SMITH	EMERALD BAY MUD	NECHES	12	17	20	21	22	22
1352	SMITH	JACKSON WSC	NECHES	25	39	52	60	67	72
1589	SMITH	LINDALE	NECHES	20	35	50	62	74	85
1590	SMITH	LINDALE RURAL WSC	NECHES	35	55	71	82	90	97
2062	SMITH	OVERTON	NECHES	1	3	4	5	6	7
2237	SMITH	R P M WSC	NECHES	2	5	6	6	8	9
2573	SMITH	SOUTHERN UTILITIES	NECHES	372	566	729	842	906	961
2806	SMITH	TROUP	NECHES	24	38	50	60	66	72
2830	SMITH	TYLER	NECHES	1,078	1,664	2,174	2,556	2,801	3,018
2897	SMITH	WALNUT GROVE WSC	NECHES	91	151	203	248	283	317
2991	SMITH	WHITEHOUSE	NECHES	93	152	205	250	286	321
3071	SMITH	WRIGHT CITY WSC	NECHES	24	37	49	58	66	71
446	TRINITY	CENTERVILLE WSC	NECHES	9	13	16	17	17	18
	TRINITY	COUNTY-OTHER, TRINITY	NECHES	20	31	31	30	33	33
1101	TRINITY	GROVETON	NECHES	6	9	11	12	12	13
2129	TRINITY	PENNINGTON WSC	Neches	6	9	10	11	11	12
478	TYLER	CHESTER WSC	NECHES	9	14	17	19	19	20
526	TYLER	COLMESNEIL	NECHES	11	16	20	22	22	22
	TYLER	COUNTY-OTHER, TYLER	NECHES	64	93	115	127	129	128
647	TYLER	CYPRESS CREEK WSC	NECHES	6	9	11	12	12	12
1500	TYLER	LAKE LIVINGSTON WSC	NECHES	0	1	1	0	0	1
1859	TYLER	MOSCOW WSC	NECHES	0	1	0	0	0	0
2831	TYLER	TYLER COUNTY WSC	NECHES	59	85	106	117	119	119
2905	TYLER	WARREN WSC	NECHES	15	21	26	28	29	29
3009	TYLER	WILDWOOD POA	NECHES	6	9	11	12	13	13
3068	TYLER	WOODVILLE	NECHES	60	87	109	121	123	123
			Total	**12,001**	**18,268**	**23,333**	**26,674**	**28,711**	**30,452**

Appendix 5C-B

GPCD Goals for Municipal WUGs

Gallon per capita per day goals for municipal water user groups in Region I can be found in the following attachment.

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As required by the TWDB, gallons per capita per day (GPCD) goals for each WUG are included in Table 5C-B.1. Goals are included for each decade from 2020 to 2070 and were calculated using the following formula:

$$GPCD\ Goals = \frac{(Projected\ Water\ Demand - Recommended\ Conservation\ Reduction)}{(Projected\ Population)}$$

Table 5C-B.1 – GPCD Goals for Municipal WUGs from 2020 to 2070

WUG Name	County	GPCD Goal					
		2020	2030	2040	2050	2060	2070
Anderson County Cedar Creek Wsc	Anderson	89	85	83	81	81	81
B B S Wsc	Anderson	87	84	81	79	79	79
B C Y Wsc	Anderson	103	100	97	95	95	95
Brushy Creek Wsc	Anderson	76	72	69	67	67	67
Brushy Creek Wsc	Anderson	77	72	69	67	67	67
County-Other, Anderson	Anderson	126	122	119	118	118	118
County-Other, Anderson	Anderson	126	122	119	118	117	117
Elkhart	Anderson	153	148	145	143	143	142
Four Pines Wsc	Anderson	83	81	79	77	77	77
Frankston	Anderson	165	160	156	154	154	154
Frankston Rural Wsc	Anderson	118	114	111	109	109	109
Neches Wsc	Anderson	117	114	111	109	108	108
Norwood Wsc	Anderson	139	137	133	132	132	132
Palestine	Anderson	227	221	217	215	214	214
Pleasant Springs Wsc	Anderson	153	148	144	142	142	141
Slocum Wsc	Anderson	105	102	99	97	97	97
Tdcj Beto Gurney & Powledge Units	Anderson	276	270	267	265	264	264
Tdcj Coffield Michael	Anderson	534	526	522	520	518	517
The Consolidated Wsc	Anderson	101	98	94	93	93	92
Tucker Wsc	Anderson	98	94	91	90	89	89
Walston Springs Wsc	Anderson	91	87	84	83	83	83
Angelina Wsc	Angelina	75	70	67	67	66	66
Central Wcid Of Angelina County	Angelina	62	60	60	60	60	60
County-Other, Angelina	Angelina	101	96	93	93	92	92
Diboll	Angelina	117	112	109	108	108	108
Four Way Sud	Angelina	77	75	74	73	72	72
Hudson Wsc	Angelina	60	60	60	60	60	60
Huntington	Angelina	91	86	83	82	81	81
Lufkin	Angelina	145	140	136	140	139	139
M & M Wsc	Angelina	76	72	69	68	68	68
Pollok-Redtown Wsc	Angelina	87	83	81	79	80	79
Redland Wsc	Angelina	69	64	63	63	63	63
Upper Jasper County Water Authority	Angelina	108	107	96	96	96	96
Woodlawn Wsc	Angelina	80	75	73	71	71	71

WUG Name	County	GPCD Goal					
		2020	2030	2040	2050	2060	2070
Zavalla	Angelina	91	87	84	82	83	82
Afton Grove Wsc	Cherokee	136	133	130	129	129	129
Alto	Cherokee	162	158	155	154	153	152
Alto Rural Wsc	Cherokee	171	164	164	163	163	162
Blackjack Wsc	Cherokee	156	151	148	146	146	146
Bullard	Cherokee	169	170	168	176	174	171
County-Other, Cherokee	Cherokee	104	101	98	97	96	97
Craft Turney Wsc	Cherokee	83	79	75	74	73	73
Gum Creek Wsc	Cherokee	88	83	81	80	80	79
Jacksonville	Cherokee	148	142	139	137	136	136
New Summerfield	Cherokee	114	111	109	108	107	107
North Cherokee Wsc	Cherokee	110	106	104	103	103	102
Pollok-Redtown Wsc	Cherokee	87	81	82	78	80	82
Rusk	Cherokee	148	143	140	138	138	137
Rusk Rural Wsc	Cherokee	91	87	84	83	82	82
South Rusk County Wsc	Cherokee	85	89	81	84	78	80
Southern Utilities	Cherokee	153	149	146	144	144	144
Troup	Cherokee	174	168	165	168	164	165
Wells	Cherokee	141	139	136	134	134	134
West Jacksonville Wsc	Cherokee	131	127	125	123	123	123
Wright City Wsc	Cherokee	103	99	96	95	95	95
County-Other, Hardin	Hardin	106	101	98	97	97	97
Hardin County Wcid 1	Hardin	82	78	76	74	74	73
Kountze	Hardin	107	103	99	97	97	97
Lake Livingston Wsc	Hardin	63	64	57	58	59	59
Lumberton Mud	Hardin	82	78	76	75	75	74
North Hardin Wsc	Hardin	62	60	60	60	60	60
Silsbee	Hardin	118	114	110	108	108	108
Sour Lake	Hardin	130	126	123	121	121	121
West Hardin Wsc	Hardin	60	60	60	60	60	60
Wildwood Poa	Hardin	168	163	159	158	156	156
Athens	Henderson	161	141	128	121	114	108
Berryville	Henderson	96	92	89	88	88	88
Bethel Ash Wsc	Henderson	91	88	86	85	85	85
Brownsboro	Henderson	140	139	138	137	136	136
Brushy Creek Wsc	Henderson	77	73	69	67	67	67
Chandler	Henderson	149	144	142	141	140	140
County-Other, Henderson	Henderson	82	77	73	73	72	72
Edom Wsc	Henderson	96	92	90	91	88	90
Frankston	Henderson	162	160	166	161	161	157
Leagueville Wsc	Henderson	95	91	89	88	88	88
Moore Station Wsc	Henderson	114	111	108	107	107	107
Murchison	Henderson	139	135	131	129	129	130
R P M Wsc	Henderson	98	94	92	91	91	90
Virginia Hill Wsc	Henderson	86	82	80	78	78	78
County-Other, Houston	Houston	154	149	146	145	145	145
Crockett	Houston	159	154	150	148	148	147
Grapeland	Houston	124	120	117	115	115	115
Lovelady	Houston	170	164	161	160	157	157

WUG Name	County	GPCD Goal					
		2020	2030	2040	2050	2060	2070
Pennington Wsc	Houston	84	81	79	78	77	77
Tdcj Eastham Unit	Houston	393	386	382	380	379	378
The Consolidated Wsc	Houston	101	97	95	93	93	93
Brookeland Fwsd	Jasper	104	101	98	95	95	95
County-Other, Jasper	Jasper	94	90	87	86	86	86
Jasper	Jasper	186	177	172	169	167	165
Jasper County Wcid 1	Jasper	67	61	60	60	60	60
Kirbyville	Jasper	159	154	151	149	149	148
Mauriceville Sud	Jasper	62	61	61	61	61	61
Rayburn Country Mud	Jasper	93	89	87	85	85	85
Rural Wsc	Jasper	93	89	86	85	85	85
South Jasper County Wsc	Jasper	67	63	60	60	60	60
Upper Jasper County Water Authority	Jasper	107	103	100	99	99	98
Beaumont	Jefferson	197	185	178	173	169	166
Bevil Oaks	Jefferson	89	84	81	80	80	80
China	Jefferson	103	99	96	94	94	94
County-Other, Jefferson	Jefferson	139	136	134	133	133	133
Groves	Jefferson	124	119	116	114	114	114
Jefferson County Wcid 10	Jefferson	78	74	71	70	69	69
Meeker Mwd	Jefferson	115	112	109	108	108	108
Nederland	Jefferson	115	111	108	106	106	106
Port Arthur	Jefferson	266	235	219	205	192	179
Port Neches	Jefferson	92	88	84	83	83	82
West Jefferson County Mwd	Jefferson	77	74	71	70	69	69
Appleby Wsc	Nacogdoches	158	153	150	149	148	148
Caro Wsc	Nacogdoches	87	83	81	79	79	79
County-Other, Nacogdoches	Nacogdoches	91	88	88	87	87	87
Cushing	Nacogdoches	151	139	134	131	128	125
D & M Wsc	Nacogdoches	129	126	125	124	124	124
Etoile Wsc	Nacogdoches	102	98	95	94	93	93
Garrison	Nacogdoches	197	192	188	186	186	185
Lilly Grove Sud	Nacogdoches	124	121	119	118	118	118
Melrose Wsc	Nacogdoches	129	126	123	122	121	121
Nacogdoches	Nacogdoches	157	150	146	143	142	140
Swift Wsc	Nacogdoches	137	132	129	128	127	127
Woden Wsc	Nacogdoches	109	105	102	101	100	100
Brookeland Fwsd	Newton	104	100	98	96	96	96
County-Other, Newton	Newton	97	92	88	88	87	87
Mauriceville Sud	Newton	62	60	60	60	60	60
Newton	Newton	157	152	150	148	147	147
South Newton Wsc	Newton	60	60	60	60	60	60
Bridge City	Orange	79	75	71	70	70	70
Bridge City	Orange	79	74	71	70	70	70
County-Other, Orange	Orange	103	98	97	97	97	97
Kelly G Brewer	Orange	138	134	131	130	130	130
Mauriceville Sud	Orange	62	60	60	60	60	60
Orange	Orange	119	115	111	110	110	110
Orange County Wcid 1	Orange	111	107	104	103	103	103

WUG Name	County	GPCD Goal					
		2020	2030	2040	2050	2060	2070
Orange County Wcid 2	Orange	121	118	115	114	114	114
Orangefield Wsc	Orange	82	81	79	79	79	79
Pinehurst	Orange	114	109	106	106	105	105
Port Arthur	Orange	357	357	357	357	357	357
South Newton Wsc	Orange	60	60	60	60	60	60
Beckville	Panola	122	118	115	114	114	114
Carthage	Panola	210	204	200	198	197	197
County-Other, Panola	Panola	90	85	82	81	81	81
Gill Wsc	Panola	103	99	95	94	94	94
Minden Brachfield Wsc	Panola	62	55	63	57	63	58
Panola-Bethany Wsc	Panola	175	169	167	169	163	161
Tatum	Panola	174	168	166	165	163	164
Chester Wsc	Polk	155	151	148	146	144	146
Corrigan	Polk	110	106	103	102	102	102
County-Other, Polk	Polk	93	89	87	86	85	85
Damascus-Stryker Wsc	Polk	111	108	105	104	104	104
Lake Livingston Wsc	Polk	61	60	60	60	60	60
Moscow Wsc	Polk	130	128	125	124	124	123
Soda Wsc	Polk	75	73	67	69	65	68
Chalk Hill Sud	Rusk	78	74	72	70	70	70
County-Other, Rusk	Rusk	97	92	89	88	88	87
Cross Roads Sud	Rusk	74	70	67	66	65	65
Crystal Farms Wsc	Rusk	89	85	82	81	81	81
Ebenezer Wsc	Rusk	139	135	132	131	131	131
Elderville Wsc	Rusk	60	60	60	60	60	60
Gaston Wsc	Rusk	103	99	96	95	95	95
Goodsprings Wsc	Rusk	81	77	74	73	73	72
Henderson	Rusk	219	212	209	206	204	203
Jacobs Wsc	Rusk	108	103	101	99	99	99
Kilgore	Rusk	190	184	181	179	179	179
Minden Brachfield Wsc	Rusk	60	60	60	60	60	60
Mt Enterprise Wsc	Rusk	144	138	139	138	138	137
New London	Rusk	307	300	297	295	294	293
New Prospect Wsc	Rusk	70	66	64	63	62	62
Overton	Rusk	189	185	182	181	181	181
South Rusk County Wsc	Rusk	89	85	82	81	80	80
Southern Utilities	Rusk	153	148	147	144	144	144
Tatum	Rusk	169	163	160	159	158	157
West Gregg Sud	Rusk	76	72	70	71	71	68
Wright City Wsc	Rusk	102	98	97	95	95	94
Brookeland Fwsd	Sabine	104	101	98	96	96	96
County-Other, Sabine	Sabine	77	73	69	69	69	69
G M Wsc	Sabine	60	60	60	60	60	60
Hemphill	Sabine	208	201	199	197	196	196
Pineland	Sabine	83	79	75	75	75	75
County-Other, San Augustine	San Augustine	86	83	80	78	78	78
G M Wsc	San Augustine	60	60	60	60	60	60
San Augustine	San Augustine	214	207	202	201	200	200
San Augustine Rural Wsc	San Augustine	85	80	78	76	76	76

WUG Name	County	GPCD Goal					
		2020	2030	2040	2050	2060	2070
Center	Shelby	290	283	279	278	277	276
Choice Wsc	Shelby	99	95	92	91	90	90
County-Other, Shelby	Shelby	98	94	91	90	89	89
East Lamar Wsc	Shelby	114	110	107	106	105	106
Five Way Wsc	Shelby	96	92	89	88	87	87
Flat Fork Wsc	Shelby	99	95	92	91	91	90
Huxley	Shelby	115	111	108	107	106	106
Joaquin	Shelby	137	132	129	128	128	128
Mcclelland Wsc	Shelby	139	135	132	131	131	131
Sand Hills Wsc	Shelby	152	145	143	141	141	140
Tenaha	Shelby	159	153	150	149	148	148
Timpson	Shelby	128	123	121	119	119	119
Algonquin Water Resources Of Texas	Smith	60	60	60	60	60	60
Arp	Smith	142	140	137	136	135	135
Ben Wheeler Wsc	Smith	53	94	89	85	81	78
Bullard	Smith	174	170	169	168	167	167
Carroll Wsc	Smith	103	100	98	97	96	96
County-Other, Smith	Smith	105	102	99	99	98	98
Crystal Systems Texas	Smith	266	256	252	248	245	241
Dean Wsc	Smith	142	137	138	136	136	136
Emerald Bay Mud	Smith	138	134	132	131	130	130
Jackson Wsc	Smith	82	77	75	73	73	73
Lindale	Smith	199	195	193	192	191	191
Lindale Rural Wsc	Smith	70	66	64	63	63	62
Overton	Smith	144	113	113	112	113	112
R P M Wsc	Smith	99	93	91	92	90	90
Southern Utilities	Smith	140	128	122	117	114	110
Troup	Smith	174	168	165	163	162	162
Tyler	Smith	165	158	155	152	151	149
Walnut Grove Wsc	Smith	111	107	105	104	103	103
Whitehouse	Smith	113	109	107	106	106	106
Wright City Wsc	Smith	102	99	96	95	95	95
Centerville Wsc	Trinity	111	107	104	104	104	104
County-Other, Trinity	Trinity	64	60	60	60	60	60
Groveton	Trinity	95	91	87	86	86	85
Pennington Wsc	Trinity	85	81	79	77	77	77
Chester Wsc	Tyler	153	145	142	141	140	139
Colmesneil	Tyler	212	206	202	200	200	199
County-Other, Tyler	Tyler	113	109	106	104	103	103
Cypress Creek Wsc	Tyler	173	168	165	164	164	162
Lake Livingston Wsc	Tyler	62	54	50	67	61	55
Moscow Wsc	Tyler	119	112	149	141	134	128
Tyler County Wsc	Tyler	104	100	96	95	94	94
Warren Wsc	Tyler	120	117	113	112	112	112
Wildwood Poa	Tyler	173	170	166	166	164	165
Woodville	Tyler	188	182	179	177	176	176

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Appendix 6-A

Title 31 Texas Administrative Code Chapters 357 and 358 Regulations Pertaining to the 2021 Plan

This appendix includes a matrix highlighting each regulation pertinent to the 2021 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	2021 Plan Compliance (Yes/No)	2021 Location(s) in the Plan and/or Other Commentary
31 TAC §357.11			
(c)(1)-(6)	RWPGs shall adopt, by two-thirds vote, bylaws that are consistent with the chapter and shall provide copies of the bylaws and any revisions thereto to the EA. The bylaws shall at minimum address terms of membership as well as methods to approve items of business, name additional members, record minutes, and resolved disputes.	Yes	The bylaws are in compliance with this requirement and were lasted updated at a general RWPG meeting dated July 17, 2019. I current copy of the bylaws were provided to the EA on February 25, 2020.
(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, Section 1.1 provides a list of current voting members of the RWPG and their corresponding interest categories.
(e)(1)-(6)	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, from the State Soil and Water Conservation Board, 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 from the RWPA.	Yes	Chapter 1, Section 1.1 provides a list of current non-voting members of the RWPG and their professional affiliation.
31 TAC §357.12			
(a)(1)-(4)	Prior to preparing the RWP, the RWPG shall hold at least one public meeting to gather recommendations as to issues that should be addressed or provisions that should be included in the next plan; prepare scope of work that includes detailed tasks and task schedule with responsible parties and budgets; approve amendments to the scope in an open meeting of the RWPG; and designate a Political Subdivision as a representative of the RWPG eligible to apply for financial assistance for scope of work and RWP development	Yes	Chapter 10, Section 10.2
(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	Chapter 10, Section 10.2
(c)(1)-(8)	The RWPGs shall approve and submit a Technical Memorandum to the EA that includes the most recent TWDB population and water demand projections, updated source water availability utilized in the RWPA, updated existing water supplies, identified water needs/surpluses, the documented process used by the RWPG to identify potential feasible WMSs, the potentially feasible WMSs, list of infeasible WMS (beginning with the 2026 RWP), and RWPG's declaration of intent to pursue simplified planning for planning cycle in each off-census RWP development (if applicable).	Yes	A Technical Memoradum including all required information was submitted to the EA in a submittal dated September 10, 2018.

Regulatory Citation	Summary of Requirement	2021 Plan Compliance (Yes/No)	2021 Location(s) in the Plan and/or Other Commentary
(d)	If a RWPG rescinds decision to pursue simplified planning, they must do so prior to executing a contract scope of work and budget amendment with the TWDB. The RWPG must discuss any action on the decision in a public meeting.	Yes	The RWPG did not rescind their decision to pursue simplified planning during this planning cycle.
(e)	If applicable, RWPG may implement simplified planning in off-census planning cycles if it has sufficient existing water supplies and there are no significant changes to water availability/supplies/demands	Yes	The RWPG decided to forgo simplified planning
(f)(g)(h)	If applicable, RWPG that pursues simplified planning must complete Technical Memorandum in subsection (c), meet new planning requirements, and adopt previous RWP information. RWPG that pursues simplified planning must hold public hearing on the intent to pursue simplified planning. RWPG shall hold a meeting to consider public comments and declare implementation of simplified planning	Yes	The RWPG decided to forgo simplified planning at its general meeting dated August 15, 2018.
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			
(a)	Public notice requirements are subject to Chapters 551 and 552. All materials discussed at an opening meeting shall be made available to the public prior to and following the meetings.	Yes	Chapter 10 summarizes compliance with public notice requirements.
(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	Chapter 10 summarizes compliance with public notice requirements.
(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	Chapter 10 summarizes compliance with public notice requirements.
(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	Chapter 10 summarizes compliance with public notice requirements.
(e)	Public notice requirements for RWPG requesting research or planning fund from the Board: Notice shall be published in a newspaper, include address of eligible applicant, brief description of RWPA, mailed to mayors/county judge/river authority, and posted on website of RWPG	Yes	Chapter 10 summarizes compliance with public notice requirements.
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	Chapter 1, Section 1.8
(a)(1)	water conservation plans;	Yes	Chapter 5C, Section 5C.2 summarizies compliance with this requirement.
(a)(2)	drought management and drought contingency plans;	Yes	Chapter 7, Section 7.2

Regulatory Citation	Summary of Requirement	2021 Plan Compliance (Yes/No)	2021 Location(s) in the Plan and/or Other Commentary
(a)(3)	information compiled by the Board from water loss audits performed by retail public utilities;	Yes	Chapter 1, Section 1.11 and Chapter 5C, Section 5C.1.2
(a)(4)	publicly available plans for major agricultural, municipal, manufacturing and commercial water users;	Yes	Chapter 1, Section 1.8
(a)(5)	local and regional water management plans;	Yes	Chapter 1, Section 1.8
(a)(6)	water availability requirements;	Yes	Chapter 3, Sections 3.1, 3.2, 3.3, and 3.4 summarize compliance with this requirment.
(a)(7)	the Texas Clean Rivers Program;	Yes	Chapter 1, Section 1.6
(a)(8)	the U.S. Clean Water Act;	Yes	Chapter 1, Sections 1.5 and 1.6
(a)(9)	water management plans;	Yes	Chapter 1, Section 1.8
(a)(10)	other planning goals including regionalization of water and wastewater services where appropriate;	Yes	Chapter 1, Section 1.8
(a)(11)	approved groundwater conservation district management plans and other plans submitted;	Yes	Groundwater Conservation Districts were discussed in Chapters 1, 3, and 5A, 5B, 7, and 8, where appropriate.
(a)(12)	approved groundwater regulatory plans; and	Yes	Chapter 1, Section 1.8
(a)(13)	any other information available from existing local or regional water planning studies.	Yes	Chapter 1, Section 1.8
(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 2021 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:	Yes	Chapter 1
(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, Section 1.1
(2)	current water use and major water demand centers;	Yes	Chapter 1, Section 1.2
(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, Section 1.3
(4)	Major Water Providers;	Yes	Chapter 1, Section 1.4
(5)	agricultural and natural resources;	Yes	Chapter 1, Section 1.5
(6)	identified water quality problems;	Yes	Chapter 1, Sections 1.3.1, 1.3.3, 1.5.2, 1.5.3, 1.5.7, 1.5.9, 1.6.1, and 1.7.1
(7)	identified threats to agricultural and natural resources due to water quantity problems or water quality problems related to water supply;	Yes	Chapter 1, Section 1.7
(8)	summary of existing local and regional water plans;	Yes	Chapter 1, Section 1.8
(9)	the identified historic drought(s) of record within the planning area;	Yes	Chapter 1, Section 1.9
(10)	current preparations for drought within the RWPA;	Yes	Chapter 1, Section 1.10

Regulatory Citation	Summary of Requirement	2021 Plan Compliance (Yes/No)	2021 Location(s) in the Plan and/or Other Commentary
(11)	information compiled by the Board from water loss audits performed by retail public utilities; and	Yes	Chapter 1, Section 1.11
(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	Chapter 1, Section 1.12
31 TAC §357.31			
(a); (f)	RWPs shall present projected Population and Water Demand projections for each Planning Decade for WUGs and MWPs.	Yes	Chapter 2
(b)	RWPs shall present projected water demands associated with MWPs 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, Section 2.4
(c)	RWPs shall evaluate the current contractual obligations of WUGs and WWPs to supply water in addition to any demands projected for the WUG or WWP.	Yes	Chapter 2, Section 2.3.7
(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. RWPG's shall report how changes in plumbing code savings probivided by the board or other approved methods by the EA	Yes	Chapter 2, Section 2.1. Savings provided in Appendix 5C-A
(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	Chapter 2, Section 2.1
(f)	Population and Water Demand Projections shall be presented for each Planning Decade for WUG's in accordance with subsection (a) of this section and MWP's in accordfance with subsection (b)	Yes	Chapter 2, Section 2.3
31 TAC §357.32			
(a)(1)-(2)	RWPGs shall evaluate the source water availability and existing water supplies that are legally and physically available to WUGs and wholesale water providers during drought conditions.	Yes	Chapter 3
(b)-(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	Chapter 3, Sections 3.1, 3.2, 3.3, and 3.4
(e)-(g)	RWPGs shall evaluate the existing water supplies for each WUG and WWP; existing contractual agreements should be taken into account. Evaluation results shall be reported by WUG and MWP	Yes	Chapter 3, Sections 3.5 and 3.6
31 TAC §357.33			
(a)	RWPs shall include, for each planning decade, comparisons of existing water supplies with projected demands	Yes	Chapter 4, Section 4.1
(b)	RWPs shall include, for each planning decade, comparisons of 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). Categories include: Municipal, irrigation, steam electric, mining, and livestock watering for the RWPA.	Yes	Chapter 4

Regulatory Citation	Summary of Requirement	2021 Plan Compliance (Yes/No)	2021 Location(s) in the Plan and/or Other Commentary
(c)	Social and economic impacts of water shortages will be evaluated.	Yes	Per TWDB Exhibit C, Second Amended General Guidelines for Fifth Cycle of Regional Water Plan Development dated April 2018, this requirement is met in Chapter 6, Section 6.4.
(d)	Results of evaluations shall be reported by WUG in accordance with 357.31(a) and MWP in accordance with 357.31(b)	Yes	Chapter 4, Sections 4.3 and 4.4
(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	Chapter 4, Section 4.5
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	Yes	Chapters 5A and 5B
(c)(1)-(6)	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
(d)	All recommended WMSs and WMSPs that are entered into the State Water Planning Database and prioritized by RWPGs shall be designed to reduce the consumption/loss of water, improve efficiency in the use of water or develop/deliver/treat additional water supply volumes to WUGs or WWPs in at least one planning decade such that additional water is available during Drought of Record conditions.	Yes	Chapters 5A and 5B
(e)	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 5B
(e)(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
(e)(3)(A)-(C); (e)(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, Appendices 5B-A and 5B-B
(e)(4); (e)(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	Chapter 5B, Appendices 5B-A and 5B-B
(e)(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 5B, Appendices 5B-A and 5B-B
(e)(9)	Consideration of water pipelines and other facilities that are currently used for water conveyance.	Yes	Chapter 5B, Appendices 5B-A and 5B-B

Regulatory Citation	Summary of Requirement	2021 Plan Compliance (Yes/No)	2021 Location(s) in the Plan and/or Other Commentary
(e)(10)	Other factors deemed relevant by the RWPG including recreational impacts.	Yes	Chapter 5B, Appendices 5B-A and 5B-B
(f)	RWPGs shall evaluate and present potentially feasible WMSs and WMSPs with sufficient specificity to allow state agencies to make financial or regulatory decisions to determine consistency of the proposed action before the state agency with an approved RWP.	Yes	Chapter 5B, Appendix 5B-A Appendix 5B-B
(g)(1); (g)(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	Chapter 5C
(h)	RWPs shall include a subchapter consolidating the RWPG's recommendations regarding water conservation.	Yes	Chapter 5C
(i)(1)-(2)	Conservation, Drought Management Measures, and Drought Contingency Plans shall be considered by RWPGs when developing the regional plans, particularly during the process of identifying, evaluating, and recommending WMSs. RWPs shall incorporate water conservation planning and drought contingency planning in the RWPA	Yes	Chapter 5C Chapter 7, Section 7.7
(i)(3)	RWPGs shall recommend Gallons Per Capita Per Day goal(s) for each municipal WUG or specified groupings of municipal WUGs. Goals must be recommended for each planning decade and may be a specific goal or a range of values.	Yes	Appendix 5C-B
(j)	RWP's shall include a subchapter consolidating the RWPG's recommendations regarding water conservation. RWPG's shall include in the RWP's model Water Conservation Plans pursuant to Texas Water Code §11.1271.	Yes	Chapter 5C, Section 5C.2 Chapter 5C, Section 5C.3
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 5B, Appendices 5B-A and 5B-B
(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, Appendices 5B-A and 5B-B
(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 MWP.	Yes	Executive Summary, Appendix ES-A, Report 13 and Chapter 5B, Tables 5B.1 and 5B.2
(g)(2)	Calculated supply factors for each WUG and MWP, 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	Calculated supply factors are included in the Executive Summary, Appendix ES-A Report 17 for WUGs and Chapter 5B, Appendix 5B-C for MWPs.
(g)(3)	Fully evaluated Alternative Water Management Strategies included in the adopted RWP shall be presented together in one place in the RWP.	Yes	Executive Summary, Appendix ES-A, Report 15

Regulatory Citation	Summary of Requirement	2021 Plan Compliance (Yes/No)	2021 Location(s) in the Plan and/or Other Commentary
31 TAC §357.40			
(a)	RWPs shall include a quantitative description of the socioeconomic impacts of not meeting the identified water needs.	Yes	Chapter 6, Section 6.4 and Appendix 6-B
(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 5B, Appendices 5B-A and 5B-B and Chapter 6, Sections 6.1 and 6.2
(c)	RWPs shall include a summary of the identified water needs that remain unmet by the RWP.	Yes	Chapter 6, Section 6.3
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, Section 6.2
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:	Yes	Chapter 7, Sections 7.1 and 7.8
(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, Section 7.2
(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	This correspondence was provided to the EA February 25, 2020.
(f)	RWPGs may designate recommended and alternative Drought Management Water Management Strategies and other recommended drought measures in the RWP	Yes	Chapters 5A, 5B, and 7, Section 7.7
(g)(1)-(3)	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. Minimum requirements: Have existing populations less than 7,500; rely on a sole source for its water supply regardless if water is provided by a WWP; and all County-Other WUG's.	Yes	Chapter 7, Section 7.3
(h)	RWPGs shall consider any relevant recommendations from the Drought Preparedness Council.	Yes	Chapter 7, Section 7.8
(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, Sections 7.2, 7.5, and 7.8
(j)	The RWPGs shall develop region-specific model drought contingency plans.	Yes	Chapter 7, Section 7.6

Regulatory Citation	Summary of Requirement	2021 Plan Compliance (Yes/No)	2021 Location(s) in the Plan and/or Other Commentary
31 TAC §357.43			
(a); (d)(1)-(3)	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. RWPG may recommend a river or streat segment as being of unique ecological value, and every unqiue river or stream to be designated by the legislature during a session greater than one year before the submittal date	Yes	Chapter 8, Section 8.1 Chapter 8, Section 8.3
(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, Section 8.1 Chapter 8, Section 8.2
(e)	RWPG's may develop information as to the potential impacts of any proposed changes in law prior to or after changes are enacted.	Yes	Chapter 8, Section 8.1 Chapter 8, Section 8.2 Chapter 8, Section 8.3
(f)	RWPGs should consider making legislative recommendations to facilitate more voluntary water transfers in the region.	Yes	Chapter 8, Section 8.3
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. The assessment shall describe the role for the state in financing recommended WMSs.	Yes	Chapter 9
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	Chapter 11, Section 11.1
(b)(1)-(3)	RWPG's shall assess the progress of the RWPA in encouraging cooperation between WUG's to achieve economies of scale. The assessment of regionalization shall include: The number of WMS' in the previously adopted and current RWP's that serve more than one WUG, Number of recommended WMS' in the previously adopted RWP that serve more than one WUG, a description of efforts the RWPG' has made to encourage WMS' and WMSP's that serve more than one WUG, and that benefit the entire region	Yes	Chapter 11, Section 11.2.6
(c)(1)-(3)	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, Section 11.2

Regulatory Citation	Summary of Requirement	2021 Plan Compliance (Yes/No)	2021 Location(s) in the Plan and/or Other Commentary
31 TAC §357.46			
	The RWPGs shall prioritize recommended WMSPs in its respective RWP and submit the prioritization separately with its adopted RWP. The RWPG must prioritize the WMSPs in accordance with the uniform standards, developed by the stakeholders committee established under the Texas Water Code in effect at the time it adopts its RWP	Yes	Final prioritization of 2021 WMSs was submitted separately to the EA when the final 2021 Plan was submitted.
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 2021 IPP has been adopted in accordance with a schedule provided by the EA.
(b);(c)	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 2021 IPP was submitted to the TWDB as required on 2/26/2020.
(d)(1)-(3)	Within 60 days of the submission of IPPs to the EA, RWPGs shall submit to the EA the identification of potential Interregional Conflicts by: Identifying the specific recommended WMS from another RWPG's IPP; providing a statement of why the RWPG considers there to be a conflict; and providing any other informationthat is relevant to the board's decision.	Not Applicable.	No Interregional Conflicts identified.
(e)	The RWPGs shall seek to resolve conflicts with other RWPGs and participate in any Board sponsored efforts to reolve Interregional Conflicts	Yes	Region I coordinated with all applicable Regions to ensure consistency across plans.
(f)(1)-(5)	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. The RWPG shall revise their IPPs to incorporate negotiated resolutions	Yes	The RWPG has considered comments from the EA, federal and state agency comments, and public comments in finalization of the 2021 Plan. Comments are available in Appendix 10-C. Responses included in Table 10.2.
(g)(1)-(2)	When submitted, RWP shall include: a technical report, an executive summary, and summaries of and responses to all comments (written and oral). The RWP shall be submitted on date disseminated by the EA unless an extension is approved and all relevent data shall be uploaded to Board's State Water Planning Database.	Yes	The 2021 Plan includes a required technical report and executive summary. Responses to comments are included as Table 10.2
31 TAC §358.3			
	Development of the state water plan shall be guided by the following principles:		
(2)	The regional water plans and state water plan shall serve as water supply plans under drought of record conditions.	Yes	Chapter 1, Section 1.9, Chapter 2, Section 2.3, Chapter 3, Section 3.1, Chapter 7, Section 7.1
(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

Regulatory Citation	Summary of Requirement	2021 Plan Compliance (Yes/No)	2021 Location(s) in the Plan and/or Other Commentary
(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	Chapters 5B, 5C, and 7
(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
(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
(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	Chapters 1, 3, 7, 10
(28)	RWPGs must consider existing regional water planning efforts when developing their plans.	Yes	Chapter 1

Appendix 6-B

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 of the findings from the TWDB.

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Socioeconomic Impacts of Projected Water Shortages for the East Texas (Region I) Regional Water Planning Area

Prepared in Support of the 2021 Region I Regional Water Plan

Texas Water Development Board

Dr. John R. Ellis
Water Use, Projections, & Planning Division
Texas Water Development Board

November 2019

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Executive Summary

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

Based on projected water demands and existing water supplies, Region I identified water needs (potential shortages) that could occur within its region under a repeat of the drought of record for six water use categories (irrigation, livestock, manufacturing, mining, municipal and steam-electric power). The TWDB then estimated the annual socioeconomic impacts of those needs—if they are not met—for each water use category and as an aggregate for the region.

This analysis was performed using an economic impact 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 repeat of the drought of record with the further caveat that no mitigation strategies are implemented. Decade specific impact estimates assume that growth occurs, and future shocks are imposed on an economy at 10-year intervals. The estimates presented are not cumulative (i.e., summing up expected impacts from today up to the decade noted), but are simply snapshots of the estimated annual socioeconomic impacts should a drought of record occur in each particular decade based on anticipated water supplies and demands for that same decade.

For regional economic impacts, income losses and job losses are estimated within each planning decade (2020 through 2070). 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 are estimated, encompassing lost consumer surplus (a welfare economics measure of consumer wellbeing); as well as population and school enrollment losses.

IMPLAN data reported that Region I generated nearly $59 billion in GDP (2018 dollars) and supported roughly 593,000 jobs in 2016. The Region I estimated total population was approximately 1.1 million in 2016.

It is estimated that not meeting the identified water needs in Region I would result in an annually combined lost income impact of approximately $9.3 billion in 2020, and $3.9 billion in 2070 (Table ES-1). It is also estimated that the region would lose approximately 68,000 jobs in 2020, and 52,000 in 2070.

All impact estimates are in year 2018 dollars and were calculated using a variety of data sources and tools including the use of a region-specific IMPLAN model, data from TWDB annual water use

estimates, the U.S. Census Bureau, Texas Agricultural Statistics Service, and the Texas Municipal League.

Table ES-1 Region I socioeconomic impact summary

Regional Economic Impacts	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$9,314	$6,786	$3,515	$3,651	$3,892	$3,920
Job losses	68,468	57,221	42,058	45,480	50,164	51,585
Financial Transfer Impacts	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Tax losses on production and imports ($ millions)*	$1,061	$704	$248	$242	$243	$239
Water trucking costs ($ millions)*	$3	$3	$3	$3	$3	$3
Utility revenue losses ($ millions)*	$12	$13	$18	$28	$42	$59
Utility tax revenue losses ($ millions)*	$0	$0	$0	$0	$1	$1
Social Impacts	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Consumer surplus losses ($ millions)*	$34	$35	$35	$36	$42	$52
Population losses	12,571	10,506	7,722	8,350	9,210	9,471
School enrollment losses	2,405	2,010	1,477	1,597	1,762	1,812

* Year 2018 dollars, rounded**.** Entries denoted by a dash (-) indicate no estimated economic impact. Entries denoted by a zero ($0) indicate estimated 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 the regional economy in the short term, 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.

As part of the regional water planning process, RWPGs must evaluate the social and economic impacts of not meeting water needs (31 Texas Administrative Code §357.33 (c)). Due to the complexity of the analysis and limited resources of the planning groups, the TWDB has historically performed this analysis for the RWPGs upon their request. Staff of the TWDB's Water Use, Projections, & Planning Division designed and conducted this analysis in support of Region I, and those efforts for this region as well as the other 15 regions allow consistency and a degree of comparability in the approach.

This document summarizes the results of the analysis and discusses the methodology used to generate the results. Section 1 provides a snapshot of the region's economy and summarizes the identified water needs in each water use category, which were calculated based on the RWPG's water supply and demand established during the regional water planning process. Section 2 defines each of ten impact assessment measures used in this analysis. Section 3 describes the methodology for the impact assessment and the approaches and assumptions specific to each water use category (i.e., irrigation, livestock, manufacturing, mining, municipal, and steam-electric power). Section 4 presents the impact estimates for each water use category with results summarized for the region as a whole. Appendix A presents a further breakdown of the socioeconomic impacts by county.

1.1 Regional Economic Summary

The Region I Regional Water Planning Area generated nearly $59 billion in gross domestic product (2018 dollars) and supported roughly 593,000 jobs in 2016, according to the IMPLAN dataset utilized in this socioeconomic analysis. This activity accounted for 3.4 percent of the state's total gross domestic product of 1.73 trillion dollars for the year based on IMPLAN. Table 1-1 lists all economic sectors ranked by the total value-added to the economy in Region I. The manufacturing sector generated more than 27 percent of the region's total value-added and was also a significant source of tax revenue. The top employers in the region were in the public administration, health care, and retail trade sectors. Region I's estimated total population was roughly 1.1 million in 2016, approximately 4 percent of the state's total.

This represents a snapshot of the regional economy as a whole, and it is important to note that not all economic sectors were included in the TWDB socioeconomic impact analysis. Data

considerations prompted use of only the more water-intensive sectors within the economy because damage estimates could only be calculated for those economic sectors which had both reliable income and water use estimates.

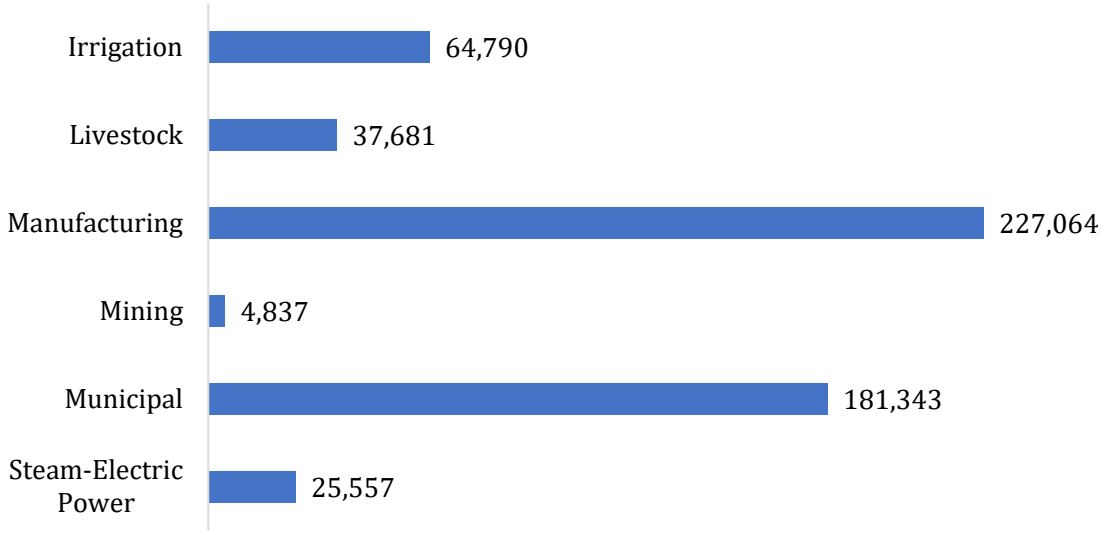
Table 1-1 Region I regional economy by economic sector*

Economic sector	Value-added ($ millions)	Tax ($ millions)	Jobs
Manufacturing	$16,152.9	$507.3	47,857
Public Administration	$5,419.7	$(20.8)	72,259
Mining, Quarrying, and Oil and Gas Extraction	$4,789.2	$732.1	16,819
Real Estate and Rental and Leasing	$4,278.7	$682.2	17,085
Health Care and Social Assistance	$4,265.8	$63.9	71,846
Construction	$3,470.9	$48.6	44,007
Retail Trade	$3,457.2	$821.9	59,420
Wholesale Trade	$2,835.7	$496.2	16,876
Professional, Scientific, and Technical Services	$2,168.8	$55.3	27,527
Transportation and Warehousing	$2,102.9	$95.5	22,237
Other Services (except Public Administration)	$1,892.8	$172.1	55,611
Utilities	$1,654.3	$249.9	2,743
Finance and Insurance	$1,564.8	$77.2	26,010
Accommodation and Food Services	$1,526.2	$250.3	40,573
Administrative and Support and Waste Management and Remediation Services	$1,159.7	$45.7	30,764
Information	$911.3	$292.2	5,543
Agriculture, Forestry, Fishing and Hunting	$710.1	$30.1	22,427
Management of Companies and Enterprises	$295.9	$9.3	3,303
Arts, Entertainment, and Recreation	$153.0	$33.8	5,874
Educational Services	$103.6	$5.8	4,152
Grand Total	$58,913.5	$4,648.6	592,934

*Source: 2016 IMPLAN for 536 sectors aggregated by 2-digit NAICS (North American Industry Classification System)

Figure 1-1 illustrates Region I's breakdown of the 2016 water use estimates by TWDB water use category. The categories with the highest use in Region I in 2016 were manufacturing (42 percent) and municipal (34 percent). Notably, more than 21 percent of the state's manufacturing water use occurred within Region I.

Figure 1-1 Region I 2016 water use estimates by water use category (in acre-feet)



Source: TWDB Annual Water Use Estimates (all values in acre-feet)

1.2 Identified Regional Water Needs (Potential Shortages)

As part of the regional water planning process, the TWDB adopted water demand projections for water user groups (WUG) in Region I with input from the planning group. WUG-level demand projections were established for utilities that provide more than 100 acre-feet of annual water supply, combined rural areas (designated as county-other), and county-wide water demand projections for five non-municipal categories (irrigation, livestock, manufacturing, mining and steam-electric power). The RWPG then compared demands to the existing water supplies of each WUG to determine potential shortages, or needs, by decade.

Table 1-2 summarizes the region's identified water needs in the event of a repeat of the drought of 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 address 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 growth, economic growth, or declining supplies. To provide a general sense of proportion, total projected needs as an overall percentage of total demand by water use category are also presented in aggregate in Table 1-2. Projected needs for individual water user groups within the aggregate can vary greatly and may reach 100% for a given WUG and water use category. A detailed summary of water needs by WUG and county appears in Chapter 4 of the 2021 Region I Regional Water Plan.

Table 1-2 Regional water needs summary by water use category

Water Use Category		2020	2030	2040	2050	2060	2070
Irrigation	water needs (acre-feet per year)	577	587	602	618	670	700
	% of the category's total water demand	1%	1%	1%	1%	1%	1%
Livestock	water needs (acre-feet per year)	25,447	28,441	32,048	36,404	41,618	42,766
	% of the category's total water demand	54%	57%	59%	62%	65%	66%
Manufacturing	water needs (acre-feet per year)	1,452	1,710	1,710	1,710	1,710	1,710
	% of the category's total water demand	0%	0%	0%	0%	0%	0%
Mining	water needs (acre-feet per year)	9,596	6,901	2,593	2,196	1,965	1,837
	% of the category's total water demand	35%	28%	14%	14%	15%	15%
Municipal*	water needs (acre-feet per year)	3,556	4,002	5,506	8,850	13,364	18,842
	% of the category's total water demand	2%	2%	3%	4%	6%	8%
Steam-electric power	water needs (acre-feet per year)	3,494	3,494	3,494	3,494	3,494	3,494
	% of the category's total water demand	5%	5%	5%	5%	5%	5%
Total water needs (acre-feet per year)		**44,122**	**45,135**	**45,953**	**53,272**	**62,821**	**69,349**

***** Municipal category consists of residential and non-residential (commercial and institutional) subcategories.

2 Impact Assessment Measures

A required component of the regional and state water plans is to estimate the potential economic and social impacts of potential water shortages during a repeat of the drought of record. Consistent with previous water plans, ten impact measures 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 gross domestic product (GDP) made by an individual producer, industry, sector, or group of sectors within a year. Value-added measures used in this report have been adjusted to include 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. These values have been adjusted to include the direct, indirect, and induced employment impacts on the region.
Financial transfer impacts	**Description**
Tax losses on production and imports	Sales and excise taxes not collected due to the shortage, in addition to customs duties, property taxes, motor vehicle licenses, severance taxes, other taxes, and special assessments less subsidies. These values have been adjusted to include the direct, indirect and induced tax impacts on the region.
Water trucking costs	Estimated cost of 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 restricted water use.
Population losses	Population losses accompanying job losses.
School enrollment losses	School enrollment losses (K-12) accompanying job losses.

2.1 Regional Economic Impacts

The two key measures used to assess regional economic impacts are income losses and job losses. The income losses presented consist of the sum of value-added losses and the additional purchase costs of electrical power.

Income Losses - Value-added Losses

Value-added is the value of total output less the value of the intermediate inputs also used in the production of the final product. Value-added is similar to GDP, a familiar measure of the productivity of an economy. The loss of value-added due to water shortages is estimated by input-output analysis using the IMPLAN software package, and includes the direct, indirect, and induced monetary impacts on the region. The indirect and induced effects are measures of reduced income as well as reduced employee spending for those input sectors which provide resources to the water shortage impacted production sectors.

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 are represented in this analysis by estimated additional costs associated with power purchases from other generating plants within the region or state. Consequently, the analysis employs additional power purchase costs as a proxy for the value-added impacts for the steam-electric power water use category, and these are included as a portion of the overall income impact for completeness.

For the purpose of this analysis, it is 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 that occurred during the recent drought period in 2011. This price is assumed to be comparable to those prices which would prevail in the event of another drought of record.

Job Losses

The number of jobs lost due to the economic impact is estimated using IMPLAN output associated with each TWDB water use category. Because of the difficulty in predicting outcomes and a lack of relevant data, job loss estimates are not calculated for the steam-electric power category.

2.2 Financial Transfer Impacts

Several impact measures evaluated in this analysis are presented to provide additional detail concerning potential impacts on a portion of the economy or government. These financial transfer impact measures 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. 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 is used to estimate reduced tax collections associated with the reduced output in the economy. Impact estimates for this measure include the direct, indirect, and induced impacts for the affected sectors.

Water Trucking Costs

In instances where water shortages for a municipal water user group are estimated by RWPGs to exceed 80 percent of water demands, it is assumed that water would need to be trucked in to support basic consumption and sanitation needs. For water shortages of 80 percent or greater, a fixed, maximum of $35,000[1] per acre-foot of water applied as an economic cost. This water trucking cost was utilized for both the residential and non-residential portions of municipal water needs.

Utility Revenue Losses

Lost utility income is calculated as the price of water service multiplied by the quantity of water not sold during a drought shortage. Such estimates are obtained from utility-specific pricing data provided by the Texas Municipal League, where available, for both water and wastewater. These water rates are applied to the potential water shortage to estimate forgone utility revenue as water providers sold less water during the drought due to restricted supplies.

Utility Tax Losses

Foregone utility tax losses include estimates of forgone 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.

[1] Based on staff survey of water hauling firms and historical data concerning transport costs for potable water in the recent drought in California for this estimate. There are many factors and variables that would determine actual water trucking costs including distance to, cost of water, and length of that drought.

2.3 Social Impacts

Consumer Surplus Losses for 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 a 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. Consumer surplus may also be viewed as an estimate of how much consumers would be willing to pay to keep the original quantity of water which they used prior to the drought. Lost consumer surplus estimates within this analysis only apply to the residential portion of municipal demand, with estimates being made for reduced outdoor and indoor residential use. Lost consumer surplus estimates varied widely by location and degree of water shortage.

Population and School Enrollment Losses

Population loss due to water shortages, as well as the associated decline in school enrollment, are based upon the job loss estimates discussed in Section 2.1. A simplified ratio of job and net population losses are calculated for the state as a whole based on a recent study of how job layoffs impact the labor market population.[2] For every 100 jobs lost, 18 people were assumed to move out of the area. School enrollment losses are estimated as a proportion of the population lost based upon public school enrollment data from the Texas Education Agency concerning the age K-12 population within the state (approximately 19%).

[2] 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/papers/150194. 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 the change in the population as the result of a job layoff event. The study found that layoffs impact both out-migration and in-migration into a region, and that a majority of those who did move following a layoff moved to another labor market rather than an adjacent county.

3 Socioeconomic Impact Assessment Methodology

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, and thereby determine a maximum impact per acre-foot of shortage for each of the socioeconomic measures. The calculations of economic impacts are based on the overall composition of the economy divided into many underlying economic sectors. Sectors in this analysis refer to one or more of the 536 specific production sectors of the economy designated within IMPLAN, the economic impact modeling software used for this assessment. Economic impacts within this report are estimated for approximately 330 of these sectors, with the focus on the more water-intensive production sectors. The economic impacts for a single water use category consist of an aggregation of impacts to multiple, related IMPLAN economic sectors.

3.1 Analysis Context

The context of this socioeconomic impact analysis involves situations where there are physical shortages of groundwater or surface water due to a recurrence of drought of record conditions. Anticipated shortages for specific water users 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.

3.2 IMPLAN Model and Data

Input-Output analysis using the IMPLAN software package was the primary means of estimating the value-added, jobs, and tax related impact measures. This analysis employed regional level models to determine key economic 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 2016 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 536 sector-specific Industry Codes, and those that rely on water as a primary input were assigned to their appropriate planning water user categories (irrigation, livestock, manufacturing, mining, and municipal). Estimates of value-added for a water use category were obtained by summing value-added estimates across the relevant IMPLAN sectors associated with that water use category. These calculations were also performed for job losses as well as tax losses on production and imports.

The adjusted value-added estimates used as an income measure in this analysis, 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.

Input-output models such as IMPLAN only capture backward linkages and do not include forward linkages in the economy.

3.3 Elasticity of Economic Impacts

The economic impact of a water need is based on the size of the water need relative to the total water demand for each water user group. Smaller water shortages, for example, less than 5 percent, are generally 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 intensifies, 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 these characteristics, an elasticity adjustment function is used to estimate impacts for the income, tax and job loss measures. Figure 3-1 illustrates this general relationship for the adjustment functions. Negative impacts are assumed to begin accruing when the shortage reaches the lower bound 'b1' (5 percent in Figure 3-1), with impacts then increasing linearly up to the 100 percent impact level (per unit volume) once the upper bound reaches the 'b2' level shortage (40 percent in Figure 3-1).

To illustrate this, if the total annual value-added for manufacturing in the region was $2 million and the reported annual volume of water used in that industry is 10,000 acre-feet, the estimated economic measure of the water shortage would be $200 per acre-foot. The economic impact of the shortage would then be estimated using this value-added amount as the maximum impact estimate ($200 per acre-foot) applied to the anticipated shortage volume and then adjusted by the elasticity function. Using the sample elasticity function shown in Figure 3-1, an approximately 22 percent shortage in the livestock category would indicate an economic impact estimate of 50% of the original $200 per acre-foot impact value (i.e., $100 per acre-foot).

Such adjustments are not required in estimating consumer surplus, utility revenue losses, or utility tax losses. Estimates of lost consumer surplus rely on utility-specific demand curves with the lost consumer surplus estimate calculated based on the relative percentage of the utility's water shortage. Estimated changes in population and school enrollment are indirectly related to the elasticity of job losses.

Assumed values for the lower and upper bounds 'b1' and 'b2' vary by water use category and are presented in Table 3-1.

Figure 3-1 Example economic impact elasticity function (as applied to a single water user's shortage)

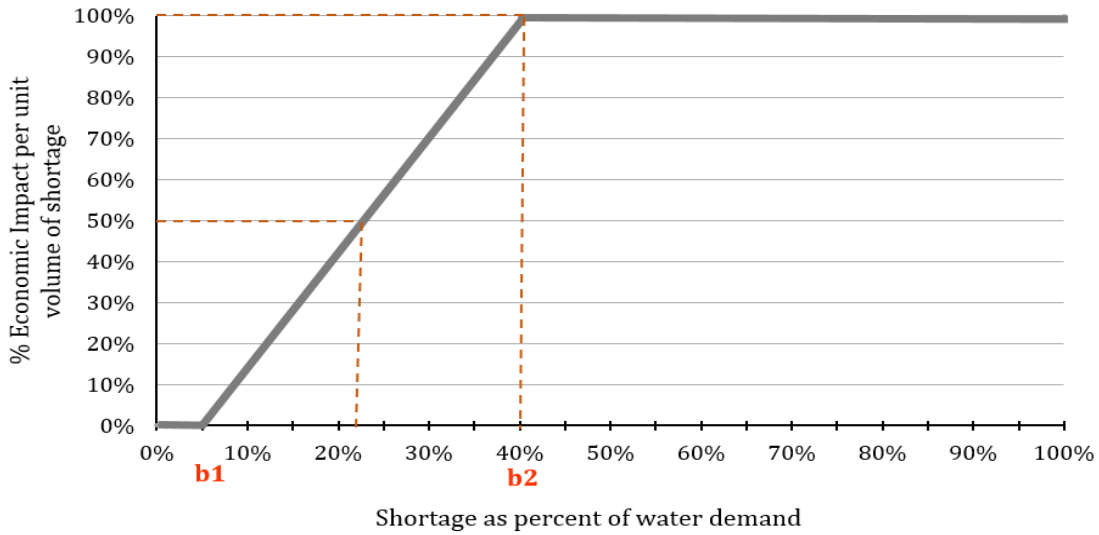


Table 3-1 Economic impact elasticity function lower and upper bounds

Water use category	Lower bound (b1)	Upper bound (b2)
Irrigation	**5%**	**40%**
Livestock	**5%**	**10%**
Manufacturing	**5%**	**40%**
Mining	**5%**	**40%**
Municipal (non-residential water intensive subcategory)	**5%**	**40%**
Steam-electric power	**N/A**	**N/A**

3.4 Analysis Assumptions and Limitations

The modeling of complex systems requires making many assumptions and acknowledging the model's uncertainty and limitations. This is particularly true when attempting to estimate a wide range of socioeconomic impacts over a large geographic area and into future decades. Some of the key assumptions and limitations of this methodology include:

1. The foundation for estimating the socioeconomic impacts of water shortages resulting from a drought are the water needs (potential shortages) that were identified by RWPGs as part of the

regional water planning process. These needs have some uncertainty associated with them but serve as a reasonable basis for evaluating the potential impacts of a drought of record event.

2. All estimated socioeconomic impacts are snapshots 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 a single year recurrence of drought of record conditions. The evaluation assumed that no recommended water management strategies are implemented. In other words, growth occurs and future shocks are imposed on an economy at 10-year intervals, and the resulting impacts are estimated. Note that the estimates presented are not cumulative (i.e., summing up expected impacts from today up to the decade noted), but are simply snapshots of the estimated annual socioeconomic impacts should a drought of record occur in each particular decade based on anticipated water 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, availability of limited resources, and other structural changes to the economy that may occur in the future. Changes in water use efficiency will undoubtedly take place in the future as supplies become more stressed. Use of the static IMPLAN structure 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 is not a form of 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 methods to weigh future costs differently through time.

5. All monetary values originally based upon year 2016 IMPLAN and other sources are reported in constant year 2018 dollars to be consistent with the water management strategy requirements in the State Water Plan.

6. IMPLAN based loss estimates (income-value-added, jobs, and taxes on production and imports) are calculated only for those IMPLAN sectors for which the TWDB's Water Use Survey (WUS) data was available and deemed reliable. Every effort is made in the annual WUS effort to capture all relevant firms who are significant water users. Lack of response to the WUS, or omission of relevant firms, impacts the loss estimates.

7. Impacts are annual estimates. The socioeconomic analysis 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.

8. 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 measures (value-added and consumer surplus) are both valid impacts but ideally should not be summed.

9. The value-added, jobs, and taxes on production and import impacts include the direct, indirect and induced effects to capture backward linkages in the economy described in Section 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.

10. The majority of impacts estimated in this analysis may be more conservative (i.e., smaller) than those that might actually occur under drought of record conditions due to not including impacts in the forward linkages in the economy. 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 this type of economic modeling effort, 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, resulting in conservative impact estimates.

11. The model does 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 some industries immediately following a drought, such as landscaping;
    b. The cost and time to rebuild liquidated livestock herds (a major capital investment 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 necessarily 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.

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

15. The methodology that the TWDB has developed for estimating the economic impacts of unmet water needs, and the assumptions and models used in the analysis, are specifically designed to estimate potential economic effects at the regional and county levels. Although it may be tempting to add the regional impacts together in an effort to produce a statewide result, the TWDB cautions against that approach for a number of reasons. The IMPLAN modeling (and corresponding economic multipliers) are all derived from regional models – a statewide model of Texas would produce somewhat different multipliers. As noted in point 14 within this section, the regional modeling used by TWDB does not capture spillover losses that could result in other regions from unmet needs in the region analyzed, or potential spillover gains if decreased production in one region leads to increases in production elsewhere. The assumed drought of record may also not occur in every region of Texas at the same time, or to the same degree.

4 Analysis Results

This section presents estimates of potential economic impacts 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. Projected economic impacts for the six water use categories (irrigation, livestock, manufacturing, mining, municipal, and steam-electric power) are reported by decade.

4.1 Impacts for Irrigation Water Shortages

Two 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 4-1. 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. However, it was not considered realistic to report increasing tax revenues during a drought of record.

Table 4-1 Impacts of water shortages on irrigation in Region I

Impact measure	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$0	$0	$0	$0	$0	$1
Job losses	2	3	4	6	14	21

* Year 2018 dollars, rounded. Entries denoted by a dash (-) indicate no estimated economic impact. Entries denoted by a zero ($0) indicate estimated income losses less than $500,000.

4.2 Impacts for Livestock Water Shortages

Seven 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 4-2.

Table 4-2 Impacts of water shortages on livestock in Region I

Impact measure	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$1,520	$1,722	$1,964	$2,255	$2,605	$2,679
Jobs losses	26,195	29,120	32,545	36,679	41,626	42,730
Tax losses on production and imports ($ millions)*	$74	$84	$96	$110	$127	$131

* Year 2018 dollars, rounded. Entries denoted by a dash (-) indicate no estimated economic impact. Entries denoted by a zero ($0) indicate estimated income losses less than $500,000.

4.3 Impacts of Manufacturing Water Shortages

Manufacturing water shortages in the region are projected to occur in three 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 4-3.

Table 4-3 Impacts of water shortages on manufacturing in Region I

Impacts measure	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$386	$438	$438	$438	$438	$438
Job losses	3,936	4,463	4,463	4,463	4,463	4,463
Tax losses on production and Imports ($ millions)*	$31	$36	$36	$36	$36	$36

* Year 2018 dollars, rounded. Entries denoted by a dash (-) indicate no estimated economic impact. Entries denoted by a zero ($0) indicate estimated income losses less than $500,000.

4.4 Impacts of Mining Water Shortages

Mining water shortages in the region are projected to occur in nine of the 20 counties in the region for one or more decades within the planning horizon. Estimated impacts to this water use type appear in Table 4-4.

Table 4-4 Impacts of water shortages on mining in Region I

Impacts measure	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$7,174	$4,390	$877	$712	$578	$491
Job losses	38,070	23,347	4,720	3,836	3,124	2,659
Tax losses on production and Imports ($ millions)*	$954	$583	$116	$94	$76	$64

* Year 2018 dollars, rounded. Entries denoted by a dash (-) indicate no estimated economic impact. Entries denoted by a zero ($0) indicate estimated income losses less than $500,000.

4.5 Impacts for Municipal Water Shortages

Twelve 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 two sub-categories within municipal water use: residential and non-residential. Non-residential municipal water use includes commercial and institutional users, which are further divided into non-water-intensive and water-intensive subsectors including car wash, laundry, hospitality, health care, recreation, and education. Lost consumer surplus estimates were made only for needs in the residential portion of municipal water use. Available IMPLAN and TWDB Water Use Survey data for the non-residential, water-intensive portion of municipal demand allowed these sectors to be included in income, jobs, and tax loss impact estimate.

Trucking cost estimates, calculated for shortages exceeding 80 percent, assumed a fixed, maximum cost of $35,000 per acre-foot to transport water for municipal use. The estimated impacts to this water use category appear in Table 4-5.

Table 4-5 Impacts of water shortages on municipal water users in Region I

Impacts measure	2020	2030	2040	2050	2060	2070
Income losses[1] ($ millions)*	$14	$16	$18	$27	$51	$93
Job losses[1]	265	288	326	497	937	1,711
Tax losses on production and imports[1] ($ millions)*	$1	$1	$2	$2	$5	$8
Trucking costs ($ millions)*	$3	$3	$3	$3	$3	$3
Utility revenue losses ($ millions)*	$12	$13	$18	$28	$42	$59
Utility tax revenue losses ($ millions)*	$0	$0	$0	$0	$1	$1

[1] Estimates apply to the water-intensive portion of non-residential municipal water use.
* Year 2018 dollars, rounded. Entries denoted by a dash (-) indicate no estimated economic impact. Entries denoted by a zero ($0) indicate estimated income losses less than $500,000.

4.6 Impacts of Steam-Electric Water Shortages

Steam-electric water shortages in the region are projected to occur in two of the 20 counties in the region for one or more decades within the planning horizon. Estimated impacts to this water use category appear in Table 4-6.

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

- Are reflected as an income loss proxy in the form of estimated additional purchasing costs for power from the electrical grid to replace power 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.
- Do 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 4-6 Impacts of water shortages on steam-electric power in Region I

Impacts measure	2020	2030	2040	2050	2060	2070
Income Losses ($ millions)*	$219	$219	$219	$219	$219	$219

* Year 2018 dollars, rounded. Entries denoted by a dash (-) indicate no estimated economic impact. Entries denoted by a zero ($0) indicate estimated income losses less than $500,000.

4.7 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 4-7.

Table 4-7 Region-wide social impacts of water shortages in Region I

Impacts measure	2020	2030	2040	2050	2060	2070
Consumer surplus losses ($ millions)*	$34	$35	$35	$36	$42	$52
Population losses	12,571	10,506	7,722	8,350	9,210	9,471
School enrollment losses	2,405	2,010	1,477	1,597	1,762	1,812

* Year 2018 dollars, rounded. Entries denoted by a dash (-) indicate no estimated economic impact. Entries denoted by a zero ($0) indicate estimated 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 2018 dollars, rounded). Values are presented only for counties with projected economic impacts for at least one decade.
(* Entries denoted by a dash (-) indicate no estimated economic impact)

		Income losses (Million $)*						Job losses					
County	Water Use Category	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070
ANDERSON	MUNICIPAL	$0.01	$0.01	$0.01	$0.01	$0.01	$0.01	0	0	0	0	0	0
ANDERSON Total		**$0.01**	**$0.01**	**$0.01**	**$0.01**	**$0.01**	**$0.01**	**0**	**0**	**0**	**0**	**0**	**0**
ANGELINA	MANUFACTURING	$386.27	$438.04	$438.04	$438.04	$438.04	$438.04	3,936	4,463	4,463	4,463	4,463	4,463
ANGELINA	MINING	$394.15	$476.64	$330.82	$249.15	$186.66	$139.16	2,089	2,526	1,753	1,321	989	738
ANGELINA Total		**$780.41**	**$914.68**	**$768.86**	**$687.20**	**$624.70**	**$577.20**	**6,025**	**6,990**	**6,217**	**5,784**	**5,452**	**5,201**
CHEROKEE	MINING	$198.32	$205.82	$174.99	$122.49	$70.00	$33.33	1,051	1,091	928	649	371	177
CHEROKEE	MUNICIPAL	$0.00	$0.02	$0.03	$0.07	$0.27	$0.73	0	0	1	1	5	13
CHEROKEE Total		**$198.33**	**$205.84**	**$175.02**	**$122.56**	**$70.27**	**$34.06**	**1,051**	**1,091**	**928**	**651**	**376**	**190**
HENDERSON	IRRIGATION	$0.01	$0.02	$0.05	$0.10	$0.32	$0.51	0	1	2	4	12	19
HENDERSON	MINING	-	$0.79	-	-	-	-	-	4	-	-	-	-
HENDERSON	MUNICIPAL	$0.00	$0.00	$0.01	$0.01	$0.31	$0.77	0	0	0	0	4	12
HENDERSON Total		**$0.01**	**$0.82**	**$0.06**	**$0.11**	**$0.63**	**$1.28**	**0**	**5**	**2**	**4**	**17**	**31**
HOUSTON	LIVESTOCK	-	$5.63	$9.08	$12.86	$16.94	$22.16	-	191	309	437	576	753
HOUSTON	MUNICIPAL	$12.99	$12.56	$11.93	$11.63	$11.57	$11.57	238	230	219	213	212	212
HOUSTON Total		**$12.99**	**$18.19**	**$21.01**	**$24.49**	**$28.51**	**$33.73**	**238**	**421**	**527**	**650**	**788**	**965**
JASPER	LIVESTOCK	$419.22	$419.22	$419.22	$419.22	$419.22	$419.22	10,573	10,573	10,573	10,573	10,573	10,573
JASPER	MUNICIPAL	$0.25	$0.27	$0.30	$0.32	$0.32	$0.32	5	5	6	6	6	6
JASPER Total		**$419.48**	**$419.49**	**$419.52**	**$419.54**	**$419.55**	**$419.55**	**10,578**	**10,578**	**10,579**	**10,579**	**10,579**	**10,579**
JEFFERSON	MUNICIPAL	-	-	-	$6.24	$25.95	$61.81	-	-	-	114	475	1,133
JEFFERSON	STEAM ELECTRIC POWER	$149.89	$149.89	$149.89	$149.89	$149.89	$149.89	-	-	-	-	-	-
JEFFERSON Total		**$149.89**	**$149.89**	**$149.89**	**$156.14**	**$175.84**	**$211.71**	**-**	**-**	**-**	**114**	**475**	**1,133**
NACOGDOCHES	LIVESTOCK	$415.89	$445.78	$480.40	$520.53	$566.44	$634.85	5,636	6,041	6,510	7,054	7,676	8,603
NACOGDOCHES	MINING	$4,562.26	$2,479.04	$6.13	-	-	-	24,182	13,140	32	-	-	-

		Income losses (Million $)*						Job losses					
County	Water Use Category	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070
NACOGDOCHES	MUNICIPAL	-	-	-	$0.02	$0.08	$0.21	-	-	-	0	1	4
NACOGDOCHES Total		**$4,978.16**	**$2,924.82**	**$486.53**	**$520.55**	**$566.52**	**$635.06**	**29,818**	**19,181**	**6,543**	**7,054**	**7,678**	**8,607**
NEWTON	MINING	$59.71	$15.20	-	-	-	-	316	81	-	-	-	-
NEWTON Total		**$59.71**	**$15.20**	**-**	**-**	**-**	**-**	**316**	**81**	**-**	**-**	**-**	**-**
ORANGE	IRRIGATION	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	2	2	2	2	2	2
ORANGE Total		**$0.06**	**$0.06**	**$0.06**	**$0.06**	**$0.06**	**$0.06**	**2**	**2**	**2**	**2**	**2**	**2**
PANOLA	LIVESTOCK	$50.21	$50.21	$50.21	$50.21	$50.21	$50.21	986	986	986	986	986	986
PANOLA	MUNICIPAL	-	$0.00	$0.02	$0.09	$0.13	$0.16	-	0	1	2	3	3
PANOLA Total		**$50.21**	**$50.21**	**$50.23**	**$50.30**	**$50.33**	**$50.36**	**986**	**986**	**986**	**988**	**988**	**989**
RUSK	LIVESTOCK	$9.33	$8.73	$8.83	$9.47	$10.12	$10.12	206	192	194	209	223	223
RUSK	MINING	$189.30	$361.19	$347.06	$331.92	$319.18	$318.18	1,037	1,979	1,902	1,819	1,749	1,744
RUSK	MUNICIPAL	$0.02	$0.02	$0.02	$0.02	$0.06	$0.16	0	0	0	0	1	3
RUSK	STEAM ELECTRIC POWER	$69.15	$69.15	$69.15	$69.15	$69.15	$69.15	-	-	-	-	-	-
RUSK Total		**$267.80**	**$439.09**	**$425.05**	**$410.56**	**$398.51**	**$397.61**	**1,243**	**2,172**	**2,097**	**2,028**	**1,973**	**1,970**
SAN AUGUSTINE	LIVESTOCK	$81.67	$94.37	$108.87	$125.77	$144.33	$144.33	1,278	1,477	1,704	1,969	2,260	2,260
SAN AUGUSTINE	MINING	$1,751.58	$832.58	-	-	-	-	9,284	4,413	-	-	-	-
SAN AUGUSTINE	MUNICIPAL	$0.72	$0.54	$0.41	$0.38	$0.38	$0.38	13	10	7	7	7	7
SAN AUGUSTINE Total		**$1,833.96**	**$927.50**	**$109.28**	**$126.15**	**$144.71**	**$144.71**	**10,576**	**5,900**	**1,712**	**1,976**	**2,266**	**2,266**
SHELBY	LIVESTOCK	$543.43	$698.41	$887.04	$1,117.25	$1,397.84	$1,397.84	7,516	9,659	12,268	15,452	19,332	19,332
SHELBY	MUNICIPAL	$0.15	$0.38	$1.08	$2.24	$3.77	$5.51	3	7	20	41	69	101
SHELBY Total		**$543.59**	**$698.79**	**$888.12**	**$1,119.49**	**$1,401.61**	**$1,403.36**	**7,519**	**9,666**	**12,288**	**15,493**	**19,401**	**19,433**
SMITH	MINING	$18.62	$19.08	$17.80	$7.97	$2.45	$0.20	110	112	105	47	14	1
SMITH	MUNICIPAL	$0.33	$1.88	$3.80	$5.73	$7.85	$11.19	6	36	73	111	153	218
SMITH Total		**$18.95**	**$20.96**	**$21.60**	**$13.70**	**$10.30**	**$11.40**	**116**	**148**	**178**	**158**	**167**	**219**
REGION I Total		**$9,313.56**	**$6,785.54**	**$3,515.24**	**$3,650.85**	**$3,891.54**	**$3,920.09**	**68,468**	**57,221**	**42,058**	**45,480**	**50,164**	**51,585**

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Appendix 8-A

Proposed Reservoir Site Locations

Chapter 8 of the 2021 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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Figure 8-A.1: Proposed Reservoir Site Locations Northeast Area

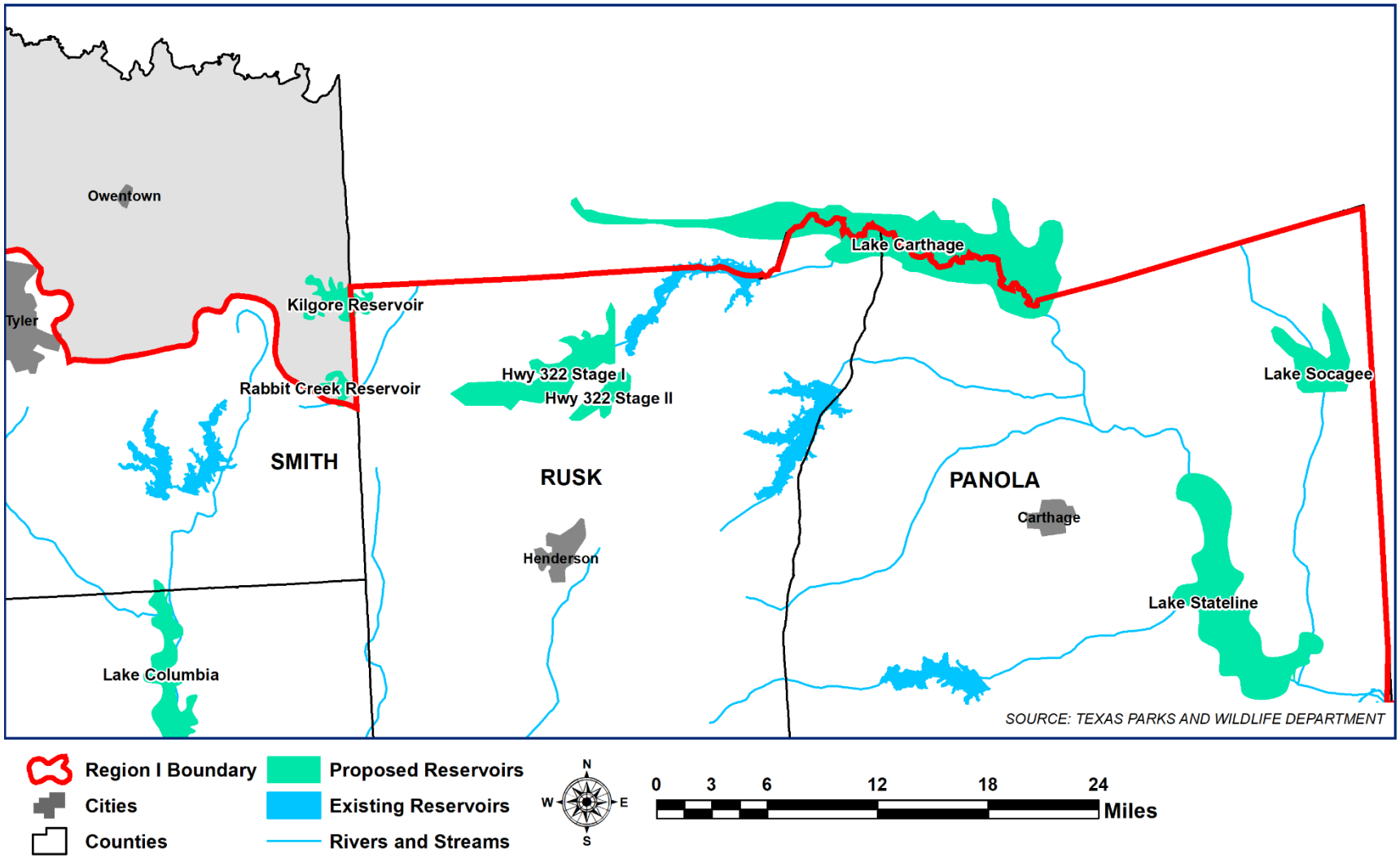


Figure 8-A.2: Proposed Reservoir Site Locations Northwest Area

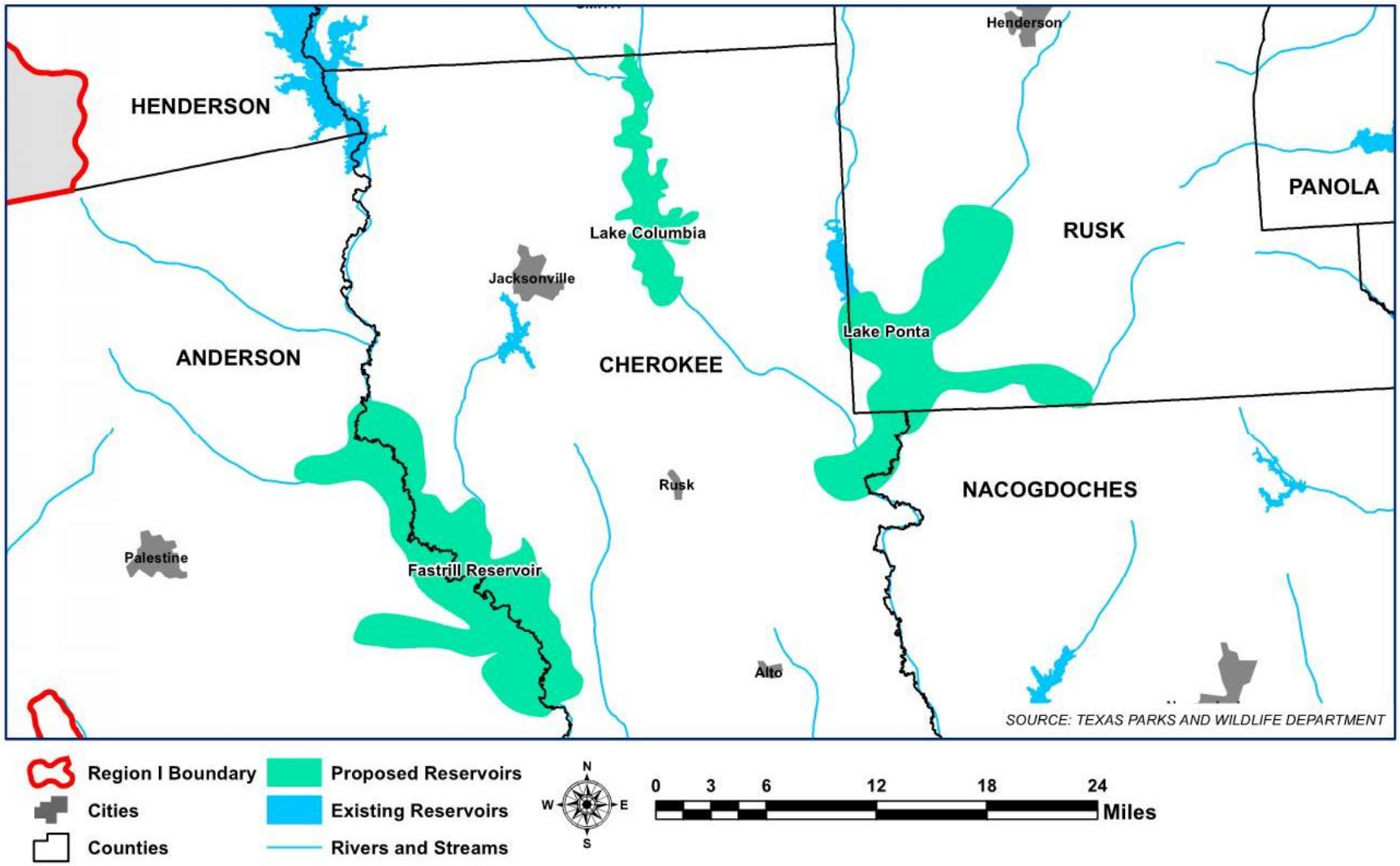


Figure 8-A.3: Proposed Reservoir Site Locations Rockland Reservoir

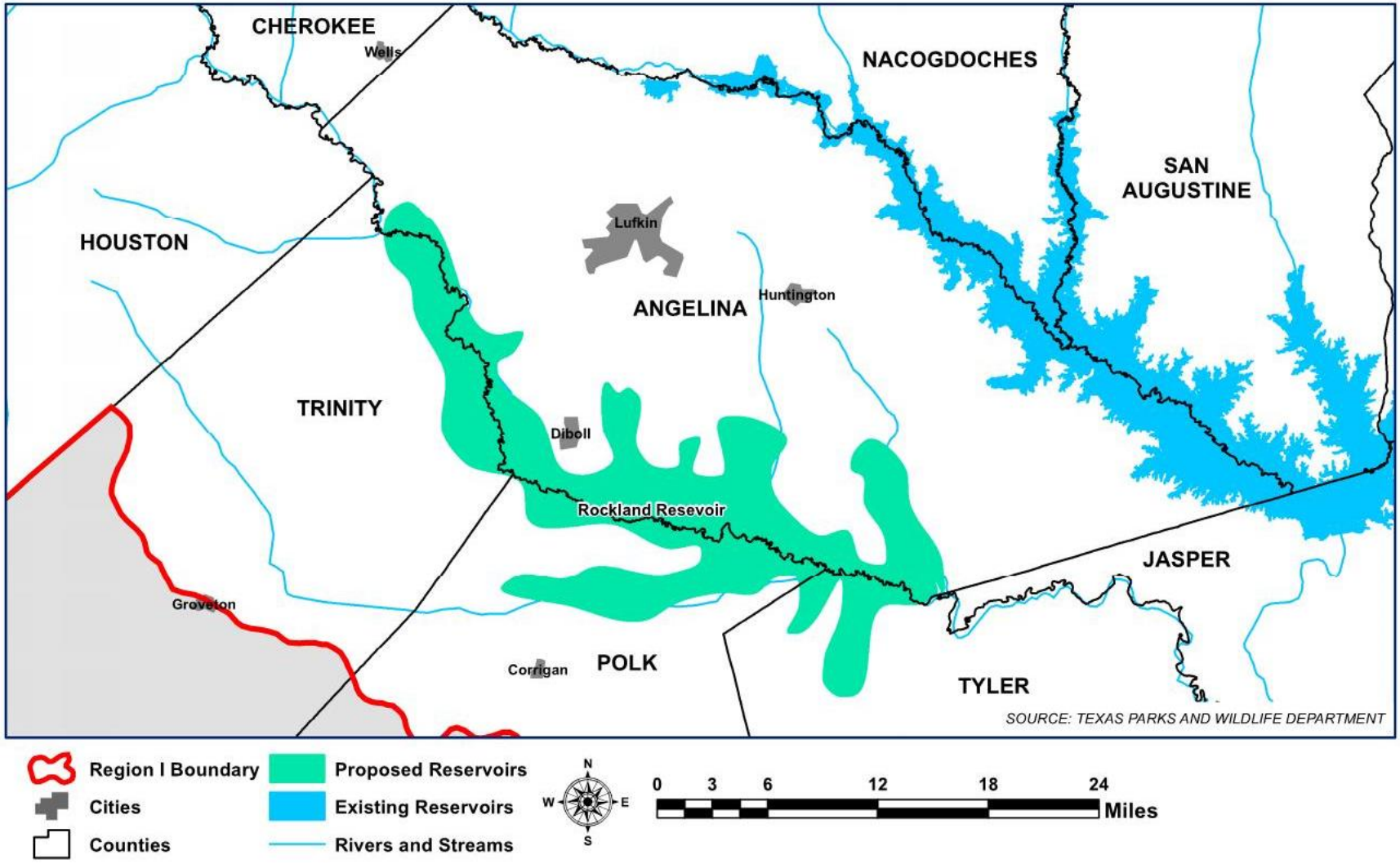
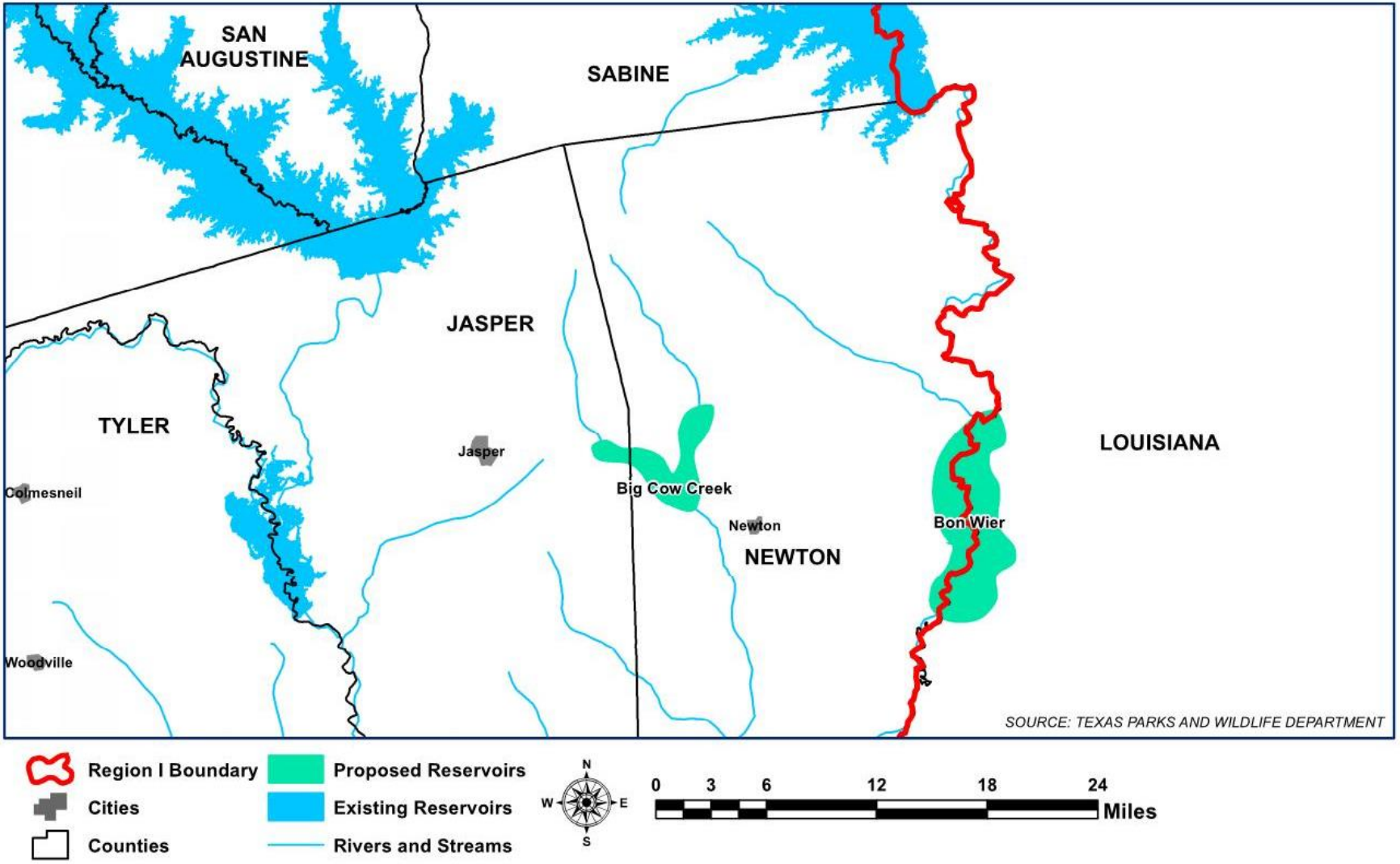


Figure 8-A.4: Proposed Reservoir Site Locations Eastern Area



Appendix 8-B

2011 Prioritization Comments & Concerns Memorandum

This appendix includes a technical memorandum prepared by the Consultant Team as part of the 2021 Prioritization submittal from the ETRWPG to the TWDB. The memorandum was prepared after Prioritization of 2021 water management strategies (WMSs).

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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.

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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.

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Appendix 9-A

Infrastructure Financing Report – Contact Information

A survey with information on how local governments, regional authorities, and other political subdivisions in the region would finance the implementation of WMSs and associated WMSPs included in the 2021 Plan was developed and administered by the TWDB and performed by the RWPG. This appendix is a summary of the contact information for each project sponsor.

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EntityName	Entity Planning Region	Respondent Contact Name	Area Code	Phone	Extension	Email	Comment	Entity Rwp Id
ALTO RURAL WSC	I	Mr. Tommy Dill	936	858-4658				167
ANGELINA & NECHES RIVER AUTHORITY	I	Mr. Kelley Holcomb	936	632-7795		kholcomb@anra.org		3
ANGELINA NACOGDOCHES WCID #1	I	Mr. David Mason	903	854-4559		manager@lakestriker.com		4
ATHENS MUNICIPAL WATER AUTHORITY	I	Mr. Mike Peek	903	804-8501		info@athenstxwater.org		6
BEAUMONT	I	Ms. Molly Villarreal	409	980-8311		water.customerservice@beaumonttexas.gov		9
BETHEL ASH WSC	I	Mr. Donnie Barfield	903	675-8466		bethelash@live.com		235
BULLARD	I	Mr. Larry Morgan	903	894-7223		citymanager@bullardtexas.net		288
CENTER	I	Mr. Chad Nehring	936	598-2941		cnehring@centertexas.org		25
CHANDLER	I	Mr. Jon Hallman	903	204-8680		jhall@chandlertx.com		313
COUNTY-OTHER, HENDERSON	I	Judge Wade McKinney	903	675-6120		countyjudgesoffice@henderson-county.com		473
COUNTY-OTHER, JEFFERSON	I	Judge Jeff M. Branick	409	835-8466		jbranick@co.jefferson.tx.us		489
COUNTY-OTHER, NACOGDOCHES	I	Judge Mike Perry	936	560-7755	220	cojudge@co.nacogdoches.tx.us		540
CUSHING	I	Mr. Randy Nugent	936	326-4665		utilityoffice@cityofcushing.org		641
D & M WSC	I	Mr. Robert Shumate	936	559-9900		dmwater.org@gmail.com		2505
HENDERSON	I	Mr. Davis Brown	903	657-5246		davisb@hendersontx.us		835
IRRIGATION, ORANGE	I	Judge Stephen Carlton	409	882-7070		bcarlton@co.orange.tx.us		1049
JACKSONVILLE	I	Mr. Randall Chandler	903	589-3510		randall.chandler@jacksonvilletx.org		77
JACOBS WSC	I	President Wayne Holland	903	657-9601				13083
JASPER	I	Mr. Greg Kelley	409	383-2214		gkelley@jaspertx.org		1127
LIVESTOCK, HOUSTON	I	Judge Jim L. Lovell	936	544-3255	221	countyjudge@co.houston.tx.us		1333
LIVESTOCK, NACOGDOCHES	I	Judge Mike Perry	936	560-7755	220	cojudge@co.nacogdoches.tx.us		1394
LIVESTOCK, PANOLA	I	Judge LeeAnn Jones	903	693-0391		leeann.jones@co.panola.tx.us		1403
LIVESTOCK, RUSK	I	Judge Joel Hale	903	657-0302		joel.hale@co.rusk.tx.us		1421
LIVESTOCK, SAN AUGUSTINE	I	Judge Jeff Boyd	936	275-2762		jeffboyd@co.san-augustine.tx.us		1423
LIVESTOCK, SHELBY	I	Judge Allison Harbison	936	598-3863		allison.harbison@co.shelby.tx.us		1430
LOWER NECHES VALLEY AUTHORITY	I	Mr. Scott Hall	409	892-4011		scott.hall@lnva.dst.tx.us		86
LUFKIN	I	Mr. Keith Wright	936	633-0414		kwright@cityoflufkin.com		89
MANUFACTURING, JEFFERSON	I	Judge Jeff M. Branick	409	835-8466		jbranick@co.jefferson.tx.us		1592
MANUFACTURING, SMITH	I	Judge Nathaniel Moran	936	598-3863		nmoran@smith-county.com		1653
MINING, ANGELINA	I	Judge Wes Suiter	936	634-5413		wsuiter@angelinacounty.net		1728
MINING, NACOGDOCHES	I	Judge Mike Perry	936	560-7755	220	cojudge@co.nacogdoches.tx.us		1879
MINING, RUSK	I	Judge Joel Hale	903	657-0302		joel.hale@co.rusk.tx.us		1903
MINING, SAN AUGUSTINE	I	Judge Jeff Boyd	936	275-2762		jeffboyd@co.san-augustine.tx.us		2773
MOORE STATION WSC	I	President Charles Anderson	903	852-3395		office@moorestationwater.com		13148
NACOGDOCHES	I	Mr. Bart Allen	936	559-2585		allenb@ci.nacogdoches.tx.us		97
OVERTON	I	Mr. Charles Cunningham	903	834-3171		ccunningham@ci.overton.tx.us		2035
PENNINGTON WSC	I	Mr. Charles Lowery	936	638-4411		penningtonwatersupply@yahoo.com		13189
PORT ARTHUR	I	Mr. Clyde Trahan	409	983-3841		clyde.trahan@portarthurtx.gov		111
RUSK	I	Mr. Thomas Thompson	903	683-2321		tthompson@rusktx.org		2168
SAN AUGUSTINE	I	Mayor Leroy Hughes	936	275-2121		info@cityofsanaugustinetx.gov		2174
SAND HILLS WSC	I	Mr. LD Eddins	936	590-9032				13223
SOUTHERN UTILITIES	I	Mr. Royce E. Wisenbaker	903	566-3511				2233

EntityName	Entity Planning Region	Respondent Contact Name	Area Code	Phone	Extension	Email	Comment	Entity Rwp Id
STEAM ELECTRIC POWER, JEFFERSON	I	Judge Jeff M. Branick	409	835-8466		jbranick@co.jefferson.tx.us		2288
STEAM ELECTRIC POWER, RUSK	I	Judge Joel Hale	903	657-0302		joel.hale@co.rusk.tx.us		2316
TYLER	I	Mr. Jimmie Johnson	903	561-1234		jljohnson@tylertexas.com		135
UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY	I	Mr. Monty Shank	903	876-2237		mdsunra@dctexas.net		140
WHITEHOUSE	I	Mr. Jeff Tomlin	903	510-7509				2450
WRIGHT CITY WSC	I	Mr. Charles A. Seale	903	859-1281				2863

Appendix 9-B

Infrastructure Financing Report – Survey Results

A survey with information on how local governments, regional authorities, and other political subdivisions in the region would finance the implementation of WMSs and associated WMSPs included in the 2021 Plan was developed and administered by the TWDB and performed by the RWPG. This appendix is a tabulation of the Planning, Design, Permitting & Acquisition Funding; Construction Funding; Percent State Participation in Owning Excess Capacity; and Year of Need for each WMSP.

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Sponsor Entity Name	Sponsor Entity Primary 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	CHER-ALT-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 735,000.00	2050		167	3926	1
ALTO RURAL WSC	I	CHER-ALT-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	CONSTRUCTION FUNDING	$ 1,691,000.00	2050		167	3926	2
ALTO RURAL WSC	I	CHER-ALT-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	77%	2050		167	3926	3
ANGELINA & NECHES RIVER AUTHORITY	I	ANRA-COL-LAKE COLUMBIA	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 234,846,468.00	2030		3	1696	1
ANGELINA & NECHES RIVER AUTHORITY	I	ANRA-COL-LAKE COLUMBIA	I	CONSTRUCTION FUNDING	$ 168,015,532.00	2030		3	1696	2
ANGELINA & NECHES RIVER AUTHORITY	I	ANRA-COL-LAKE COLUMBIA	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2030		3	1696	3
ANGELINA & NECHES RIVER AUTHORITY	I	ANRA-GW-ANRA GROUNDWATER WELLS	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 8,658,634.35	2030		3	2051	1
ANGELINA & NECHES RIVER AUTHORITY	I	ANRA-GW-ANRA GROUNDWATER WELLS	I	CONSTRUCTION FUNDING	$ 21,116,365.65	2030		3	2051	2
ANGELINA & NECHES RIVER AUTHORITY	I	ANRA-GW-ANRA GROUNDWATER WELLS	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2030		3	2051	3
ANGELINA & NECHES RIVER AUTHORITY	I	ANRA-WTP-ANRA TREATMENT PLANT AND DISTRIBUTION SYSTEM	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 67,917,000.00	2030		3	2136	1
ANGELINA & NECHES RIVER AUTHORITY	I	ANRA-WTP-ANRA TREATMENT PLANT AND DISTRIBUTION SYSTEM	I	CONSTRUCTION FUNDING	$ 160,084,000.00	2030		3	2136	2
ANGELINA & NECHES RIVER AUTHORITY	I	ANRA-WTP-ANRA TREATMENT PLANT AND DISTRIBUTION SYSTEM	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2030		3	2136	3
ANGELINA & NECHES RIVER AUTHORITY	I	CHER-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY (ANGELINA RIVER)	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 2,555,000.00	2020		3	2052	1
ANGELINA & NECHES RIVER AUTHORITY	I	CHER-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY (ANGELINA RIVER)	I	CONSTRUCTION FUNDING	$ 4,458,000.00	2020		3	2052	2
ANGELINA & NECHES RIVER AUTHORITY	I	CHER-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY (ANGELINA RIVER)	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2020		3	2052	3
ANGELINA NACOGDOCHES WCID #1	I	ANCD-VOL-VOLUMETRIC SURVEY AND NORMAL POOL ELEVATION ADJUSTMENT	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 3,557,400.00	2040		4	2199	1
ANGELINA NACOGDOCHES WCID #1	I	ANCD-VOL-VOLUMETRIC SURVEY AND NORMAL POOL ELEVATION ADJUSTMENT	I	CONSTRUCTION FUNDING	$ 20,158,600.00	2040		4	2199	2
ANGELINA NACOGDOCHES WCID #1	I	ANCD-VOL-VOLUMETRIC SURVEY AND NORMAL POOL ELEVATION ADJUSTMENT	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2040		4	2199	3
ATHENS MUNICIPAL WATER AUTHORITY	I	ATHENS MWA - NEW WELLS PHASE I	C	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	*	*		6	1074	1
ATHENS MUNICIPAL WATER AUTHORITY	I	ATHENS MWA - NEW WELLS PHASE I	C	CONSTRUCTION FUNDING	*	*		6	1074	2
ATHENS MUNICIPAL WATER AUTHORITY	I	ATHENS MWA - NEW WELLS PHASE I	C	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	*	*		6	1074	3

Sponsor Entity Name	Sponsor Entity Primary 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
ATHENS MUNICIPAL WATER AUTHORITY	I	ATHENS MWA - NEW WELLS PHASE II	C	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	*	*		6	3861	1
ATHENS MUNICIPAL WATER AUTHORITY	I	ATHENS MWA - NEW WELLS PHASE II	C	CONSTRUCTION FUNDING	*	*		6	3861	2
ATHENS MUNICIPAL WATER AUTHORITY	I	ATHENS MWA - NEW WELLS PHASE II	C	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	*	*		6	3861	3
ATHENS MUNICIPAL WATER AUTHORITY	I	ATHENS MWA - WTP INFRASTRUCTURE IMPROVEMENTS	C	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	*	*		6	1075	1
ATHENS MUNICIPAL WATER AUTHORITY	I	ATHENS MWA - WTP INFRASTRUCTURE IMPROVEMENTS	C	CONSTRUCTION FUNDING	*	*		6	1075	2
ATHENS MUNICIPAL WATER AUTHORITY	I	ATHENS MWA - WTP INFRASTRUCTURE IMPROVEMENTS	C	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	*	*		6	1075	3
BEAUMONT	I	JEFF-BEA-ADVANCED CONSERVATION	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 666,000.00	2040		9	4411	1
BEAUMONT	I	JEFF-BEA-ADVANCED CONSERVATION	I	CONSTRUCTION FUNDING	$ 1,533,000.00	2040		9	4411	2
BEAUMONT	I	JEFF-BEA-ADVANCED CONSERVATION	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	77%	2040		9	4411	3
BETHEL ASH WSC	I	CONSERVATION, WATER LOSS CONTROL - BETHEL-ASH WSC	C	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	*	*		235	1300	1
BETHEL ASH WSC	I	CONSERVATION, WATER LOSS CONTROL - BETHEL-ASH WSC	C	CONSTRUCTION FUNDING	*	*		235	1300	2
BETHEL ASH WSC	I	CONSERVATION, WATER LOSS CONTROL - BETHEL-ASH WSC	C	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	*	*		235	1300	3
BULLARD	I	SMTH-BLD-PURCHASE FROM CITY OF TYLER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 4,867,000.00	2030		288	2046	1
BULLARD	I	SMTH-BLD-PURCHASE FROM CITY OF TYLER	I	CONSTRUCTION FUNDING	$ 9,397,000.00	2030		288	2046	2
BULLARD	I	SMTH-BLD-PURCHASE FROM CITY OF TYLER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	88%	2030		288	2046	3
CENTER	I	CENT-REU-CITY OF CENTER REUSE PIPELINE FROM WWTP TO LAKE CENTER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 662,000.00	2030		25	2133	1
CENTER	I	CENT-REU-CITY OF CENTER REUSE PIPELINE FROM WWTP TO LAKE CENTER	I	CONSTRUCTION FUNDING	$ 1,794,000.00	2030		25	2133	2
CENTER	I	CENT-REU-CITY OF CENTER REUSE PIPELINE FROM WWTP TO LAKE CENTER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2030		25	2133	3
CENTER	I	CENT-TOL-PIPELINE FROM TOLEDO BEND TO LAKE CENTER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 10,918,000.00	2040		25	2134	1
CENTER	I	CENT-TOL-PIPELINE FROM TOLEDO BEND TO LAKE CENTER	I	CONSTRUCTION FUNDING	$ 16,947,000.00	2040		25	2134	2
CENTER	I	CENT-TOL-PIPELINE FROM TOLEDO BEND TO LAKE CENTER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2040		25	2134	3

Sponsor Entity Name	Sponsor Entity Primary 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
CHANDLER	I	HDSN-CHN-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 446,000.00	2070		313	3932	1
CHANDLER	I	HDSN-CHN-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	CONSTRUCTION FUNDING	$ 951,000.00	2070		313	3932	2
CHANDLER	I	HDSN-CHN-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2070		313	3932	3
COUNTY-OTHER, HENDERSON	I	CONSERVATION, WATER LOSS CONTROL - HENDERSON COUNTY	C	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	*	*		473	1556	1
COUNTY-OTHER, HENDERSON	I	CONSERVATION, WATER LOSS CONTROL - HENDERSON COUNTY	C	CONSTRUCTION FUNDING	*	*		473	1556	2
COUNTY-OTHER, HENDERSON	I	CONSERVATION, WATER LOSS CONTROL - HENDERSON COUNTY	C	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	*	*		473	1556	3
COUNTY-OTHER, JEFFERSON	I	JEFF-CTR-PURCHASE FROM LOWER NECHES VALLEY AUTHORITY (SAM RAYBURN)	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 6,332,000.00	2060		489	1931	1
COUNTY-OTHER, JEFFERSON	I	JEFF-CTR-PURCHASE FROM LOWER NECHES VALLEY AUTHORITY (SAM RAYBURN)	I	CONSTRUCTION FUNDING	$ 15,333,000.00	2060		489	1931	2
COUNTY-OTHER, JEFFERSON	I	JEFF-CTR-PURCHASE FROM LOWER NECHES VALLEY AUTHORITY (SAM RAYBURN)	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2060		489	1931	3
COUNTY-OTHER, NACOGDOCHES	I	NACN-LK - LAKE NACONICHE INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 16,733,000.00	2030		540	2125	1
COUNTY-OTHER, NACOGDOCHES	I	NACN-LK - LAKE NACONICHE INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$ 25,384,000.00	2030		540	2125	2
COUNTY-OTHER, NACOGDOCHES	I	NACN-LK - LAKE NACONICHE INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2030		540	2125	3
CUSHING	I	WUG-CONS-MUNICIPAL CONSERVATION-CUSHING	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 366,000.00	2020		641	3951	1
CUSHING	I	WUG-CONS-MUNICIPAL CONSERVATION-CUSHING	I	CONSTRUCTION FUNDING	$ 664,000.00	2020		641	3951	2
CUSHING	I	WUG-CONS-MUNICIPAL CONSERVATION-CUSHING	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2020		641	3951	3
D & M WSC	I	NACW-DMW-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 1,453,000.00	2040		2505	2088	1
D & M WSC	I	NACW-DMW-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	CONSTRUCTION FUNDING	$ 3,114,000.00	2040		2505	2088	2
D & M WSC	I	NACW-DMW-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2040		2505	2088	3
HENDERSON	I	WUG-CONS-MUNICIPAL CONSERVATION-HENDERSON	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 3,366,000.00	2020		835	3952	1
HENDERSON	I	WUG-CONS-MUNICIPAL CONSERVATION-HENDERSON	I	CONSTRUCTION FUNDING	$ 6,534,000.00	2020		835	3952	2
HENDERSON	I	WUG-CONS-MUNICIPAL CONSERVATION-HENDERSON	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2020		835	3952	3

Sponsor Entity Name	Sponsor Entity Primary 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
IRRIGATION, ORANGE	I	ORAN-IRR-PURCHASE FROM SABINE RIVER AUTHORITY (SABINE RIVER)	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 5,870,000.00	2030		1049	3965	1
IRRIGATION, ORANGE	I	ORAN-IRR-PURCHASE FROM SABINE RIVER AUTHORITY (SABINE RIVER)	I	CONSTRUCTION FUNDING	$ 8,754,000.00	2030		1049	3965	2
IRRIGATION, ORANGE	I	ORAN-IRR-PURCHASE FROM SABINE RIVER AUTHORITY (SABINE RIVER)	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2030		1049	3965	3
JACKSONVILLE	I	JACK-COL-SUPPLY FROM LAKE COLUMBIA	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 8,866,000.00	2040		77	2099	1
JACKSONVILLE	I	JACK-COL-SUPPLY FROM LAKE COLUMBIA	I	CONSTRUCTION FUNDING	$ 20,524,000.00	2040		77	2099	2
JACKSONVILLE	I	JACK-COL-SUPPLY FROM LAKE COLUMBIA	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2040		77	2099	3
JACOBS WSC	I	RUSK-JAW-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 557,000.00	2070		13083	3946	1
JACOBS WSC	I	RUSK-JAW-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	CONSTRUCTION FUNDING	$ 1,238,000.00	2070		13083	3946	2
JACOBS WSC	I	RUSK-JAW-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2070		13083	3946	3
JASPER	I	WUG-CONS-MUNICIPAL CONSERVATION-JASPER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 5,250,960.00	2020		1127	3953	1
JASPER	I	WUG-CONS-MUNICIPAL CONSERVATION-JASPER	I	CONSTRUCTION FUNDING	$ 10,193,040.00	2020		1127	3953	2
JASPER	I	WUG-CONS-MUNICIPAL CONSERVATION-JASPER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2020		1127	3953	3
LIVESTOCK, HOUSTON	I	HOUS-LTK-NEW WELLS IN YEGUA-JACKSON	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 129,000.00	2070		1333	1916	1
LIVESTOCK, HOUSTON	I	HOUS-LTK-NEW WELLS IN YEGUA-JACKSON	I	CONSTRUCTION FUNDING	$ 270,000.00	2070		1333	1916	2
LIVESTOCK, HOUSTON	I	HOUS-LTK-NEW WELLS IN YEGUA-JACKSON	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2070		1333	1916	3
LIVESTOCK, NACOGDOCHES	I	NACW-LTK-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 7,489,000.00	2030		1394	2084	1
LIVESTOCK, NACOGDOCHES	I	NACW-LTK-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	CONSTRUCTION FUNDING	$ 19,188,000.00	2030		1394	2084	2
LIVESTOCK, NACOGDOCHES	I	NACW-LTK-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2030		1394	2084	3
LIVESTOCK, PANOLA	I	PANL-LTK-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 345,000.00	2030		1403	3945	1
LIVESTOCK, PANOLA	I	PANL-LTK-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	CONSTRUCTION FUNDING	$ 827,000.00	2030		1403	3945	2
LIVESTOCK, PANOLA	I	PANL-LTK-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2030		1403	3945	3

Sponsor Entity Name	Sponsor Entity Primary 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
LIVESTOCK, RUSK	I	RUSK-LTK-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 89,000.00	2040		1421	3947	1
LIVESTOCK, RUSK	I	RUSK-LTK-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	CONSTRUCTION FUNDING	$ 194,000.00	2040		1421	3947	2
LIVESTOCK, RUSK	I	RUSK-LTK-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	76%	2040		1421	3947	3
LIVESTOCK, SAN AUGUSTINE	I	SAUG-LTK-PURCHASE FROM SRA (TOLEDO BEND)	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 14,593,000.00	2030		1423	3964	1
LIVESTOCK, SAN AUGUSTINE	I	SAUG-LTK-PURCHASE FROM SRA (TOLEDO BEND)	I	CONSTRUCTION FUNDING	$ 26,709,000.00	2030		1423	3964	2
LIVESTOCK, SAN AUGUSTINE	I	SAUG-LTK-PURCHASE FROM SRA (TOLEDO BEND)	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	43%	2030		1423	3964	3
LIVESTOCK, SHELBY	I	SHEL-LTK-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ -	2020		1430	2050	1
LIVESTOCK, SHELBY	I	SHEL-LTK-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)	I	CONSTRUCTION FUNDING	$ -	2020		1430	2050	2
LIVESTOCK, SHELBY	I	SHEL-LTK-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	66%	2020		1430	2050	3
LOWER NECHES VALLEY AUTHORITY	I	LNVA NECHES-TRINITY BASIN INTERCONNECT	H	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	*	2030		86	3067	1
LOWER NECHES VALLEY AUTHORITY	I	LNVA NECHES-TRINITY BASIN INTERCONNECT	H	CONSTRUCTION FUNDING	*	2030		86	3067	2
LOWER NECHES VALLEY AUTHORITY	I	LNVA NECHES-TRINITY BASIN INTERCONNECT	H	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	*	2030		86	3067	3
LOWER NECHES VALLEY AUTHORITY	I	LNVA-SRA-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 161,099,306.14	2040		86	1943	1
LOWER NECHES VALLEY AUTHORITY	I	LNVA-SRA-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)	I	CONSTRUCTION FUNDING	$ 368,506,693.86	2040		86	1943	2
LOWER NECHES VALLEY AUTHORITY	I	LNVA-SRA-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2040		86	1943	3
LOWER NECHES VALLEY AUTHORITY	I	LNVA-WRR-BEAUMONT WEST REGIONAL RESERVOIR	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 23,738,000.00	2030		86	2009	1
LOWER NECHES VALLEY AUTHORITY	I	LNVA-WRR-BEAUMONT WEST REGIONAL RESERVOIR	I	CONSTRUCTION FUNDING	$ 13,800,000.00	2030		86	2009	2
LOWER NECHES VALLEY AUTHORITY	I	LNVA-WRR-BEAUMONT WEST REGIONAL RESERVOIR	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2030		86	2009	3
LUFKIN	I	LUFK-RAY-CONVEYANCE FROM SAM RAYBURN TO KURTH LAKE - PHASE 1	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 24,691,000.00	2030		89	2010	1
LUFKIN	I	LUFK-RAY-CONVEYANCE FROM SAM RAYBURN TO KURTH LAKE - PHASE 1	I	CONSTRUCTION FUNDING	$ 53,529,000.00	2030		89	2010	2
LUFKIN	I	LUFK-RAY-CONVEYANCE FROM SAM RAYBURN TO KURTH LAKE - PHASE 1	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2030		89	2010	3

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LUFKIN	I	LUFK-RAY-CONVEYANCE FROM SAM RAYBURN TO KURTH LAKE - PHASE 2	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 10,676,000.00	2040		89	2011	1
LUFKIN	I	LUFK-RAY-CONVEYANCE FROM SAM RAYBURN TO KURTH LAKE - PHASE 2	I	CONSTRUCTION FUNDING	$ 67,523,000.00	2040		89	2011	2
LUFKIN	I	LUFK-RAY-CONVEYANCE FROM SAM RAYBURN TO KURTH LAKE - PHASE 2	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2040		89	2011	3
LUFKIN	I	LUFK-RAY-CONVEYANCE FROM SAM RAYBURN TO KURTH LAKE - PHASE 3	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 2,876,000.00	2050		89	2012	1
LUFKIN	I	LUFK-RAY-CONVEYANCE FROM SAM RAYBURN TO KURTH LAKE - PHASE 3	I	CONSTRUCTION FUNDING	$ 5,958,000.00	2050		89	2012	2
LUFKIN	I	LUFK-RAY-CONVEYANCE FROM SAM RAYBURN TO KURTH LAKE - PHASE 3	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2050		89	2012	3
MANUFACTURING, JEFFERSON	I	JEFF-MFG-PURCHASE FROM LOWER NECHES VALLEY AUTHORITY (SAM RAYBURN)	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 79,953,000.00	2030		1592	1932	1
MANUFACTURING, JEFFERSON	I	JEFF-MFG-PURCHASE FROM LOWER NECHES VALLEY AUTHORITY (SAM RAYBURN)	I	CONSTRUCTION FUNDING	$ 199,257,000.00	2030		1592	1932	2
MANUFACTURING, JEFFERSON	I	JEFF-MFG-PURCHASE FROM LOWER NECHES VALLEY AUTHORITY (SAM RAYBURN)	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2030		1592	1932	3
MANUFACTURING, SMITH	I	SMTH-MFG-PURCHASE FROM CITY OF TYLER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 2,397,000.00	2030		1653	2048	1
MANUFACTURING, SMITH	I	SMTH-MFG-PURCHASE FROM CITY OF TYLER	I	CONSTRUCTION FUNDING	$ 3,801,000.00	2030		1653	2048	2
MANUFACTURING, SMITH	I	SMTH-MFG-PURCHASE FROM CITY OF TYLER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2030		1653	2048	3
MINING, ANGELINA	I	ANGL-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY (RUN OF RIVER, ANGELINA)	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 2,692,000.00	2030		1728	2053	1
MINING, ANGELINA	I	ANGL-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY (RUN OF RIVER, ANGELINA)	I	CONSTRUCTION FUNDING	$ 5,235,000.00	2030		1728	2053	2
MINING, ANGELINA	I	ANGL-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY (RUN OF RIVER, ANGELINA)	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2030		1728	2053	3
MINING, NACOGDOCHES	I	NACW-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY (ANGELINA RIVER)	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 5,557,000.00	2030		1879	2054	1
MINING, NACOGDOCHES	I	NACW-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY (ANGELINA RIVER)	I	CONSTRUCTION FUNDING	$ 9,000,000.00	2030		1879	2054	2
MINING, NACOGDOCHES	I	NACW-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY (ANGELINA RIVER)	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2030		1879	2054	3
MINING, RUSK	I	RUSK-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY (ANGELINA RIVER)	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 6,381,000.00	2030		1903	2056	1
MINING, RUSK	I	RUSK-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY (ANGELINA RIVER)	I	CONSTRUCTION FUNDING	$ 8,427,000.00	2030		1903	2056	2
MINING, RUSK	I	RUSK-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY (ANGELINA RIVER)	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2030		1903	2056	3

Sponsor Entity Name	Sponsor Entity Primary 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
MINING, SAN AUGUSTINE	I	SAUG-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 12,727,000.00	2030		2773	2055	1
MINING, SAN AUGUSTINE	I	SAUG-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY	I	CONSTRUCTION FUNDING	$ 23,542,000.00	2030		2773	2055	2
MINING, SAN AUGUSTINE	I	SAUG-MIN-PURCHASE FROM ANGELINA NECHES RIVER AUTHORITY	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2030		2773	2055	3
MOORE STATION WSC	I	HDSN-MSW-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 451,000.00	2060		13148	3930	1
MOORE STATION WSC	I	HDSN-MSW-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	CONSTRUCTION FUNDING	$ 966,000.00	2060		13148	3930	2
MOORE STATION WSC	I	HDSN-MSW-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	66%	2060		13148	3930	3
NACOGDOCHES	I	NACP-COL-LAKE COLUMBIA TO NACOGDOCHES RAW WATER TRANSMISSION SYSTEM	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 15,531,000.00	2030		97	2101	1
NACOGDOCHES	I	NACP-COL-LAKE COLUMBIA TO NACOGDOCHES RAW WATER TRANSMISSION SYSTEM	I	CONSTRUCTION FUNDING	$ 35,223,000.00	2030		97	2101	2
NACOGDOCHES	I	NACP-COL-LAKE COLUMBIA TO NACOGDOCHES RAW WATER TRANSMISSION SYSTEM	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2030		97	2101	3
NACOGDOCHES	I	WUG-CONS-MUNICIPAL CONSERVATION-NACOGDOCHES	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 9,861,000.00	2020		97	3954	1
NACOGDOCHES	I	WUG-CONS-MUNICIPAL CONSERVATION-NACOGDOCHES	I	CONSTRUCTION FUNDING	$ 17,859,000.00	2020		97	3954	2
NACOGDOCHES	I	WUG-CONS-MUNICIPAL CONSERVATION-NACOGDOCHES	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2020		97	3954	3
OVERTON	I	SMTH-OVN-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 2,778,000.00	2020		2035	3948	1
OVERTON	I	SMTH-OVN-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	CONSTRUCTION FUNDING	$ 6,136,000.00	2020		2035	3948	2
OVERTON	I	SMTH-OVN-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	71%	2020		2035	3948	3
PENNINGTON WSC	I	MUNICIPAL CONSERVATION, PENNINGTON WSC	H	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	*	*		13189	3189	1
PENNINGTON WSC	I	MUNICIPAL CONSERVATION, PENNINGTON WSC	H	CONSTRUCTION FUNDING	*	*		13189	3189	2
PENNINGTON WSC	I	MUNICIPAL CONSERVATION, PENNINGTON WSC	H	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	*	*		13189	3189	3
PORT ARTHUR	I	PORT-CONS-CITY OF PORT ARTHUR - ADVANCED CONSERVATION	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ -	2020		111	3959	1
PORT ARTHUR	I	PORT-CONS-CITY OF PORT ARTHUR - ADVANCED CONSERVATION	I	CONSTRUCTION FUNDING	$ 51,618,000.00	2020		111	3959	2
PORT ARTHUR	I	PORT-CONS-CITY OF PORT ARTHUR - ADVANCED CONSERVATION	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2020		111	3959	3

Sponsor Entity Name	Sponsor Entity Primary 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
RUSK	I	CHER-RUS NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 715,000.00	2070		2168	3927	1
RUSK	I	CHER-RUS NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	CONSTRUCTION FUNDING	$ 1,646,000.00	2070		2168	3927	2
RUSK	I	CHER-RUS NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2070		2168	3927	3
SAN AUGUSTINE	I	SAUG-SAG-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 347,000.00	2030		2174	3958	1
SAN AUGUSTINE	I	SAUG-SAG-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	CONSTRUCTION FUNDING	$ 698,000.00	2030		2174	3958	2
SAN AUGUSTINE	I	SAUG-SAG-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2030		2174	3958	3
SAN AUGUSTINE	I	WUG-CONS-MUNICIPAL CONSERVATION-SAN AUGUSTINE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 817,000.00	2020		2174	3955	1
SAN AUGUSTINE	I	WUG-CONS-MUNICIPAL CONSERVATION-SAN AUGUSTINE	I	CONSTRUCTION FUNDING	$ 1,480,000.00	2020		2174	3955	2
SAN AUGUSTINE	I	WUG-CONS-MUNICIPAL CONSERVATION-SAN AUGUSTINE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	57%	2020		2174	3955	3
SAND HILLS WSC	I	SHEL-SHW-PURCHASE FROM CENTER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ -	2020		13223	3962	1
SAND HILLS WSC	I	SHEL-SHW-PURCHASE FROM CENTER	I	CONSTRUCTION FUNDING	$ -	2020		13223	3962	2
SAND HILLS WSC	I	SHEL-SHW-PURCHASE FROM CENTER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2020		13223	3962	3
SOUTHERN UTILITIES	I	WUG-CONS-MUNICIPAL CONSERVATION-SOUTHERN UTILITIES	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 11,833,000.00	2020		2233	3956	1
SOUTHERN UTILITIES	I	WUG-CONS-MUNICIPAL CONSERVATION-SOUTHERN UTILITIES	I	CONSTRUCTION FUNDING	$ 21,431,000.00	2020		2233	3956	2
SOUTHERN UTILITIES	I	WUG-CONS-MUNICIPAL CONSERVATION-SOUTHERN UTILITIES	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2020		2233	3956	3
STEAM ELECTRIC POWER, JEFFERSON	I	JEFF-SEP-PURCHASE FROM LOWER NECHES VALLEY AUTHORITY (SAM RAYBURN)	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 11,777,000.00	2030		2288	1933	1
STEAM ELECTRIC POWER, JEFFERSON	I	JEFF-SEP-PURCHASE FROM LOWER NECHES VALLEY AUTHORITY (SAM RAYBURN)	I	CONSTRUCTION FUNDING	$ 20,525,000.00	2030		2288	1933	2
STEAM ELECTRIC POWER, JEFFERSON	I	JEFF-SEP-PURCHASE FROM LOWER NECHES VALLEY AUTHORITY (SAM RAYBURN)	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2030		2288	1933	3
STEAM ELECTRIC POWER, RUSK	I	RUSK-SEP-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 11,698,500.00	2030		2316	1936	1
STEAM ELECTRIC POWER, RUSK	I	RUSK-SEP-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)	I	CONSTRUCTION FUNDING	$ 18,309,500.00	2030		2316	1936	2
STEAM ELECTRIC POWER, RUSK	I	RUSK-SEP-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2030		2316	1936	3

Sponsor Entity Name	Sponsor Entity Primary 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
TYLER	I	TYLR-PAL-CITY OF TYLER - LAKE PALESTINE EXPANSION	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 31,872,000.00	2030		135	2123	1
TYLER	I	TYLR-PAL-CITY OF TYLER - LAKE PALESTINE EXPANSION	I	CONSTRUCTION FUNDING	$ 79,318,000.00	2030		135	2123	2
TYLER	I	TYLR-PAL-CITY OF TYLER - LAKE PALESTINE EXPANSION	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	71%	2030		135	2123	3
TYLER	I	WUG-CONS-MUNICIPAL CONSERVATION-TYLER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 19,980,440.00	2020		135	3957	1
TYLER	I	WUG-CONS-MUNICIPAL CONSERVATION-TYLER	I	CONSTRUCTION FUNDING	$ 38,785,560.00	2020		135	3957	2
TYLER	I	WUG-CONS-MUNICIPAL CONSERVATION-TYLER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2020		135	3957	3
UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY	I	UNM-LP-RUN OF RIVER, NECHES WITH LAKE PALESTINE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 150,422,000.00	2020		140	2149	1
UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY	I	UNM-LP-RUN OF RIVER, NECHES WITH LAKE PALESTINE	I	CONSTRUCTION FUNDING	$ 368,555,000.00	2020		140	2149	2
UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY	I	UNM-LP-RUN OF RIVER, NECHES WITH LAKE PALESTINE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2020		140	2149	3
WHITEHOUSE	I	SMTH-WTH-PURCHASE FROM CITY OF TYLER (LAKE PALESTINE/LAKE TYLER/CARRIZO-WILCOX)	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 2,806,000.00	2060		2450	3961	1
WHITEHOUSE	I	SMTH-WTH-PURCHASE FROM CITY OF TYLER (LAKE PALESTINE/LAKE TYLER/CARRIZO-WILCOX)	I	CONSTRUCTION FUNDING	$ 4,860,000.00	2060		2450	3961	2
WHITEHOUSE	I	SMTH-WTH-PURCHASE FROM CITY OF TYLER (LAKE PALESTINE/LAKE TYLER/CARRIZO-WILCOX)	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	2060		2450	3961	3
WRIGHT CITY WSC	I	CHER-WCW-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$ 715,000.00	2050		2863	3928	1
WRIGHT CITY WSC	I	CHER-WCW-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	CONSTRUCTION FUNDING	$ 1,646,000.00	2050		2863	3928	2
WRIGHT CITY WSC	I	CHER-WCW-NEW WELLS IN CARRIZO-WILCOX AQUIFER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	80%	2050		2863	3928	3

*Region I is not the primary sponsor of this project. See sponsor region for costing information.

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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 including public notices and press releases. This appendix includes the following:

- March 6, 2015 Notice of Application for Regional Water Planning Grant funding for the fifth Cycle of Regional Water Planning
- August 15, 2018 Notice of Meeting to Consider Approving Submittal of Technical Memorandum
- Notice of the public hearing for the 2021 Initially Prepared Plan.

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EAST TEXAS
Regional Water Planning Group
Region I WPG

FROM: East Texas Regional Water Planning Group (Region I)

DATE: March 6, 2015

SUBJECT: **Notice of Application for Regional Water Planning Grant Funding for the Fifth Cycle of Regional Water Planning**

NOTICE TO PUBLIC
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 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 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.etexwaterplan.org. Written comments from the public regarding the grant application must be submitted to the City of Nacogdoches and TWDB by no later than *April 6, 2015*. Comments can be submitted to the East Texas Regional Water Planning Group and the TWDB as follows:

Rex Hunt, P.E.
Consulting Engineer for Region I
Alan Plummer Associates, Inc.
6300 La Calma, Suite 400
Austin, TX 78752

Kevin Patteson, Executive Administrator
Texas Water Development Board
P.O. Box 13231
Austin, Texas 78711-3231

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@ci.nacogdoches.tx.us , **or** David Carter, Texas Water Development Board, P.O. Box 13231, Austin, Texas 78711, (512) 463-7847.

East Texas Regional Water Planning Group
Region I
10:00 AM Wednesday
August 15, 2018
C.L. Simon Recreation Center
1112 North Street, Nacogdoches, Texas 75961

NOTICE TO PUBLIC
Notice of Meeting to Consider Approving Submittal of Technical Memorandum

To All Interested Parties:
The Region I Water Planning Group area includes all or part of the following counties: Anderson, Angelina, Cherokee, Hardin, Henderson (partial), Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk (partial), Rusk, Sabine, San Augustine, Shelby, Smith (partial), Trinity (partial) and Tyler.

The Region I Water Planning Group (ETRWPG) will consider action to approve submission of a Technical Memorandum developed during preparation of the Region I 2021 Regional Water Plan, as included in Item 14 of the agenda. The memorandum details regional planning activities to date during development of the 2021 Regional Water Plan, including preliminary analyses of water demand projections, water supply availability and existing supplies, water needs, and the ETRWPG's declaration of intent whether to pursue or forgo simplified planning. The proposed memorandum will be discussed and acted upon during a public meeting of the ETRWPG on August 15, 2018. The proposed Technical Memorandum will be made available on the Region I website (www.etexwaterplan.org) upon completion prior to the public meeting and as well as following the meeting.

The ETRWPG will accept written and oral comments at the public meeting. Written comments from the public regarding the Technical Memorandum may also be submitted to the ETRWPG until August 30, 2018 for inclusion with the Technical Memorandum when submitted to the Texas Water Development Board. Comments may be submitted to ETRWPG by email to corleys@ci.nacogdoches.tx.us or by mail as follows:

Stacy Corley
City of Nacogdoches
Administrative Contact for Region I
P. O. Box 635030
Nacogdoches, Texas 75963

For additional information, please contact:

- Region I c/o Kelley Holcomb, General Manager, ANRA, P. O. Box 387 Lufkin, Texas 75902, telephone 936-633-7543, or email kholcomb@anra.org

Persons with disabilities who plan to attend this meeting and would like to request auxiliary aids or services are requested to contact Stacy Corley at (936) 559-2528 at least three business days prior to the meeting so that appropriate arrangements can be made.

Publishers Affidavit

Acct #099148000 Job =197825801 *Tear Sheet Attached*
Name CITY OF NACOGDOCHES *3752881* *B24262584*

STATE OF TEXAS
COUNTY OF JEFFERSON

BEFORE ME, THE UNDERSIGNED AUTHORITY, ON THIS DAY PERSONALLY APPEARED Victoria Bond WHO BEING BY ME DULY SWORN, DEPOSES AND SAYS THAT HE/SHE IS A NEWSPAPER REPRESENTATIVE FOR THE BEAUMONT ENTERPRISE; THAT SAID NEWSPAPER REGULARLY PUBLISHED IN JEFFERSON COUNTY CIRCULATED IN JEFFERSON, HARDIN, TYLER, NEWTON, ORANGE, JASPER, LIBERTY, SABINE, CHAMBERS, SAN AUGUSTINE, ANGELINA AND GALVESTON COUNTY(COUNTIES), TEXAS; THAT THE ATTACHED NOTICE IN SAID NEWSPAPER ON THE FOLLOWING DATE(S), TO WIT:
03-06-15

Victoria Bond
NEWSPAPER REPRESENTATIVE

SWORN AND SUBSCRIBED TO BEFORE ME, THIS 9TH DAY OF MARCH 2015,

TO CERTIFY WHICH WITNESS MY HAND AND SEAL OF OFFICE.

Erika Acevedo
NOTARY PUBLIC IN AND FOR
THE STATE OF TEXAS

ERIKA ACEVEDO
PRINT OR TYPE NAME OF NOTARY PUBLIC
MY COMMISSION EXPIRES April 3, 2016

ERIKA ACEVEDO
NOTARY PUBLIC, STATE OF TEXAS
MY COMMISSION EXPIRES
APRIL 3, 2016

EDS

CALL (409) 838-2888 to advertise

EMAIL Classifieds@BeaumontEnterprise.com

Recreational Vehicles

2015 44ft. travel trailer, Park Model, 2 slides, 2 airs, 1 Bd, house type, lrg. range & refrig, many extras, $39,500 Lafayette, 260-433-0474

'99 Bounder Diesel 39' Motor Home. (60,532 miles), Howard power center steering system, back up camera, brake buddy, CB, dishwasher, washer/dryer garbage disposal, Onan gen. 7.5kw, slide out, awnings, $26,500. 409-489-3173

Chevrolet

'14 Chevy Corvette convertible, 2 LT, auto, all power, 1200 mi, **REDUCED!** $62,500. **899-9660 or 550-3140 cell.**

Ford

'03 Ford Taurus ES,
4 dr, air, auto, clean, 89k mi, $3995. **Call 409-842-5202.**

Beaumont

★ESTATE SALE★
By Vivian
Thurs, Fri & Sat 9-4
Bad Boy 0 turn mower, 8 shoulder whitetail deer mounts, Red washer & dryer set, 2 leather sofas, home gm, bedroom & living room furniture for over100 photos and info visit: estatesalesamerica.net 13420 Alaskan Dr. 77713 (Bevil Oaks)

Nederland

623 21st St,
Sat 3/7 & Sun 3/8 , 7-4, Moving Sale, everything must go

ecycled Paper

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'99 Honda Accord LXI,
4 dr, leather, 5 speed, clean, exc cond, $3495.
Call 409-783-3009.

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CASH PAID
for Junk Cars and Pick-Ups.
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Legal Notices

Published: March 6, 2015

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

Legal Notices

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
PO 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.

REQUEST FOR PROPOSAL
Sealed proposals for the following project addressed to Purchasing Agent, Nederland Independent School District, 220 17th Street, Nederland, Texas 77627, will be received on Thursday, April 2, 2015 CST, at which time they will publicly opened and read aloud the following:
Roof Repairs at C.O. Wilson Middle School at 2:00 p.m. CST
Roof Repairs at Central Middle School at 2:15 p.m. CST
A PRE PROPOSAL CONFERENCE WILL BE HELD AT 2:00 P.M., Thursday, March 26, 2015 CST IN THE NEDERLAND INDEPENDENT SCHOOL DISTRICT BOARD ROOM, 220 17TH STREET, NEDERLAND, TEXAS 77627. The conference is not mandatory but highly recommended since we do not anticipate having additional walkthroughs.
Proposals forms and specifications may be obtained from Neches Engineers, 8865 College Street, Suite 200, Beaumont, Texas or the Nederland ISD Purchasing Office located at 220 17th Street, Nederland, TX or by calling (409) 726-2207.

ADVERTISE Contact Shwanna Ferguson at SFerguson@BeaumontEnterprise.com or

PUBLISHER'S AFFIDAVIT

THE STATE OF TEXAS, }
}
COUNTY OF SMITH }

I, David R. Stringer, do solemnly swear that I am VP of Advertising of the TYLER MORNING TELEGRAPH, printed and published in the City of Tyler, County of Smith, State of Texas, and that from, my own personal knowledge and reference to the files of said publication. The notice stating "FROM: East Texas Regional Water Plan", was inserted in the Tyler Morning Telegraph on the dates as follows: 02/01/17

David R. Stringer

Subscribed and sworn to before me this 02/01/17 A.D.

SHERRY C SHOEMAKER
NOTARY PUBLIC
State of Texas
Comm. Exp. 02-07-2020
Notary ID 1186590-2

Sherry C. Shoemaker
Notary Public, Smith County, Texas

My Commission Expires 2/7/2020

Invoice # 1553251
Purchase Order#
for a cost of $104.92.

Ad Clerk WHITE

Regional Water Planning Group (Region I)

DATE: January 27, 2017

SUBJECT: Notice of Application for Regional Water Planning Grant Funding to complete the Fifth Cycle of Regional Water Planning

NOTICE TO PUBLIC REGIONAL WATER PLANNING

Notice is hereby given that the City of Nacogdoches will submit by Noon February 21, 2017, 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 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 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 Website at www.ci.nacogdoches.tx.us or online at www.ci.nacogdoches.tx.us Written comments from the public regarding the grant application must be submitted to City of Nacogdoches and TWDB by no later than February 27, 2017. Comments can be submitted to City of Nacogdoches and the TWDB as follows:

Stacy Corley
Administrative Agent for Region I
City of Nacogdoches
P.O. Box 635030
Nacogdoches, Texas
75963-5030

Jeff Walker
Executive Administrator
Texas Water Development Board
P.O. Box 13231
Austin, Texas
78711-3231

For additional information, please contact Stacy Corley, City of Nacogdoches, 635030, Nacogdoches, Texas 75963-5030 or 936-559-2828 and corleys@ci.nacogdoches.tx.us, or David Carter, Texas Water Development Board, P.O. Box 13231, Austin, Texas 78711, Contracts@twdb.texas.gov.

Mailed on or before:
January 27, 2017
Publish date:
February 1, 2017

The Daily Sentinel

1920 COLONIAL DRIVE- PO BOX 630068-NACOGDOCHES, TEXAS 75963-0068- (936) 564-8361

Robin Land Editor & Publisher

THE STATE OF TEXAS
COUNTY OF Nacogdoches

BEFORE ME, the undersigned, a Notary Public, this day personally came –**Judy Carpenter**–, who after being sworn according to law that she is the ADVERTISING MANAGER FOR **THE DAILY SENTINEL**.

THE PUBLISHERS, of **The DAILY SENTINEL,** a daily newspaper of general circulation published in Nacogdoches, Texas, in said County and State, attest that the attached printed material was published in said newspaper March 10th 2015.

Judy Carpenter
Advertising Manager

SUBSCRIBED AND SWORN TO BEFORE ME THIS THE 10th **DAY OF** March **2015.**

Brenda Jo Skinner

Notary Public, State of Texas

—Brenda Jo Skinner—
Notary's Printed Name

BRENDA JO SKINNER
Notary Public, State of Texas
My Commission Expires
November 05, 2017

The Daily Sentinel

Classified

Call to Place Your AD Monday – Friday 8am – 5pm
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Fax 936-560-4267
Email classifieds@dailysentinel.com

Deadlines:
Saturday .....12:00 p.m. Friday
Sunday .....2:30 p.m. Friday
Monday .....3:30 p.m. Friday
call 936-558-3217 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

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
www.alamonac.com

615 E Parker Rd.3BR 2BA, 2 car garage on quiet 3/4 acre lot. Open floor plan. 936-371-3589

Choice Realty
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nacogdochesrealty.com

CHARLES POOL REAL ESTATE
"We Open Doors For You"
3505 NORTH ST.
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

University Club APARTMENTS
2BR's STARTING AT **$599** PER MONTH
- $99 Deposit Special
- FREE Cable & HBO
- FREE Internet Service
- 1BR, 2BR, 3BR & Townhomes
- Completely Remodeled Units*

*Select units

OPEN HOUSE
SUNDAY, MARCH 8TH 1-3PM

430 Blue Lake in Central Heights
Newconstruction,4Bedroom2.5Bath,2800sqft.,76acre
MLS 2140549A $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

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

★★★★★
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Visit us online at: nacogdochesrealestate.com

CIMARRON
Subdivision in CHISD
936-564-8180

TO BE MOVED: 3BR 2BA home inMartinsville 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 FARMS • HOMES COMMERCIAL
www.lsimpson.com
936-564-6418

Northeast Hills APARTMENTS
NOW LEASING
1 Bedrooms starting at $430/month.
Quiet Location with pool on site.
Pets Ok.
Northeasthills.net
936-564-4120

LOTS/ACREAGES 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 $55K 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 936-569-6363

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. Bu Central [illegible] + Dep. 936-569-0377

3BR 1BA in Garrison $650mo + $400dep. 936-615-8582

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 1,050sq.ft. 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
Now Leasing
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 with1yr 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
Starting@ $595mo
2BR 2BA Remodeled Flats Starting @ $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 Dblwide 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 Restaurant. 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 remoldeled.** $1100mo 936-371-9101

Office Space. 403 E.Hospital St. 1,200+ sq.ft. $1000MO, $1000Dep. 936-554-4922 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

ANNOUNCEMENTS

EMPLOYMENT

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 $222 Nothway Dr. Nacogdoches, TX**

WOODLAND TRAILS APARTMENTS
Maintenance man needed for small property in Nacodogches. Must be EPA certified. Please fax resume to 936-560-2112 or call 936-560-3119.
E-mail: manager.wt@migproperty.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

LEGAL NOTICES 270

NOTICE OF APPLICATION ← PUBLIC NOTICE
5TH CYLE 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
PO 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.*

Stacy Corley Log Off

Open Meeting Submission

TRD:	2018007231
Date Posted:	08/10/2018
Status:	Accepted
Agency Id:	1013
Date of Submission:	08/10/2018
Agency Name:	East Texas Regional Water Planning Group (Region I)
Board:	East Texas Regional Water Planning Group Region I
Committee:	Region I
Date of Meeting:	08/15/2018
Time of Meeting:	10:00 AM **(##:## AM Local Time)**
Street Location:	1112 North Street
City:	Nacogdoches
State:	TX
Liaison Name:	Stacy Corley
Liaison Id:	2
Additional Information Obtained From:	Stacy Corley 936-559-2528 or corleys@ci.nacogdoches.tx.us
Agenda:	REGION I AGENDA Wednesday, August 15, 2018, 10:00 AM Nacogdoches Recreation Center 1112 North Street Nacogdoches, Texas 75961 AGENDA 1. Call to Order. 2. Invocation & Pledge of Allegiance. 3. Roll Call/Determination of Quorum. 4. Consideration and approval of the minutes of the May 16, 2018 meeting. 5. Report from City of Nacogdoches - Stacy Corley 6. Reports of adjoining regions activity: a. Region C - Vacant b. Region D - Leah Adams c. Region H - Scott Hall 7. Reports from Standing Committees: a. Executive Committee - Kelley Holcomb b. Finance Committee - Mark Dunn c. Bylaws Committee - David Alders d. Technical Committee - Scott Hall e. Nominations Committee - Monty Shank 8. Reports from other state agencies: a. Texas Water Development Board staff - Lann Bookout b. Texas Department of Parks & Wildlife - Terry Stelly c. Texas Department of Agriculture - Manual Martinez d. Texas Soil and Water Conservation Board - Rusty Ray 9. Report from consultant team - Rex Hunt a. Review of Round 5 Planning Schedule b. Review of Simplified Planning Process 10. Educational Presentation: Region C Drought Planning Methodologies - Brian McDonald 11. Public Comments. (limited to 3 minutes) 12. Consideration and approval of the FY 2019 Annual Budget. 13. Consideration and possible approval of a request for the East Texas Regional Water Planning Group Intent to utilize Simplified

Planning for the Fifth Cycle of Regional Water Planning for the East Texas Regional Water Planning Area - Rex Hunt.
14. Consideration and approval for the East Texas Regional Water Planning Group Chair to submit the Task 4C Technical Memorandum to the Texas Water Development Board on or before September 10, 2018.
15. Consideration and possible approval of the appointment of new Voting Members - Monty Shank
16. General Discussion.
17. Set Next Meeting Date.
18. Adjourn.

Standing Committees
Wednesday, August 15, 2018, 9:30 AM
AGENDA

The Region I East Texas Regional Water Planning Group has four standing committees. These committees function under the direction of the Region I East Texas Regional Water Planning Group as defined in the approved By-Laws. Committee meetings are held on an as needed basis. These Committees are:

Executive Committee (no meeting)

Nominations Committee (9:30 AM)
1. Discussion on vacancies on the RWPG

By-Laws Committee (9:30 AM)
1. Discussion on proposed changes in By-Laws relating to SB 347 85(R)

Finance Committee (9:30 AM)
1. Discussion on proposed FY 2019 budget

Technical Committee (9:30AM)
1. Review comments received to date from the public, Water User Groups, and Wholesale Water Providers that impact the Technical Memorandum
2. Review the draft Task 4C Technical Memorandum

East Texas Regional Water Planning Group
Region I
10:00 AM Wednesday
August 15, 2018
C.L. Simon Recreation Center
1112 North Street, Nacogdoches, Texas 75961

NOTICE TO PUBLIC
Notice of Meeting to Consider Approving Submittal of Technical Memorandum

To All Interested Parties:
The Region I Water Planning Group area includes all or part of the following counties: Anderson, Angelina, Cherokee, Hardin, Henderson (partial), Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk (partial), Rusk, Sabine, San Augustine, Shelby, Smith (partial), Trinity (partial) and Tyler.

The Region I Water Planning Group (ETRWPG) will consider action to approve submission of a Technical Memorandum developed during preparation of the Region I 2021 Regional Water Plan, as included in Item 14 of the agenda. The memorandum details regional planning activities to date during development of the 2021 Regional Water Plan, including preliminary analyses of water demand projections, water supply availability and existing supplies, water needs, and the ETRWPG's declaration of intent whether to pursue or forgo simplified planning. The proposed memorandum will be discussed and acted upon during a public meeting of the ETRWPG on August 15, 2018. The proposed Technical Memorandum will be made available on the Region I website (www.etexwaterplan.org) upon completion prior to the public meeting and as well as following the meeting.

The ETRWPG will accept written and oral comments at the public meeting. Written comments from the public regarding the Technical Memorandum may also be submitted to the ETRWPG until August 30, 2018 for inclusion with the Technical Memorandum when submitted to the Texas Water Development Board. Comments may be submitted to ETRWPG by email to corleys@ci.nacogdoches.tx.us or by mail as follows:

Stacy Corley
City of Nacogdoches
Administrative Contact for Region I
P. O. Box 635030
Nacogdoches, Texas 75963

For additional information, please contact:

- Region I c/o Kelley Holcomb, General Manager, ANRA, P. O. Box 387 Lufkin, Texas 75902, telephone 936-633-7543, or email kholcomb@anra.org

Persons with disabilities who plan to attend this meeting and would like to request auxiliary aids or services are requested to contact Stacy Corley at (936) 559-2528 at least three business days prior to the meeting so that appropriate arrangements can be made.

Posted 7-31-2018
Removed

NOTICE OF PUBLIC HEARING FOR THE EAST TEXAS REGIONAL WATER PLANNING GROUP 2021 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 Group (Region I) 2021 Initially Prepared Plan (IPP). The public hearing for the IPP will include a public comment period and will be held as follows:

5: 30 P.M. Thursday May 14, 2020 — C.L. Simon Recreation/Library 1112 North Street, Nacogdoches TX 75961

The ETRWPG was established under provisions of Texas Senate Bill 1 (7th Texas Legislature) to develop a regional water plan for the ETRWPG which 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.

Copies of the IPP are available for review at the following County Clerk offices:
Anderson County, Angelina County, Cherokee County, Hardin County, Henderson County, Houston County, Jasper County, Jefferson County, Nacogdoches County, Newton County, Orange County, Panola County, Polk County, Rusk County, Sabine County, San Augustine County, Shelby County, Smith County, Trinity County, and Tyler County.

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 on the Texas Water Development Board Website at http://www.twdb.texas.gov/waterplanning/rwp/plans/2021/IPP.asp; on the East Texas Regional Water Planning Group website at www.etexwaterplan.org, and at the City of Nacogdoches, Office of the Region I Administrative Contact Stacy Corley, 202 E Pilar Street, Room 343 Nacogdoches, TX 75961. Written and oral comments will be accepted at the public hearing. The ETRWPG will also accept written comments from **April 14, 2020** through **July 13, 2020** 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@plummer.com

during this life stage by providing information, resources, and support. Individual projects may focus primarily on meeting the needs of people with IDD who are aging, meeting the needs of aging caregivers of family members with IDD, and/or reducing gaps in the long-term services and supports system for people with IDD who are aging.

TCDD has approved funding for up to two projects for up to $175,000 per organization, per year, for up to five years. Funds available for these projects are provided to TCDD by the U.S. Department of Health and Human Services, Administration on Disabilities, pursuant to the Developmental Disabilities Assistance and Bill of Rights Act. Funding for the projects is dependent on the results of a review process established by TCDD and on the availability of funds. Non-federal matching funds of at least 10% of the total project costs are required for projects in federally designated poverty areas. Non-federal matching funds of at least 25% of total project costs are required for projects in other areas.

Additional information concerning this Request for Applications (RFA) and TCDD is available at https://tcdd.texas.gov/grants-rfas/funding-available-for-grants/. All questions pertaining to this RFA should be directed in writing to TCDD via email at apply@tcdd.texas.gov or via telephone at (512) 437-5432.

Deadline: Applications must be submitted by 11:59 p.m. CT on Thursday, June 25, 2020. Applications will not be accepted after the due date.

TRD-202001392
Beth Stalvey
Executive Director
Texas Council for Developmental Disabilities
Filed: April 8, 2020

♦ ♦ ♦

Request for Applications: TCDD Journalism Fellows Program

The Texas Council for Developmental Disabilities (TCDD) announces the availability of funds for the TCDD Journalism Fellows Program. Through these grants, media entities will hire a journalism fellow who will publish content about people with disabilities and disability issues. Media entities will provide ongoing support and mentorship for the fellow, who will focus on disability-related issues in Texas and publish news and information about services and supports, people with disabilities and their families, and other topics. Content developed by the fellow will inform Texans about disability-related issues and potentially lead to systems change. At the conclusion of the grants, fellows will have the skills, experience, and expertise to pursue a career as a journalist with a disability focus.

TCDD has approved funding for up to six projects for up to $75,000 per organization for 12 months. Funds available for these projects are provided to TCDD by the U.S. Department of Health and Human Services, Administration on Disabilities, pursuant to the Developmental Disabilities Assistance and Bill of Rights Act. Funding for projects is dependent on the results of a review process established by TCDD and on the availability of funds. Non-federal matching funds of at least 10% of the total project costs are required for projects in federally designated poverty areas. Non-federal matching funds of at least 25% of total project costs are required for projects in other areas.

Additional information concerning this Request for Applications (RFA) and TCDD is available at

https://tcdd.texas.gov/grants-rfas/funding-available-for-grants/. All questions pertaining to this RFA should be directed in writing to TCDD via email at apply@tcdd.texas.gov or via telephone at (512) 437-5432.

Deadline: Applications must be submitted through https://tcdd.smapply.org/prog/lst/ and will be reviewed by TCDD according to the following schedule: applications received by 11:59 p.m. on June 22, 2020, may be reviewed at the August 2020 Council meeting; applications received by 11:59 p.m. on September 21, 2020, may be reviewed at the November 2020 Council meeting.

TRD-202001390
Beth Stalvey
Executive Director
Texas Council for Developmental Disabilities
Filed: April 8, 2020

♦ ♦ ♦

East Texas Regional Water Planning Group (Region I)

Notice of Public Hearing for the East Texas Regional Water Planning Group 2021 Initially Prepared Regional Water Plan

Governor Abbott Allows Virtual & Telephonic Open Meetings to Maintain Government Transparency. As Texas works to mitigate the spread of COVID-19, the Governor granted the Office of the Attorney General's Request for suspension of certain open-meeting statutes. This temporary suspension will allow for telephonic meetings of governmental bodies that are accessible to the public in an effort to reduce in-person meetings that assemble large groups of people.

Notice is hereby given that the East Texas Regional Water Planning Group (ETRWPG) is taking comment on and holding a public hearing **via Telephonic Open Public Hearing** for the East Texas Regional Water Planning Group (Region I) 2021 Initially Prepared Plan (IPP). The **telephonic public hearing** for the IPP will include a **public comment period** on **Thursday May 14, 2020, at 5:30 P.M.**

Join by phone: +1 (440) 494-6883 (PIN: 329949771)

The ETRWPG was established under provisions of Texas Senate Bill 1 (7th Texas Legislature) to develop a regional water plan for the ETRWPG which 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.

Due to Public Library/County offices being closed to the public in order to abide by Governor Abbott's temporary suspension of public gatherings:

Copies of the IPP are available for review on the Texas Water Development Board Website at https://www.twdb.texas.gov/waterplanning/rwp/plans/2021/index.asp#region-i; on the East Texas Regional Water Planning Group website at http://www.etexwaterplan.org/2021InntiallyPreparedPlan.htm, and may request a copy from the City of Nacogdoches, Office of the Region I Administrative Contact Stacy Corley, corleys@ci.nacogdoches.tx.us. **Oral** comments will be accepted **during the telephonic public hearing.** The ETRWPG will also accept **written** comments from **April 14, 2020,** through **July 13, 2020,** 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@plummer.com

Page	:	1 of 2 04/07/2020 12:46:57	**Ad Number**	:	24378212
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Contact	:	Stacy Corley	**Sub Section**	:	Classifieds Section
Address1	:	PO BOX 635030	**Category**	:	4 Legal Notices
Address2	:		**Dates Run**	:	04/10/2020-04/10/2020
City St Zip	:	NACOGDOCHES TX 759635030	**Days**	:	1
Phone	:	(936) 559-2528	**Size**	:	1 x 10.30, 93 lines
Fax	:	(936) 559-2528	**Words**	:	340
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NOTICE OF PUBLIC HEARING FOR THE EAST TEXAS REGIONAL WATER PLANNING GROUP 2021 INITIALLY PREPARED REGIONAL WATER PLAN

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+1 440-494-6883
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			Ad Number	:	24378212
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Order Number	:	24289399	**Salesperson**	:	0837 - OPEN
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Contact	:	Stacy Corley	**Sub Section**	:	Classifieds Section
Address1	:	PO BOX 635030	**Category**	:	4 Legal Notices
Address2	:		**Dates Run**	:	04/10/2020-04/10/2020
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Phone	:	(936) 559-2528	**Size**	:	1 x 10.30, 93 lines
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			Amount Due	:	270.15
Keywords	:	NOTICE OF PUBLIC HEARING FOR THE EAST TEXAS REGION			
Notes	:				
Zones	:				

Tyler.

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Austin, Texas 78752
Phone: 512.452.5905 or rhunt@plummer.com

HOMES FOR SALE

PUBLISHER'S NOTICE:
All real estate advertised herein is subject to the Federal Fair Housing Act, which makes it illegal to advertise "any preference, limitation, or discrimination because of race, color, religion, sex, handicap, familial status, or national origin, or intention to make any such preference, limitation, or discrimination." We will not knowingly accept any advertising for real estate which is in violation of the law. All persons are hereby informed that all dwellings advertised are available on an equal opportunity basis.

HOMES FOR SALE

CONDOS/ TOWNHOMES

FURNISHED HOUSES

Cottage for rent in Northeast Nac 2BR 2 bath. Available in May. No Smoking/animals. $1600 month, utilities inc. Call/text at 936.615.1150

UNFURNISHED HOUSES

2BR Duplex on Northside w/ 2 Car Carport. Water Pd. & Yard Kept 569-3266 Call for Details

3 BR/2B 2 STORY HOME, 2000 SQ. FT. $850 DOUGLASS SCHOOL DISTRICT. 564-5180

3BR/2B Garage, Extra Room $1200mo/$900dep 936-615-0358

UNFURNISHED HOUSES

Barham Properties:
Apartments & Homes for Rent
View Rentals
Barhamproperties.com
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Home for lease Newly Updated inside $1650
2744 sq ft. 4 bdr, 2.5 bath, brkfst nk, office/5th br, liv rm, din rm, pantry, 2 car pt, No Pets/smoking 2 acre
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DUPLEXES FOR RENT

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MOBILE HOME RENTALS

★★★★★★★★★
WHITE FENCE IND. RENTAL PROPERTIES 1.5BRs & 3BRs Mobile Homes Avail. 936-564-9076 whitefenceindustries.com
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LEGAL NOTICES

NOTICE OF PROPOSED BRANCH PURCHASE AND ASSUMPTION TRANSACTION

Notice is hereby given that application has been made to the Comptroller of the Currency, Southern District Office, 500 North Akard Street, Suite 1600, Dallas, Texas 75201, for consent for Commercial Bank of Texas, National Association, 215 Main Street, Nacogdoches, Texas 75961, to purchase certain assets and to assume certain liabilities, including deposit liabilities, of CapTex Bank, National Association, 106 Hamilton Street, Trenton, Texas 75490, associated with the branch office of CapTex Bank, National Association, located at 201 South Highway 78, Farmersville, Texas 75442. The acquired branch office will continue operations as a branch office of Commercial Bank of Texas, National Association.

This notice is published pursuant to 12 USC 1828(c) and 12 CFR 5. Any person desiring to comment on this application may do so by submitting written comments no later than April 16, 2020 to the Director for District Licensing, Comptroller of the Currency, Southern District Office, at 500 North Akard Street, Suite 1600, Dallas, Texas 75201 or so.licensing@occ.treas.gov. The public file is available for inspection at that office during regular business hours. Written requests for a copy of the public file on the application should be sent to the Director for District Licensing. Information about the filing may be found in the OCC's Weekly Bulletin available on the OCC website at: https://www.occ.treas.gov/.

SPORTING GOODS GUNS/AMMO

Century Arms AK 47, American made, 180 rounds ammo. Shot less than 100 times. $550.00 936-234-0441

FARM SERVICES

CALL TODAY
I REPAIR FARM TRACTORS AND FARM EQUIPMENT, AND I ALSO DO BUSH HOGGING. CALL 936-552-1705 THANKS

LEGAL NOTICES

Region I
East Texas Regional Water Planning Group

NOTICE OF PUBLIC HEARING FOR THE EAST TEXAS REGIONAL WATER PLANNING GROUP 2021 INITIALLY PREPARED REGIONAL WATER PLAN

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Alan Plummer Associates, Inc.
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Phone: 512.452.5905 or rhunt@plummer.com

Tyler Morning Telegraph

Tyler Morning Telegraph
410 W. Erwin St.
Tyler, Texas 75702

Phone: Fax: Email:**jgarrett@tylerpaper.com**

04/03/20

Proof of Ad

Account:	330656
Name:	STACY CORLEY
Company:	CITY OF NACOGDOCHES/ REGION I/TEAR
Address:	PO DRAWER 635030 Nacogdoches, TX 75963-5070, ? ?
Telephone:	(936) 559-2567
Fax:	(936) 559-2915
Email:	corleys@ci.nacogdoches.tx.us

Start Date:	04/10/20
End Date:	04/10/20
Inserts:	2
Class:	2065
Ad ID:	1632444
Salesperson:	Josette Garrett
Blind Box:	

Gross:	~~$315.30~~
Discount:	$0.00
Pay Type:	
Paid Amount:	**- $0.00**
Amount Due:	**$315.30**

NOTICE OF PUBLIC HEARING FOR THE EAST TEXAS REGIONAL WATER PLANNING GROUP 2021 INITIALLY PREPARED REGIONAL WATER PLAN

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Phone: 512.452.5905
or rhunt@plummer.com

We Appreciate Your Business!
Thank You STACY CORLEY!

Ad shown is not actual size.

Appendix 10-B

Transcripts, Presentations, and Minutes from Public Hearings

A fundamental element of the planning process is input from the public. A public hearing was scheduled on May 14, 2020 to provide the public with forums to comment on the 2021 Initially Prepared Plan. The public hearing was held at the public library in Nacogdoches Texas. The transcripts, presentations, and minutes from the public hearing are provided in this appendix.

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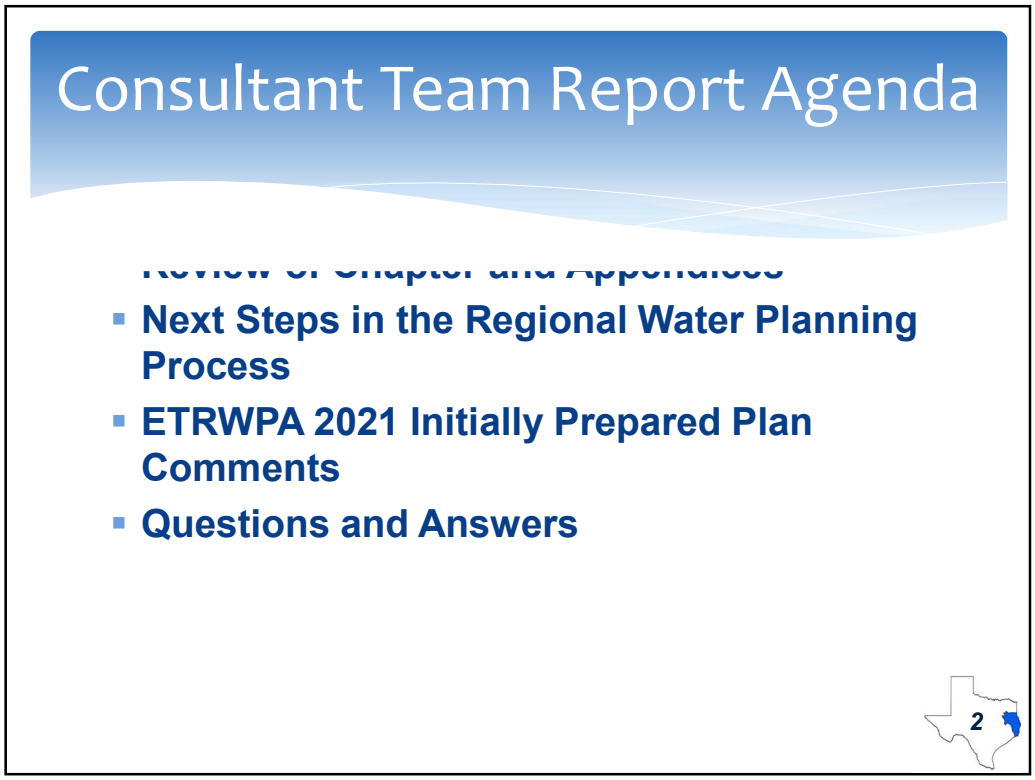
Region I
East Texas Regional
Water Planning Group
Initially Prepared Plan
Public Hearing
May 14, 2020
PLUMMER
FREESE AND NICHOLS
WSP


Consultant Team Report Agenda
Review of Chapter and Appendices
Next Steps in the Regional Water Planning Process
ETRWPA 2021 Initially Prepared Plan Comments
Questions and Answers
2

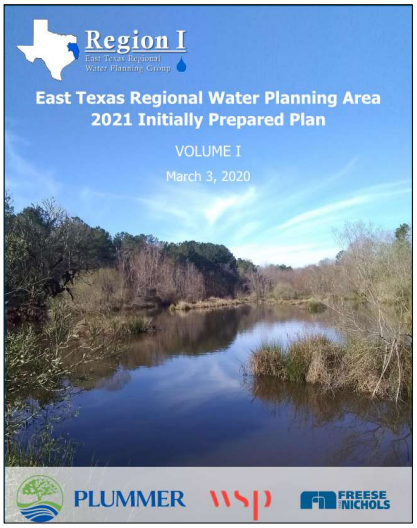
Initially Prepared Plan

Review of Chapters and Appendices

3

Overview

- 2 Volumes
- 1 Executive Summary
- 11 Chapters
- 49 appendices
  - 25 DB22 Reports
- 127 Tables and Figures
- Over 1000 Pages
- Final 2021 Regional Water Plan Due December 2020



4

Chapters

Chapter	Title	Substantial Completion Date	Number of Appendices
-	Executive Summary	January 15, 2020	1
1	Description of the Region	October 15, 2020	2
2	Current and Projected Population and Water Demand	October 15, 2020	5
3	Water Supply Analyses	October 15, 2020	4
4	Identification of Water Needs	October 15, 2020	6
5A	Identification of Potentially Feasible Water Management Strategies	November 20, 2019	2
5B	Evaluation of Potentially Feasible, Recommended, and Alternative Water Management Strategies	January 15, 2020	5
5C	Water Conservation Recommendations	November 20, 2019	1
6	Impacts of the Regional Water Plan and Consistency with Protection of Resources	October 15, 2020	1
7	Drought Response Information, Activities, and Recommendations	January 15, 2020	0
8	Unique Stream Segments, Unique Reservoir Sites, and Legislative and Regulatory Recommendations	October 15, 2020	2
9	Infrastructure Financing Report	January 15, 2020	2
10	Public Participation and Adoption of Plan	October 15, 2020	4
11	Implementation and Comparison to the Previous Regional Water Plan	January 15, 2020	1

5

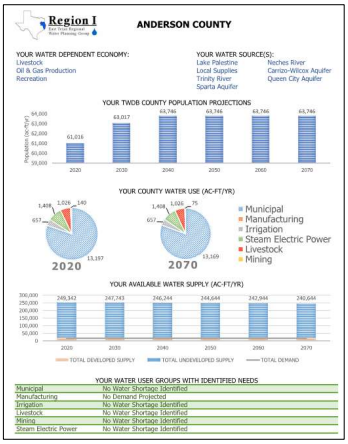
Executive Summary

6

Executive Summary

Chapter Summary:

- Introduction to Regional Water Planning
- Key Findings and Recommendations
- Regional Description
- County Summary Sheets
- TWDB DB22 Data Reports



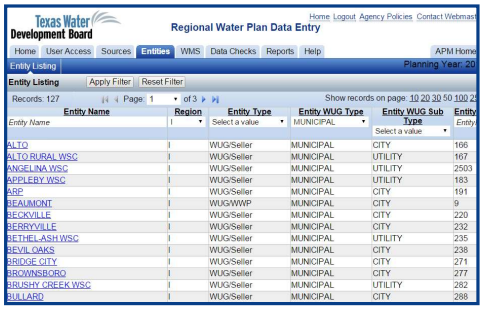
Example County Summary Sheet

7

Executive Summary

Appendices Summary:

- 25 reports generated by the Regional Water Planning Application (DB22)



- Report 01 Water User Group Population Projections
- Report 02 Water User Group Water Demands
- Report 03 Water User Group Category – Summary
- Report 04 Source Water Availability
- Report 05 Water User Group Existing Water Supplies
- Report 06 Water User Group Identified Water Needs/Surpluses
- Report 07 Water User Group Second-Tier Identified Water Need
- Report 08 Water User Group Second-Tier Identified Water Need – Summary
- Report 09 Source Water Balance
- Report 10a Water User Group Data Comparison to 2016 Regional Water Plan
- Report 10b Source Data Comparison to 2016 Regional Water Plan
- Report 11 Water User Group Unmet Needs
- Report 12 Water User Group Unmet Needs Summary
- Report 13 Water User Group Recommended Water Management Strategies
- Report 14 Recommended Projects Associated with Water Management Strategies
- Report 15 Water User Group Alternative Water Management Strategies
- Report 16 Alternative Projects Associated with Water Management Strategies
- Report 17 Water User Group Management Supply Factor
- Report 18 Recommended Water Management Strategies Requiring New or Amended Interbasin Transfer Permit
- Report 19 Water User Group Recommended Conservation Water Management Strategy Associated with Recommended Interbasin Transfer Water Management Strategy
- Report 20 Recommended Water Management Strategy Supplies Unallocated to Water User Groups
- Report 21 Summary of Water Management Strategy Users by Water Management Strategy Type
- Report 22 Summary of Water Management Strategy Users by Source
- Report 23 Major Water Provider Existing Sales and Transfers
- Report 24 Major Water Provider Recommended Water Management Strategy and Projects

8

Chapter 1:

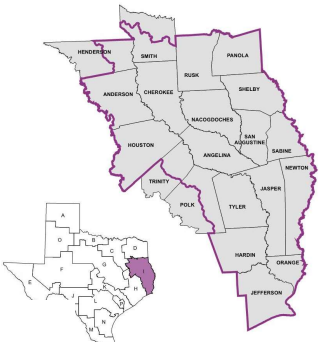
Description of the Region

9

Description of the Region

Chapter Summary:

- Current Water Demand
- Water Sources, Water User Groups and Major Water Providers
- Regional Resources and Treats to Water Quality, Agricultural and Natural Resources
- Local and Regional Water Planning Efforts
- Drought of Record and Current Drought Preparations
- Water Loss and Water Audits
- Threats Addressed or Affected by Wate Management Strategies

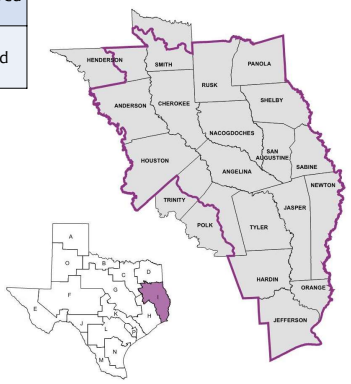


10

Chapter 1 – Description of the Region

Appendices Summary:

Appendix	Title	Description
1-A	Species of Special Concern in the ETRWA	List of rare, threatened, or endangered species developed by the TPWD
1-B	Water Loss Audits	Public utilities with active financial obligations to the TWDB are required to submit water loss audits



11

Chapter 2:

Current and Projected Population and Water Demand

12

Chapter 2 – Current and Projected Population and Water Demand

Chapter Summary:

- Methodology for Updating Demands
- Population Growth Projections
- Water Demands by Water Use Category (6)
  - Municipal
  - Irrigation
  - Manufacturing
  - Steam Electric Power
  - Mining
  - Livestock
- Demands on Major Water Providers

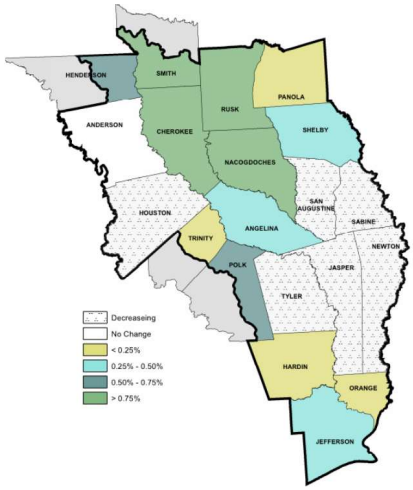


Figure 2.6 Municipal Demand Annual Growth Rate

13

Appendices Summary:

14

Chapter 3:

Water Supply Analyses

15

Chapter Summary:

- Water availability modeling by source
  - Groundwater
  - Surface Water
  - Reuse
  - Water Systems
- Water availability by user
  - Water user groups
  - Wholesale water providers
- Model assumptions and variances

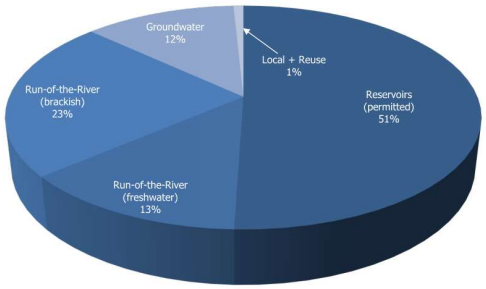


Figure 3.4 Year 2020 Available Supplies by Source Type

16

Appendices Summary:

17

Chapter 4:

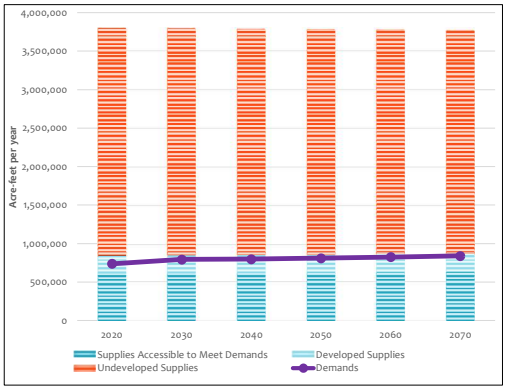
Identification of Water Needs

18

to Determine Needs

Chapter Summary:

- Supply – Demand = Surplus/Shortage
- Water supply and demand
  - Region
  - County
  - WUGs
  - WWPs
- Sub-WUG and County-Other considerations
- Second-tier needs



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to Determine Needs

Appendices Summary:

Appendix	Title	Description
4-A	Water Demands, Supplies, and Needs for Major Water Providers	Data presented by water use category for each MWP

20

Chapter 5A:

Identification of Potentially Feasible Water Management Strategies

21

Chapter 5A – Identification of Potentially Feasible Water Management Strategies

Chapter Summary:

- Explains process of evaluating WMSs
- Potentially feasible strategies
  - Recommended strategies
  - Alternative strategies
- Strategy Types
  - Water Conservation
  - Water Reuse (indirect/direct)
  - Expansion of Existing Supplies
  - New Supply Development
  - Interbasin Transfer
  - Drought Management

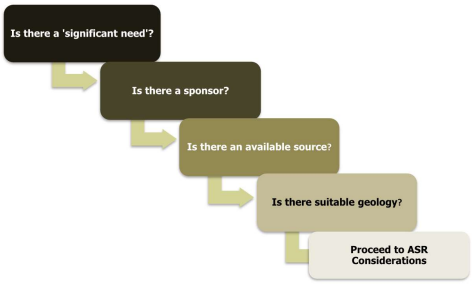

Figure 5A.1 Aquifer Storage and Recovery Screening Criteria

22

Management Strategies

Appendices Summary:

23

Chapter 5B:

Evaluation of Potentially Feasible, Recommended, and Alternative Water Management Strategies

24

Chapter Summary:

- Evaluates WMSs to be prioritized for SWIFT Funding
  - Recommended Strategies by Water User Group (WUG)

Table 5B.1 2021 Needs, Recommended, and Alternative Water Management Strategies for Water User Groups

NEEDS RECOMMENDED STRATEGY *ALTERNATIVE STRATEGY* BALANCE (Does not include Alternative totals)

County	WUG	2021 Needs and Strategies	2020	2030	2040	2050	2060	2070	Strategy Source	Capital Costs ($)	Annual Costs ($)	Unit Costs before Amortization ($ per acre-feet)	Unit Costs before Amortization ($ per 1000 gal)
ANDERSON	ELKHART	Unmet Need	0	0	0	0	0	0					
		Municipal Conservation	4	6	6	7	7	8	CT	$0.00	$2,000	$316	$0.97
	FRANKSTON	Unmet Need	0	0	0	0	0	0					
		Municipal Conservation	4	6	7	7	7	8	CT	$0.00	$2,000	$308	$0.94
	NORWOOD WSC	Unmet Need	0	0	0	0	0	0					
		Municipal Conservation	2	0	0	0	0	0	CT	$0.00	$1,000	$500	$1.53
	PALESTINE	Unmet Need	0	0	0	0	0	0					
		Municipal Conservation	81	126	140	150	161	172	CT	$0.00	$30,000	$212	$0.65
	PLEASANT SPRINGS WSC	Unmet Need	0	0	0	0	0	0					
		Municipal Conservation	2	4	5	5	5	6	CT	$0.00	$2,000	$407	$1.25
	TDCJ BETO GURNEY & POWLEDGE UNITS	Unmet Need	0	0	0	0	0	0					
		Municipal Conservation	10	17	29	30	32	34	CT	$0.00	$6,000	$208	$0.64
	TDCJ COFFIELD MICHAEL	Unmet Need	0	0	0	0	0	0					
		Municipal Conservation	44	75	80	85	91	96	CT	$0.00	$8,000	$102	$0.31

  - Recommended Strategies by Major Water Provider (MWP)

Table 5B.2 2021 Needs and Water Management Strategies for Wholesale Water Providers (ac-ft per year)

NEEDS RECOMMENDED STRATEGY *ALTERNATIVE STRATEGY* BALANCE (Does not include Alternative totals)

WWP	2021 Needs and Strategies	2020	2030	2040	2050	2060	2070	Capital Costs ($)	Annual Costs ($)	Unit Costs before Amortization ($ per acre-feet)	Unit Costs before Amortization ($ per 1000 gal)
ANRA	Unmet Needs	-21,888	-62,569	-71,812	-71,457	-71,297	-101,207			----	
	Lake Columbia	0	75,720	75,640	75,560	75,480	75,400	$402,862,000	$23,509,000	$311	$0.95
	ANRA Treatment and Distribution System	0	0	0	0	0	0	$228,001,000	$49,839,000	$2,242	$6.88
	Run of River, Neches (New Application)	20,000	20,000	20,000	20,000	20,000	20,000	$0	$0	$0	$0.00
	Run of River, Neches (Submitted Application)	10,000	10,000	10,000	10,000	10,000	10,000	$0	$0	$0	$0.00
	New Wells (Carrizo-Wilcox Aquifer)	5,600	5,600	5,600	5,600	5,600	5,600	$29,775,000	$3,185,000	$569	$1.75
	RECOMMENDED WMS TOTAL	35,600	111,320	111,240	111,160	111,080	111,000				
AN WCID#1	Unmet Needs	0	0	0	0	0	0			----	
	Hydraulic Dredging (Includes Volumetric Survey and Normal Pool Elevation Adjustment)	0	0	5,600	5,600	5,600	5,600	$23,716,000	-	$476	$1.46
	RECOMMENDED WMS TOTAL			5,600	5,600	5,600	5,600				

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Appendices Summary:

Appendix	Title	Description
5B-A	Technical Memorandums of Water Management Analysis	Technical Memorandums of Water Management Analysis divided by WUGs
5B-B	Quantification of Environmental Impacts of Water Management Strategies and Strategy Evaluation Matrix	Summary of the approach used for identifying and selecting WMS for development of plan
5B-C	Management Supply Factors for Major Water Providers	Summary of Management Supply Factor by MWP and decade; used for accounting for uncertanties

26

Chapter 5C:

Water Conservation Recommendations

27

Chapter 5C – Water Conservation Recommendations

Chapter Summary:

- Texas Water Code §11.002(8) defines Water Conservation: water use practices, techniques, and technologies that:
  - Reduce consumption
  - Reduce loss or waste
  - Improve efficient use
  - Increase recycling and reuse
- Advanced conservation evaluated for municipal WUGs that have projected needs (n=22) and that have a projected gpcd greater than 140 (n=14)
- Conservation measures evaluated include:
  - Enhanced Education
  - Conservation Rate Pricing
  - Enhanced Water Loss Reduction

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Appendices Summary:

29

Chapter 6:

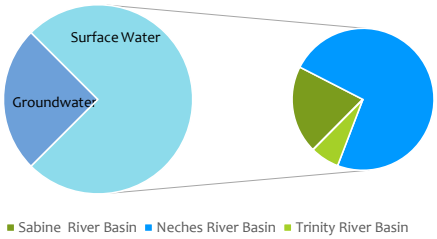
Impacts of the Regional Water Plan and Consistency with Protection of Resources

30

Chapter 6 – Impacts of the Regional Water Plan and Consistency with Protection of Resources

Chapter Summary:

- Describes potential impacts of plans and treats to the region's resources:
  - Water Resources
  - Agricultural Resources
  - Natural Resources
    - Timber
    - Energy resources
    - Parks and public lands
    - Threatened and endangered species
- Addresses consistency of plan with protection of resources and water planning requirements



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Chapter 6 – Impacts of the Regional Water Plan and Consistency with Protection of Resources

Appendices Summary:

Appendix	Title	Description
6-A	Title 31 Texas Administrative Code Chapters 357 and 358 Regulations Pertaining to the 2021 Plan	Matrix demonstrating compliance with Chapters 357 and 358 in the TAC, Title 31 by showing regulation and where regulation is met in 2021 Plan
6-B	Socioeconomic Impact Analysis	TWDB report and analysis of not meeting identified water needs

32

Chapter 7:

Drought Response Information, Activities, and Recommendations

33

Chapter 7 – Drought Response Information, Activities, and Recommendations

Chapter Summary:

- Historical drought monitors
- Reviews and summarizes 46 drought contingency plans
- Lists potential emergency water supply sources by WUG

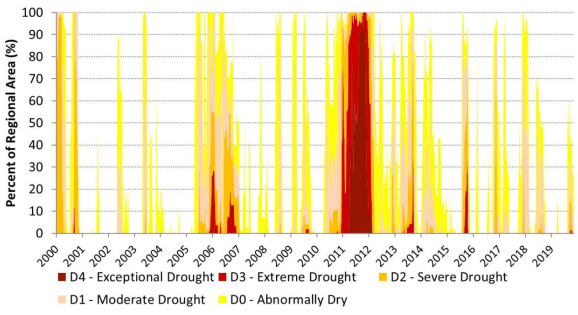

Figure 7.1 Composite Drought Monitor Index for Counties in the East Texas Regional Water Planning Area
SOURCE: DATA PROVIDED BY THE NATIONAL DROUGHT MITIGATION CENTER, NOVEMBER 2019.

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Recommendations

Appendices Summary:

No Chapter 7 Appendices

- Model Drought Contingency Plans posted on Region I website per TWDB requirements

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Chapter 8:

Unique Stream Segments, Unique Reservoir Sites, and Legislative and Regulatory Recommendations

36

Chapter 8 – Unique Stream Segments, Unique Reservoir Sites, and Legislative and Regulatory Recommendations

Chapter Summary:

- Unique stream segments
  - Texas Parks & Wildlife Department identified 41 unique segments in 2005
- Unique reservoir sites
  - Two unique reservoir sites
- Legislative and regulatory recommendations

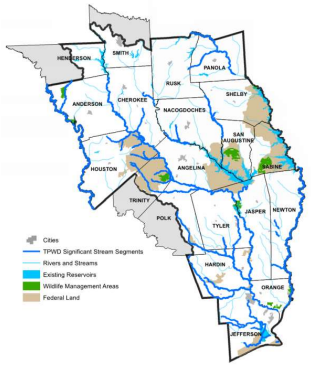

Figure 8.1 Texas Parks and Wildlife Department Ecologically Significant Stream Segments

SOURCE: TEXAS PARKS AND WILDLIFE DEPARTMENT

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and Legislative and Regulatory Recommendations

Appendices Summary:

Appendix	Title	Description
8-A	Proposed Reservoir Site Locations	Maps showing the locations of proposed reservoirs discussed in Chapter 8
		Technical memorandum prepared by the Consulting Team that describes some of the primary concerns and observation of the Technical Committee for the ETRWA regarding the 2011 Prioritization Process. An updated process will be available after the IPP after 2021 Prioritization is complete.

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Chapter 9:

Infrastructure Financing Report

39

Chapter 9 – Infrastructure Financing Report

Chapter Summary:

- Assessment of how WMSs and WMSPs will be financed
- TWDB developed survey
- Identify role of state in financing projects within the plan
- Identify number of political subdivisions in need of financial assistance
- Determine what portion of RWP cannot be paid by local utility revenue
- Evaluate financing options available to meet needs

40

Appendices Summary:

Appendix	Title	Description
9-A	Infrastructure Financing Report - Contact Information	Survey of WUGs and WWPS with identified needs will be conducted after the IPP and this appendix will summarize the updated contact information of contacted WWPs and WUGs
		Survey of WUGs and WWPS with identified needs will be conducted after the IPP and this appendix will summarize confirmed infrastructure projects, costs, and potential funding sources

41

Chapter 10:

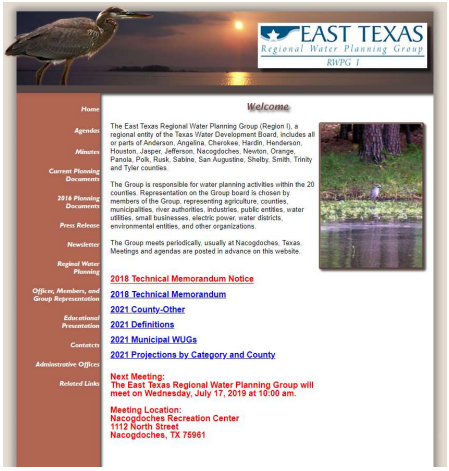
Public Participation and Adoption of Plan

42

Chapter 10 – Public Participation and Adoption of Plan

Chapter Summary:

- Public involvement and participation
  - Representatives of major WUGs
- Methods for public engagement
  - Water user group involvement
  - Press releases
  - Newsletters
  - ETRWPA website
  - Public meetings
  - Public hearings



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Appendices Summary:

10-C	Initially Prepared Plan Public Comments	This appendix will include all comments received during the 2021 IPP comment period.
		This appendix will include a letter from Kelley Holcomb informing the TWDB of the approval and adoption of the 2021 IPP

Note: Appendices 10-B through 10-D will be available after the 2021 IPP is submitted

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Chapter 11:

Implementation and Comparison to the Previous Regional Water Plan

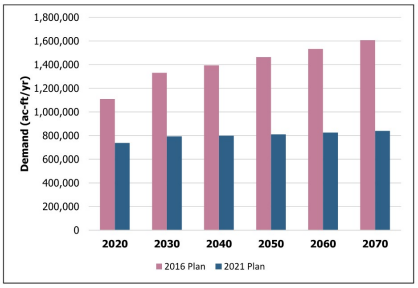
45

Chapter 11 – Implementation and Comparison to the Previous Regional Water Plan

Chapter Summary:

- TWDB Implementation survey
  - Recommended project sponsors
  - Changes in supplies since 2011 plan
  - TWDB funding records
  - Conservation implementation reports
- Comparison of 2021 Plan to 2016 Plan
  - Water Demand Projections
  - Drought of Record
  - Water Availability
  - Existing Water Supplies of Water User Groups
  - Identified Needs of WUGs and WWPs
  - Recommended and Alternative WMSs

Figure 11.1 Total Projected Demand for the East Texas Regional Water Planning Area from the 2016 and 2021 Plans



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Regional Water Plan

Appendices Summary:

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Initially Prepared Plan

Next Steps in the Regional Water Planning Process

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Regional Water Planning Process

- **August 2020**
  - Accept public comments
  - Incorporate TWDB comments received
- **September 2020**
  - Update Chapter 10 – Public Participation
  - Prioritize 2021 WMSs
- **October 2020**
  - Adopt Final 2021 Prioritization
  - Adopt Final 2021 Regional Water Plan
- **December 2020**
  - Submit Final 2021 Regional Water Plan to the TWDB

Initially Prepared Plan

ETRWPA 2021 Initially Prepared Plan Comments

- **Comments Accepted Today**
- **PDF of 2021 IPP available to download:**
  - www.twdb.Texas.gov
  - www.etexwaterplan.org
- **Written comments accepted until August 24, 2020**

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Austin, Texas 78752
(512)-826-1568
rhunt@plummer.com

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Questions?

Cynthia Syvarth
(512) 452-5905
csyvarth@plummer.com
Plummer Associates, Inc.

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Region I
East Texas Regional
Water Planning Group
Initially Prepared Plan
Public Hearing
May 14, 2020

MINUTES OF THE TELEPHONIC JOIN BY PHONE
REGIONAL WATER PLANNING GROUP "I"
IPP PUBLIC HEARING
Thursday, May 14, 2020 – 5:30 P.M.

1. **Call to Order** – Kelley Holcomb, Chair, called the meeting to order at 5:35 P.M.
2. **Summary of IPP – Consultants – Cynthia Syvarth**
3. **Public Comments:**

   Tycie Brooks, Mayor of Browndale in Jasper County, asked for more information regarding the plan. Rex Hunt of Plummer advised he would contact her.

   Sam Collins with Newton County Historic Commission asked about the previously planned nuclear plant included in past Region I Plans.

4. **Hearing Closed 5:48 P.M. by Chair, Kelley Holcomb.**

APPROVED THIS 5th day of August, 2020

_____
Kelley Holcomb, Chair
ETRWPG – Region I

ATTEST:

_____
John Martin, Secretary

Minutes approved August 5th, 2020

Appendix 10-C

Initially Prepared Plan Submittal Letter

This appendix includes the letter from the East Texas Regional Water Planning Group chair, Kelley Holcomb, informing the Texas Water Development Board (TWDB) of the approval and adoption of the 2021 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 635030
Nacogdoches TX 75963
936-633-7543

March 3, 2020

Mr. Jeff Walker
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 2021 Initially Prepared Plan

Dear Mr. Walker:

The Region I, East Texas Regional Water Planning Group (ETRWPG) met on February 19, 2020 and formally adopted the Region I 2021 Initially Prepared Plan (IPP) and approved its submission to the Texas Water Development Board (TWDB) commensurate with the March 3, 2020 deadline. The submittal shall be delivered in person by a member of our consulting team with Plummer Associates, Inc.

1. The submission of the IPP includes seven (7) double-sided, hard copies and two (2) electronic copies. The electronic copies of the IPP each include one copy in searchable PDF and one copy in Microsoft Word format.
2. I hereby certify that the Region I 2016 IPP is complete.
3. The IPP is a technical report with all 11 required plan chapters organized as outlined in Table 1-1 of the TWDB Second Amended General Guidelines for Fifth Cycle of Regional Water Plan Development (Exhibit C) dated April 2018.
4. The IPP Executive Summary contains less than 30 pages.
5. The IPP appendix to the Executive Summary contains all unmodified DB22 reports required.
6. In development of the IPP, the ETRWPG has met all requirements under the Texas Open Meetings Act and Public Information Act.
7. A singular list of all potentially feasible WMSs identified by the ETRWPG is included in Appendix 5A-B.
8. The electronic copies of the IPP include a set of Arc-GIS compatible data consisting of a single file with shapefiles marking locations of recommended and alternative water management strategies with capital costs.
9. The electronic copies of the IPP include an electronic appendix containing WAM model(s) input/output used in developing surface water availability with a pdf cover page with information regarding the date of each model run.
10. The ETRWPG did not develop any non-MAG groundwater availability evaluations; therefore, a GAM model summary is not included in the electronic copies of the IPP.

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

Appendix 10-D

Initially Prepared Plan Public Comments

Opportunities for public comment are provided through the regional water planning process. The members of the public are invited to provide comments at regularly scheduled meetings of the ETRWPG. Comments may be received in person, as well as by letter, email, or telephone. During the official comment period during the summer of 2020, comments regarding the 2021 Initially Prepared Plan were received from entities and/or individuals. This appendix includes copies of all written comments and a transcript of oral comments. Appendix 10-E of the 2021 Plan includes responses to all comments received during the 2021 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

Mr. Kelley Holcomb, Chair
c/o Angelina & Neches River Authority
2901 N. John Reddit Dr.
Lufkin, Texas 75904

Mr. Jim Jeffers
City of Nacogdoches
P.O. Box 635030
Nacogdoches, Texas 75963

Re: Texas Water Development Board Comments for the East Texas (Region I) Regional Water Planning Group Initially Prepared Plan, Contract No. 1548301837

Dear Mr. Holcomb and Mr. Jeffers:

Texas Water Development Board (TWDB) staff have completed their review of the Initially Prepared Plan (IPP) submitted by March 3, 2020 on behalf of the East Texas Regional Water Planning Group (RWPG). The attached comments follow this format:

- **Level 1:** Comments, questions, and data 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.

Please note that rule references are based on recent revisions to 31 Texas Administrative Code (TAC) Chapter 357, adopted by the TWDB Board on June 4, 2020. 31 TAC § 357.50(f) requires the RWPG to consider timely agency and public comment. Section 357.50(g) 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 (*Contract Exhibit C, Section 13.1.2)*.

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, please be sure to also incorporate the following:

a) Completed results from the RWPG's infrastructure financing survey for sponsors of recommended projects with capital costs, including an electronic version of the survey spreadsheet *[31 TAC § 357.44]*;

b) Completed results from the implementation survey, including an electronic version of the survey spreadsheet *[31 TAC § 357.45(a)]*;
c) Documentation that comments received on the IPP were considered in the development of the final plan *[31 TAC § 357.50(f)]*; and
d) Evidence, such as a certification in the form of a cover letter, that the final, adopted regional water plan is complete and adopted by the RWPG *[31 TAC § 357.50(h)(1)]*.

Please ensure that the final plan includes updated State Water Planning Database (DB22) reports, and that the numerical values presented in the tables throughout the final, adopted regional water plan are consistent with the data provided in DB22. For the purpose of development of the 2022 State Water Plan, water management strategy and other data entered by the RWPG in DB22 shall take precedence over any conflicting data presented in the final regional water plan *[Contract Exhibit C, Sections 13.1.3 and 13.2.2]*.

Additionally, subsequent review of DB22 data is being performed. If issues arise during our ongoing data review, they will be communicated promptly to the planning group to resolve. Please anticipate the need to respond to additional comments regarding data integrity, including any source overallocations, prior to the adoption of the final regional water plans.

The 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 also be incorporated in hard copy format within each plan *[31 TAC § 357.50(g)(2)(C), Contract Exhibit C, Section 13.1.2 and 13.2.1]*.

The following items must accompany, the submission of the final, adopted regional water plan:

1. The prioritized list of all recommended projects in the regional water plan, including an electronic version of the prioritization spreadsheet *[31 TAC § 357.46];* and,
2. All hydrologic modeling files and GIS files, including any remaining 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(g)(2)(C), Contract Exhibit C, Section 13.1.2, and 13.2.1]*.

The following general requirements that apply to recommended water management strategies must be adhered to in all final regional water plans including:

1. Regional water plans must not include any recommended strategies or project 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(39), § 357.34(e)(3)(A), Contract Exhibit C, Sections 5.5.2 and 5.5.3]*; and,

2. Regional water plans must not include the costs of any retail distribution lines or other infrastructure costs that are not directly associated with the development of additional supply volumes (e.g., via treatment) other than those line replacement costs related to projects that are for the primary purpose of achieving conservation savings via water loss reduction *[§ 357.34(e)(3)(A), Contract Exhibit C, Section 5.5.3]*.

Please be advised that, within the attached document, your region has received a comment specifically requesting that the RWPG provide the basis for how the RWPG considers it feasible that certain water management strategies will actually be implemented by January 5, 2023 (see Level 1, Comment 1), especially for projects with long lead times. This comment is aimed at making sure RWPGs do not present projects in their plans to provide water during the 2020 decade that cannot reasonably be expected to be online, *and provide water supply*, by January 5, 2023. For project types whose drought yields rely on *previously stored water*, the 2020 supply volume should take into consideration reasonably expected accumulated storage that would already be available in the event of drought. The RWPG must adequately address this Level 1 comment in the final, adopted regional water plan, which might require making changes to your regional plan.

It is preferable that RWPGs adopt a realistic plan that acknowledges the likelihood of unmet needs in a near-term drought, rather than to present a plan that overlooks reasonably foreseeable, near-term shortages due to the inclusion of unrealistic project timelines. If a '2020' decade project cannot reasonably be expected to come online by January 2023, for example if a reservoir has not started the permitting process, it should be moved to the 2030 decade. Any potential supply gaps (unmet needs) created by moving out projects to the 2030 decade may be shown as simply 'unmet' in the 2020 decade or be shown as met by a 'demand management' strategy. Doing so will appropriately reflect the fact that some entities would likely face an actual shortage if a drought of record were to occur in the very near future despite projects (that may be included in the plan but associated with a later decade) that will eventually address those same potential shortages in future years.

It is imperative that you provide the TWDB with information on how you intend to address this comment and all other comments well in advance of your adoption the regional water plan to ensure that the response is adequate for the Executive Administrator to recommend the plan to the TWDB Board for consideration in a timely and efficient manner. Your TWDB project manager will review and provide feedback to ensure all IPP comments and associated plan revisions have been addressed adequately. Failure to adequately address this comment (or any Level 1 comment) may result in the delay of the TWDB Board approval of your final regional water plan.

As a reminder, the deadline to submit the final, adopted regional water plan and associated material to the TWDB is **October 14, 2020.** Any remaining data revisions to DB22 must be

communicated to Sabrina Anderson at Sabrina.Anderson@twdb.texas.gov by **September 14, 2020.**

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 or Lann.Bookout@twdb.texas.gov. TWDB staff will be available to assist you in any way possible to ensure successful completion of your final regional water plan.

Sincerely,

Jessica Pena Zuba Digitally signed by Jessica Pena Zuba
Date: 2020.06.15 19:15:28 -05'00'

Jessica Zuba Date: 6/15/2020
Deputy Executive Administrator
Water Supply and Infrastructure

Attachment

c w/att.: Mr. Rex Hunt, Plummer

ATTACHMENT

TWDB comments on the Initially Prepared 2021 East Texas (Region I) Regional Water Plan.

Level 1: Comments, questions, and data revisions that must be satisfactorily addressed in order to meet statutory, agency rule, and/or contract requirements.

1. Chapter 5 and the State Water Planning Database (DB22). The plan includes the following recommended water management strategies (WMS) by WMS type, providing supply in 2020 (not including demand management): five *groundwater wells & other* and 15 *other surface water*. **Strategy supply with an online decade of 2020 must be constructed and delivering water by January 5, 2023.**
   a) Please confirm that all strategies shown as providing supply in 2020 are expected to be providing water supply by January 5, 2023. *[31 § TAC 357.10(21); Contract Exhibit C, Section 5.2]*
   b) Please provide the specific basis on which the planning group anticipates that it is feasible that the 15 *other surface water* WMSs will all actually be online and providing water supply by January 5, 2023. For example, provide information on actions taken by sponsors and anticipated future project milestones that demonstrate sufficient progress toward implementation. *[31 § TAC 357.10(21); Contract Exhibit C, Section 5.2]*
   c) In the event that the resulting adjustment of the timing of WMSs in the plan results in an increase in near-term unmet water needs, please update the related portions of the plan and DB22 accordingly, and also indicate whether 'demand management' will be the WMS used in the event of drought to address such water supply shortfalls or if the plan will show these as simply 'unmet'. If municipal shortages are left 'unmet' and without a 'demand management' strategy to meet the shortage, please also ensure that adequate justification is included in accordance with 31 TAC § 357.50(j). *[TWC § 16.051(a); 31 § TAC 357.50(j); [31 TAC § 357.34(i)(2); Contract Exhibit C, Section 5.2]*
   d) **Please be advised that, in accordance with Senate Bill 1511, 85th Texas Legislature, the planning group will be expected to rely on its next planning cycle budget to amend its 2021 Regional Water Plan during development of the 2026 Regional Water Plan, if recommended WMSs or projects become infeasible, for example, due to timing of projects coming online.** Infeasible WMSs include those WMSs where proposed sponsors have not taken an affirmative vote or other action to make expenditures necessary to construct or file applications for permits required in connection with implementation of the WMS on a schedule in order for the WMS to be completed by the time the WMS is needed to address drought in the plan. *[TWC § 16.053(h)(10); 31 TAC § 357.12(b)]*

2. Section 3.1.4, Table 3.4, page 3-11. Please clarify why the firm yield (available supply, 1,874 ac-ft/yr) is greater than the permitted diversion (1,460 ac-ft/yr) for

Lake Center and whether/how the plan relies upon the greater amount in the final, adopted regional water plan. *[31 TAC § 357.32(c)(1)]*

3. Section 3.1.6, page 3-16. Please confirm whether the estimates of local surface water supplies are firm supplies under drought of record conditions and document this information in the final, adopted regional water plan. *[31 TAC § 357.32(a); Contract Exhibit C, Section 3.2]*

4. Section 3.2.1, Table 3.7, page 3-19. Desired future conditions (DFC) in Angelina County for the Queen City and Sparta aquifers are listed as 16 ac-ft for the Queen City Aquifer and not relevant due to size (NRS) for the Sparta Aquifer. GAM Run 17-024 shows that the DFC for Queen City Aquifer is NRS while the DFC for Sparta Aquifer is 16 ac-ft. Please update Table 3.7 to match GAM Run 17-024 in the final, adopted regional water plan. *[31 TAC § 357.32(d)]*

5. Section 3.2.2, Table 3.9, pages 3-21 to 3-23. Table 3.9 lists zero groundwater availability for Panola/Queen City/Sabine, Rusk/Sparta/Neches, Sabine/Queen City/Neches, Sabine/Queen City/Sabine, San Augustine/Queen City/Neches, San Augustine/Queen City/Sabine, Shelby/Queen City/Sabine, and Smith/Sparta/Neches. These aquifers do not exist in these geographic areas. Please remove these from Table 3.9 in the final, adopted regional water plan. *[31 TAC § 357.32(d)]*

6. Section 3.2.2, Table 3.9, pages 3-21 through 3-23. Non-relevant aquifers for Polk, Sabine, and Tyler counties are missing. Please include the non-relevant aquifers in Table 3.9 for Polk/Yegua-Jackson/Neches, Sabine/Gulf Coast/Sabine, and Tyler/Yegua-Jackson/Neches in the final, adopted regional water plan. *[31 TAC § 357.32(d)]*

7. Appendix 3-B. The documentation provided in Appendix 3-B (i.e., Water Availability Technical Memorandum) does not appear to summarize the Water Availability Model (WAM) analysis for the City of Beaumont (WR 4415) as mentioned in the IPP (last two sentences on page 3-11 and first three words on page 3-12) and approved in the region's hydrologic variance request. Please include this information in Chapter 3 or Appendix 3-B of the final, adopted regional water plan, *[31 TAC § 357.32(c)(2)]*

8. Section 4.4.1, page 4-11. The plan states that it is assumed that Lake Columbia will be completed by 2020. Page 5B-82 and page 5B-A-121 indicate Lake Columbia completion by 2030. Strategy supply with an online decade of 2020 must be constructed and delivering water by January 5, 2023. Given the Lake Columbia permit status and development timeline of a major reservoir, please revise the online decade of this technically feasible project to a realistic WMSP online timeframe (i.e., 2030) consistently throughout the final, adopted regional water plan. In the event that the adjustment of the timing of a WMS in the plan results in an increase in near-term unmet water needs, please update the related portions of

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the plan and DB22 accordingly. *[TWC § 16.053(h)(10); Contract Exhibit C, Section 5.2]*

9. Chapter 5. Multiple WMS evaluations state that the implementation decade is 2020 and has a development timeline of 5 years (for example CENT-TOL (page 5-A-150), LNVA-WRR (page 5B-A-161)). Please reevaluate the 5 years reference and clarify that strategies presented as providing supply in 2020 will be constructed and delivering water by January 5, 2023. If necessary, please revise the initial supply decade to represent a more realistic timeframe in the final, adopted regional water plan. *[31 TAC § 357.10(21); Contract Exhibit C, Section 5.2]*

10. Chapter 5. The plan does not appear to include specific goals for gallons of water use per capita per day (GPCD) for municipal WUGs in the planning area for each decade. Please include specific goals by decade for each municipal WUG in the final, adopted regional water plan. This may be a specific GPCD, or ranges of GPCD; may be based on specific municipal WUGs, or groupings of municipal WUGs as determined appropriate by the RWPG. *[TWC § 16.053 (e)(11); 31 TAC § 357.34(i)(3)]*

11. Chapter 5. Please include documentation of why aquifer storage and recovery, seawater desalination, and brackish groundwater desalination were not selected as recommended WMSs in the final, adopted regional water plan. *[TWC 16.053(e)(5)(j); Contract Exhibit C, Section 5.2; 31 § TAC 357.34(g)]*

12. Chapter 5 and Appendix 5B. The plan does not clearly state if or how environmental flow needs were taken into account in calculation of yield for the following WMSs: Permit Amendment for Houston County Lake (Strategy ID: HCWC-PA), Neches Run of River Strategies (UNM-LP, UNM-TS, UNM-GW), Angelina Run of River (ANRA-ROR), and Beaumont West Regional Reservoir (LNVA-WRR). Please provide this information in the final, adopted regional water plan. *[31 TAC § 358.3(22); 31 TAC § 358.3(23); 31 TAC § 357.34(e)(3)(B)]*

13. Section 5A.4.2, page 5A-16. The plan presents a screening process for aquifer storage and recovery (ASR) and notes seven entities with significant identified needs, however the plan does not appear to provide a specific assessment of ASR for the entities identified. Please provide the results of the screening process presented in Figure 5A.1 in the final, adopted regional water plan. *[TWC § 16.053(e)(10); 31 TAC § 357.34(h)]*

14. Section 5B.3.1., page 5B-82 and Appendix 5B-A. The ANRA-Run of River (submitted application/new application) WMSs are shown as providing supply for various mining needs in the plan however, there does not appear to be technical evaluation presented for this strategy. Please provide a technical evaluation for this strategy in the final, adopted regional water plan. *[31 TAC §357.34(f)]*

15. Appendix 5A-A, page 5A-A-2 states that conservation will not be considered for steam electric power, livestock, or mining demands. Each of these water user group categories has identified needs and conservation must be considered for each need. Please document more clearly that conservation was considered, as required by

rule, for these specific needs in the final, adopted regional water plan. *[31 TAC § 357.34(i)(2)]*

16. Appendix 5B-A, page 5B-A-127. The evaluation for ANRA-WTP indicates a supply of zero acre-feet per year, however page 5B-86 indicates the ANRA-WTP WMS will supply up to 22,232 acre-feet per year. Please reconcile this information in the final, adopted regional water plan. *[31 TAC § 357.34(d)]*

17. Appendix 5B-A and 5B-B. The plan appears to combine the environmental factors (i.e. environmental water needs, wildlife habitat, cultural resources, and effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico) into the term "Environmental Factors". It is not clear how the overall environmental factor score for quantifying impacts is determined. Please clarify what methodology, formula or other means, is used to calculate the overall environmental factor score in the final, adopted regional water plan. *[31 TAC §357.34(e)(3)(B)]*

18. Appendix 5B-B. It is not clear where recreational impacts are considered in the WMS analysis Evaluation Matrix Rating Criteria. Please clarify whether this factor is analyzed for WMS impacts in the final, adopted regional water plan. *[31 TAC § 357.34.(e)(10)]*

19. Section 6.1.1, page 6-2 describes ratings for "Major Impacts on Key Water Quality Parameters", however these ratings do not appear to match the ratings described in "Evaluation Matrix Rating Criteria" (Appendix 5B-B, page 5B-B-5). Please reconcile these ratings and definitions in the final, adopted regional water plan. *[31 TAC § 357.34(e)(8)]*

20. Section 6.1.2, page 6-2 describes ratings for "Threat to Agricultural Resources/Rural Areas", however these descriptions do not appear to match the ratings described in "Evaluation Matrix Rating Criteria" (Appendix 5B-B, page 5B-B-5). Please reconcile these ratings and definitions in the final, adopted regional water plan. *[31 TAC § 357.34(e)(7)]*

21. Section 6.3, page 6-5. The plan states that there are no unmet needs, municipal or non-municipal, included in the 2021 Plan, however data reported in DB22 shows unmet need of one acre-foot per year in Manufacturing, Jefferson County. Please reconcile this information in the final, adopted regional water plan. *[31 TAC § 357.40(c)]*

22. Section 7.3, page 7-17. The plan states that TWDB guidance requires existing major water infrastructure facilities to be collected confidentially and separately form the 2021 Plan and does not include a list of existing emergency interconnects. TWDB guidance states that location and detailed facility information should be kept separate from the plan. Please include, at a minimum, a description of the methodology used to collect the information, and the number of existing and potential interconnects including who is connected to who, in the final, adopted regional water plan. *[31 TAC § 357.42(d); Contract Exhibit C, Section 7.3]*

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23. Section 7.8.1, page 7-49, last sentence. The plan appears to state how the region addressed recommendations the Drought Preparedness Council provided for the *2016 RWP*. Please indicate how the region addressed the Drought Preparedness Council's recommendations provided to planning groups on August 1, 2019 and noted in the 2nd bullet of Section 7.8.1. *[31 TAC § 357.42(h)]*

24. Chapter 7. The plan does not appear to include a discussion of whether drought contingency measures have been recently implemented (for example, since adoption of the last regional water plan) in response to drought conditions. Please include this information in the final, adopted regional water plan *[Contract Scope of Work, Task 7, subtask 3]*

25. Section 8.1, Page 8-1, page 8-2, and page 8-6. This section appears to include outdated information, including reference to a draft Texas Parks and Wildlife report, TWDB recommended stakeholder committee, and reference to action taken at the January 2015 Region I meeting. The TPWD ecologically significant stream segment information appears to be in final form on their website. Please confirm status of information referenced and update as appropriate in the final, adopted regional water plan. *[31 TAC § 357.43(b)]*

26. Section 10.3. The plan notes that all meetings were held in accordance with the Texas Open Meetings Act but does not discuss compliance with the Texas Public Information Act. Please address how the planning group complied with the Texas Public Information Act in the final adopted regional water plan. *[31 TAC §357.21; 31 TAC §357.50(f)]*

27. Section 11.1, page 11-1. The plan states that "this is the first year a plan will have water management strategy projects…", however WMS projects were included in the 2016 regional water plan. Please correct this statement in the final, adopted regional water plan *[31 TAC § 357.45(a)]*

28. Section 11.2.2, page 11-4. The plan appears to include the comparison of drought of record information from the 2016 regional water plan. Please update this information as necessary for the final, adopted regional water plan. *[31 TAC § 357.45(c)(2)]*

29. Chapter 11. Please provide a brief summary of how the 2016 Plan differs from the 2021 Plan with regards to recommended and alternative WMS *projects* in the final, adopted regional water plan. *[31 TAC § 357.45(c)(4)]*

30. Appendix 11-A. It appears that the implementation survey in the plan uses the template from the 2016 regional water plan. Please ensure that the template and data used for the implementation survey are based on the survey template and data that the TWDB provided in June 2019 for this current planning cycle. *[31 TAC § 357.45(a)]*

31. Chapter 11. The plan does not appear to indicate the progress of the planning group in encouraging cooperation between water user groups to achieve economies of

scale and otherwise incentivize strategies that benefit the entire region. Please include this information in the final, adopted regional water plan. *[TWC § 16.053(e)(12)]*

32. Appendix ES-A. The plan appears to be missing DB22 report #18, Recommended Water Management Strategies Requiring a New or Amended IBT Permit. Please include a copy of this report in the final, adopted regional water plan. *[Contract Scope of Work, Task 10, subtask 11]*

33. Appendix ES-A. The plan includes some DB22 reports that appear blank due to the region not having relevant data for these reports. Please provide a cover page or note on the DB22 report table of contents indicating the reason for these report contents being blank. *[Contract Exhibit C, Section 13.1.2]*

Level 2: Comments and suggestions for consideration that may improve the readability and overall understanding of the regional water plan.

1. Page 1-12, Section 1.3.1, fourth paragraph, second sentence. The text states the Gulf Coast Aquifer provides water to all or parts of 10 counties in the ETRWPA however data reports indicate that eight (8) counties within the ETRWPA receive supply from the Gulf Coast Aquifer. Please consider revising as appropriate in the final plan.

2. Section 1.3.1. Please consider adding a reference source for the average total pumping values presented for each aquifer in the region.

3. Page 1-17, last full paragraph, first sentence. The sentence states that the ETRWPA encompasses GMAs 11 and 14. Please consider updating the text to state that the ETRWPA includes portions of GMAs 11 and 14.

4. Page 3-1, third paragraph and page 3-5, Figure 3.4. The text on page 3-1 says "approximately 11% of the total freshwater supply is groundwater"; however, Figure 3.4 shows that approximately 12% of the freshwater supply is groundwater. Please consider revising the text or figure accordingly.

5. Page 3-5. The text says "slightly more than 549,000 ac-ft per year, however, it should say "slightly less than 549,000 ac-ft" based on the values presented in Table 3.1. Please consider revising the text in the final plan.

6. Page 3-18, Figure 3.5, and page 1-18, Figure 1.9, and Section 1.3.1, page 1-16. Deep East Texas Groundwater Conservation District (GCD) and Anderson County GCD are included in the Figure 3.5. Please exclude these GCDs from the figure as these GCDs no longer exist.

7. Page 3-19, 1st paragraph. Please consider correcting the reference "Error!Reference source not found" in the final plan.

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8. Page 3-24, Table 3.10. The first sentence states that Table 3.10 presents the total MAG volumes by aquifer for planning years 2020 through 2070, however Table 3.10 only includes the volumes for the year 2020. Please consider adjusting the text or table so they agree.

9. Page 3-24, Table 3.10. The first column is named "Region," but the cells below are filled with the word "Total." Please consider correcting the cells with the word "Total" to either "Northern" or "Southern" as best fits the region.

10. Chapter 3, page 3-9. Please consider revising the title for Section 3.1.4 to "Reservoir Water Availability".

11. In Appendix 3-B last sentence in first paragraph references Appendix 3-D. This appears to be a typo. Please correct the typographical error in the final plan.

12. In Appendix 3-B, the last sentence in the first paragraph references Appendix 3-D. This appears to be a typo. Please correct the typographical error in the final plan.

13. Chapter 5B, page 5B-54 includes conservation strategies for New London in the last two tables, yet the table on page 5B-55 states "none" for New London's recommended WMSs. Please reconcile the tables in the final water plan

14. Please consider reconciling the following statements which appear contradictory:

    a) Appendix 5B-A-181 has the statement: "Based on current contracts and the available supplies from the Neches Basin WAM, the UNRMWA shows a small shortage during the planning period for Lake Palestine supplies. UNRMWA does not think the shortages to be real as the shortage is primarily associated with the reduced firm yield of Lake Palestine due to projected sediment accumulation in the lake. UNRMWA believes that the storage-area-elevation curves used in the Water Availability Models are severely under-predicting the storage volumes available in various parts of the lake. Therefore, UNRMWA believes that the lake yield is much larger than what is projected by the Water Availability Models."

    b) Appendix 5B-A-178 has the statement: "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."

15. Section 5.B.3.16, page 5B-123. Please consider including a discussion of the basis for why the UNRMWA "believes" that the WAMs "underpredict the storage volumes available in various parts of the lake".

16. Appendix 5A-A, page 5A-A-2 states that 140 GPCD is the TWDB recommended goal for municipal users. Please correct this statement, which is a recommendation by the Texas Water Conservation Implementation Task Force, not a TWDB recommendation.

17. Alternating page numbers in Appendix 5B-A are "Appendix4-A" and "Appendix 5B-A". Please consider revising in the final plan.

18. Appendix 5B-A, page 5B-A-1, 2nd paragraph references the *Exhibit C, First Amended General Guidelines for Regional Water Planning Development – October 2012*. Please update this reference to the current version of Exhibit C under contract: *Exhibit C, Second Amended General Guidelines for Fifth Cycle of Regional Water Plan Development – April 2018*.

19. Appendix 5B-A, page 5B-A-7 states that the plan used the Texas Water Development Board Water Availability Models. Water Availability Models are maintained by the Texas Commission on Environmental Quality. Please consider correcting this information in the final plan.

20. Appendix 6-A. Please consider updating the Texas Administrative Code matrix to reflect updated rule references, based on amendments to 31 TAC Chapter 357 adopted by the TWDB Board on June 4, 2020.

21. Chapter 8, Section 8.1, Page 8-1, 4th paragraph contains a footnote reference that does not appear until page 8-15 and appears to be an incorrect reference to the footnoted material. Please consider revising in the final plan.

22. The GIS files submitted for WMS projects do not include the minimum required metadata. Please include at a minimum, metadata about the data's projection, with the final GIS data submitted. *[Contract Exhibit D, Section 2.4.1]*

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Protecting and Enhancing Natural Resources for Tomorrow

June 18, 2020

Mr. Rex Hunt, P.E.
Region I Consultant

Dear Mr. Hunt;

For the past 2 years the Texas State Soil and Water Conservation Board (TSSWCB) has been participating in the Texas Water Development Board's (TWDB) Regional Water Planning meetings as directed by Senate Bill 1511, passed in the 2017 legislative session. We appreciate being included in the process and offer these constructive comments to the regional water plans and ultimately the State water plan. Attached you will find some specific comments to the Region I water plan as they pertain to the TSSWCB.

As you may know 82% of Texas' land area is privately-owned and are working lands, involved in agricultural, timber, and wildlife operations. These lands are important as they provide substantial economic, environmental, and recreational resources that benefit both the landowners and public. They also provide ecosystem services that we all rely on for everyday necessities, such as air and water quality, carbon sequestration, and wildlife habitat.

With that said, these working lands are where the vast majority of our rain falls and ultimately supply the water for all of our needs, such as municipal, industrial, wildlife, and agricultural to name a few. Texas' private working lands are a valuable resource for all Texans.

Over the years, the private landowners of these working lands have been good stewards of their property. In an indirect way they have been assisting the 16 TWDB's Regional Water Planning Groups in achieving their goals through voluntary incentive-based land conservation practices.

It has been proven over time if a raindrop is controlled where it hits the ground there can be a benefit to both water quality and water quantity. Private landowners have been providing benefits to our water resources by implementing Best Management P(BMP) that slow water runoff and provide for soil stabilization, which also slows the sedimentation of our reservoirs and allows for more water infiltration into our aquifers.

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http://www.tsswcb.texas.gov

Some common BMPs include brush management, prescribed grazing, fencing, grade stabilization, irrigation land leveling, terrace, contour farming, cover crop, residue and tillage management, and riparian herbaceous cover.

The TSSWCB has been active with agricultural producers since 1939 as the lead agency for planning, implementing, and managing coordinated natural resource conservation programs for preventing and abating agricultural and sivicultural nonpoint sources of water pollution.

The TSSWCB also works to ensure that the State's network of over 2,000 flood control dams are protecting lives and property by providing operation, maintenance, and structural repair grants to local government sponsors.

The TSSWCB successfully delivers technical and financial assistance to private landowners of Texas through Texas' 216 local Soil and Water Conservation Districts (SWCD) which are led by 1,080 locally elected district directors who are active in agriculture. Through the TSSWCB Water Quality Management Plan Program (WQMP), farmers, ranchers, and silviculturalists receive technical and financial assistance to voluntarily conserve and protect our natural resources. Participants receive assistance with conservation practices, BMPs, that address water quality, water quantity, and soil erosion while promoting the productivity of agricultural lands. This efficient locally led conservation delivery system ensures that those most affected by conservation programs can make decisions on how and what programs will be implemented voluntarily on their private lands.

Over time, lands change ownership and many larger tracts are broken up into smaller parcels. Most new landowners did not grow up on working lands and therefore may not have a knowledge of land management techniques. The TSSWCB is writing new WQMPs for these new landowners who are implementing BMPs on their land. Education and implementation of proper land management and BMPs continues to be essential. Voluntary incentive-based programs are essential to continue to address soil and water conservation in Texas.

These BMPs implemented for soil and water conservation provide benefits not only to the landowner but ultimately to all Texans and our water supply.

Respectfully,

Barry Mahler
Chairman

Rex Isom
Executive Director

Attachment

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Region I

- Page 1-2, Table 1.1 East Texas Regional Water Planning Group Members, Non-Voting Members
    - Include Texas State Soil and Water Conservation Board (TSSWCB), Rusty Ray

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Appendix 10-E

Initially Prepared Plan Comments and ETRWPG Responses

Opportunities for public comment are provided through the regional water planning process. The members of the public are invited to provide comments at regularly scheduled meetings of the ETRWPG. Comments may be received in person, as well as by letter, email, or telephone. During the official comment period during the summer of 2020, comments regarding the 2021 Initially Prepared Plan were received from entities and/or individuals. This appendix includes responses to all comments received during the 2021 Initially Prepared Plan comment period.

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Comment	ETRWPG Response	Changes Made (if applicable)
Comments Received: 6/15/2020 **Jessica Pena Zuba (Texas Water Development Board)** **Level 1 Comments, Appendix 10-D**		
1. Chapter 5 and the State Water Planning Database (DB22). The plan includes the following recommended water management strategies (WMS) by WMS type, providing supply in 2020 (not including demand management): five groundwater wells & other and 15 other surface water. Strategy supply with an online decade of 2020 must be constructed and delivering water by January 5, 2023. a) Please confirm that all strategies shown as providing supply in 2020 are expected to be providing water supply by January 5, 2023. [31 § TAC 357.10(21); Contract Exhibit C, Section 5.2] b) Please provide the specific basis on which the planning group anticipates that it is feasible that the 15 other surface water WMSs will all actually be online and providing water supply by January 5, 2023. For example, provide information on actions taken by sponsors and anticipated future project milestones that demonstrate sufficient progress toward implementation. [31§ TAC 357.10(21); Contract Exhibit C, Section 5.2] c) In the event that the resulting adjustment of the timing of WMSs in the plan results in an increase in near-term unmet water needs, please update the related portions of the plan and DB22 accordingly, and also indicate whether 'demand management' will be the WMS used in the event of drought to address such water supply shortfalls or if the plan will show these as simply 'unmet'. If municipal shortages are left 'unmet' and without a 'demand management' strategy to meet the shortage, please also ensure that adequate justification is included in accordance with 31 TAC § 357.50(j). [TWC § 16.051(a); 31 § TAC 357.50(j); [31 TAC § 357.34(i)(2); Contract Exhibit C, Section 5.2] d) Please be advised that, in accordance with Senate Bill 1511, 85th Texas Legislature, the planning group will be expected to rely on its next planning cycle budget to amend its 2021 Regional Water Plan during development of the 2026 Regional Water Plan, if recommended WMSs or projects become infeasible, for example, due to timing of projects coming online. Infeasible WMSs include those WMSs where proposed sponsors have not taken an affirmative vote or other action to make expenditures necessary to construct or file applications for permits required in connection with implementation of the WMS on a schedule in order for the WMS to be completed by the time the WMS is needed to address drought in the plan. [TWC § 16.053(h)(10); 31 TAC § 357.12(b)]	RWPG Accepted Recommended Change. Twenty-two projects were changed from an online decade of 2020 to 2030	Changes were primarily made to Chapter 5B and Appendix 5B-A
2. Section 3.1.4, Table 3.4, page 3-11. Please clarify why the firm yield (available supply, 1,874 ac-ft/yr) is greater than the permitted diversion (1,460 ac-ft/yr) for Lake Center and whether/how the plan relies upon the greater amount in the final, adopted regional water plan. [31 TAC § 357.32(c)(1)]	RWPG Accepted Recommended Change.	Firm yield reduced to 1,460 ac-ft/yr.
3. Section 3.1.6, page 3-16. Please confirm whether the estimates of local surface water supplies are firm supplies under drought of record conditions and document this information in the final, adopted regional water plan. [31 TAC § 357.32(a); Contract Exhibit C, Section 3.2]	RWPG Accepted Recommended Change.	Clarifying language added to Section 3.1.6.
4. Section 3.2.1, Table 3.7, page 3-19. Desired future conditions (DFC) in Angelina County for the Queen City and Sparta aquifers are listed as 16 ac-ft for the Queen City Aquifer and not relevant due to size (NRS) for the Sparta Aquifer. GAM Run 17- 024 shows that the DFC for Queen City Aquifer is NRS while the DFC for Sparta Aquifer is 16 ac-ft. Please update Table 3.7 to match GAM Run 17-024 in the final, adopted regional water plan. [31 TAC § 357.32(d)]	RWPG Accepted Recommended Change.	Table 3.7 updated.
5. Section 3.2.2, Table 3.9, pages 3-21 to 3-23. Table 3.9 lists zero groundwater availability for Panola/Queen City/Sabine, Rusk/Sparta/Neches, Sabine/Queen City/Neches, Sabine/Queen City/Sabine, San Augustine/Queen City/Neches, San Augustine/Queen City/Sabine, Shelby/Queen City/Sabine, and Smith/Sparta/Neches. These aquifers do not exist in these geographic areas. Please remove these from Table 3.9 in the final, adopted regional water plan. [31 TAC § 357.32(d)]	RWPG Accepted Recommended Change.	Table 3.9 updated.

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6. Section 3.2.2, Table 3.9, pages 3-21 through 3-23. Non-relevant aquifers for Polk, Sabine, and Tyler counties are missing. Please include the non-relevant aquifers in Table 3.9 for Polk/Yegua-Jackson/Neches, Sabine/Gulf Coast/Sabine, and Tyler/Yegua-Jackson/Neches in the final, adopted regional water plan. [31 TAC § 357.32(d)]	RWPG Accepted Recommended Change.	Table 3.9 updated.
7. Appendix 3-B. The documentation provided in Appendix 3-B (i.e., Water Availability Technical Memorandum) does not appear to summarize the Water Availability Model (WAM) analysis for the City of Beaumont (WR 4415) as mentioned in the IPP (last two sentences on page 3-11 and first three words on page 3-12) and approved in the region's hydrologic variance request. Please include this information in Chapter 3 or Appendix 3-B of the final, adopted regional water plan, [31 TAC § 357.32(c)(2)]	RWPG Accepted Recommended Change.	City of Beaumont analysis added into Appendix 3-B.
8. Section 4.4.1, page 4-11. The plan states that it is assumed that Lake Columbia will be completed by 2020. Page 5B-82 and page 5B-A-121 indicate Lake Columbia completion by 2030. Strategy supply with an online decade of 2020 must be constructed and delivering water by January 5, 2023. Given the Lake Columbia permit status and development timeline of a major reservoir, please revise the online decade of this technically feasible project to a realistic WMSP online timeframe (i.e., 2030) consistently throughout the final, adopted regional water plan. In the event that the adjustment of the timing of a WMS in the plan results in an increase in near-term unmet water needs, please update the related portions of the plan and DB22 accordingly. [TWC § 16.053(h)(10); Contract Exhibit C, Section 5.2]	RWPG Accepted Recommended Change.	Online decade shifted to 2030.
9. Chapter 5. Multiple WMS evaluations state that the implementation decade is 2020 and has a development timeline of 5 years (for example CENT-TOL (page 5-A-150), LNVA-WRR (page 5B-A-161)). Please reevaluate the 5 years reference and clarify that strategies presented as providing supply in 2020 will be constructed and delivering water by January 5, 2023. If necessary, please revise the initial supply decade to represent a more realistic timeframe in the final, adopted regional water plan. [31 TAC § 357.10(21); Contract Exhibit C, Section 5.2]	RWPG Accepted Recommended Change.	Projects shifted to online decade of 2030.
10. Chapter 5. The plan does not appear to include specific goals for gallons of water use per capita per day (GPCD) for municipal WUGs in the planning area for each decade. Please include specific goals by decade for each municipal WUG in the final, adopted regional water plan. This may be a specific GPCD, or ranges of GPCD; may be based on specific municipal WUGs, or groupings of municipal WUGs as determined appropriate by the RWPG. [TWC § 16.053 (e)(11); 31 TAC § 357.34(i)(3)]	RWPG Accepted Recommended Change.	Specific gpcd goals added into Appendix 5C-B.
11. Chapter 5. Please include documentation of why aquifer storage and recovery, seawater desalination, and brackish groundwater desalination were not selected as recommended WMSs in the final, adopted regional water plan. [TWC 16.053(e)(5)(j); Contract Exhibit C, Section 5.2; 31 § TAC 357.34(g)]	RWPG Accepted Recommended Change.	Discussion added in 5A.4.2.
12. Chapter 5 and Appendix 5B. The plan does not clearly state if or how environmental flow needs were taken into account in calculation of yield for the following WMSs: Permit Amendment for Houston County Lake (Strategy ID: HCWC-PA), Neches Run of River Strategies (UNM-LP, UNM-TS, UNM-GW), Angelina Run of River (ANRA- ROR), and Beaumont West Regional Reservoir (LNVA-WRR). Please provide this information in the final, adopted regional water plan. [31 TAC § 358.3(22); 31 TAC § 358.3(23); 31 TAC § 357.34(e)(3)(B)]	RWPG Accepted Recommended Change.	Environmental flows were considered. Language added to clarify.
13. Section 5A.4.2, page 5A-16. The plan presents a screening process for aquifer storage and recovery (ASR) and notes seven entities with significant identified needs, however the plan does not appear to provide a specific assessment of ASR for the entities identified. Please provide the results of the screening process presented in Figure 5A.1 in the final, adopted regional water plan. [TWC § 16.053(e)(10); 31 TAC § 357.34(h)]	RWPG Accepted Recommended Change.	Discussion added in 5A.4.2.
14. Section 5B.3.1., page 5B-82 and Appendix 5B-A. The ANRA-Run of River (submitted application/new application) WMSs are shown as providing supply for various mining needs in the plan however, there does not appear to be technical evaluation presented for this strategy. Please provide a technical evaluation for this strategy in the final, adopted regional water plan. [31 TAC §357.34(f)]	RWPG Accepted Recommended Change.	ANRA-Run of River evaluation added into Appendix 5B-A

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15. Appendix 5A-A, page 5A-A-2 states that conservation will not be considered for steam electric power, livestock, or mining demands. Each of these water user group categories has identified needs and conservation must be considered for each need. Please document more clearly that conservation was considered, as required by rule, for these specific needs in the final, adopted regional water plan. [31 TAC § 357.34(i)(2)]	RWPG Accepted Recommended Change.	Clarifying language added into Appendix 5A-A
16. Appendix 5B-A, page 5B-A-127. The evaluation for ANRA-WTP indicates a supply of zero acre-feet per year, however page 5B-86 indicates the ANRA-WTP WMS will supply up to 22,232 acre-feet per year. Please reconcile this information in the final, adopted regional water plan. [31 TAC § 357.34(d)]	RWPG Accepted Recommended Change.	Clarifying language added into Appendix 5B-A
17. Appendix 5B-A and 5B-B. The plan appears to combine the environmental factors (i.e. environmental water needs, wildlife habitat, cultural resources, and effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico) into the term "Environmental Factors". It is not clear how the overall environmental factor score for quantifying impacts is determined. Please clarify what methodology, formula or other means, is used to calculate the overall environmental factor score in the final, adopted regional water plan. [31 TAC §357.34(e)(3)(B)]	RWPG Accepted Recommended Change.	Clarifying language added into Appendix 5B-B.
18. Appendix 5B-B. It is not clear where recreational impacts are considered in the WMS analysis Evaluation Matrix Rating Criteria. Please clarify whether this factor is analyzed for WMS impacts in the final, adopted regional water plan. [31 TAC § 357.34.(e)(10)]	RWPG Accepted Recommended Change.	Clarifying language added into Appendix 5B-B.
19. Section 6.1.1, page 6-2 describes ratings for "Major Impacts on Key Water Quality Parameters", however these ratings do not appear to match the ratings described in "Evaluation Matrix Rating Criteria" (Appendix 5B-B, page 5B-B-5). Please reconcile these ratings and definitions in the final, adopted regional water plan. [31 TAC § 357.34(e)(8)]	RWPG Accepted Recommended Change.	Ratings revised to be consistent between Appendix 5B-A, 5B-B, and Chapter 6.
20. Section 6.1.2, page 6-2 describes ratings for "Threat to Agricultural Resources/Rural Areas", however these descriptions do not appear to match the ratings described in "Evaluation Matrix Rating Criteria" (Appendix 5B-B, page 5B-B-5). Please reconcile these ratings and definitions in the final, adopted regional water plan. [31 TAC § 357.34(e)(7)]	RWPG Accepted Recommended Change.	Ratings revised to be consistent between Appendix 5B-A, 5B-B, and Chapter 6.
21. Section 6.3, page 6-5. The plan states that there are no unmet needs, municipal or non-municipal, included in the 2021 Plan, however data reported in DB22 shows unmet need of one acre-foot per year in Manufacturing, Jefferson County. Please reconcile this information in the final, adopted regional water plan. [31 TAC § 357.40(c)]	RWPG Accepted Recommended Change.	Section 6.3 revised to discuss unmet needs.
22. Section 7.3, page 7-17. The plan states that TWDB guidance requires existing major water infrastructure facilities to be collected confidentially and separately form the 2021 Plan and does not include a list of existing emergency interconnects. TWDB guidance states that location and detailed facility information should be kept separate from the plan. Please include, at a minimum, a description of the methodology used to collect the information, and the number of existing and potential interconnects including who is connected to who, in the final, adopted regional water plan. [31 TAC § 357.42(d); Contract Exhibit C, Section 7.3]	RWPG Accepted Recommended Change.	Section 7.3 revised to include interconnect information.
23. Section 7.8.1, page 7-49, last sentence. The plan appears to state how the region addressed recommendations the Drought Preparedness Council provided for the 2016 RWP. Please indicate how the region addressed the Drought Preparedness Council's recommendations provided to planning groups on August 1, 2019 and noted in the 2nd bullet of Section 7.8.1. [31 TAC § 357.42(h)]	RWPG Accepted Recommended Change.	Clarifying text added in Chapter 7. Model drought contingency plan for manufacturing added to website.
24. Chapter 7. The plan does not appear to include a discussion of whether drought contingency measures have been recently implemented (for example, since adoption of the last regional water plan) in response to drought conditions. Please include this information in the final, adopted regional water plan [Contract Scope of Work, Task 7, subtask 3]	RWPG Accepted Recommended Change.	Information added to Section 7.2.1.

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25. Section 8.1, Page 8-1, page 8-2, and page 8-6. This section appears to include outdated information, including reference to a draft Texas Parks and Wildlife report, TWDB recommended stakeholder committee, and reference to action taken at the January 2015 Region I meeting. The TPWD ecologically significant stream segment information appears to be in final form on their website. Please confirm status of information referenced and update as appropriate in the final, adopted regional water plan. [31 TAC § 357.43(b)]	RWPG Accepted Recommended Change.	Outdated information updated.
26. Section 10.3. The plan notes that all meetings were held in accordance with the Texas Open Meetings Act but does not discuss compliance with the Texas Public Information Act. Please address how the planning group complied with the Texas Public Information Act in the final adopted regional water plan. [31 TAC §357.21; 31 TAC §357.50(f)]	RWPG Accepted Recommended Change.	Discussion of compliance added.
27. Section 11.1, page 11-1. The plan states that "this is the first year a plan will have water management strategy projects…", however WMS projects were included in the 2016 regional water plan. Please correct this statement in the final, adopted regional water plan [31 TAC § 357.45(a)]	RWPG Accepted Recommended Change.	Statement corrected.
28. Section 11.2.2, page 11-4. The plan appears to include the comparison of drought of record information from the 2016 regional water plan. Please update this information as necessary for the final, adopted regional water plan. [31 TAC § 357.45(c)(2)]	RWPG Accepted Recommended Change.	Information updated.
29. Chapter 11. Please provide a brief summary of how the 2016 Plan differs from the 2021 Plan with regards to recommended and alternative WMS projects in the final, adopted regional water plan. [31 TAC § 357.45(c)(4)]	RWPG Accepted Recommended Change.	Information updated.
30. Appendix 11-A. It appears that the implementation survey in the plan uses the template from the 2016 regional water plan. Please ensure that the template and data used for the implementation survey are based on the survey template and data that the TWDB provided in June 2019 for this current planning cycle. [31 TAC § 357.45(a)]	RWPG Accepted Recommended Change.	Revised to use updated template.
31. Chapter 11. The plan does not appear to indicate the progress of the planning group in encouraging cooperation between water user groups to achieve economies of scale and otherwise incentivize strategies that benefit the entire region. Please include this information in the final, adopted regional water plan. [TWC § 16.053(e)(12)]	RWPG Accepted Recommended Change.	Language added into Section 11.2.6.
32. Appendix ES-A. The plan appears to be missing DB22 report #18, Recommended Water Management Strategies Requiring a New or Amended IBT Permit. Please include a copy of this report in the final, adopted regional water plan. [Contract Scope of Work, Task 10, subtask 11]	Report #18 was included in the IPP on PDF page 103 of Volume II.	-
33. Appendix ES-A. The plan includes some DB22 reports that appear blank due to the region not having relevant data for these reports. Please provide a cover page or note on the DB22 report table of contents indicating the reason for these report contents being blank. [Contract Exhibit C, Section 13.1.2]	RWPG Accepted Recommended Change.	Note will be added on table of contents.
Comments Received: 6/15/2020 **Jessica Pena Zuba (Texas Water Development Board)** **Level 2 Comments, Appendix 10-D**		
1. Page 1-12, Section 1.3.1, fourth paragraph, second sentence. The text states the Gulf Coast Aquifer provides water to all or parts of 10 counties in the ETRWPA however data reports indicate that eight (8) counties within the ETRWPA receive supply from the Gulf Coast Aquifer. Please consider revising as appropriate in the final plan.	RWPG Accepted Recommended Change.	Text revised.
2. Section 1.3.1. Please consider adding a reference source for the average total pumping values presented for each aquifer in the region.	RWPG Accepted Recommended Change.	Reference added.
3. Page 1-17, last full paragraph, first sentence. The sentence states that the ETRWPA encompasses GMAs 11 and 14. Please consider updating the text to state that the ETRWPA includes portions of GMAs 11 and 14.	RWPG Accepted Recommended Change.	Text revised.
4. Page 3-1, third paragraph and page 3-5, Figure 3.4. The text on page 3-1 says "approximately 11% of the total freshwater supply is groundwater"; however, Figure 3.4 shows that approximately 12% of the freshwater supply is groundwater. Please consider revising the text or figure accordingly.	RWPG Accepted Recommended Change.	Text revised.

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5. Page 3-5. The text says "slightly more than 549,000 ac-ft per year, however, it should say "slightly less than 549,000 ac-ft" based on the values presented in Table 3.1. Please consider revising the text in the final plan.	RWPG Accepted Recommended Change.	Text revised.
6. Page 3-18, Figure 3.5, and page 1-18, Figure 1.9, and Section 1.3.1, page 1-16. Deep East Texas Groundwater Conservation District (GCD) and Anderson County GCD are included in the Figure 3.5. Please exclude these GCDs from the figure as these GCDs no longer exist.	RWPG Accepted Recommended Change.	Figure revised.
7. Page 3-19, 1st paragraph. Please consider correcting the reference "Error!Reference source not found" in the final plan.	No change necessary.	-
8. Page 3-24, Table 3.10. The first sentence states that Table 3.10 presents the total MAG volumes by aquifer for planning years 2020 through 2070, however Table 3.10 only includes the volumes for the year 2020. Please consider adjusting the text or table so they agree.	RWPG Accepted Recommended Change.	Table revised.
9. Page 3-24, Table 3.10. The first column is named "Region," but the cells below are filled with the word "Total." Please consider correcting the cells with the word "Total" to either "Northern" or "Southern" as best fits the region.	RWPG Accepted Recommended Change.	Table revised.
10. Chapter 3, page 3-9. Please consider revising the title for Section 3.1.4 to "Reservoir Water Availability".	RWPG Accepted Recommended Change.	Title revised.
11. In Appendix 3-B last sentence in first paragraph references Appendix 3-D. This appears to be a typo. Please correct the typographical error in the final plan.	RWPG Accepted Recommended Change.	Text revised.
12. In Appendix 3-B, the last sentence in the first paragraph references Appendix 3-D. This appears to be a typo. Please correct the typographical error in the final plan.	RWPG Accepted Recommended Change.	Text revised.
13. Chapter 5B, page 5B-54 includes conservation strategies for New London in the last two tables, yet the table on page 5B-55 states "none" for New London's recommended WMSs. Please reconcile the tables in the final water plan	RWPG Accepted Recommended Change.	5B-55 revised.
14. Please consider reconciling the following statements which appear contradictory: a) Appendix 5B-A-181 has the statement: "Based on current contracts and the available supplies from the Neches Basin WAM, the UNRMWA shows a small shortage during the planning period for Lake Palestine supplies. UNRMWA does not think the shortages to be real as the shortage is primarily associated with the reduced firm yield of Lake Palestine due to projected sediment accumulation in the lake. UNRMWA believes that the storage-area-elevation curves used in the Water Availability Models are severely under-predicting the storage volumes available in various parts of the lake. Therefore, UNRMWA believes that the lake yield is much larger than what is projected by the Water Availability Models." b) Appendix 5B-A-178 has the statement: "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."	RWPG Accepted Recommended Change.	Text revised.
15. Section 5.B.3.16, page 5B-123. Please consider including a discussion of the basis for why the UNRMWA "believes" that the WAMs "underpredict the storage volumes available in various parts of the lake".	RWPG Accepted Recommended Change.	Clarifying statement added
16. Appendix 5A-A, page 5A-A-2 states that 140 GPCD is the TWDB recommended goal for municipal users. Please correct this statement, which is a recommendation by the Texas Water Conservation Implementation Task Force, not a TWDB recommendation.	RWPG Accepted Recommended Change.	Text revised.
17. Alternating page numbers in Appendix 5B-A are "Appendix4-A" and "Appendix 5B- A". Please consider revising in the final plan.	RWPG Accepted Recommended Change.	Text revised.
18. Appendix 5B-A, page 5B-A-1, 2nd paragraph references the Exhibit C, First Amended General Guidelines for Regional Water Planning Development – October 2012. Please update this reference to the current version of Exhibit C under contract: Exhibit C, Second Amended General Guidelines for Fifth Cycle of Regional Water Plan Development – April 2018.	RWPG Accepted Recommended Change.	Text revised.

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19. Appendix 5B-A, page 5B-A-7 states that the plan used the Texas Water Development Board Water Availability Models. Water Availability Models are maintained by the Texas Commission on Environmental Quality. Please consider correcting this information in the final plan.	RWPG Accepted Recommended Change.	Text revised.
20. Appendix 6-A. Please consider updating the Texas Administrative Code matrix to reflect updated rule references, based on amendments to 31 TAC Chapter 357 adopted by the TWDB Board on June 4, 2020.	RWPG Accepted Recommended Change.	Matrix updated in Appendix 6-A.
21. Chapter 8, Section 8.1, Page 8-1, 4th paragraph contains a footnote reference that does not appear until page 8-15 and appears to be an incorrect reference to the footnoted material. Please consider revising in the final plan.	No change. The "footnote" on Page 8-1 is actually a citation for a reference	-
22. The GIS files submitted for WMS projects do not include the minimum required metadata. Please include at a minimum, metadata about the data's projection, with the final GIS data submitted. [Contract Exhibit D, Section 2.4.1]	RWPG Accepted Recommended Change.	Metadata will be submitted.
Comments Received: 6/18/2020 **Barry Mahler and Rex Isom (Texas Soil and Water Conservation Board)**		
1. Page 1-2, Table 1.1 East Texas Regional Water Planning Group Members, Non-Voting Members. Please include Texas State Soil and Water Conservation Board and Rusty Ray	RWPG Accepted Recommended Change.	Table 1.1 updated.