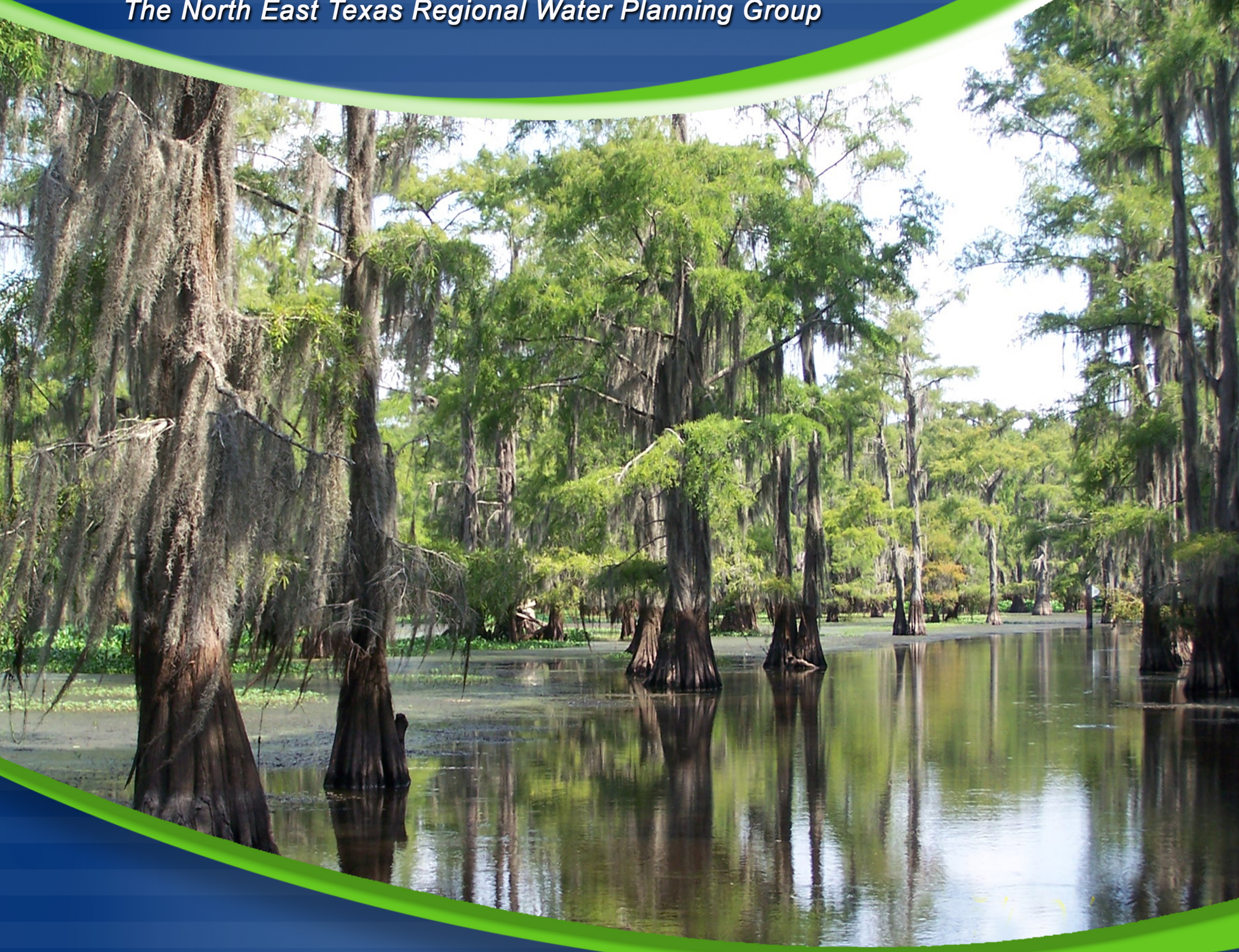
2016 REGION D WATER PLAN VOLUME II: APPENDICES

Prepared for
The North East Texas Regional Water Planning Group



RPS

HAYES ENGINEERING, INC
TEXAS REGISTERED ENGINEERING FIRM F-1465

LBG GUYTON

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APPENDIX ES

Executive Summary Tables

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APPENDIX ES

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Table ES.1 Population and Water Demand Projections for the North East Texas Region by WUG Category

Total Regional Projection	2020	2030	2040	2050	2060	2070
Population	**831,469**	**907,531**	**988,859**	**1,089,197**	**1,211,979**	**1,370,438**
Water Demand (ac-ft)						
Municipal	134,310	142,631	152,536	166,385	184,540	208,132
Manufacturing	332,070	355,072	377,273	396,249	425,638	457,217
Irrigation	40,866	40,737	40,442	39,913	39,413	39,138
Steam Electric	96,574	112,905	132,815	157,084	186,668	222,648
Mining	7,115	7,748	7,670	7,280	6,914	6,795
Livestock	23,237	23,281	23,220	23,116	23,036	23,042
Total Water Demand (ac-ft)	**634,172**	**682,374**	**733,956**	**790,027**	**866,209**	**956,972**

Table ES.2 Water Supply by WUG Category

WUG Category	2020	2030	2040	2050	2060	2070
Municipal	226,768	236,834	236,668	240,722	244,142	246,589
Manufacturing	319,475	314,897	310,403	312,260	321,933	284,400
Irrigation	12,761	12,722	12,671	12,623	12,578	12,472
Steam Electric	78,774	78,389	78,073	77,741	78,165	78,967
Mining	11,145	11,678	12,175	12,694	12,697	12,541
Livestock	26,044	26,119	26,091	26,024	25,909	25,885
Total	**674,967**	**680,639**	**676,081**	**682,064**	**695,424**	**660,854**

Table ES.3 Water Needs by WUG Category

WUG Category	2020	2030	2040	2050	2060	2070
Municipal	22,341	25,306	29,850	32,424	39,003	51,390
Manufacturing	61,557	72,166	87,466	100,894	120,136	175,740
Irrigation	30,763	30,696	30,479	30,021	29,589	29,402
Steam Electric	32,643	45,291	64,237	88,459	117,157	152,800
Mining	2,888	3,265	2,935	2,274	1,700	1,363
Livestock	0	0	0	0	0	0
Total	**150,192**	**176,724**	**214,967**	**254,072**	**307,585**	**410,695**

Table ES.4 Second Tier Identified Water Needs by WUG Category

WUG Category	2020	2030	2040	2050	2060	2070
Municipal	15,910	18,596	22,968	25,592	32,162	44,523
Manufacturing	50,591	59,050	67,506	75,013	91,243	141,905
Irrigation	30,763	30,696	30,479	30,021	29,589	29,402
Steam Electric	25,195	37,893	55,096	79,471	108,119	140,739
Mining	2,888	3,265	2,935	2,274	1,700	1,363
Livestock	0	0	0	0	0	0
Total	**125,347**	**149,500**	**178,984**	**212,371**	**262,813**	**357,932**

Table ES.5 Source Water Balance

TYPE		2020	2030	2040	2050	2060	2070
Groundwater	Total Available	288,083	287,261	286,526	285,896	285,111	285,111
	Current Supply	94,563	96,427	97,991	99,296	99,632	100,007
	% Utilized	33%	34%	34%	35%	35%	35%
Reuse	Total Available	83,965	78,682	73,509	74,909	83,926	77,843
	Current Supply	83,854	78,568	71,964	73,325	82,304	74,649
	% Utilized	100%	100%	98%	98%	98%	96%
Surface Water	Total Available	1,283,365	1,246,460	1,207,676	1,168,889	1,127,733	1,079,376
	Current Supply	1,044,568	1,038,462	1,029,353	1,023,590	1,017,599	977,540
	% Utilized	81%	83%	85%	88%	90%	91%
TOTAL	TOTAL AVAILABLE	1,655,413	1,612,403	1,567,711	1,529,694	1,496,770	1,442,330
	CURRENT SUPPLY	1,222,985	1,213,457	1,199,308	1,196,211	1,199,535	1,152,196
	% Utilized	74%	75%	77%	78%	80%	80%

Table ES.6 Unmet Needs by Category

WUG Category	2020	2030	2040	2050	2060	2070
Municipal	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	86,355
Irrigation	4,376	4,313	4,260	4,208	4,155	4,125
Steam Electric	4,637	6,790	7,610	10,889	14,649	16,152
Mining	227	283	360	444	533	639
Livestock	0	0	0	0	0	0
Total	**9,240**	**11,386**	**12,230**	**15,541**	**19,337**	**107,271**

County	Entity	Strategy	Total Capital Cost	Total Annual Cost	Projected Deficit (-) / Recommendation (ac-ft/yr) by Year 2020	2030	2040	2050	2060	2070
BOWIE	DE KALB	RENEW EXISTING CONTRACT	$ -	$ 74,000	304	303	299	298	297	297
BOWIE	HOOKS	RENEW EXISTING CONTRACT	$ -	$ 64,000	265	258	249	244	243	243
BOWIE	IRRIGATION BOWIE	DRILL NEW WELLS	$ 2,021,000	$ 2,053,000	3,700	3,700	3,638	3,483	3,338	3,276
BOWIE	IRRIGATION BOWIE	DRILL NEW WELLS	$ 1,466,000	$ 923,000	1,540	1,525	1,441	1,193	1,000	1,000
BOWIE	IRRIGATION BOWIE	VOLUNTARY REALLOCATION BOWIE COUNTY OTHER TO IRRIGATION	$ -	$ -	0	15	0	0	0	0
BOWIE	MACEDONIA-EYLAU MUD #1	RENEW EXISTING CONTRACT	$ -	$ 278,000	565	574	577	577	577	577
BOWIE	MAUD	RENEW EXISTING CONTRACT	$ -	$ 41,000	170	169	167	165	164	164
BOWIE	NASH	RENEW EXISTING CONTRACT	$ -	$ 52,000	206	212	214	214	214	214
BOWIE	NEW BOSTON	RENEW EXISTING CONTRACT	$ -	$ 268,000	1,098	1,104	1,094	1,091	1,089	1,089
BOWIE	REDWATER	RENEW EXISTING CONTRACT	$ -	$ 20,000	82	82	79	77	77	77
BOWIE	TEXAMERICAS CENTER	RENEW EXISTING CONTRACT	$ -	$ 256,000	514	527	530	530	530	530
BOWIE	TEXARKANA	ADVANCED WATER CONSERVATION	$ -	$ 4,037,000	6,403	6,664	6,815	6,742	6,729	6,728
BOWIE	TEXARKANA	DREDGE WRIGHT PATMAN	$ 205,862,000	$ 17,226,000					2,000	18,000
BOWIE	TEXARKANA	RIVERBEND STRATEGY	$ 117,116,000	$ 16,386,000	6,368	6,664	6,815	6,742	6,729	6,728
BOWIE	WAKE VILLAGE	RENEW EXISTING CONTRACT	$ -	$ 164,000	677	669	654	644	642	642
CAMP	BI COUNTY WSC	DRILL NEW WELLS	$ 2,493,000	$ 254,000	0	0	0	0	161	269
CASS	MANUFACTURING CASS	INCREASE EXISTING CONTRACT			0	0	0	0	16,000	47,990
CASS	MANUFACTURING CASS	DRILL NEW WELLS	$ 894,000	$ 164,000	151	151	151	151	151	151
CASS	MANUFACTURING CASS	ADVANCED WATER CONSERVATION	$ -	$ -	11,508	12,123	12,711	13,219	14,116	15,073
GREGG	MINING GREGG	DRILL NEW WELLS	$ 377,000	$ 37,000	54	54	54	54	54	54
GREGG	MINING GREGG	DRILL NEW WELLS	$ 1,566,000	$ 144,000	226	339	339	339	339	339
HARRISON	IRRIGATION HARRISON	DRILL NEW WELLS	$ 1,092,000	$ 102,000	236	236	236	236	236	236
HARRISON	IRRIGATION HARRISON	DRILL NEW WELLS	$ 377,000	$ 37,000	54	54	54	54	54	54
HARRISON	MANUFACTURING HARRISON	ADVANCED WATER CONSERVATION	$ -	$ -	9,501	10,408	11,316	12,108	13,038	14,039
HARRISON	MANUFACTURING HARRISON	TOLEDO BEND INTAKE AND RAW WATER PIPELINE	$ 498,773,000	$ 53,051,000	50,000	55,000	65,000	70,000	80,000	0
HARRISON	MANUFACTURING HARRISON	UNMET NEED			0	0	0	0	0	86,355
HARRISON	MARSHALL	INCREASE EXISTING CONTRACT	$ 4,738,000	$ 1,088,000	0	0	0	0	41	701
HARRISON	MINING HARRISON	DRILL NEW WELLS	$ 1,438,000	$ 134,000	324	324	324	324	108	0
HARRISON	MINING HARRISON	DRILL NEW WELLS	$ 5,994,000	$ 578,000	1,398	1,398	1,398	1,398	1,398	1,398
HARRISON	STEAM ELECTRIC POWER HARRISON	TOLEDO BEND INTAKE AND RAW WATER PIPELINE	$ 498,773,000	$ 53,051,000	2,000	6,000	10,000	15,000	21,000	47,000
HARRISON	WASKOM	DRILL NEW WELLS	$ 1,495,000	$ 161,000	46	46	46	92	138	184
HOPKINS	BRINKER WSC	INCREASE EXISTING CONTRACT	$ -	$ 74,100	0	0	0	0	29	63
HOPKINS	CUMBY	DRILL NEW WELLS	$ 772,000	$ 128,000	0	79	78	76	75	73
HOPKINS	CUMBY	DRILL NEW WELLS	SEE ABOVE	SEE ABOVE	0	1	2	4	5	7
HOPKINS	IRRIGATION HOPKINS	DRILL NEW WELLS	$ 33,000	$ 140,000	210	210	210	210	210	210
HOPKINS	IRRIGATION HOPKINS	DRILL NEW WELLS	$ 681,000	$ 374,000	610	610	610	610	610	610
HOPKINS	IRRIGATION HOPKINS	SULPHUR SPRINGS RAW WATER PIPELINE	$ 4,758,000	$ 2,132,000	1,306	1,306	1,306	1,306	1,306	1,306
HOPKINS	MARTIN SPRINGS WSC	DRILL NEW WELLS	$ 1,184,000	$ 184,000	0	0	0	0	60	120
HOPKINS	MINING HOPKINS	UNMET NEED			320	320	440	540	540	640
HUNT	ABLES SPRINGS WSC	ADVANCED WATER CONSERVATION	REGION C COSTING		2	4	3	6	9	15
HUNT	ABLES SPRINGS WSC	INCREASE EXISTING CONTRACT	REGION C COSTING		86	184	278	391	544	756
HUNT	BLACKLAND WSC	ADVANCED WATER CONSERVATION	REGION C COSTING		12	19	22	26	31	36
HUNT	BLACKLAND WSC	DIRECT CONNECTION AND ADDITIONAL WATER	REGION C COSTING		48	153	204	246	296	356
HUNT	CADDO BASIN SUD	ADVANCED WATER CONSERVATION	REGION C COSTING		2	3	4	7	10	14
HUNT	CADDO BASIN SUD	NEW CONTRACT	$ -	$ 1,357,000	75	282	462	609	613	570
HUNT	CADDO BASIN SUD	NEW CONTRACT	SEE ABOVE	SEE ABOVE	0	0	0	77	409	967
HUNT	CADDO MILLS	INCREASE EXISTING CONTRACT	$ -	$ 225,000	0	1	36	68	108	255
HUNT	CELESTE	DRILL NEW WELLS	$ 2,368,000	$ 324,000	0	0	0	102	102	204

County	Entity	Strategy	Total Capital Cost	Total Annual Cost	Projected Deficit (-) / Recommendation (ac-ft/yr) by Year					
					2020	2030	2040	2050	2060	2070
HUNT	COMMERCE WD	VOLUNTARY REALLOCATION OF HUNT MANUFACTURING SUPPLY FROM TAWAKONI TO NORTH HUNT SUD	$ -	$ -	0	36	134	268	338	388
HUNT	COUNTY-OTHER HUNT	DRILL NEW WELLS	$ 9,582,000	$ 2,203,000	0	600	1,200	1,800	2,385	2,387
HUNT	COUNTY-OTHER HUNT	POETRY WSC INCREASE CONTRACT	$ -	$ 1,150,000	0	0	670	670	670	551
HUNT	COUNTY-OTHER HUNT	POETRY WSC INCREASE CONTRACT	$ -	$ 1,794,000	0	0	0	0	1,045	628
HUNT	COUNTY-OTHER HUNT	GREENVILLE TIE-IN PIPELINE	$ 25,670,000	$ 6,000,000	0	0	0	0	0	3,990
HUNT	GREENVILLE	VOLUNTARY REALLOCATION OF HUNT MANUFACTURING SURPLUS	$ -	$ -	484	546	613	677	721	825
HUNT	GREENVILLE	WTP EXPANSION	$ 36,074,000	$ 5,601,000	3,224	6,351	6,550	4,650	3,046	2,942
HUNT	GREENVILLE	CHAPMAN RAW WATER PIPELINE AND NEW WTP	$ 193,438,000	$ 28,159,000	0	0	0	10,223	9,891	9,333
HUNT	GREENVILLE	TOLEDO BEND TIE-IN PIPELINE	$ 42,470,000	$ 5,171,000	0	0	0	0	0	5,100
HUNT	HICKORY CREEK SUD	DRILL NEW WELLS	$ 4,597,000	$ 702,000	0	0	0	189	378	463
HUNT	HICKORY CREEK SUD	DRILL NEW WELLS	$ 9,190,000	$ 1,500,000	0	0	189	378	567	1,138
HUNT	IRRIGATION HUNT	DRILL NEW WELLS	$ 282,000	$ 108,000	150	150	150	150	146	146
HUNT	JOSEPHINE	ADVANCED WATER CONSERVATION	REGION C COSTING		2	4	5	9	11	13
HUNT	JOSEPHINE	INCREASE EXISTING CONTRACT	REGION C COSTING		38	121	201	286	311	339
HUNT	LONE OAK	INCREASE EXISTING CONTRACT	$ -	$ 96,000	0	0	0	0	0	56
HUNT	MINING HUNT	DRILL NEW WELLS	$ 254,000	$ 68,000	75	75	75	75	7	0
HUNT	NORTH HUNT SUD	INCREASE EXISTING CONTRACT	$ -	$ -	0	36	134	268	338	388
HUNT	NORTH HUNT SUD	DELTA COUNTY PIPELINE	$ 1,774,000	$ 495,000	0	0	0	0	122	350
HUNT	ROYSE CITY	ADVANCED WATER CONSERVATION	REGION C COSTING		4	12	20	26	40	61
HUNT	SABINE RIVER AUTHORITY	SRA VOLUNTARY REALLOCATION WEST TAWAKONI SURPLUS TO POETRY WSC	$ -	$ -	0	0	670	670	670	551
HUNT	SABINE RIVER AUTHORITY	VOLUNTARY REALLOCATION COMBINED CONSUMERS SUD SURPLUS PURCHASE FROM SRA TO POETRY WSC	$ -	$ -	0	0	0	0	1,045	628
HUNT	STEAM ELECTRIC POWER HUNT	ADVANCED WATER CONSERVATION	$ -	$ -	7,448	7,398	9,141	8,988	9,038	12,061
HUNT	STEAM ELECTRIC POWER HUNT	UNMET NEED			4,637	6,790	7,610	10,889	14,649	16,152
HUNT	WOLFE CITY	DRILL NEW WELLS	$ 3,889,000	$ 465,000	0	0	0	81	192	271
LAMAR	COUNTY-OTHER LAMAR	INCREASE EXISTING CONTRACT	$ -	$ 189,000	116	116	116	116	116	116
LAMAR	IRRIGATION LAMAR	PAT MAYSE RAW WATER PIPELINE	$ 7,875,000	$ 5,364,000	18,312	18,308	18,305	18,302	18,299	18,302
LAMAR	MANUFACTURING LAMAR	ADVANCED WATER CONSERVATION	$ -	$ -	565	592	620	642	685	834
LAMAR	MANUFACTURING LAMAR	DRILL NEW WELLS	$ 76,000	$ 68,000	0	0	0	0	0	120
LAMAR	STEAM ELECTRIC LAMAR	INCREASE EXISTING CONTRACT	$ -	$ 1,722,000	0	1,415	2,733	4,870	7,474	10,568
MARION	MINING MARION	DRILL NEW WELLS	$ 3,108,000	$ 294,000	432	648	648	648	648	648
MORRIS	MANUFACTURING MORRIS	ADVANCED WATER CONSERVATION			9,593	10,210	10,780	11,242	12,129	13,087
MORRIS	TRI SUD	RENEW AND INCREASE EXISTING CONTRACT	SEE TITUS COUNTY	SEE TITUS COUNTY	164	161	160	163	166	170
RED RIVER	CLARKSVILLE	BLEND GROUNDWATER WITH SURFACE WATER	$ -	$ -	0	0	371	371	371	371
RED RIVER	CLARKSVILLE	CONTRACT WITH TEXARKANA AND TREATED WATER PIPELINE TO DEKALB	$ 10,053,000	$ 1,178,000	0	0	303	303	303	303
RED RIVER	COUNTY-OTHER	RENEW EXISTING CONTRACT	$ -	$ 89,000	94	144	185	230	274	318
RED RIVER	IRRIGATION RED RIVER	UNMET NEED			0	0	0	0	0	0
RED RIVER	MANUFACTURING RED RIVER	DRILL NEW WELLS	$ 136,000	$ 22,000	0	0	20	20	20	20
SMITH	CRYSTAL SYSTEMS INC	DRILL NEW WELLS	$ 6,605,000	$ 814,000	644	644	966	1,610	1,610	1,936
SMITH	HIDEAWAY	INCREASE EXISTING CONTRACT	$ -	$ 152,000	0	0	0	0	0	117
SMITH	LINDALE	DRILL NEW WELLS	$ 4,012,000	$ 769,000	966	1,288	1,610	1,932	2,576	2,898
SMITH	MANUFACTURING SMITH	INCREASE EXISTING CONTRACT	REGION I COSTING		300	327	354	377	408	442
SMITH	MINING SMITH	DRILL NEW WELLS	$ 607,000	$ 57,000	0	0	0	0	108	108

County	Entity	Strategy	Total Capital Cost	Total Annual Cost	Projected Deficit (-) / Recommendation (ac-ft/yr) by Year 2020	2030	2040	2050	2060	2070
SMITH	OVERTON	ADVANCED WATER CONSERVATION	$ -	$ -	17	18	21	23	27	31
SMITH	WINONA	DRILL NEW WELLS	$ 755,000	$ 88,000	0	0	0	108	108	108
TITUS	MANUFACTURING TITUS	ADVANCED WATER CONSERVATION	$ -	$ -	900	932	962	986	1,054	1,126
TITUS	MANUFACTURING TITUS	DRILL NEW WELLS	$ 113,000	$ 37,000	45	45	45	45	45	45
TITUS	MANUFACTURING TITUS	INCREASE EXISTING CONTRACT	$ -	$ 3,338,000	2,658	2,742	2,826	3,027	3,634	4,269
TITUS	NETMWD	VOLUNTARY REALLOCATION OF HARRISON STEAM ELECTRIC	$ -	$ -	0	0	0	0	0	18,000
TITUS	NETMWD	VOLUNTARY REALLOCATION OF MARION STEAM ELECTRIC	$ -	$ -	0	0	0	0	0	1,592
TITUS	STEAM ELECTRIC POWER TITUS	INCREASE EXISTING CONTRACT	$ -	$ 2,494,000	24,942	24,826	24,712	24,487	23,812	22,592
TITUS	STEAM ELECTRIC POWER TITUS	INCREASE EXISTING CONTRACT	$ -	$ 989,000	0	9,849	9,890	9,846	9,698	9,802
TITUS	STEAM ELECTRIC POWER TITUS	INCREASE EXISTING CONTRACT	$ -	$ 4,107,000	0	0	41,069	40,569	40,028	38,868
TITUS	STEAM ELECTRIC POWER TITUS	INCREASE EXISTING CONTRACT	$ -	$ 1,800,000	0	0	0	0	0	18,000
TITUS	STEAM ELECTRIC POWER TITUS	INCREASE EXISTING CONTRACT	$ -	$ 159,000	0	0	0	0	0	2,293
TITUS	TRI SUD	RENEW AND INCREASE EXISTING CONTRACT	$ -	$ 1,876,000	918	1,000	1,091	1,202	1,329	1,466
TITUS	TRI SUD	RENEW AND INCREASE EXISTING CONTRACT	SEE ABOVE	SEE ABOVE	478	520	568	626	692	763
UPSHUR	BI COUNTY WSC	DRILL NEW WELLS	SEE CAMP COUNTY	SEE CAMP CO	0	0	0	0	54	54
UPSHUR	GILMER	DRILL NEW WELLS	$ 1,075,000	$ 131,000	0	269	269	269	269	269
UPSHUR	MANUFACTURING UPSHUR	DRILL NEW WELLS	$ 2,785,000	$ 258,000	324	324	324	324	430	430
UPSHUR	MINING UPSHUR	DRILL NEW WELLS	$ 6,760,000	$ 637,000	430	860	860	860	860	860
VAN ZANDT	ABLES SPRINGS WSC	ADVANCED WATER CONSERVATION	SEE HUNT COUNTY	SEE HUNT COUNTY	1	0	2	2	3	2
VAN ZANDT	CANTON	DRILL NEW WELLS	$ 863,000	$ 154,000	100	100	100	100	100	100
VAN ZANDT	CANTON	INDIRECT REUSE	$ 6,803,000	$ 667,000	323	323	323	323	323	323
VAN ZANDT	IRRIGATION VAN ZANDT	DRILL NEW WELLS	$ 227,000	$ 188,000	330	330	330	330	330	330
VAN ZANDT	MANUFACTURING VAN ZANDT	DRILL NEW WELLS	$ 734,000	$ 220,000	194	194	194	290	290	290
VAN ZANDT	R-P-M WSC	ADVANCED WATER CONSERVATION	REGION I COSTING		1	6	10	15	19	23
VAN ZANDT	R-P-M WSC	DRILL NEW WELLS	$ 1,244,000	$ 184,000	75	150	150	225	285	285

STRATEGY ALTERNATIVE RECOMMENDATION SUMMARY

					Water Supply Volume (ac-ft/yr) by Year					
County	Entity	Strategy	Total Capital Cost	Total Annual Cost	2020	2030	2040	2050	2060	2070
BOWIE	TEXAMERICAS CENTER	NEW RAW WATER INTAKE RAW WATER PIPELINE	$ 42,178,000	$ 8,145,000	514	527	530	530	530	530
HOPKINS	BRINKER WSC	DRILL NEW WELLS	$ 344,000	$ 79,000	0	0	0	0	65	65
HOPKINS	IRRIGATION HOPKINS	DRILL NEW WELLS	$ 372,000	$ 216,000	354	354	354	354	354	354
HOPKINS	IRRIGATION HOPKINS	DRILL NEW WELLS	$ 817,000	$ 436,000	709	709	709	709	709	709
HOPKINS	IRRIGATION HOPKINS	DRILL NEW WELLS	$ 2,064,000	$ 755,000	1,063	1,063	1,063	1,063	1,063	1,063
HUNT	GREENVILLE	CHAPMAN RAW WATER PIPELINE AND NEW WTP	$ 193,438,000	$ 28,159,000	10,750	10,750	10,750	10,750	10,750	10,750
HUNT	GREENVILLE	TOLEDO BEND TIE-IN PIPELINE	$ 78,477,000	$ 12,550,000	0	0	0	2,410	10,043	21,230
HUNT	NORTH HUNT SUD	DRILL NEW WELLS	$ 4,867,000	$ 646,000	0	0	0	0	131	394
HUNT	STEAM ELECTRIC POWER HUNT	INCREASE EXISTING CONTRACT	$ -	$ 3,683,000	4,637	6,790	7,610	10,889	14,649	16,152
RED RIVER	CLARKSVILLE	DIMPLE RESERVOIR	$ 33,906,000	$ 2,545,000	0	0	303	303	303	303
RED RIVER	CLARKSVILLE	DRILL NEW WELLS AND RO TREATEMENT	$ 7,878,000	$ 1,457,000	0	0	388	388	388	388
RED RIVER	CLARKSVILLE	PAT MAYSE TREATED WATER PIPELINE TO DEROIT AND CONTRACT	$ 10,506,000	$ 1,513,000	0	0	303	303	303	303
RED RIVER	IRRIGATION RED RIVER	DRILL NEW WELLS	$ 1,227,000	$ 668,000	1,106	1,106	1,106	1,106	1,106	1,106
RED RIVER	IRRIGATION RED RIVER	DRILL NEW WELLS	$ 2,293,000	$ 1,240,000	2,057	2,057	2,057	2,057	2,057	2,057
RED RIVER	IRRIGATION RED RIVER	UNMET NEED			1,213	1,150	1,097	1,045	992	962
TITUS	MANUFACTURING TITUS	DRILL NEW WELLS	$ 571,000	$ 310,000	500	500	500	500	500	500
TITUS	MANUFACTURING TITUS	INCREASE EXISTING CONTRACT	$ -	$ 3,338,000	2,658	2,742	2,826	3,027	3,634	4,269
VAN ZANDT	CANTON	GRAND SALINE RESERVOIR	$ 45,373,000	$ 5,588,000	1,810	1,810	1,810	1,810	1,810	1,810
VAN ZANDT	IRRIGATION VAN ZANDT	DRILL NEW WELLS	$ 376,000	$ 211,000	330	330	330	330	330	330
VAN ZANDT	R-P-M WSC	DRILL NEW WELLS	$ 824,000	$ 240,000	75	150	150	225	285	285

APPENDIX A

Region D Water Loss Audit Data

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APPENDIX A: 2010 Summary of Water Loss Audit Data by Gallons and Percentage for the North East Texas Region

<table>
<tr><td rowspan="9">Region D
103 Audits Submitted</td><td rowspan="9">System Input Volume
34,026,601,411</td><td rowspan="4">Authorized Consumption
29,397,406,362
86.4%</td><td rowspan="2">Billed Consumption
27,452,570,181
80.7%</td><td>Billed Metered
27,450,331,836
80.7%</td><td rowspan="2">Revenue Water
27,452,570,181
80.7%</td></tr>
<tr><td>Billed Unmetered
2,238,345
0.0%</td></tr>
<tr><td rowspan="2">Unbilled Consumption
1,944,836,181
5.7%</td><td>Unbilled Metered
1,178,626,895
3.5%</td><td rowspan="7">Non-revenue Water
6,581,147,240
19.3%</td></tr>
<tr><td>Unbilled Unmetered
766,209,286
2.3%</td></tr>
<tr><td rowspan="5">Water Loss
4,645,118,199
13.7%</td><td rowspan="3">Apparent Loss
941,755,483
2.8%</td><td>Unauthorized Consumption
79,368,604
0.2%</td></tr>
<tr><td>Customer Meter Accuracy Loss
855,076,896
2.5%</td></tr>
<tr><td>Systematic Data Handling Discrepency
7,356,468
0.0%</td></tr>
<tr><td rowspan="2">Real Loss
3,708,075,298
10.9%</td><td>Reported Breaks and Leaks
750,563,832
2.2%</td></tr>
<tr><td>Unreported Loss
2,967,237,621
8.7%</td></tr>
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APPENDIX B

2011 Evaluation of Sub-Regional Water Supply Master Plans

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2011 Evaluation of Sub-Regional Water Supply Master Plans Prepared for North East Texas Regional Water Planning Group

In June 2007, the Texas Water Development Board (TWDB) commissioned the Northeast Municipal Water District (NETMWD) to provide a further study of sub-regional water supply master plans in Region D, the North East Texas Region, that was initiated in the 2006 Regional Plan. This report was published under separate cover December 17, 2008 and is not reproduced in this appendix.

Texas is projected to more than double in population in the next 50 years. This growth will increase the vulnerability of our water supplies and lead to a significant decline in quality of life if adequate planning is not undertaken. The investigation of the creation of sub-regional water supply master plans was to allow the smaller systems to consider the economic benefits, regulatory compliance benefits and the ability to better serve their end users with adequate water availability.

The 2006 North East Texas Regional Water Plan (NETRWP) identified 255 public water systems in the region. As the plan developed, it became apparent that many of these were quite small, and that in several cases, a number of small systems were located in close proximity to each other. The North East Texas Regional Water Planning Group (NETRWPG) expressed that very small systems may lack the financial, managerial, or technical capacity to continue as separate, viable entities over the long term. In 2004, the NETRWPG requested funding from the TWDB to study the possibility of combining identified clusters of small public supply systems, and, in 2005, the TWDB approved the request.

A total of 51 existing public water supply systems were selected for inclusion in the study, and they were combined into 10 clusters based upon proximity. These clusters were in six of the most southerly counties in the region – Hopkins County, Rains County, Van Zandt County, Harrison County, Upshur County and Smith County. The final clusters varied in size from 1,252 connections to 4,167 connections, with the goal being to have 2,000 more connections. A total of 25,544 connections were included.

This initial work was presented in a volume entitled "Supplemental Tasks" as a part of the 2006 Regional Plan. Physical data on the systems was tabulated, discussion of financial/managerial/technical and political/legal aspects were presented, and rough cost estimates for physical consolidation were presented. The conclusion of the 2006 work was that:

> "ultimately, for very small systems, consolidation will become essential to survival. Increasing regulatory compliance pressures, increasing costs, and limits on water supply are all growing influences which will compel consolidation."

As a portion of the 2011 planning, the NETRWPG elected to pursue further discussions with the entities identified as potential clusters in the 2006 plan. A second emphasis would expand the scope to include additional very small systems not included in 2006. The 2006 selection was limited to small systems which, by virtue of geographic proximity, might combine with neighboring small systems to create a larger, more viable entity. In the 2011 scope, an additional 93 systems with less than 300 meters were identified which were not positioned geographically so as to suggest consolidation with other small systems. In general, these small entities are adjacent to, or surrounded by, a much larger system which would be the most logical partner.

Based upon the information gathered in the study, the following observations were proferred:

1. At the end of the 2006 planning period, 144 systems (93 small and 51 clusters) were identified. By the end of 2008, only 95 of these are still independent, stand-alone systems. The remaining systems have either merged with another small system, have been purchased by a larger for profit or governmental system, or were a proposed system which had not developed. No new systems were identified in these cluster areas.

2. In general, systems desire to remain completely autonomous. Smaller systems do recognize, however, that there are some advantages in working together, and are occasionally willing to do so – for example, shared management or operating staff, or specific programs – provided that each Board retains final approval authority. A merger or consolidation which results in loss of autonomy is the least preferred option.

3. There is a need for regionalization in northern Van Zandt County. It appears that adequate groundwater resources are becoming increasingly difficult to develop, and a contracted or surface water supply alternative will be too expensive for the smaller entities to pursue individually. The City of Canton has conducted some work in this regard, but the NETRWPG may be of assistance in encouraging regional partnerships among the various local entities.

APPENDIX C

CHAPTER 2

Population and Water Demand Projections

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APPENDIX C
CHAPTER 2

Table of Contents

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TWDB Final Approved
Population Projections for Region D

WUG	County	Basin	P2020	P2030	P2040	P2050	P2060	P2070
CENTRAL BOWIE COUNTY WSC	BOWIE	RED	1,199	1,233	1,244	1,244	1,244	1,244
CENTRAL BOWIE COUNTY WSC	BOWIE	SULPHUR	6,453	6,636	6,693	6,693	6,693	6,693
COUNTY-OTHER	BOWIE	RED	6,834	7,028	7,088	7,088	7,088	7,088
COUNTY-OTHER	BOWIE	SULPHUR	13,078	13,561	13,712	13,712	13,712	13,712
DE KALB	BOWIE	RED	267	275	277	277	277	277
DE KALB	BOWIE	SULPHUR	1,490	1,532	1,545	1,545	1,545	1,545
HOOKS	BOWIE	RED	2,863	2,944	2,970	2,970	2,970	2,970
MACEDONIA-EYLAU MUD #1	BOWIE	SULPHUR	8,397	8,530	8,572	8,572	8,572	8,572
MAUD	BOWIE	SULPHUR	1,092	1,123	1,133	1,133	1,133	1,133
NASH	BOWIE	SULPHUR	3,061	3,148	3,175	3,175	3,175	3,175
NEW BOSTON	BOWIE	RED	1,383	1,422	1,435	1,435	1,435	1,435
NEW BOSTON	BOWIE	SULPHUR	3,322	3,416	3,445	3,445	3,445	3,445
RED LICK	BOWIE	RED	568	584	589	589	589	589
RED LICK	BOWIE	SULPHUR	475	488	492	492	492	492
REDWATER	BOWIE	SULPHUR	1,093	1,124	1,134	1,134	1,134	1,134
TEXAMERICAS CENTER	BOWIE	RED	91	93	94	94	94	94
TEXAMERICAS CENTER	BOWIE	SULPHUR	442	455	459	459	459	459
TEXARKANA	BOWIE	RED	4,442	4,568	4,607	4,607	4,607	4,607
TEXARKANA	BOWIE	SULPHUR	33,204	34,144	34,439	34,439	34,439	34,439

TWDB Final Approved
Population Projections for Region D

WUG	County	Basin	P2020	P2030	P2040	P2050	P2060	P2070
WAKE VILLAGE	BOWIE	SULPHUR	5,949	6,109	6,160	6,160	6,160	6,160
	BOWIE TOTAL		**95,703**	**98,413**	**99,263**	**99,263**	**99,263**	**99,263**
BI COUNTY WSC	CAMP	CYPRESS	6,842	8,224	9,305	10,587	11,779	12,941
COUNTY-OTHER	CAMP	CYPRESS	2,012	1,715	1,483	1,208	952	702
PITTSBURG	CAMP	CYPRESS	4,701	4,934	5,116	5,332	5,533	5,729
	CAMP TOTAL		**13,555**	**14,873**	**15,904**	**17,127**	**18,264**	**19,372**
ATLANTA	CASS	CYPRESS	5,772	5,812	5,812	5,812	5,812	5,812
ATLANTA	CASS	SULPHUR	6	6	6	6	6	6
COUNTY-OTHER	CASS	CYPRESS	13,965	14,060	14,060	14,060	14,060	14,060
COUNTY-OTHER	CASS	SULPHUR	3,885	3,911	3,911	3,911	3,911	3,911
EASTERN CASS WSC	CASS	CYPRESS	1,925	1,939	1,939	1,939	1,939	1,939
EASTERN CASS WSC	CASS	SULPHUR	149	150	150	150	150	150
HUGHES SPRINGS	CASS	CYPRESS	1,786	1,799	1,799	1,799	1,799	1,799
LINDEN	CASS	CYPRESS	2,025	2,038	2,038	2,038	2,038	2,038
QUEEN CITY	CASS	CYPRESS	939	946	946	946	946	946
QUEEN CITY	CASS	SULPHUR	564	568	568	568	568	568
	CASS TOTAL		**31,016**	**31,229**	**31,229**	**31,229**	**31,229**	**31,229**
COOPER	DELTA	SULPHUR	2,003	2,024	2,024	2,024	2,024	2,024
COUNTY-OTHER	DELTA	SULPHUR	3,079	3,111	3,111	3,111	3,111	3,111

TWDB Final Approved
Population Projections for Region D

WUG	County	Basin	P2020	P2030	P2040	P2050	P2060	P2070
NORTH HUNT SUD	DELTA	SULPHUR	238	241	241	241	241	241
	DELTA TOTAL		**5,320**	**5,376**	**5,376**	**5,376**	**5,376**	**5,376**
COUNTY-OTHER	FRANKLIN	CYPRESS	368	385	394	404	410	417
COUNTY-OTHER	FRANKLIN	SULPHUR	454	475	488	500	509	516
CYPRESS SPRINGS SUD	FRANKLIN	CYPRESS	4,235	4,427	4,543	4,655	4,740	4,806
CYPRESS SPRINGS SUD	FRANKLIN	SULPHUR	2,535	2,649	2,718	2,786	2,836	2,876
MOUNT VERNON	FRANKLIN	SULPHUR	2,793	2,919	2,995	3,069	3,125	3,169
WINNSBORO	FRANKLIN	CYPRESS	739	772	792	812	827	838
	FRANKLIN TOTAL		**11,124**	**11,627**	**11,930**	**12,226**	**12,447**	**12,622**
CLARKSVILLE CITY	GREGG	SABINE	948	1,038	1,141	1,258	1,389	1,537
COUNTY-OTHER	GREGG	CYPRESS	860	942	1,036	1,142	1,261	1,396
COUNTY-OTHER	GREGG	SABINE	4,678	5,123	5,631	6,205	6,853	7,585
CROSS ROADS SUD	GREGG	SABINE	364	399	438	483	533	590
EASTON	GREGG	SABINE	502	550	605	666	735	814
ELDERVILLE WSC	GREGG	SABINE	3,441	3,769	4,143	4,566	5,041	5,579
GLADEWATER	GREGG	SABINE	4,376	4,792	5,268	5,806	6,410	7,094
KILGORE	GREGG	SABINE	10,913	11,951	13,139	14,480	15,987	17,694
LAKEPORT	GREGG	SABINE	1,067	1,169	1,285	1,416	1,564	1,730
LIBERTY CITY WSC	GREGG	SABINE	5,014	5,491	6,037	6,653	7,346	8,130

WUG	County	Basin	P2020	P2030	P2040	P2050	P2060	P2070
LONGVIEW	GREGG	SABINE	86,085	94,275	103,640	114,219	126,114	139,574
TRYON ROAD SUD	GREGG	CYPRESS	4,167	4,563	5,016	5,528	6,104	6,755
TRYON ROAD SUD	GREGG	SABINE	293	321	353	389	430	476
WEST GREGG SUD	GREGG	SABINE	3,552	3,890	4,276	4,713	5,203	5,759
WHITE OAK	GREGG	SABINE	7,087	7,761	8,532	9,403	10,382	11,490
	GREGG TOTAL		**133,347**	**146,034**	**160,540**	**176,927**	**195,352**	**216,203**
COUNTY-OTHER	HARRISON	CYPRESS	16,655	17,885	19,160	20,949	22,900	25,196
COUNTY-OTHER	HARRISON	SABINE	10,447	11,221	12,019	13,143	14,365	15,809
DIANA SUD	HARRISON	CYPRESS	357	384	411	449	491	540
GILL WSC	HARRISON	SABINE	1,456	1,563	1,675	1,831	2,001	2,202
GUM SPRINGS WSC	HARRISON	CYPRESS	1,962	2,107	2,257	2,468	2,697	2,968
GUM SPRINGS WSC	HARRISON	SABINE	5,340	5,735	6,144	6,717	7,342	8,079
HALLSVILLE	HARRISON	SABINE	3,834	4,117	4,411	4,822	5,271	5,800
LONGVIEW	HARRISON	SABINE	2,005	2,153	2,306	2,521	2,756	3,032
MARSHALL	HARRISON	CYPRESS	4,437	4,765	5,105	5,581	6,100	6,713
MARSHALL	HARRISON	SABINE	20,773	22,309	23,899	26,130	28,561	31,427
TRYON ROAD SUD	HARRISON	CYPRESS	756	812	870	951	1,039	1,144
WASKOM	HARRISON	CYPRESS	2,315	2,487	2,664	2,912	3,183	3,503
	HARRISON TOTAL		**70,337**	**75,538**	**80,921**	**88,474**	**96,706**	**106,413**

WUG	County	Basin	P2020	P2030	P2040	P2050	P2060	P2070
BRINKER WSC	HOPKINS	SULPHUR	2,252	2,601	2,919	3,284	3,636	3,990
CASH SUD	HOPKINS	SABINE	101	109	116	124	132	139
COMO	HOPKINS	SABINE	573	628	678	736	791	847
COMO	HOPKINS	SULPHUR	201	220	238	258	278	297
COUNTY-OTHER	HOPKINS	CYPRESS	442	499	552	613	671	730
COUNTY-OTHER	HOPKINS	SABINE	4,269	4,203	4,142	4,071	4,004	3,936
COUNTY-OTHER	HOPKINS	SULPHUR	2,243	2,432	2,604	2,803	2,994	3,188
CUMBY	HOPKINS	SABINE	838	972	1,094	1,235	1,371	1,507
CUMBY	HOPKINS	SULPHUR	81	94	106	119	132	145
CYPRESS SPRINGS SUD	HOPKINS	CYPRESS	310	310	310	310	310	310
CYPRESS SPRINGS SUD	HOPKINS	SULPHUR	602	602	602	602	602	602
JONES WSC	HOPKINS	SABINE	140	169	195	225	254	283
MARTIN SPRINGS WSC	HOPKINS	SABINE	3,195	3,737	4,233	4,801	5,349	5,900
MARTIN SPRINGS WSC	HOPKINS	SULPHUR	584	684	774	878	978	1,079
NORTH HOPKINS WSC	HOPKINS	SULPHUR	5,907	6,576	7,186	7,887	8,563	9,242
SULPHUR SPRINGS	HOPKINS	SABINE	49	51	53	56	58	61
SULPHUR SPRINGS	HOPKINS	SULPHUR	16,191	17,008	17,753	18,608	19,433	20,261
	HOPKINS TOTAL		**37,978**	**40,895**	**43,555**	**46,610**	**49,556**	**52,517**
ABLES SPRINGS WSC	HUNT	SABINE	893	1,368	2,012	2,902	4,170	6,013

TWDB Final Approved
Population Projections for Region D

WUG	County	Basin	P2020	P2030	P2040	P2050	P2060	P2070
BLACKLAND WSC	HUNT	SABINE	32	32	32	32	32	32
CADDO BASIN SUD	HUNT	SABINE	6,337	8,401	11,201	15,067	20,576	28,581
CADDO MILLS	HUNT	SABINE	1,710	2,214	2,898	3,843	5,190	7,147
CAMPBELL	HUNT	SABINE	727	903	1,143	1,473	1,944	2,629
CAMPBELL	HUNT	SULPHUR	50	62	78	101	133	180
CASH SUD	HUNT	SABINE	17,740	21,288	25,545	30,654	36,784	44,140
CASH SUD	HUNT	SULPHUR	252	302	363	435	522	627
CELESTE	HUNT	SABINE	991	1,231	1,558	2,009	2,651	3,584
COMBINED CONSUMERS SUD	HUNT	SABINE	6,063	7,535	9,531	12,288	16,216	21,923
COMMERCE	HUNT	SULPHUR	8,883	9,975	11,456	13,502	16,416	20,651
COUNTY-OTHER	HUNT	SABINE	16,719	23,249	32,662	46,427	67,453	99,563
COUNTY-OTHER	HUNT	SULPHUR	1,350	2,091	3,174	4,559	7,020	9,959
COUNTY-OTHER	HUNT	TRINITY	259	297	277	372	37	206
GREENVILLE	HUNT	SABINE	28,700	32,964	38,749	46,738	58,120	74,659
HICKORY CREEK SUD	HUNT	SABINE	2,045	2,989	4,269	6,038	8,558	12,219
HICKORY CREEK SUD	HUNT	SULPHUR	1,419	2,076	2,966	4,195	5,944	8,488
HICKORY CREEK SUD	HUNT	TRINITY	700	1,021	1,459	2,062	2,924	4,175
JOSEPHINE	HUNT	SABINE	131	232	369	559	559	559
LONE OAK	HUNT	SABINE	749	954	1,232	1,617	2,165	2,962

TWDB Final Approved
Population Projections for Region D

WUG	County	Basin	P2020	P2030	P2040	P2050	P2060	P2070
MACBEE SUD	HUNT	SABINE	337	419	530	683	902	1,219
NORTH HUNT SUD	HUNT	SULPHUR	3,483	4,551	6,000	8,001	10,851	14,993
QUINLAN	HUNT	SABINE	1,441	1,505	1,591	1,711	1,882	2,130
ROYSE CITY	HUNT	SABINE	364	452	572	737	973	1,316
WEST TAWAKONI	HUNT	SABINE	1,800	2,104	2,516	3,086	3,898	5,078
WOLFE CITY	HUNT	SULPHUR	1,719	2,136	2,703	3,484	4,598	6,217
	HUNT TOTAL		**104,894**	**130,351**	**164,886**	**212,575**	**280,518**	**379,250**
BLOSSOM	LAMAR	SULPHUR	1,566	1,626	1,671	1,712	1,744	1,769
COUNTY-OTHER	LAMAR	RED	820	851	875	896	913	926
COUNTY-OTHER	LAMAR	SULPHUR	1,887	1,962	2,016	2,066	2,103	2,135
DEPORT	LAMAR	SULPHUR	552	573	589	603	614	623
LAMAR COUNTY WSD	LAMAR	RED	11,919	12,381	12,722	13,031	13,272	13,467
LAMAR COUNTY WSD	LAMAR	SULPHUR	5,053	5,248	5,393	5,524	5,626	5,708
PARIS	LAMAR	RED	10,487	10,893	11,193	11,465	11,677	11,848
PARIS	LAMAR	SULPHUR	15,886	16,501	16,956	17,368	17,690	17,949
RENO	LAMAR	RED	438	455	467	479	488	495
RENO	LAMAR	SULPHUR	2,880	2,991	3,074	3,148	3,206	3,253
ROXTON	LAMAR	SULPHUR	682	708	727	745	759	770
	LAMAR TOTAL		**52,170**	**54,189**	**55,683**	**57,037**	**58,092**	**58,943**

TWDB Final Approved
Population Projections for Region D

WUG	County	Basin	P2020	P2030	P2040	P2050	P2060	P2070
COUNTY-OTHER	MARION	CYPRESS	8,100	8,100	8,100	8,100	8,100	8,100
DIANA SUD	MARION	CYPRESS	384	384	384	384	384	384
JEFFERSON	MARION	CYPRESS	2,117	2,117	2,117	2,117	2,117	2,117
	MARION TOTAL		**10,601**	**10,601**	**10,601**	**10,601**	**10,601**	**10,601**
BI COUNTY WSC	MORRIS	CYPRESS	1,276	1,299	1,325	1,364	1,395	1,426
COUNTY-OTHER	MORRIS	CYPRESS	2,833	2,887	2,945	3,032	3,102	3,170
COUNTY-OTHER	MORRIS	SULPHUR	839	854	871	897	917	938
DAINGERFIELD	MORRIS	CYPRESS	2,646	2,695	2,749	2,829	2,894	2,958
HUGHES SPRINGS	MORRIS	CYPRESS	7	7	7	7	7	7
LONE STAR	MORRIS	CYPRESS	1,634	1,664	1,698	1,748	1,787	1,827
NAPLES	MORRIS	CYPRESS	644	656	669	688	704	720
NAPLES	MORRIS	SULPHUR	780	795	811	835	854	872
OMAHA	MORRIS	CYPRESS	627	639	652	671	685	701
OMAHA	MORRIS	SULPHUR	428	436	445	458	469	479
TRI SUD	MORRIS	CYPRESS	1,650	1,680	1,714	1,764	1,804	1,844
	MORRIS TOTAL		**13,364**	**13,612**	**13,886**	**14,293**	**14,618**	**14,942**
ALBA	RAINS	SABINE	3	3	3	3	3	3
BRIGHT STAR-SALEM SUD	RAINS	SABINE	2,090	2,216	2,252	2,276	2,286	2,291
CASH SUD	RAINS	SABINE	691	733	745	753	756	758

TWDB Final Approved
Population Projections for Region D

WUG	County	Basin	P2020	P2030	P2040	P2050	P2060	P2070
COUNTY-OTHER	RAINS	SABINE	5,843	6,196	6,295	6,364	6,394	6,408
EAST TAWAKONI	RAINS	SABINE	962	1,020	1,037	1,048	1,053	1,055
EMORY	RAINS	SABINE	1,350	1,431	1,455	1,470	1,477	1,480
GOLDEN WSC	RAINS	SABINE	55	58	59	60	60	60
POINT	RAINS	SABINE	894	948	963	973	978	980
	RAINS TOTAL		**11,888**	**12,605**	**12,809**	**12,947**	**13,007**	**13,035**
BOGATA	RED RIVER	SULPHUR	1,164	1,164	1,164	1,164	1,164	1,164
CLARKSVILLE	RED RIVER	SULPHUR	3,315	3,315	3,315	3,315	3,315	3,315
COUNTY-OTHER	RED RIVER	RED	944	848	751	655	98	11
COUNTY-OTHER	RED RIVER	SULPHUR	929	661	393	124	316	38
DEPORT	RED RIVER	SULPHUR	53	53	53	53	53	53
DETROIT	RED RIVER	SULPHUR	739	739	739	739	739	739
RED RIVER COUNTY WSC	RED RIVER	RED	1,546	1,642	1,739	1,835	2,132	2,229
RED RIVER COUNTY WSC	RED RIVER	SULPHUR	4,286	4,554	4,822	5,091	5,159	5,427
	RED RIVER TOTAL		**12,976**	**12,976**	**12,976**	**12,976**	**12,976**	**12,976**
COUNTY-OTHER	SMITH	SABINE	11,639	12,990	14,518	16,307	18,414	20,921
CRYSTAL SYSTEMS INC	SMITH	SABINE	1,970	2,248	2,564	2,932	3,367	3,883
HIDEAWAY	SMITH	SABINE	3,504	3,998	4,558	5,214	5,986	6,904
JACKSON WSC	SMITH	SABINE	2,150	2,453	2,797	3,199	3,673	4,237

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WUG	County	Basin	P2020	P2030	P2040	P2050	P2060	P2070
LIBERTY CITY WSC	SMITH	SABINE	136	155	177	202	233	268
LINDALE	SMITH	SABINE	4,023	4,882	5,856	6,996	8,339	9,935
LINDALE RURAL WSC	SMITH	SABINE	5,487	6,261	7,139	8,165	9,375	10,812
OVERTON	SMITH	SABINE	76	86	99	113	130	150
SMITH COUNTY MUD #1	SMITH	SABINE	1,035	1,181	1,347	1,540	1,769	2,040
SOUTHERN UTILITIES COMPANY	SMITH	SABINE	11,958	13,644	15,557	17,794	20,430	23,563
TYLER	SMITH	SABINE	999	1,139	1,299	1,486	1,706	1,968
WEST GREGG SUD	SMITH	SABINE	909	1,037	1,182	1,353	1,553	1,791
WINONA	SMITH	SABINE	654	747	851	974	1,118	1,290
	SMITH TOTAL		**44,540**	**50,821**	**57,944**	**66,275**	**76,093**	**87,762**
BI COUNTY WSC	TITUS	CYPRESS	362	409	457	510	566	625
COUNTY-OTHER	TITUS	CYPRESS	1,798	2,031	2,271	2,536	2,814	3,108
COUNTY-OTHER	TITUS	SULPHUR	1,368	1,544	1,728	1,929	2,141	2,364
CYPRESS SPRINGS SUD	TITUS	CYPRESS	90	101	113	127	140	155
CYPRESS SPRINGS SUD	TITUS	SULPHUR	144	163	182	203	226	249
MOUNT PLEASANT	TITUS	CYPRESS	17,639	19,919	22,279	24,869	27,596	30,477
TALCO	TITUS	SULPHUR	585	661	739	825	915	1,011
TRI SUD	TITUS	CYPRESS	9,252	10,448	11,686	13,044	14,475	15,986
TRI SUD	TITUS	SULPHUR	4,811	5,434	6,077	6,784	7,527	8,313

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WUG	County	Basin	P2020	P2030	P2040	P2050	P2060	P2070
WINFIELD	TITUS	CYPRESS	151	171	192	214	237	262
WINFIELD	TITUS	SULPHUR	443	500	559	624	693	765
	TITUS TOTAL		**36,643**	**41,381**	**46,283**	**51,665**	**57,330**	**63,315**
BI COUNTY WSC	UPSHUR	CYPRESS	3,872	4,183	4,451	4,727	4,979	5,216
BIG SANDY	UPSHUR	SABINE	1,459	1,577	1,678	1,781	1,877	1,966
COUNTY-OTHER	UPSHUR	CYPRESS	8,899	9,615	10,233	10,866	11,448	11,991
COUNTY-OTHER	UPSHUR	SABINE	4,255	4,595	4,891	5,195	5,472	5,731
DIANA SUD	UPSHUR	CYPRESS	4,868	5,259	5,596	5,943	6,260	6,557
EAST MOUNTAIN	UPSHUR	CYPRESS	241	260	277	294	310	324
EAST MOUNTAIN	UPSHUR	SABINE	625	676	719	763	804	843
FOUKE WSC	UPSHUR	SABINE	97	105	112	119	125	131
GILMER	UPSHUR	CYPRESS	5,328	5,757	6,126	6,505	6,853	7,178
GLADEWATER	UPSHUR	SABINE	2,658	2,872	3,056	3,245	3,419	3,581
ORE CITY	UPSHUR	CYPRESS	1,243	1,343	1,429	1,518	1,599	1,674
PRITCHETT WSC	UPSHUR	CYPRESS	2,159	2,333	2,483	2,636	2,777	2,909
PRITCHETT WSC	UPSHUR	SABINE	5,200	5,618	5,978	6,349	6,688	7,005
SHARON WSC	UPSHUR	CYPRESS	1,792	1,936	2,060	2,187	2,304	2,413
	UPSHUR TOTAL		**42,696**	**46,129**	**49,089**	**52,128**	**54,915**	**57,519**
ABLES SPRINGS WSC	VAN ZANDT	SABINE	34	37	40	42	45	46

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WUG	County	Basin	P2020	P2030	P2040	P2050	P2060	P2070
BETHEL-ASH WSC	VAN ZANDT	NECHES	714	934	1,103	1,271	1,409	1,528
BETHEL-ASH WSC	VAN ZANDT	TRINITY	201	264	311	358	398	431
CANTON	VAN ZANDT	SABINE	3,947	4,316	4,598	4,877	5,109	5,308
CANTON	VAN ZANDT	TRINITY	16	17	18	20	21	21
COMBINED CONSUMERS SUD	VAN ZANDT	SABINE	1,105	1,212	1,294	1,376	1,444	1,502
COUNTY-OTHER	VAN ZANDT	NECHES	8,782	9,132	9,398	9,663	9,885	10,073
COUNTY-OTHER	VAN ZANDT	SABINE	11,594	12,900	13,899	14,892	15,715	16,421
COUNTY-OTHER	VAN ZANDT	TRINITY	6,515	7,293	7,888	8,478	8,969	9,392
EDGEWOOD	VAN ZANDT	SABINE	1,564	1,683	1,774	1,864	1,939	2,003
GOLDEN WSC	VAN ZANDT	SABINE	700	758	803	847	884	915
GRAND SALINE	VAN ZANDT	SABINE	3,278	3,416	3,521	3,626	3,713	3,787
MACBEE SUD	VAN ZANDT	SABINE	2,619	2,874	3,068	3,262	3,423	3,561
MACBEE SUD	VAN ZANDT	TRINITY	4,272	4,688	5,007	5,323	5,585	5,809
R-P-M WSC	VAN ZANDT	NECHES	2,303	2,847	3,263	3,676	4,019	4,313
SOUTH TAWAKONI WSC	VAN ZANDT	SABINE	4,261	4,844	5,289	5,731	6,098	6,412
VAN	VAN ZANDT	NECHES	1,922	2,144	2,314	2,482	2,622	2,742
VAN	VAN ZANDT	SABINE	1,067	1,191	1,285	1,379	1,457	1,523
WILLS POINT	VAN ZANDT	SABINE	1,421	1,435	1,446	1,456	1,465	1,473
WILLS POINT	VAN ZANDT	TRINITY	2,140	2,161	2,177	2,194	2,207	2,218

WUG	County	Basin	P2020	P2030	P2040	P2050	P2060	P2070
	VAN ZANDT TOTAL		**58,455**	**64,146**	**68,496**	**72,817**	**76,407**	**79,478**
ALBA	WOOD	SABINE	537	560	569	582	589	594
BRIGHT STAR-SALEM SUD	WOOD	SABINE	1,557	1,622	1,648	1,689	1,709	1,722
COUNTY-OTHER	WOOD	CYPRESS	894	931	947	969	982	989
COUNTY-OTHER	WOOD	SABINE	4,056	4,225	4,292	4,397	4,450	4,485
CYPRESS SPRINGS SUD	WOOD	CYPRESS	364	379	385	395	399	403
FOUKE WSC	WOOD	SABINE	7,240	7,542	7,664	7,852	7,945	8,008
GOLDEN WSC	WOOD	SABINE	2,680	2,791	2,836	2,906	2,940	2,964
HAWKINS	WOOD	SABINE	1,367	1,424	1,447	1,482	1,500	1,512
HOLLY RANCH WATER COMPANY	WOOD	SABINE	2,746	2,860	2,907	2,978	3,013	3,037
JONES WSC	WOOD	SABINE	3,870	4,032	4,097	4,197	4,247	4,281
MINEOLA	WOOD	SABINE	4,827	5,029	5,110	5,235	5,297	5,339
NEW HOPE SUD	WOOD	SABINE	2,534	2,640	2,682	2,748	2,781	2,803
PRITCHETT WSC	WOOD	SABINE	81	84	85	87	88	89
QUITMAN	WOOD	SABINE	1,934	2,015	2,048	2,098	2,123	2,140
RAMEY WSC	WOOD	SABINE	3,512	3,659	3,718	3,809	3,854	3,885
SHARON WSC	WOOD	CYPRESS	1,228	1,280	1,300	1,332	1,348	1,359
SHARON WSC	WOOD	SABINE	2,516	2,621	2,663	2,729	2,761	2,783
WINNSBORO	WOOD	CYPRESS	1,127	1,174	1,193	1,222	1,236	1,246

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WUG	County	Basin	P2020	P2030	P2040	P2050	P2060	P2070
WINNSBORO	WOOD	SABINE	1,792	1,867	1,897	1,944	1,967	1,983
	WOOD TOTAL		**44,862**	**46,735**	**47,488**	**48,651**	**49,229**	**49,622**
	GRAND TOTAL		**831,469**	**907,531**	**988,859**	**1,089,197**	**1,211,979**	**1,370,438**

County Name	Water User Group	Basin	Water Demand Projections (ac-ft)[1]						Base GPCPD2	Recommended Reduction from Base GPCPD for Water Demand Projections (in acft) Plumbing Code Savings[3] (gallons)					
			2020	2030	2040	2050	2060	2070		2020	2030	2040	2050	2060	2070
BOWIE	CENTRAL BOWIE COUNTY WSC	RED	84	83	84	84	84	84	70	9	13	16	18	18	18
BOWIE	CENTRAL BOWIE COUNTY WSC	SULPHUR	451	446	450	450	450	450	70	9	13	16	18	18	18
BOWIE	COUNTY-OTHER	RED	816	804	791	787	785	785	117	10	15	17	18	18	18
BOWIE	COUNTY-OTHER	SULPHUR	1,563	1,551	1,530	1,525	1,519	1,519	117	10	15	17	18	18	18
BOWIE	DE KALB	RED	47	47	46	46	46	46	164	10	15	18	18	19	19
BOWIE	DE KALB	SULPHUR	257	256	253	252	251	251	164	10	15	18	18	19	19
BOWIE	HOOKS	RED	265	258	249	244	243	243	92	10	14	17	19	19	19
BOWIE	MACEDONIA-EYLAU MUD #1	SULPHUR	565	574	577	577	577	577	60	0	0	0	0	0	0
BOWIE	MAUD	SULPHUR	170	169	167	165	164	164	148	10	14	17	19	19	19
BOWIE	NASH	SULPHUR	206	212	214	214	214	214	60	0	0	0	0	0	0
BOWIE	NEW BOSTON	RED	323	325	322	321	321	321	218	10	14	18	19	19	19
BOWIE	NEW BOSTON	SULPHUR	775	779	772	770	768	768	218	10	14	18	19	19	19
BOWIE	RED LICK	RED	66	66	65	64	64	64	111	8	11	13	14	15	15
BOWIE	RED LICK	SULPHUR	55	55	54	53	53	53	111	8	11	13	14	15	15
BOWIE	REDWATER	SULPHUR	148	148	145	143	143	143	129	9	12	15	17	17	17
BOWIE	TEXAMERICAS CENTER	RED	88	90	90	90	90	90	864	3	7	10	12	12	12
BOWIE	TEXAMERICAS CENTER	SULPHUR	426	437	439	438	438	438	864	3	7	10	12	12	12
BOWIE	TEXARKANA	RED	1,507	1,530	1,527	1,518	1,517	1,517	312	9	13	16	18	18	18
BOWIE	TEXARKANA	SULPHUR	11,264	11,430	11,411	11,347	11,335	11,334	312	9	13	16	18	18	18
BOWIE	WAKE VILLAGE	SULPHUR	677	669	654	644	642	642	111	10	13	16	18	18	18
CAMP	BI COUNTY WSC	CYPRESS	708	820	907	1,019	1,131	1,241	101	9	12	14	15	15	15
CAMP	COUNTY-OTHER	CYPRESS	136	116	100	82	64	48	117	4	4	4	4	4	4
CAMP	PITTSBURG	CYPRESS	831	849	862	889	920	953	167	9	13	17	18	19	19
CASS	ATLANTA	CYPRESS	999	978	955	947	945	945	164	10	14	17	19	19	19
CASS	ATLANTA	SULPHUR	1	1	1	1	1	1	164	10	14	17	19	19	19
CASS	COUNTY-OTHER	CYPRESS	1,243	1,183	1,127	1,107	1,103	1,103	117	10	14	17	19	19	19
CASS	COUNTY-OTHER	SULPHUR	346	330	314	309	307	307	117	10	14	17	19	19	19
CASS	EASTERN CASS WSC	CYPRESS	152	147	142	140	139	139	78	8	10	13	14	14	14
CASS	EASTERN CASS WSC	SULPHUR	12	12	11	11	11	11	78	8	10	13	14	14	14
CASS	HUGHES SPRINGS	CYPRESS	201	194	186	185	184	184	110	10	14	18	19	19	19
CASS	LINDEN	CYPRESS	289	280	273	272	272	271	137	10	15	18	18	18	18
CASS	QUEEN CITY	CYPRESS	142	138	135	135	134	134	145	10	14	18	18	19	19
CASS	QUEEN CITY	SULPHUR	86	84	81	81	81	81	145	10	14	18	18	19	19
DELTA	COOPER	SULPHUR	441	435	427	426	425	425	206	10	14	18	18	19	19
DELTA	COUNTY-OTHER	SULPHUR	207	210	210	210	210	210	117	0	0	0	0	0	0
DELTA	NORTH HUNT SUD	SULPHUR	16	17	17	17	17	17	60	0	0	0	0	0	0
FRANKLIN	COUNTY-OTHER	CYPRESS	69	71	72	73	75	76	117	7	9	10	10	11	11
FRANKLIN	COUNTY-OTHER	SULPHUR	84	88	90	92	93	94	117	7	9	10	10	11	11
FRANKLIN	CYPRESS SPRINGS SUD	CYPRESS	383	383	379	381	387	392	89	8	12	14	16	16	16

County Name	Water User Group	Basin	Water Demand Projections (ac-ft)[1]						Base GPCPD2	Recommended Reduction from Base GPCPD for Water Demand Projections (in acft) Plumbing Code Savings[3] (gallons)					
			2020	2030	2040	2050	2060	2070		2020	2030	2040	2050	2060	2070
FRANKLIN	CYPRESS SPRINGS SUD	SULPHUR	229	229	228	229	232	235	89	8	12	14	16	16	16
FRANKLIN	MOUNT VERNON	SULPHUR	548	560	565	574	584	592	184	9	13	16	17	17	17
FRANKLIN	WINNSBORO	CYPRESS	138	141	142	144	146	148	176	10	14	17	18	19	19
GREGG	CLARKSVILLE CITY	SABINE	101	106	112	122	134	148	104	10	14	16	18	18	18
GREGG	COUNTY-OTHER	CYPRESS	112	118	125	138	151	168	117	10	15	18	19	19	19
GREGG	COUNTY-OTHER	SABINE	606	636	679	745	821	907	117	10	15	18	19	19	19
GREGG	CROSS ROADS SUD	SABINE	31	32	33	36	40	44	83	REG C	REG C	REG C	REG C	REG C	REG C
GREGG	EASTON	SABINE	34	37	41	45	50	55	69	9	9	9	9	9	9
GREGG	ELDERVILLE WSC	SABINE	232	254	279	307	339	375	60	0	0	0	0	0	0
GREGG	GLADEWATER	SABINE	732	779	838	914	1,007	1,113	159	10	14	17	19	19	19
GREGG	KILGORE	SABINE	2,355	2,525	2,735	2,991	3,297	3,647	202	9	13	16	18	18	18
GREGG	LAKEPORT	SABINE	95	99	105	113	124	137	88	9	13	16	17	17	17
GREGG	LIBERTY CITY WSC	SABINE	504	529	563	610	671	742	99	9	13	16	17	17	18
GREGG	LONGVIEW	SABINE	23,668	25,487	27,680	30,319	33,432	36,985	255	10	14	17	18	18	18
GREGG	TRYON ROAD SUD	CYPRESS	605	642	690	752	827	915	139	10	13	16	18	18	18
GREGG	TRYON ROAD SUD	SABINE	43	46	49	53	59	65	139	10	13	16	18	18	18
GREGG	WEST GREGG SUD	SABINE	308	321	341	369	406	448	86	9	12	15	16	17	17
GREGG	WHITE OAK	SABINE	1,371	1,467	1,586	1,733	1,909	2,112	182	9	13	16	18	18	18
HARRISON	COUNTY-OTHER	CYPRESS	1,951	2,015	2,096	2,256	2,457	2,702	117	9	13	16	18	18	18
HARRISON	COUNTY-OTHER	SABINE	1,225	1,265	1,315	1,416	1,542	1,695	117	9	13	16	18	18	18
HARRISON	DIANA SUD	CYPRESS	31	32	33	36	39	43	86	9	12	15	16	16	16
HARRISON	GILL WSC	SABINE	168	173	178	194	211	232	113	10	15	18	19	19	19
HARRISON	GUM SPRINGS WSC	CYPRESS	183	187	193	207	225	247	92	9	13	16	17	18	18
HARRISON	GUM SPRINGS WSC	SABINE	496	507	524	561	610	671	92	9	13	16	17	18	18
HARRISON	HALLSVILLE	SABINE	523	545	572	618	674	741	130	8	12	14	16	16	16
HARRISON	LONGVIEW	SABINE	552	583	616	670	731	804	255	10	14	17	18	18	18
HARRISON	MARSHALL	CYPRESS	895	938	986	1,068	1,165	1,281	190	10	14	18	19	20	20
HARRISON	MARSHALL	SABINE	4,190	4,388	4,613	4,999	5,453	5,997	190	10	14	18	19	20	20
HARRISON	TRYON ROAD SUD	CYPRESS	110	115	120	130	141	155	139	9	13	16	18	18	18
HARRISON	WASKOM	CYPRESS	345	359	376	406	443	487	142	9	13	16	18	18	18
HOPKINS	BRINKER WSC	SULPHUR	241	268	293	325	359	393	105	10	13	16	17	17	17
HOPKINS	CASH SUD	SABINE	12	13	13	14	15	15	113	9	13	15	15	16	16
HOPKINS	COMO	SABINE	65	68	72	76	82	87	110	10	14	16	18	18	18
HOPKINS	COMO	SULPHUR	23	24	25	27	29	31	110	10	14	16	18	18	18
HOPKINS	COUNTY-OTHER	CYPRESS	52	56	60	66	72	78	117	9	14	17	19	19	19
HOPKINS	COUNTY-OTHER	SABINE	506	478	456	440	431	423	117	9	14	17	19	19	19
HOPKINS	COUNTY-OTHER	SULPHUR	266	277	286	302	322	343	117	9	14	17	19	19	19
HOPKINS	CUMBY	SABINE	106	120	132	147	163	179	123	9	13	16	17	17	17
HOPKINS	CUMBY	SULPHUR	11	12	13	15	16	18	123	9	13	16	17	17	17

County Name	Water User Group	Basin	Water Demand Projections (ac-ft)[1]						Base GPCPD2	Recommended Reduction from Base GPCPD for Water Demand Projections (in acft) Plumbing Code Savings[3] (gallons)					
			2020	2030	2040	2050	2060	2070		2020	2030	2040	2050	2060	2070
HOPKINS	CYPRESS SPRINGS SUD	CYPRESS	28	27	26	25	25	25	89	8	12	14	16	16	16
HOPKINS	CYPRESS SPRINGS SUD	SULPHUR	55	52	51	50	50	50	89	8	12	14	16	16	16
HOPKINS	JONES WSC	SABINE	13	15	16	18	21	23	90	10	14	17	19	19	19
HOPKINS	MARTIN SPRINGS WSC	SABINE	387	437	482	542	602	662	118	10	14	16	17	18	18
HOPKINS	MARTIN SPRINGS WSC	SULPHUR	71	80	89	99	110	122	118	10	14	16	17	18	18
HOPKINS	NORTH HOPKINS WSC	SULPHUR	462	481	500	539	583	628	80	10	15	18	19	19	19
HOPKINS	SULPHUR SPRINGS	SABINE	10	10	10	11	11	12	185	9	13	17	18	19	19
HOPKINS	SULPHUR SPRINGS	SULPHUR	3,186	3,268	3,350	3,476	3,624	3,777	185	9	13	17	18	19	19
HUNT	ABLES SPRINGS WSC	SABINE	61	92	136	196	281	405	63	REG C	REG C	REG C	REG C	REG C	REG C
HUNT	BLACKLAND WSC	SABINE	7	7	7	7	7	7	189	REG C	REG C	REG C	REG C	REG C	REG C
HUNT	CADDO BASIN SUD	SABINE	707	898	1,168	1,555	2,118	2,939	110	10	15	17	18	18	18
HUNT	CADDO MILLS	SABINE	153	187	237	310	417	574	90	11	15	17	18	18	18
HUNT	CAMPBELL	SABINE	49	61	77	99	131	177	69	9	9	9	9	9	9
HUNT	CAMPBELL	SULPHUR	4	4	6	7	9	12	69	9	9	9	9	9	9
HUNT	CASH SUD	SABINE	2,038	2,368	2,789	3,316	3,969	4,758	113	9	13	15	15	16	16
HUNT	CASH SUD	SULPHUR	29	34	40	48	57	68	113	9	13	15	15	16	16
HUNT	CELESTE	SABINE	122	145	178	227	299	403	120	11	15	18	19	20	20
HUNT	COMBINED CONSUMERS SUD	SABINE	502	589	718	910	1,195	1,612	84	10	14	17	18	18	18
HUNT	COMMERCE	SULPHUR	1,427	1,556	1,749	2,040	2,474	3,109	153	10	14	17	18	19	19
HUNT	COUNTY-OTHER	SABINE	2,081	2,803	3,875	5,471	7,933	11,698	117	9	12	14	15	15	15
HUNT	COUNTY-OTHER	SULPHUR	169	253	377	538	826	1,171	117	9	12	14	15	15	15
HUNT	COUNTY-OTHER	TRINITY	32	35	33	43	4	24	117	9	12	14	15	15	15
HUNT	GREENVILLE	SABINE	8,908	10,070	11,709	14,051	17,451	22,405	287	10	14	17	19	19	19
HUNT	HICKORY CREEK SUD	SABINE	203	285	400	561	792	1,131	99	10	14	15	16	16	16
HUNT	HICKORY CREEK SUD	SULPHUR	142	198	278	390	552	787	99	10	14	15	16	16	16
HUNT	HICKORY CREEK SUD	TRINITY	70	98	137	192	272	387	99	10	14	15	16	16	16
HUNT	JOSEPHINE	SABINE	20	34	54	81	81	81	145	REG C	REG C	REG C	REG C	REG C	REG C
HUNT	LONE OAK	SABINE	63	76	94	121	161	220	86	11	16	18	20	20	20
HUNT	MACBEE SUD	SABINE	23	29	36	46	61	82	63	3	3	3	3	3	3
HUNT	NORTH HUNT SUD	SULPHUR	235	306	404	538	730	1,008	60	0	0	0	0	0	0
HUNT	QUINLAN	SABINE	127	126	127	133	145	164	88	9	14	17	19	19	19
HUNT	ROYSE CITY	SABINE	43	52	64	82	108	146	110	REG C	REG C	REG C	REG C	REG C	REG C
HUNT	WEST TAWAKONI	SABINE	186	208	243	294	369	480	101	9	13	15	16	17	17
HUNT	WOLFE CITY	SULPHUR	169	199	243	311	409	552	99	11	16	19	19	20	20
LAMAR	BLOSSOM	SULPHUR	138	136	134	134	135	137	88	10	14	17	19	19	19
LAMAR	COUNTY-OTHER	RED	127	129	132	135	137	139	117	11	15	15	15	16	16
LAMAR	COUNTY-OTHER	SULPHUR	291	295	302	309	314	319	117	11	15	15	15	16	16
LAMAR	DEPORT	SULPHUR	42	40	40	41	42	42	77	10	15	17	17	17	17
LAMAR	LAMAR COUNTY WSD	RED	1,557	1,572	1,582	1,602	1,626	1,650	125	8	12	14	15	16	16

			Water Demand Projections (ac-ft)[1]						Base	Recommended Reduction from Base GPCPD for Water Demand Projections (in acft) Plumbing Code Savings[3] (gallons)					
County Name	Water User Group	Basin	2020	2030	2040	2050	2060	2070	GPCPD2	2020	2030	2040	2050	2060	2070
LAMAR	LAMAR COUNTY WSD	SULPHUR	660	667	671	679	690	700	125	8	12	14	15	16	16
LAMAR	PARIS	RED	1,179	1,172	1,163	1,169	1,186	1,203	97	10	14	17	19	19	19
LAMAR	PARIS	SULPHUR	1,785	1,775	1,760	1,769	1,796	1,822	97	10	14	17	19	19	19
LAMAR	RENO	RED	73	74	75	76	77	78	156	9	12	14	16	16	16
LAMAR	RENO	SULPHUR	476	483	487	494	503	510	156	9	12	14	16	16	16
LAMAR	ROXTON	SULPHUR	66	65	64	64	65	66	95	10	14	17	19	19	19
MARION	COUNTY-OTHER	CYPRESS	545	545	545	545	545	545	117	7	7	7	7	7	7
MARION	DIANA SUD	CYPRESS	34	32	31	31	30	30	86	9	12	15	16	16	16
MARION	JEFFERSON	CYPRESS	389	379	371	366	365	365	173	9	13	17	19	19	19
MORRIS	BI COUNTY WSC	CYPRESS	132	130	130	132	134	137	101	9	12	14	15	15	15
MORRIS	COUNTY-OTHER	CYPRESS	343	334	331	339	345	353	117	10	15	18	18	19	19
MORRIS	COUNTY-OTHER	SULPHUR	102	99	98	101	103	105	117	10	15	18	18	19	19
MORRIS	DAINGERFIELD	CYPRESS	473	469	467	476	486	497	169	10	14	17	19	19	19
MORRIS	HUGHES SPRINGS	CYPRESS	1	1	1	1	1	1	110	10	14	18	19	19	19
MORRIS	LONE STAR	CYPRESS	186	182	179	181	184	188	111	10	14	17	19	19	19
MORRIS	NAPLES	CYPRESS	75	73	72	73	75	76	113	10	14	18	19	19	19
MORRIS	NAPLES	SULPHUR	90	88	86	88	90	92	113	10	14	18	19	19	19
MORRIS	OMAHA	CYPRESS	111	110	110	112	114	116	166	9	13	16	18	19	19
MORRIS	OMAHA	SULPHUR	75	74	74	75	77	79	166	9	13	16	18	19	19
MORRIS	TRI SUD	CYPRESS	164	161	160	163	166	170	97	8	12	14	15	15	15
RAINS	ALBA	SABINE	1	1	1	1	1	1	119	9	13	16	18	18	18
RAINS	BRIGHT STAR-SALEM SUD	SABINE	169	167	162	162	162	162	82	10	15	18	19	19	19
RAINS	CASH SUD	SABINE	80	82	82	82	82	82	113	9	13	15	15	16	16
RAINS	COUNTY-OTHER	SABINE	587	606	606	606	607	608	117	7	10	11	12	12	12
RAINS	EAST TAWAKONI	SABINE	197	205	205	206	207	207	192	9	13	16	17	17	17
RAINS	EMORY	SABINE	498	522	527	530	532	533	338	9	13	15	17	17	17
RAINS	GOLDEN WSC	SABINE	5	5	5	5	5	5	72	9	13	16	18	18	18
RAINS	POINT	SABINE	220	229	229	230	231	231	229	10	14	17	18	19	19
RED RIVER	BOGATA	SULPHUR	122	116	112	112	111	111	103	10	15	18	18	18	18
RED RIVER	CLARKSVILLE	SULPHUR	620	602	593	592	591	591	173	10	15	17	17	18	18
RED RIVER	COUNTY-OTHER	RED	120	103	91	79	12	2	117	12	17	17	17	19	28
RED RIVER	COUNTY-OTHER	SULPHUR	118	81	48	15	38	4	117	12	17	17	17	19	28
RED RIVER	DEPORT	SULPHUR	4	4	4	4	4	4	77	10	15	17	17	17	17
RED RIVER	DETROIT	SULPHUR	50	50	50	50	50	50	63	3	3	3	3	3	3
RED RIVER	RED RIVER COUNTY WSC	RED	117	117	117	124	144	150	77	10	14	17	17	17	17
RED RIVER	RED RIVER COUNTY WSC	SULPHUR	324	322	324	342	347	365	77	10	14	17	17	17	17
SMITH	COUNTY-OTHER	SABINE	1,371	1,479	1,619	1,799	2,026	2,300	117	9	12	14	16	16	16
SMITH	CRYSTAL SYSTEMS INC	SABINE	616	695	791	903	1,036	1,194	291	12	15	16	16	16	17
SMITH	HIDEAWAY	SABINE	1,004	1,140	1,296	1,480	1,697	1,956	262	6	8	8	9	9	9

County Name	Water User Group	Basin	Water Demand Projections (ac-ft)[1] 2020	2030	2040	2050	2060	2070	Base GPCPD2	Recommended Reduction from Base GPCPD for Water Demand Projections (in acft) Plumbing Code Savings[3] (gallons) 2020	2030	2040	2050	2060	2070
SMITH	JACKSON WSC	SABINE	197	213	235	263	301	347	91	REG I	REG I	REG I	REG I	REG I	REG I
SMITH	LIBERTY CITY WSC	SABINE	14	15	17	19	22	25	99	9	13	16	17	17	18
SMITH	LINDALE	SABINE	913	1,091	1,298	1,544	1,838	2,188	211	9	12	13	14	14	14
SMITH	LINDALE RURAL WSC	SABINE	429	465	512	575	657	756	78	8	12	14	15	16	16
SMITH	OVERTON	SABINE	17	18	21	23	27	31	199	REG I	REG I	REG I	REG I	REG I	REG I
SMITH	SMITH COUNTY MUD #1	SABINE	464	525	596	679	780	899	408	8	12	13	14	15	15
SMITH	SOUTHERN UTILITIES COMPANY	SABINE	2,045	2,272	2,540	2,876	3,295	3,798	162	REG I	REG I	REG I	REG I	REG I	REG I
SMITH	TYLER	SABINE	192	214	239	272	311	359	180	REG I	REG I	REG I	REG I	REG I	REG I
SMITH	WEST GREGG SUD	SABINE	79	86	95	106	121	140	86	9	12	15	16	17	17
SMITH	WINONA	SABINE	136	151	169	192	220	254	195	10	15	18	19	20	20
TITUS	BI COUNTY WSC	CYPRESS	38	41	45	50	55	60	101	9	12	14	15	15	15
TITUS	COUNTY-OTHER	CYPRESS	282	311	345	386	427	470	117	12	16	16	16	17	17
TITUS	COUNTY-OTHER	SULPHUR	215	236	264	293	325	359	117	12	16	16	16	17	17
TITUS	CYPRESS SPRINGS SUD	CYPRESS	9	9	10	11	12	13	89	8	12	14	16	16	16
TITUS	CYPRESS SPRINGS SUD	SULPHUR	13	14	15	17	18	20	89	8	12	14	16	16	16
TITUS	MOUNT PLEASANT	CYPRESS	3,918	4,334	4,780	5,299	5,871	6,481	208	10	14	16	18	18	18
TITUS	TALCO	SULPHUR	70	76	82	91	101	111	117	11	15	19	19	19	19
TITUS	TRI SUD	CYPRESS	918	1,000	1,091	1,202	1,329	1,466	97	8	12	14	15	15	15
TITUS	TRI SUD	SULPHUR	478	520	568	626	692	763	97	8	12	14	15	15	15
TITUS	WINFIELD	CYPRESS	17	18	20	22	24	27	105	9	12	15	16	16	16
TITUS	WINFIELD	SULPHUR	47	52	57	62	69	76	105	9	12	15	16	16	16
UPSHUR	BI COUNTY WSC	CYPRESS	401	417	434	455	478	500	101	9	12	14	15	15	15
UPSHUR	BIG SANDY	SABINE	223	234	243	255	268	280	146	10	14	17	19	19	19
UPSHUR	COUNTY-OTHER	CYPRESS	1,013	1,054	1,091	1,142	1,199	1,255	117	9	13	16	17	18	18
UPSHUR	COUNTY-OTHER	SABINE	485	504	522	546	573	600	117	9	13	16	17	18	18
UPSHUR	DIANA SUD	CYPRESS	423	435	447	466	489	512	86	9	12	15	16	16	16
UPSHUR	EAST MOUNTAIN	CYPRESS	29	31	32	33	35	36	116	9	13	16	17	17	17
UPSHUR	EAST MOUNTAIN	SABINE	75	78	81	85	89	93	116	9	13	16	17	17	17
UPSHUR	FOUKE WSC	SABINE	11	12	12	13	13	14	106	8	12	14	15	15	15
UPSHUR	GILMER	CYPRESS	1,051	1,108	1,157	1,217	1,280	1,340	186	10	14	17	19	19	19
UPSHUR	GLADEWATER	SABINE	445	467	486	511	537	562	159	10	14	17	19	19	19
UPSHUR	ORE CITY	CYPRESS	148	154	159	166	175	183	116	10	14	17	18	19	19
UPSHUR	PRITCHETT WSC	CYPRESS	191	196	200	208	218	229	88	9	13	16	18	18	18
UPSHUR	PRITCHETT WSC	SABINE	458	470	481	500	525	549	88	9	13	16	18	18	18
UPSHUR	SHARON WSC	CYPRESS	143	145	146	154	161	169	81	10	15	18	18	19	19
VAN ZANDT	ABLES SPRINGS WSC	SABINE	3	3	3	3	4	4	63	REG C	REG C	REG C	REG C	REG C	REG C
VAN ZANDT	BETHEL-ASH WSC	NECHES	73	92	106	120	134	145	100	REG C	REG C	REG C	REG C	REG C	REG C
VAN ZANDT	BETHEL-ASH WSC	TRINITY	21	26	30	35	38	41	100	REG C	REG C	REG C	REG C	REG C	REG C
VAN ZANDT	CANTON	SABINE	957	1,028	1,081	1,138	1,191	1,237	226	10	14	16	18	18	18

			Water Demand Projections (ac-ft)[1]						Base	Recommended Reduction from Base GPCPD for Water Demand Projections (in acft) Plumbing Code Savings[3] (gallons)					
County Name	**Water User Group**	**Basin**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**	**GPCPD2**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
VAN ZANDT	CANTON	TRINITY	4	4	4	5	5	5	226	10	14	16	18	18	18
VAN ZANDT	COMBINED CONSUMERS SUD	SABINE	92	95	98	102	107	111	84	10	14	17	18	18	18
VAN ZANDT	COUNTY-OTHER	NECHES	908	910	913	925	943	961	117	9	12	14	16	16	16
VAN ZANDT	COUNTY-OTHER	SABINE	1,198	1,284	1,348	1,425	1,499	1,565	117	9	12	14	16	16	16
VAN ZANDT	COUNTY-OTHER	TRINITY	674	726	766	812	856	896	117	9	12	14	16	16	16
VAN ZANDT	EDGEWOOD	SABINE	273	286	295	307	319	329	165	10	14	17	18	18	18
VAN ZANDT	GOLDEN WSC	SABINE	57	58	59	61	63	65	72	9	13	16	18	18	18
VAN ZANDT	GRAND SALINE	SABINE	374	375	375	380	388	395	111	9	13	16	18	18	18
VAN ZANDT	MACBEE SUD	SABINE	177	194	207	220	231	240	63	3	3	3	3	3	3
VAN ZANDT	MACBEE SUD	TRINITY	287	315	336	357	375	390	63	3	3	3	3	3	3
VAN ZANDT	R-P-M WSC	NECHES	251	299	336	375	409	438	107	10	13	15	16	16	16
VAN ZANDT	SOUTH TAWAKONI WSC	SABINE	400	432	455	484	513	539	94	10	15	17	19	19	19
VAN ZANDT	VAN	NECHES	238	256	270	286	302	315	120	9	13	16	17	17	17
VAN ZANDT	VAN	SABINE	133	143	151	160	168	176	120	9	13	16	17	17	17
VAN ZANDT	WILLS POINT	SABINE	247	243	240	239	239	241	164	9	13	16	18	18	18
VAN ZANDT	WILLS POINT	TRINITY	371	366	360	358	361	362	164	9	13	16	18	18	18
WOOD	ALBA	SABINE	66	67	66	66	67	68	119	9	13	16	18	18	18
WOOD	BRIGHT STAR-SALEM SUD	SABINE	126	123	118	121	121	122	82	10	15	18	19	19	19
WOOD	COUNTY-OTHER	CYPRESS	86	88	90	91	93	93	117	8	9	9	10	10	10
WOOD	COUNTY-OTHER	SABINE	391	403	407	416	419	422	117	8	9	9	10	10	10
WOOD	CYPRESS SPRINGS SUD	CYPRESS	33	33	33	33	33	33	89	8	12	14	16	16	16
WOOD	FOUKE WSC	SABINE	792	798	792	800	807	813	106	8	12	14	15	15	15
WOOD	GOLDEN WSC	SABINE	216	213	207	207	208	210	72	9	13	16	18	18	18
WOOD	HAWKINS	SABINE	350	357	358	364	368	371	238	10	14	18	19	19	19
WOOD	HOLLY RANCH WATER COMPANY	SABINE	185	193	196	201	203	205	69	9	9	9	9	9	9
WOOD	JONES WSC	SABINE	349	344	335	335	338	341	90	10	14	17	19	19	19
WOOD	MINEOLA	SABINE	764	772	767	775	783	789	151	10	14	17	19	19	19
WOOD	NEW HOPE SUD	SABINE	330	333	330	333	336	339	125	9	13	15	17	17	17
WOOD	PRITCHETT WSC	SABINE	8	8	7	7	7	7	88	9	13	16	18	18	18
WOOD	QUITMAN	SABINE	300	302	300	304	307	309	148	10	14	18	19	19	19
WOOD	RAMEY WSC	SABINE	265	261	253	256	260	262	76	9	13	15	16	16	16
WOOD	SHARON WSC	CYPRESS	98	96	92	94	95	95	81	10	15	18	18	19	19
WOOD	SHARON WSC	SABINE	200	195	188	191	192	195	81	10	15	18	18	19	19
WOOD	WINNSBORO	CYPRESS	211	214	213	216	219	220	176	10	14	17	18	19	19
WOOD	WINNSBORO	SABINE	334	340	339	344	346	350	176	10	14	17	18	19	19
	Region D Water Demand Total		134,310	142,631	152,536	166,385	184,540	208,132							

Water User Group	Base GPCPD2	Above AVE?	Above AVE + STD DEV?	Received Survey?	Water Loss (Real + Apparent)
ABLES SPRINGS WSC	63	`			NOT REPORTED
ALBA	119			Y	14.4%
ATLANTA	164	Y		Y	68.4%
BETHEL-ASH WSC	100			Y	NOT REPORTED
BI COUNTY WSC	101				NOT REPORTED
BIG SANDY	146	Y		Y	NOT REPORTED
BLACKLAND WSC	189	Y			NOT REPORTED
BLOSSOM	88			Y	7.8%
BOGATA	103				NOT REPORTED
BRIGHT STAR-SALEM SUD	82			Y	9.7%
BRINKER WSC	105				NOT REPORTED
CADDO BASIN SUD	110				15.5%
CADDO MILLS	90				NOT REPORTED
CAMPBELL	69				NOT REPORTED
CANTON	226	Y	Y		16.6%
CASH SUD	113			Y	11.2%
CELESTE	120				22.7%
CENTRAL BOWIE COUNTY WSC	70				15.2%
CLARKSVILLE	173	Y		Y	NOT REPORTED
CLARKSVILLE CITY	104				7.8%
COMBINED CONSUMERS SUD	84			Y	NOT REPORTED
COMMERCE	153	Y			9.5%
COMO	110				NOT REPORTED
COOPER	206	Y		Y	46%
COUNTY-OTHER, BOWIE	117				NOT REPORTED
COUNTY-OTHER, CAMP	117				NOT REPORTED
COUNTY-OTHER, CASS	117				NOT REPORTED
COUNTY-OTHER, DELTA	117				NOT REPORTED
COUNTY-OTHER, FRANKLIN	117				NOT REPORTED
COUNTY-OTHER, GREGG	117				NOT REPORTED
COUNTY-OTHER, HARRISON	117				NOT REPORTED
COUNTY-OTHER, HOPKINS	117				NOT REPORTED
COUNTY-OTHER, HUNT	117				NOT REPORTED
COUNTY-OTHER, LAMAR	117				NOT REPORTED
COUNTY-OTHER, MARION	117				NOT REPORTED
COUNTY-OTHER, MORRIS	117				NOT REPORTED
COUNTY-OTHER, RAINS	117				NOT REPORTED
COUNTY-OTHER, RED RIVER	117				NOT REPORTED
COUNTY-OTHER, SMITH	117				NOT REPORTED
COUNTY-OTHER, TITUS	117				NOT REPORTED
COUNTY-OTHER, UPSHUR	117				NOT REPORTED
COUNTY-OTHER, VAN ZANDT	117				NOT REPORTED
COUNTY-OTHER, WOOD	117				NOT REPORTED
CROSS ROADS SUD	83				NOT REPORTED
CRYSTAL SYSTEMS INC	291	Y	Y	Y	NOT REPORTED
CUMBY	123			Y	15.7%
CYPRESS SPRINGS SUD	89			Y	5.3%
DAINGERFIELD	169	Y			16.9%
DE KALB	164	Y			13.3%
DEPORT	77				NOT REPORTED

Water User Group	Base GPCPD2	Above AVE?	Above AVE + STD DEV?	Received Survey?	Water Loss (Real + Apparent)
DETROIT	63			Y	NOT REPORTED
DIANA SUD	86				11.3%
EAST MOUNTAIN	116			Y	23%
EAST TAWAKONI	192	Y			16%
EASTERN CASS WSC	78				NOT REPORTED
EASTON	69				NOT REPORTED
EDGEWOOD	165	Y		Y	35.3%
ELDERVILLE WSC	60				1.1%
EMORY	338	Y	Y		NOT REPORTED
FOUKE WSC	106				36.3%
GILL WSC	113			Y	37.1%
GILMER	186	Y			6.1%
GLADEWATER	159	Y			NOT REPORTED
GOLDEN WSC	72			Y	10.7%
GRAND SALINE	111				NOT REPORTED
GREENVILLE	287	Y	Y		9.6%
GUM SPRINGS WSC	92				11.8%
HALLSVILLE	130			Y	2%
HAWKINS	238	Y	Y	Y	2.4%
HICKORY CREEK SUD	99				NOT REPORTED
HIDEAWAY	262	Y	Y		NOT REPORTED
HOLLY RANCH WATER COMPANY	69				NOT REPORTED
HOOKS	92				NOT REPORTED
HUGHES SPRINGS	110				9.5%
JACKSON WSC	91				NOT REPORTED
JEFFERSON	173	Y			11.3%
JONES WSC	90				NOT REPORTED
JOSEPHINE	145	Y		Y	NOT REPORTED
KILGORE	202	Y			22.5%
LAKEPORT	88				NOT REPORTED
LAMAR COUNTY WSD	125				38.9%
LIBERTY CITY WSC	99			Y	10.8%
LINDALE	211	Y		Y	NOT REPORTED
LINDALE RURAL WSC	78			Y	NOT REPORTED
LINDEN	137				NOT REPORTED
LONE OAK	86			Y	NOT REPORTED
LONE STAR	111			Y	19.8%
LONGVIEW	255	Y	Y		0.5%
MACBEE SUD	63			Y	NOT REPORTED
MACEDONIA-EYLAU MUD #1	60				NOT REPORTED
MARSHALL	190	Y			17.8%
MARTIN SPRINGS WSC	118				NOT REPORTED
MAUD	148	Y		Y	NOT REPORTED
MINEOLA	151	Y			33.6%
MOUNT PLEASANT	208	Y		Y	16.7%
MOUNT VERNON	184	Y			22.8%
NAPLES	113				NOT REPORTED
NASH	60			Y	NOT REPORTED
NEW BOSTON	218	Y			NOT REPORTED
NEW HOPE SUD	125			Y	30.2%

Water User Group	Base GPCPD2	Above AVE?	Above AVE + STD DEV?	Received Survey?	Water Loss (Real + Apparent)
NORTH HOPKINS WSC	80			Y	3.4%
NORTH HUNT SUD	60				NOT REPORTED
OMAHA	166	Y			NOT REPORTED
ORE CITY	116				NOT REPORTED
OVERTON	199	Y			NOT REPORTED
PARIS	97			Y	10.1%
PITTSBURG	167	Y		Y	38.1%
POINT	229	Y	Y		NOT REPORTED
PRITCHETT WSC	88			Y	28.1%
QUEEN CITY	145	Y			23.7%
QUINLAN	88				36.9%
QUITMAN	148	Y			3.5%
RAMEY WSC	76				NOT REPORTED
RED LICK	111				NOT REPORTED
RED RIVER COUNTY WSC	77				NOT REPORTED
REDWATER	129			Y	21.5%
RENO	156	Y		Y	NOT REPORTED
ROXTON	95				NOT REPORTED
ROYSE CITY	110				NOT REPORTED
R-P-M WSC	107				25.8%
SHARON WSC	81				20.2%
SMITH COUNTY MUD #1	408	Y	Y	Y	NOT REPORTED
SOUTH TAWAKONI WSC	94			Y	9.5%
SOUTHERN UTILITIES COMPANY	162	Y			NOT REPORTED
SULPHUR SPRINGS	185	Y			11.4%
TALCO	117				14.9%
TEXAMERICAS CENTER	864	Y	Y		NOT REPORTED
TEXARKANA	312	Y	Y	Y	9.6%
TRI SUD	97				30.4%
TRYON ROAD SUD	139	Y		Y	NOT REPORTED
TYLER	180	Y		Y	NOT REPORTED
VAN	120				NOT REPORTED
WAKE VILLAGE	111				14%
WASKOM	142	Y		Y	22.4%
WEST GREGG SUD	86			Y	14.2%
WEST TAWAKONI	101				NOT REPORTED
WHITE OAK	182	Y			11.7%
WILLS POINT	164	Y			NOT REPORTED
WINFIELD	105				NOT REPORTED
WINNSBORO	176	Y			23.8%
WINONA	195	Y			NOT REPORTED
WOLFE CITY	99				32.6%
AVERAGE	137				
STD DEVIATION	84.4				
AVERAGE + STD DEVIATION	221.4				
TOTAL NO. OF SYSTEMS	142				

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Water User Group (WUG) Population

REGION D	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
BOWIE COUNTY						
RED BASIN						
CENTRAL BOWIE COUNTY WSC	1,199	1,233	1,244	1,244	1,244	1,244
DE KALB	267	275	277	277	277	277
HOOKS	2,863	2,944	2,970	2,970	2,970	2,970
NEW BOSTON	1,383	1,422	1,435	1,435	1,435	1,435
RED LICK	568	584	589	589	589	589
TEXAMERICAS CENTER	91	93	94	94	94	94
TEXARKANA	4,442	4,568	4,607	4,607	4,607	4,607
COUNTY-OTHER	6,834	7,028	7,088	7,088	7,088	7,088
RED BASIN TOTAL POPULATION	**17,647**	**18,147**	**18,304**	**18,304**	**18,304**	**18,304**
SULPHUR BASIN						
CENTRAL BOWIE COUNTY WSC	6,453	6,636	6,693	6,693	6,693	6,693
DE KALB	1,490	1,532	1,545	1,545	1,545	1,545
MACEDONIA-EYLAU MUD #1	8,397	8,530	8,572	8,572	8,572	8,572
MAUD	1,092	1,123	1,133	1,133	1,133	1,133
NASH	3,061	3,148	3,175	3,175	3,175	3,175
NEW BOSTON	3,322	3,416	3,445	3,445	3,445	3,445
RED LICK	475	488	492	492	492	492
REDWATER	1,093	1,124	1,134	1,134	1,134	1,134
TEXAMERICAS CENTER	442	455	459	459	459	459
TEXARKANA	33,204	34,144	34,439	34,439	34,439	34,439
WAKE VILLAGE	5,949	6,109	6,160	6,160	6,160	6,160
COUNTY-OTHER	13,078	13,561	13,712	13,712	13,712	13,712
SULPHUR BASIN TOTAL POPULATION	**78,056**	**80,266**	**80,959**	**80,959**	**80,959**	**80,959**
BOWIE COUNTY TOTAL POPULATION	**95,703**	**98,413**	**99,263**	**99,263**	**99,263**	**99,263**
CAMP COUNTY						
CYPRESS BASIN						
BI COUNTY WSC	6,842	8,224	9,305	10,587	11,779	12,941
PITTSBURG	4,701	4,934	5,116	5,332	5,533	5,729
COUNTY-OTHER	2,012	1,715	1,483	1,208	952	702
CYPRESS BASIN TOTAL POPULATION	**13,555**	**14,873**	**15,904**	**17,127**	**18,264**	**19,372**
CAMP COUNTY TOTAL POPULATION	**13,555**	**14,873**	**15,904**	**17,127**	**18,264**	**19,372**
CASS COUNTY						
CYPRESS BASIN						
ATLANTA	5,772	5,812	5,812	5,812	5,812	5,812
EASTERN CASS WSC	1,925	1,939	1,939	1,939	1,939	1,939
HUGHES SPRINGS	1,786	1,799	1,799	1,799	1,799	1,799
LINDEN	2,025	2,038	2,038	2,038	2,038	2,038
QUEEN CITY	939	946	946	946	946	946
COUNTY-OTHER	13,965	14,060	14,060	14,060	14,060	14,060
CYPRESS BASIN TOTAL POPULATION	**26,412**	**26,594**	**26,594**	**26,594**	**26,594**	**26,594**

Water User Group (WUG) Population

REGION D	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
CASS COUNTY						
SULPHUR BASIN						
ATLANTA	6	6	6	6	6	6
EASTERN CASS WSC	149	150	150	150	150	150
QUEEN CITY	564	568	568	568	568	568
COUNTY-OTHER	3,885	3,911	3,911	3,911	3,911	3,911
SULPHUR BASIN TOTAL POPULATION	**4,604**	**4,635**	**4,635**	**4,635**	**4,635**	**4,635**
CASS COUNTY TOTAL POPULATION	**31,016**	**31,229**	**31,229**	**31,229**	**31,229**	**31,229**
DELTA COUNTY						
SULPHUR BASIN						
COOPER	2,003	2,024	2,024	2,024	2,024	2,024
NORTH HUNT SUD	238	241	241	241	241	241
COUNTY-OTHER	3,079	3,111	3,111	3,111	3,111	3,111
SULPHUR BASIN TOTAL POPULATION	**5,320**	**5,376**	**5,376**	**5,376**	**5,376**	**5,376**
DELTA COUNTY TOTAL POPULATION	**5,320**	**5,376**	**5,376**	**5,376**	**5,376**	**5,376**
FRANKLIN COUNTY						
CYPRESS BASIN						
CYPRESS SPRINGS SUD	4,235	4,427	4,543	4,655	4,740	4,806
WINNSBORO	739	772	792	812	827	838
COUNTY-OTHER	368	385	394	404	410	417
CYPRESS BASIN TOTAL POPULATION	**5,342**	**5,584**	**5,729**	**5,871**	**5,977**	**6,061**
SULPHUR BASIN						
CYPRESS SPRINGS SUD	2,535	2,649	2,718	2,786	2,836	2,876
MOUNT VERNON	2,793	2,919	2,995	3,069	3,125	3,169
COUNTY-OTHER	454	475	488	500	509	516
SULPHUR BASIN TOTAL POPULATION	**5,782**	**6,043**	**6,201**	**6,355**	**6,470**	**6,561**
FRANKLIN COUNTY TOTAL POPULATION	**11,124**	**11,627**	**11,930**	**12,226**	**12,447**	**12,622**
GREGG COUNTY						
CYPRESS BASIN						
TRYON ROAD SUD	4,167	4,563	5,016	5,528	6,104	6,755
COUNTY-OTHER	860	942	1,036	1,142	1,261	1,396
CYPRESS BASIN TOTAL POPULATION	**5,027**	**5,505**	**6,052**	**6,670**	**7,365**	**8,151**
SABINE BASIN						
CLARKSVILLE CITY	948	1,038	1,141	1,258	1,389	1,537
CROSS ROADS SUD	364	399	438	483	533	590
EASTON	502	550	605	666	735	814
ELDERVILLE WSC	3,441	3,769	4,143	4,566	5,041	5,579
GLADEWATER	4,376	4,792	5,268	5,806	6,410	7,094
KILGORE	10,913	11,951	13,139	14,480	15,987	17,694
LAKEPORT	1,067	1,169	1,285	1,416	1,564	1,730
LIBERTY CITY WSC	5,014	5,491	6,037	6,653	7,346	8,130

Water User Group (WUG) Population

REGION D	WUG POPULATION					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
GREGG COUNTY						
SABINE BASIN						
LONGVIEW	86,085	94,275	103,640	114,219	126,114	139,574
TRYON ROAD SUD	293	321	353	389	430	476
WEST GREGG SUD	3,552	3,890	4,276	4,713	5,203	5,759
WHITE OAK	7,087	7,761	8,532	9,403	10,382	11,490
COUNTY-OTHER	4,678	5,123	5,631	6,205	6,853	7,585
SABINE BASIN TOTAL POPULATION	**128,320**	**140,529**	**154,488**	**170,257**	**187,987**	**208,052**
GREGG COUNTY TOTAL POPULATION	**133,347**	**146,034**	**160,540**	**176,927**	**195,352**	**216,203**
HARRISON COUNTY						
CYPRESS BASIN						
DIANA SUD	357	384	411	449	491	540
GUM SPRINGS WSC	1,962	2,107	2,257	2,468	2,697	2,968
MARSHALL	4,437	4,765	5,105	5,581	6,100	6,713
TRYON ROAD SUD	756	812	870	951	1,039	1,144
WASKOM	2,315	2,487	2,664	2,912	3,183	3,503
COUNTY-OTHER	16,655	17,885	19,160	20,949	22,900	25,196
CYPRESS BASIN TOTAL POPULATION	**26,482**	**28,440**	**30,467**	**33,310**	**36,410**	**40,064**
SABINE BASIN						
GILL WSC	1,456	1,563	1,675	1,831	2,001	2,202
GUM SPRINGS WSC	5,340	5,735	6,144	6,717	7,342	8,079
HALLSVILLE	3,834	4,117	4,411	4,822	5,271	5,800
LONGVIEW	2,005	2,153	2,306	2,521	2,756	3,032
MARSHALL	20,773	22,309	23,899	26,130	28,561	31,427
COUNTY-OTHER	10,447	11,221	12,019	13,143	14,365	15,809
SABINE BASIN TOTAL POPULATION	**43,855**	**47,098**	**50,454**	**55,164**	**60,296**	**66,349**
HARRISON COUNTY TOTAL POPULATION	**70,337**	**75,538**	**80,921**	**88,474**	**96,706**	**106,413**
HOPKINS COUNTY						
CYPRESS BASIN						
CYPRESS SPRINGS SUD	310	310	310	310	310	310
COUNTY-OTHER	442	499	552	613	671	730
CYPRESS BASIN TOTAL POPULATION	**752**	**809**	**862**	**923**	**981**	**1,040**
SABINE BASIN						
CASH SUD	101	109	116	124	132	139
COMO	573	628	678	736	791	847
CUMBY	838	972	1,094	1,235	1,371	1,507
JONES WSC	140	169	195	225	254	283
MARTIN SPRINGS WSC	3,195	3,737	4,233	4,801	5,349	5,900
SULPHUR SPRINGS	49	51	53	56	58	61
COUNTY-OTHER	4,269	4,203	4,142	4,071	4,004	3,936
SABINE BASIN TOTAL POPULATION	**9,165**	**9,869**	**10,511**	**11,248**	**11,959**	**12,673**

Water User Group (WUG) Population

REGION D	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
HOPKINS COUNTY						
SULPHUR BASIN						
BRINKER WSC	2,252	2,601	2,919	3,284	3,636	3,990
COMO	201	220	238	258	278	297
CUMBY	81	94	106	119	132	145
CYPRESS SPRINGS SUD	602	602	602	602	602	602
MARTIN SPRINGS WSC	584	684	774	878	978	1,079
NORTH HOPKINS WSC	5,907	6,576	7,186	7,887	8,563	9,242
SULPHUR SPRINGS	16,191	17,008	17,753	18,608	19,433	20,261
COUNTY-OTHER	2,243	2,432	2,604	2,803	2,994	3,188
SULPHUR BASIN TOTAL POPULATION	**28,061**	**30,217**	**32,182**	**34,439**	**36,616**	**38,804**
HOPKINS COUNTY TOTAL POPULATION	**37,978**	**40,895**	**43,555**	**46,610**	**49,556**	**52,517**
HUNT COUNTY						
SABINE BASIN						
ABLES SPRINGS WSC	893	1,368	2,012	2,902	4,170	6,013
BLACKLAND WSC	32	32	32	32	32	32
CADDO BASIN SUD	6,337	8,401	11,201	15,067	20,576	28,581
CADDO MILLS	1,710	2,214	2,898	3,843	5,190	7,147
CAMPBELL	727	903	1,143	1,473	1,944	2,629
CASH SUD	17,740	21,288	25,545	30,654	36,784	44,140
CELESTE	991	1,231	1,558	2,009	2,651	3,584
COMBINED CONSUMERS SUD	6,063	7,535	9,531	12,288	16,216	21,923
GREENVILLE	28,700	32,964	38,749	46,738	58,120	74,659
HICKORY CREEK SUD	2,045	2,989	4,269	6,038	8,558	12,219
JOSEPHINE	131	232	369	559	559	559
LONE OAK	749	954	1,232	1,617	2,165	2,962
MACBEE SUD	337	419	530	683	902	1,219
QUINLAN	1,441	1,505	1,591	1,711	1,882	2,130
ROYSE CITY	364	452	572	737	973	1,316
WEST TAWAKONI	1,800	2,104	2,516	3,086	3,898	5,078
COUNTY-OTHER	16,719	23,249	32,662	46,427	67,453	99,563
SABINE BASIN TOTAL POPULATION	**86,779**	**107,840**	**136,410**	**175,864**	**232,073**	**313,754**
SULPHUR BASIN						
CAMPBELL	50	62	78	101	133	180
CASH SUD	252	302	363	435	522	627
COMMERCE	8,883	9,975	11,456	13,502	16,416	20,651
HICKORY CREEK SUD	1,419	2,076	2,966	4,195	5,944	8,488
NORTH HUNT SUD	3,483	4,551	6,000	8,001	10,851	14,993
WOLFE CITY	1,719	2,136	2,703	3,484	4,598	6,217
COUNTY-OTHER	1,350	2,091	3,174	4,559	7,020	9,959
SULPHUR BASIN TOTAL POPULATION	**17,156**	**21,193**	**26,740**	**34,277**	**45,484**	**61,115**

Water User Group (WUG) Population

REGION D	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
HUNT COUNTY						
TRINITY BASIN						
HICKORY CREEK SUD	700	1,021	1,459	2,062	2,924	4,175
COUNTY-OTHER	259	297	277	372	37	206
TRINITY BASIN TOTAL POPULATION	**959**	**1,318**	**1,736**	**2,434**	**2,961**	**4,381**
HUNT COUNTY TOTAL POPULATION	**104,894**	**130,351**	**164,886**	**212,575**	**280,518**	**379,250**
LAMAR COUNTY						
RED BASIN						
LAMAR COUNTY WSD	11,919	12,381	12,722	13,031	13,272	13,467
PARIS	10,487	10,893	11,193	11,465	11,677	11,848
RENO	438	455	467	479	488	495
COUNTY-OTHER	820	851	875	896	913	926
RED BASIN TOTAL POPULATION	**23,664**	**24,580**	**25,257**	**25,871**	**26,350**	**26,736**
SULPHUR BASIN						
BLOSSOM	1,566	1,626	1,671	1,712	1,744	1,769
DEPORT	552	573	589	603	614	623
LAMAR COUNTY WSD	5,053	5,248	5,393	5,524	5,626	5,708
PARIS	15,886	16,501	16,956	17,368	17,690	17,949
RENO	2,880	2,991	3,074	3,148	3,206	3,253
ROXTON	682	708	727	745	759	770
COUNTY-OTHER	1,887	1,962	2,016	2,066	2,103	2,135
SULPHUR BASIN TOTAL POPULATION	**28,506**	**29,609**	**30,426**	**31,166**	**31,742**	**32,207**
LAMAR COUNTY TOTAL POPULATION	**52,170**	**54,189**	**55,683**	**57,037**	**58,092**	**58,943**
MARION COUNTY						
CYPRESS BASIN						
DIANA SUD	384	384	384	384	384	384
JEFFERSON	2,117	2,117	2,117	2,117	2,117	2,117
COUNTY-OTHER	8,100	8,100	8,100	8,100	8,100	8,100
CYPRESS BASIN TOTAL POPULATION	**10,601**	**10,601**	**10,601**	**10,601**	**10,601**	**10,601**
MARION COUNTY TOTAL POPULATION	**10,601**	**10,601**	**10,601**	**10,601**	**10,601**	**10,601**
MORRIS COUNTY						
CYPRESS BASIN						
BI COUNTY WSC	1,276	1,299	1,325	1,364	1,395	1,426
DAINGERFIELD	2,646	2,695	2,749	2,829	2,894	2,958
HUGHES SPRINGS	7	7	7	7	7	7
LONE STAR	1,634	1,664	1,698	1,748	1,787	1,827
NAPLES	644	656	669	688	704	720
OMAHA	627	639	652	671	685	701
TRI SUD	1,650	1,680	1,714	1,764	1,804	1,844
COUNTY-OTHER	2,833	2,887	2,945	3,032	3,102	3,170
CYPRESS BASIN TOTAL POPULATION	**11,317**	**11,527**	**11,759**	**12,103**	**12,378**	**12,653**

Water User Group (WUG) Population

REGION D	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
MORRIS COUNTY						
SULPHUR BASIN						
NAPLES	780	795	811	835	854	872
OMAHA	428	436	445	458	469	479
COUNTY-OTHER	839	854	871	897	917	938
SULPHUR BASIN TOTAL POPULATION	**2,047**	**2,085**	**2,127**	**2,190**	**2,240**	**2,289**
MORRIS COUNTY TOTAL POPULATION	**13,364**	**13,612**	**13,886**	**14,293**	**14,618**	**14,942**
RAINS COUNTY						
SABINE BASIN						
ALBA	3	3	3	3	3	3
BRIGHT STAR-SALEM SUD	2,090	2,216	2,252	2,276	2,286	2,291
CASH SUD	691	733	745	753	756	758
EAST TAWAKONI	962	1,020	1,037	1,048	1,053	1,055
EMORY	1,350	1,431	1,455	1,470	1,477	1,480
GOLDEN WSC	55	58	59	60	60	60
POINT	894	948	963	973	978	980
COUNTY-OTHER	5,843	6,196	6,295	6,364	6,394	6,408
SABINE BASIN TOTAL POPULATION	**11,888**	**12,605**	**12,809**	**12,947**	**13,007**	**13,035**
RAINS COUNTY TOTAL POPULATION	**11,888**	**12,605**	**12,809**	**12,947**	**13,007**	**13,035**
RED RIVER COUNTY						
RED BASIN						
RED RIVER COUNTY WSC	1,546	1,642	1,739	1,835	2,132	2,229
COUNTY-OTHER	944	848	751	655	98	11
RED BASIN TOTAL POPULATION	**2,490**	**2,490**	**2,490**	**2,490**	**2,230**	**2,240**
SULPHUR BASIN						
BOGATA	1,164	1,164	1,164	1,164	1,164	1,164
CLARKSVILLE	3,315	3,315	3,315	3,315	3,315	3,315
DEPORT	53	53	53	53	53	53
DETROIT	739	739	739	739	739	739
RED RIVER COUNTY WSC	4,286	4,554	4,822	5,091	5,159	5,427
COUNTY-OTHER	929	661	393	124	316	38
SULPHUR BASIN TOTAL POPULATION	**10,486**	**10,486**	**10,486**	**10,486**	**10,746**	**10,736**
RED RIVER COUNTY TOTAL POPULATION	**12,976**	**12,976**	**12,976**	**12,976**	**12,976**	**12,976**
SMITH COUNTY						
SABINE BASIN						
CRYSTAL SYSTEMS INC	1,970	2,248	2,564	2,932	3,367	3,883
HIDEAWAY	3,504	3,998	4,558	5,214	5,986	6,904
JACKSON WSC	2,150	2,453	2,797	3,199	3,673	4,237
LIBERTY CITY WSC	136	155	177	202	233	268
LINDALE	4,023	4,882	5,856	6,996	8,339	9,935
LINDALE RURAL WSC	5,487	6,261	7,139	8,165	9,375	10,812
OVERTON	76	86	99	113	130	150

Water User Group (WUG) Population

REGION D	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
SMITH COUNTY						
SABINE BASIN						
SMITH COUNTY MUD #1	1,035	1,181	1,347	1,540	1,769	2,040
SOUTHERN UTILITIES COMPANY	11,958	13,644	15,557	17,794	20,430	23,563
TYLER	999	1,139	1,299	1,486	1,706	1,968
WEST GREGG SUD	909	1,037	1,182	1,353	1,553	1,791
WINONA	654	747	851	974	1,118	1,290
COUNTY-OTHER	11,639	12,990	14,518	16,307	18,414	20,921
SABINE BASIN TOTAL POPULATION	**44,540**	**50,821**	**57,944**	**66,275**	**76,093**	**87,762**
SMITH COUNTY TOTAL POPULATION	**44,540**	**50,821**	**57,944**	**66,275**	**76,093**	**87,762**
TITUS COUNTY						
CYPRESS BASIN						
BI COUNTY WSC	362	409	457	510	566	625
CYPRESS SPRINGS SUD	90	101	113	127	140	155
MOUNT PLEASANT	17,639	19,919	22,279	24,869	27,596	30,477
TRI SUD	9,252	10,448	11,686	13,044	14,475	15,986
WINFIELD	151	171	192	214	237	262
COUNTY-OTHER	1,798	2,031	2,271	2,536	2,814	3,108
CYPRESS BASIN TOTAL POPULATION	**29,292**	**33,079**	**36,998**	**41,300**	**45,828**	**50,613**
SULPHUR BASIN						
CYPRESS SPRINGS SUD	144	163	182	203	226	249
TALCO	585	661	739	825	915	1,011
TRI SUD	4,811	5,434	6,077	6,784	7,527	8,313
WINFIELD	443	500	559	624	693	765
COUNTY-OTHER	1,368	1,544	1,728	1,929	2,141	2,364
SULPHUR BASIN TOTAL POPULATION	**7,351**	**8,302**	**9,285**	**10,365**	**11,502**	**12,702**
TITUS COUNTY TOTAL POPULATION	**36,643**	**41,381**	**46,283**	**51,665**	**57,330**	**63,315**
UPSHUR COUNTY						
CYPRESS BASIN						
BI COUNTY WSC	3,872	4,183	4,451	4,727	4,979	5,216
DIANA SUD	4,868	5,259	5,596	5,943	6,260	6,557
EAST MOUNTAIN	241	260	277	294	310	324
GILMER	5,328	5,757	6,126	6,505	6,853	7,178
ORE CITY	1,243	1,343	1,429	1,518	1,599	1,674
PRITCHETT WSC	2,159	2,333	2,483	2,636	2,777	2,909
SHARON WSC	1,792	1,936	2,060	2,187	2,304	2,413
COUNTY-OTHER	8,899	9,615	10,233	10,866	11,448	11,991
CYPRESS BASIN TOTAL POPULATION	**28,402**	**30,686**	**32,655**	**34,676**	**36,530**	**38,262**
SABINE BASIN						
BIG SANDY	1,459	1,577	1,678	1,781	1,877	1,966
EAST MOUNTAIN	625	676	719	763	804	843
FOUKE WSC	97	105	112	119	125	131

Water User Group (WUG) Population

REGION D	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
UPSHUR COUNTY						
SABINE BASIN						
GLADEWATER	2,658	2,872	3,056	3,245	3,419	3,581
PRITCHETT WSC	5,200	5,618	5,978	6,349	6,688	7,005
COUNTY-OTHER	4,255	4,595	4,891	5,195	5,472	5,731
SABINE BASIN TOTAL POPULATION	**14,294**	**15,443**	**16,434**	**17,452**	**18,385**	**19,257**
UPSHUR COUNTY TOTAL POPULATION	**42,696**	**46,129**	**49,089**	**52,128**	**54,915**	**57,519**
VAN ZANDT COUNTY						
NECHES BASIN						
BETHEL-ASH WSC	714	934	1,103	1,271	1,409	1,528
R-P-M WSC	2,303	2,847	3,263	3,676	4,019	4,313
VAN	1,922	2,144	2,314	2,482	2,622	2,742
COUNTY-OTHER	8,782	9,132	9,398	9,663	9,885	10,073
NECHES BASIN TOTAL POPULATION	**13,721**	**15,057**	**16,078**	**17,092**	**17,935**	**18,656**
SABINE BASIN						
ABLES SPRINGS WSC	34	37	40	42	45	46
CANTON	3,947	4,316	4,598	4,877	5,109	5,308
COMBINED CONSUMERS SUD	1,105	1,212	1,294	1,376	1,444	1,502
EDGEWOOD	1,564	1,683	1,774	1,864	1,939	2,003
GOLDEN WSC	700	758	803	847	884	915
GRAND SALINE	3,278	3,416	3,521	3,626	3,713	3,787
MACBEE SUD	2,619	2,874	3,068	3,262	3,423	3,561
SOUTH TAWAKONI WSC	4,261	4,844	5,289	5,731	6,098	6,412
VAN	1,067	1,191	1,285	1,379	1,457	1,523
WILLS POINT	1,421	1,435	1,446	1,456	1,465	1,473
COUNTY-OTHER	11,594	12,900	13,899	14,892	15,715	16,421
SABINE BASIN TOTAL POPULATION	**31,590**	**34,666**	**37,017**	**39,352**	**41,292**	**42,951**
TRINITY BASIN						
BETHEL-ASH WSC	201	264	311	358	398	431
CANTON	16	17	18	20	21	21
MACBEE SUD	4,272	4,688	5,007	5,323	5,585	5,809
WILLS POINT	2,140	2,161	2,177	2,194	2,207	2,218
COUNTY-OTHER	6,515	7,293	7,888	8,478	8,969	9,392
TRINITY BASIN TOTAL POPULATION	**13,144**	**14,423**	**15,401**	**16,373**	**17,180**	**17,871**
VAN ZANDT COUNTY TOTAL POPULATION	**58,455**	**64,146**	**68,496**	**72,817**	**76,407**	**79,478**
WOOD COUNTY						
CYPRESS BASIN						
CYPRESS SPRINGS SUD	364	379	385	395	399	403
SHARON WSC	1,228	1,280	1,300	1,332	1,348	1,359
WINNSBORO	1,127	1,174	1,193	1,222	1,236	1,246
COUNTY-OTHER	894	931	947	969	982	989
CYPRESS BASIN TOTAL POPULATION	**3,613**	**3,764**	**3,825**	**3,918**	**3,965**	**3,997**

Water User Group (WUG) Population

REGION D	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
WOOD COUNTY						
SABINE BASIN						
ALBA	537	560	569	582	589	594
BRIGHT STAR-SALEM SUD	1,557	1,622	1,648	1,689	1,709	1,722
FOUKE WSC	7,240	7,542	7,664	7,852	7,945	8,008
GOLDEN WSC	2,680	2,791	2,836	2,906	2,940	2,964
HAWKINS	1,367	1,424	1,447	1,482	1,500	1,512
HOLLY RANCH WATER COMPANY	2,746	2,860	2,907	2,978	3,013	3,037
JONES WSC	3,870	4,032	4,097	4,197	4,247	4,281
MINEOLA	4,827	5,029	5,110	5,235	5,297	5,339
NEW HOPE SUD	2,534	2,640	2,682	2,748	2,781	2,803
PRITCHETT WSC	81	84	85	87	88	89
QUITMAN	1,934	2,015	2,048	2,098	2,123	2,140
RAMEY WSC	3,512	3,659	3,718	3,809	3,854	3,885
SHARON WSC	2,516	2,621	2,663	2,729	2,761	2,783
WINNSBORO	1,792	1,867	1,897	1,944	1,967	1,983
COUNTY-OTHER	4,056	4,225	4,292	4,397	4,450	4,485
SABINE BASIN TOTAL POPULATION	**41,249**	**42,971**	**43,663**	**44,733**	**45,264**	**45,625**
WOOD COUNTY TOTAL POPULATION	**44,862**	**46,735**	**47,488**	**48,651**	**49,229**	**49,622**
REGION D TOTAL POPULATION	**831,469**	**907,531**	**988,859**	**1,089,197**	**1,211,979**	**1,370,438**

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Water User Group (WUG) Demand

REGION D	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
BOWIE COUNTY						
RED BASIN						
CENTRAL BOWIE COUNTY WSC	84	83	84	84	84	84
DE KALB	47	47	46	46	46	46
HOOKS	265	258	249	244	243	243
NEW BOSTON	323	325	322	321	321	321
RED LICK	66	66	65	64	64	64
TEXAMERICAS CENTER	88	90	90	90	90	90
TEXARKANA	1,507	1,530	1,527	1,518	1,517	1,517
COUNTY-OTHER	816	804	791	787	785	785
MANUFACTURING	16	17	18	20	21	23
LIVESTOCK	435	435	395	339	290	271
IRRIGATION	3,826	3,826	3,727	3,479	3,248	3,150
RED BASIN TOTAL DEMAND	**7,473**	**7,481**	**7,314**	**6,992**	**6,709**	**6,594**
SULPHUR BASIN						
CENTRAL BOWIE COUNTY WSC	451	446	450	450	450	450
DE KALB	257	256	253	252	251	251
MACEDONIA-EYLAU MUD #1	565	574	577	577	577	577
MAUD	170	169	167	165	164	164
NASH	206	212	214	214	214	214
NEW BOSTON	775	779	772	770	768	768
RED LICK	55	55	54	53	53	53
REDWATER	148	148	145	143	143	143
TEXAMERICAS CENTER	426	437	439	438	438	438
TEXARKANA	11,264	11,430	11,411	11,347	11,335	11,334
WAKE VILLAGE	677	669	654	644	642	642
COUNTY-OTHER	1,563	1,551	1,530	1,525	1,519	1,519
MANUFACTURING	1,563	1,697	1,827	1,937	2,094	2,263
LIVESTOCK	721	721	655	561	481	449
IRRIGATION	2,395	2,395	2,333	2,178	2,033	1,971
SULPHUR BASIN TOTAL DEMAND	**21,236**	**21,539**	**21,481**	**21,254**	**21,162**	**21,236**
BOWIE COUNTY TOTAL DEMAND	**28,709**	**29,020**	**28,795**	**28,246**	**27,871**	**27,830**
CAMP COUNTY						
CYPRESS BASIN						
BI COUNTY WSC	708	820	907	1,019	1,131	1,241
PITTSBURG	831	849	862	889	920	953
COUNTY-OTHER	136	116	100	82	64	48
MANUFACTURING	46	48	50	52	55	58
MINING	12	11	10	9	8	7
LIVESTOCK	952	952	952	952	952	952
CYPRESS BASIN TOTAL DEMAND	**2,685**	**2,796**	**2,881**	**3,003**	**3,130**	**3,259**
CAMP COUNTY TOTAL DEMAND	**2,685**	**2,796**	**2,881**	**3,003**	**3,130**	**3,259**
CASS COUNTY						
CYPRESS BASIN						
ATLANTA	999	978	955	947	945	945
EASTERN CASS WSC	152	147	142	140	139	139
HUGHES SPRINGS	201	194	186	185	184	184
LINDEN	289	280	273	272	272	271
QUEEN CITY	142	138	135	135	134	134

Water User Group (WUG) Demand

REGION D	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
CASS COUNTY						
CYPRESS BASIN						
COUNTY-OTHER	1,243	1,183	1,127	1,107	1,103	1,103
MANUFACTURING	115	121	127	132	141	151
MINING	39	58	60	45	30	20
LIVESTOCK	363	363	363	363	363	363
CYPRESS BASIN TOTAL DEMAND	**3,543**	**3,462**	**3,368**	**3,326**	**3,311**	**3,310**
SULPHUR BASIN						
ATLANTA	1	1	1	1	1	1
EASTERN CASS WSC	12	12	11	11	11	11
QUEEN CITY	86	84	81	81	81	81
COUNTY-OTHER	346	330	314	309	307	307
MANUFACTURING	115,084	121,234	127,110	132,192	141,158	150,732
LIVESTOCK	352	352	352	352	352	352
SULPHUR BASIN TOTAL DEMAND	**115,881**	**122,013**	**127,869**	**132,946**	**141,910**	**151,484**
CASS COUNTY TOTAL DEMAND	**119,424**	**125,475**	**131,237**	**136,272**	**145,221**	**154,794**
DELTA COUNTY						
SULPHUR BASIN						
COOPER	441	435	427	426	425	425
NORTH HUNT SUD	16	17	17	17	17	17
COUNTY-OTHER	207	210	210	210	210	210
LIVESTOCK	373	373	373	373	373	373
IRRIGATION	2,775	2,746	2,712	2,683	2,654	2,626
SULPHUR BASIN TOTAL DEMAND	**3,812**	**3,781**	**3,739**	**3,709**	**3,679**	**3,651**
DELTA COUNTY TOTAL DEMAND	**3,812**	**3,781**	**3,739**	**3,709**	**3,679**	**3,651**
FRANKLIN COUNTY						
CYPRESS BASIN						
CYPRESS SPRINGS SUD	383	383	379	381	387	392
WINNSBORO	138	141	142	144	146	148
COUNTY-OTHER	69	71	72	73	75	76
LIVESTOCK	414	414	414	414	414	414
IRRIGATION	8	8	8	8	8	8
CYPRESS BASIN TOTAL DEMAND	**1,012**	**1,017**	**1,015**	**1,020**	**1,030**	**1,038**
SABINE BASIN						
LIVESTOCK	1	1	1	1	1	1
SABINE BASIN TOTAL DEMAND	**1**	**1**	**1**	**1**	**1**	**1**
SULPHUR BASIN						
CYPRESS SPRINGS SUD	229	229	228	229	232	235
MOUNT VERNON	548	560	565	574	584	592
COUNTY-OTHER	84	88	90	92	93	94
MINING	5	5	4	4	3	2
LIVESTOCK	621	621	621	621	621	621
IRRIGATION	18	18	18	18	18	18
SULPHUR BASIN TOTAL DEMAND	**1,505**	**1,521**	**1,526**	**1,538**	**1,551**	**1,562**
FRANKLIN COUNTY TOTAL DEMAND	**2,518**	**2,539**	**2,542**	**2,559**	**2,582**	**2,601**
GREGG COUNTY						
CYPRESS BASIN						
TRYON ROAD SUD	605	642	690	752	827	915
COUNTY-OTHER	112	118	125	138	151	168

Water User Group (WUG) Demand

REGION D	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
GREGG COUNTY						
CYPRESS BASIN						
MINING	14	22	21	17	12	9
LIVESTOCK	11	11	11	11	11	11
IRRIGATION	1	1	1	1	1	1
CYPRESS BASIN TOTAL DEMAND	**743**	**794**	**848**	**919**	**1,002**	**1,104**
SABINE BASIN						
CLARKSVILLE CITY	101	106	112	122	134	148
CROSS ROADS SUD	31	32	33	36	40	44
EASTON	34	37	41	45	50	55
ELDERVILLE WSC	232	254	279	307	339	375
GLADEWATER	732	779	838	914	1,007	1,113
KILGORE	2,355	2,525	2,735	2,991	3,297	3,647
LAKEPORT	95	99	105	113	124	137
LIBERTY CITY WSC	504	529	563	610	671	742
LONGVIEW	23,668	25,487	27,680	30,319	33,432	36,985
TRYON ROAD SUD	43	46	49	53	59	65
WEST GREGG SUD	308	321	341	369	406	448
WHITE OAK	1,371	1,467	1,586	1,733	1,909	2,112
COUNTY-OTHER	606	636	679	745	821	907
MANUFACTURING	4,251	4,713	5,165	5,554	6,028	6,542
MINING	260	411	408	320	234	171
STEAM ELECTRIC POWER	978	1,143	1,345	1,591	1,890	2,094
LIVESTOCK	204	204	204	204	204	204
IRRIGATION	23	23	23	23	23	23
SABINE BASIN TOTAL DEMAND	**35,796**	**38,812**	**42,186**	**46,049**	**50,668**	**55,812**
GREGG COUNTY TOTAL DEMAND	**36,539**	**39,606**	**43,034**	**46,968**	**51,670**	**56,916**
HARRISON COUNTY						
CYPRESS BASIN						
DIANA SUD	31	32	33	36	39	43
GUM SPRINGS WSC	183	187	193	207	225	247
MARSHALL	895	938	986	1,068	1,165	1,281
TRYON ROAD SUD	110	115	120	130	141	155
WASKOM	345	359	376	406	443	487
COUNTY-OTHER	1,951	2,015	2,096	2,256	2,457	2,702
MANUFACTURING	95	104	113	121	131	141
MINING	525	436	365	297	228	180
LIVESTOCK	514	540	567	595	624	658
IRRIGATION	267	267	267	267	267	267
CYPRESS BASIN TOTAL DEMAND	**4,916**	**4,993**	**5,116**	**5,383**	**5,720**	**6,161**
SABINE BASIN						
GILL WSC	168	173	178	194	211	232
GUM SPRINGS WSC	496	507	524	561	610	671
HALLSVILLE	523	545	572	618	674	741
LONGVIEW	552	583	616	670	731	804
MARSHALL	4,190	4,388	4,613	4,999	5,453	5,997
COUNTY-OTHER	1,225	1,265	1,315	1,416	1,542	1,695
MANUFACTURING	95,005	104,083	113,155	121,082	130,380	140,393
MINING	1,973	1,641	1,375	1,115	860	675

Water User Group (WUG) Demand

REGION D	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
HARRISON COUNTY						
SABINE BASIN						
STEAM ELECTRIC POWER	19,838	23,193	27,283	32,268	38,345	46,625
LIVESTOCK	342	360	378	396	416	439
IRRIGATION	178	178	178	178	178	178
SABINE BASIN TOTAL DEMAND	**124,490**	**136,916**	**150,187**	**163,497**	**179,400**	**198,450**
HARRISON COUNTY TOTAL DEMAND	**129,406**	**141,909**	**155,303**	**168,880**	**185,120**	**204,611**
HOPKINS COUNTY						
CYPRESS BASIN						
CYPRESS SPRINGS SUD	28	27	26	25	25	25
COUNTY-OTHER	52	56	60	66	72	78
MINING	31	34	36	40	44	47
LIVESTOCK	93	93	93	93	93	93
IRRIGATION	3	3	3	3	3	3
CYPRESS BASIN TOTAL DEMAND	**207**	**213**	**218**	**227**	**237**	**246**
SABINE BASIN						
CASH SUD	12	13	13	14	15	15
COMO	65	68	72	76	82	87
CUMBY	106	120	132	147	163	179
JONES WSC	13	15	16	18	21	23
MARTIN SPRINGS WSC	387	437	482	542	602	662
SULPHUR SPRINGS	10	10	10	11	11	12
COUNTY-OTHER	506	478	456	440	431	423
MINING	320	348	379	412	448	489
LIVESTOCK	1,148	1,148	1,148	1,148	1,148	1,148
IRRIGATION	35	35	35	35	35	35
SABINE BASIN TOTAL DEMAND	**2,602**	**2,672**	**2,743**	**2,843**	**2,956**	**3,073**
SULPHUR BASIN						
BRINKER WSC	241	268	293	325	359	393
COMO	23	24	25	27	29	31
CUMBY	11	12	13	15	16	18
CYPRESS SPRINGS SUD	55	52	51	50	50	50
MARTIN SPRINGS WSC	71	80	89	99	110	122
NORTH HOPKINS WSC	462	481	500	539	583	628
SULPHUR SPRINGS	3,186	3,268	3,350	3,476	3,624	3,777
COUNTY-OTHER	266	277	286	302	322	343
MANUFACTURING	1,741	1,830	1,915	1,987	2,126	2,275
MINING	680	742	807	877	954	1,041
LIVESTOCK	2,995	2,995	2,995	2,995	2,995	2,995
IRRIGATION	2,231	2,231	2,231	2,231	2,231	2,231
SULPHUR BASIN TOTAL DEMAND	**11,962**	**12,260**	**12,555**	**12,923**	**13,399**	**13,904**
HOPKINS COUNTY TOTAL DEMAND	**14,771**	**15,145**	**15,516**	**15,993**	**16,592**	**17,223**
HUNT COUNTY						
SABINE BASIN						
ABLES SPRINGS WSC	61	92	136	196	281	405
BLACKLAND WSC	7	7	7	7	7	7
CADDO BASIN SUD	707	898	1,168	1,555	2,118	2,939
CADDO MILLS	153	187	237	310	417	574

Water User Group (WUG) Demand

REGION D	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
HUNT COUNTY						
SABINE BASIN						
CAMPBELL	49	61	77	99	131	177
CASH SUD	2,038	2,368	2,789	3,316	3,969	4,758
CELESTE	122	145	178	227	299	403
COMBINED CONSUMERS SUD	502	589	718	910	1,195	1,612
GREENVILLE	8,908	10,070	11,709	14,051	17,451	22,405
HICKORY CREEK SUD	203	285	400	561	792	1,131
JOSEPHINE	20	34	54	81	81	81
LONE OAK	63	76	94	121	161	220
MACBEE SUD	23	29	36	46	61	82
QUINLAN	127	126	127	133	145	164
ROYSE CITY	43	52	64	82	108	146
WEST TAWAKONI	186	208	243	294	369	480
COUNTY-OTHER	2,081	2,803	3,875	5,471	7,933	11,698
MANUFACTURING	564	670	784	893	968	1,050
MINING	90	83	62	50	41	33
STEAM ELECTRIC POWER	12,436	14,539	17,102	20,228	24,038	28,564
LIVESTOCK	803	803	803	803	803	803
IRRIGATION	214	214	214	214	214	214
SABINE BASIN TOTAL DEMAND	**29,400**	**34,339**	**40,877**	**49,648**	**61,582**	**77,946**
SULPHUR BASIN						
CAMPBELL	4	4	6	7	9	12
CASH SUD	29	34	40	48	57	68
COMMERCE	1,427	1,556	1,749	2,040	2,474	3,109
HICKORY CREEK SUD	142	198	278	390	552	787
NORTH HUNT SUD	235	306	404	538	730	1,008
WOLFE CITY	169	199	243	311	409	552
COUNTY-OTHER	169	253	377	538	826	1,171
MANUFACTURING	141	167	196	223	242	262
MINING	35	32	24	19	16	13
LIVESTOCK	300	300	300	300	300	300
IRRIGATION	35	35	35	35	35	35
SULPHUR BASIN TOTAL DEMAND	**2,686**	**3,084**	**3,652**	**4,449**	**5,650**	**7,317**
TRINITY BASIN						
HICKORY CREEK SUD	70	98	137	192	272	387
COUNTY-OTHER	32	35	33	43	4	24
MINING	3	3	2	2	1	1
LIVESTOCK	38	38	38	38	38	38
IRRIGATION	5	5	5	5	5	5
TRINITY BASIN TOTAL DEMAND	**148**	**179**	**215**	**280**	**320**	**455**
HUNT COUNTY TOTAL DEMAND	**32,234**	**37,602**	**44,744**	**54,377**	**67,552**	**85,718**
LAMAR COUNTY						
RED BASIN						
LAMAR COUNTY WSD	1,557	1,572	1,582	1,602	1,626	1,650
PARIS	1,179	1,172	1,163	1,169	1,186	1,203
RENO	73	74	75	76	77	78
COUNTY-OTHER	127	129	132	135	137	139
MANUFACTURING	771	809	845	877	937	1,001

Water User Group (WUG) Demand

REGION D	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
LAMAR COUNTY						
RED BASIN						
STEAM ELECTRIC POWER	8,503	9,941	11,694	13,831	16,435	19,529
LIVESTOCK	1,176	1,176	1,176	1,176	1,176	1,176
IRRIGATION	17,078	17,024	16,970	16,917	16,865	16,815
RED BASIN TOTAL DEMAND	**30,464**	**31,897**	**33,637**	**35,783**	**38,439**	**41,591**
SULPHUR BASIN						
BLOSSOM	138	136	134	134	135	137
DEPORT	42	40	40	41	42	42
LAMAR COUNTY WSD	660	667	671	679	690	700
PARIS	1,785	1,775	1,760	1,769	1,796	1,822
RENO	476	483	487	494	503	510
ROXTON	66	65	64	64	65	66
COUNTY-OTHER	291	295	302	309	314	319
MANUFACTURING	5,656	5,932	6,200	6,429	6,868	7,337
LIVESTOCK	1,624	1,624	1,624	1,624	1,624	1,624
IRRIGATION	3,867	3,855	3,843	3,831	3,819	3,807
SULPHUR BASIN TOTAL DEMAND	**14,605**	**14,872**	**15,125**	**15,374**	**15,856**	**16,364**
LAMAR COUNTY TOTAL DEMAND	**45,069**	**46,769**	**48,762**	**51,157**	**54,295**	**57,955**
MARION COUNTY						
CYPRESS BASIN						
DIANA SUD	34	32	31	31	30	30
JEFFERSON	389	379	371	366	365	365
COUNTY-OTHER	545	545	545	545	545	545
MANUFACTURING	72	76	79	83	89	95
MINING	489	764	712	595	478	393
STEAM ELECTRIC POWER	1,852	2,165	2,547	3,012	3,580	3,967
LIVESTOCK	411	411	411	411	411	411
CYPRESS BASIN TOTAL DEMAND	**3,792**	**4,372**	**4,696**	**5,043**	**5,498**	**5,806**
MARION COUNTY TOTAL DEMAND	**3,792**	**4,372**	**4,696**	**5,043**	**5,498**	**5,806**
MORRIS COUNTY						
CYPRESS BASIN						
BI COUNTY WSC	132	130	130	132	134	137
DAINGERFIELD	473	469	467	476	486	497
HUGHES SPRINGS	1	1	1	1	1	1
LONE STAR	186	182	179	181	184	188
NAPLES	75	73	72	73	75	76
OMAHA	111	110	110	112	114	116
TRI SUD	164	161	160	163	166	170
COUNTY-OTHER	343	334	331	339	345	353
MANUFACTURING	95,931	102,101	107,795	112,420	121,294	130,868
STEAM ELECTRIC POWER	43	50	59	69	82	91
LIVESTOCK	322	322	322	322	322	322
CYPRESS BASIN TOTAL DEMAND	**97,781**	**103,933**	**109,626**	**114,288**	**123,203**	**132,819**
SULPHUR BASIN						
NAPLES	90	88	86	88	90	92
OMAHA	75	74	74	75	77	79
COUNTY-OTHER	102	99	98	101	103	105

Water User Group (WUG) Demand

REGION D	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
MORRIS COUNTY						
SULPHUR BASIN						
LIVESTOCK	296	296	296	296	296	296
SULPHUR BASIN TOTAL DEMAND	**563**	**557**	**554**	**560**	**566**	**572**
MORRIS COUNTY TOTAL DEMAND	**98,344**	**104,490**	**110,180**	**114,848**	**123,769**	**133,391**
RAINS COUNTY						
SABINE BASIN						
ALBA	1	1	1	1	1	1
BRIGHT STAR-SALEM SUD	169	167	162	162	162	162
CASH SUD	80	82	82	82	82	82
EAST TAWAKONI	197	205	205	206	207	207
EMORY	498	522	527	530	532	533
GOLDEN WSC	5	5	5	5	5	5
POINT	220	229	229	230	231	231
COUNTY-OTHER	587	606	606	606	607	608
MANUFACTURING	3	3	3	3	3	3
LIVESTOCK	506	506	506	506	506	506
IRRIGATION	38	38	38	38	38	38
SABINE BASIN TOTAL DEMAND	**2,304**	**2,364**	**2,364**	**2,369**	**2,374**	**2,376**
RAINS COUNTY TOTAL DEMAND	**2,304**	**2,364**	**2,364**	**2,369**	**2,374**	**2,376**
RED RIVER COUNTY						
RED BASIN						
RED RIVER COUNTY WSC	117	117	117	124	144	150
COUNTY-OTHER	120	103	91	79	12	2
LIVESTOCK	738	738	738	738	738	738
IRRIGATION	1,436	1,422	1,407	1,392	1,378	1,364
RED BASIN TOTAL DEMAND	**2,411**	**2,380**	**2,353**	**2,333**	**2,272**	**2,254**
SULPHUR BASIN						
BOGATA	122	116	112	112	111	111
CLARKSVILLE	620	602	593	592	591	591
DEPORT	4	4	4	4	4	4
DETROIT	50	50	50	50	50	50
RED RIVER COUNTY WSC	324	322	324	342	347	365
COUNTY-OTHER	118	81	48	15	38	4
MANUFACTURING	9	9	9	9	10	11
MINING	4	4	3	3	3	3
STEAM ELECTRIC POWER	489	572	673	796	946	1,048
LIVESTOCK	746	746	746	746	746	746
IRRIGATION	3,720	3,681	3,643	3,606	3,567	3,531
SULPHUR BASIN TOTAL DEMAND	**6,206**	**6,187**	**6,205**	**6,275**	**6,413**	**6,464**
RED RIVER COUNTY TOTAL DEMAND	**8,617**	**8,567**	**8,558**	**8,608**	**8,685**	**8,718**
SMITH COUNTY						
SABINE BASIN						
CRYSTAL SYSTEMS INC	616	695	791	903	1,036	1,194
HIDEAWAY	1,004	1,140	1,296	1,480	1,697	1,956
JACKSON WSC	197	213	235	263	301	347
LIBERTY CITY WSC	14	15	17	19	22	25
LINDALE	913	1,091	1,298	1,544	1,838	2,188

Water User Group (WUG) Demand

REGION D	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
SMITH COUNTY						
SABINE BASIN						
LINDALE RURAL WSC	429	465	512	575	657	756
OVERTON	17	18	21	23	27	31
SMITH COUNTY MUD #1	464	525	596	679	780	899
SOUTHERN UTILITIES COMPANY	2,045	2,272	2,540	2,876	3,295	3,798
TYLER	192	214	239	272	311	359
WEST GREGG SUD	79	86	95	106	121	140
WINONA	136	151	169	192	220	254
COUNTY-OTHER	1,371	1,479	1,619	1,799	2,026	2,300
MANUFACTURING	300	327	354	377	408	442
MINING	287	309	341	394	438	497
STEAM ELECTRIC POWER	12	14	16	19	23	27
LIVESTOCK	468	468	468	468	468	468
IRRIGATION	370	389	408	428	450	475
SABINE BASIN TOTAL DEMAND	**8,914**	**9,871**	**11,015**	**12,417**	**14,118**	**16,156**
SMITH COUNTY TOTAL DEMAND	**8,914**	**9,871**	**11,015**	**12,417**	**14,118**	**16,156**
TITUS COUNTY						
CYPRESS BASIN						
BI COUNTY WSC	38	41	45	50	55	60
CYPRESS SPRINGS SUD	9	9	10	11	12	13
MOUNT PLEASANT	3,918	4,334	4,780	5,299	5,871	6,481
TRI SUD	918	1,000	1,091	1,202	1,329	1,466
WINFIELD	17	18	20	22	24	27
COUNTY-OTHER	282	311	345	386	427	470
MANUFACTURING	8,995	9,315	9,615	9,864	10,537	11,256
MINING	1,512	1,633	1,756	1,891	2,039	2,201
STEAM ELECTRIC POWER	52,423	61,288	72,096	85,270	101,329	120,703
LIVESTOCK	428	428	428	428	428	428
IRRIGATION	82	82	82	82	82	82
CYPRESS BASIN TOTAL DEMAND	**68,622**	**78,459**	**90,268**	**104,505**	**122,133**	**143,187**
SULPHUR BASIN						
CYPRESS SPRINGS SUD	13	14	15	17	18	20
TALCO	70	76	82	91	101	111
TRI SUD	478	520	568	626	692	763
WINFIELD	47	52	57	62	69	76
COUNTY-OTHER	215	236	264	293	325	359
MINING	132	142	153	164	177	191
LIVESTOCK	502	502	502	502	502	502
IRRIGATION	918	918	918	918	918	918
SULPHUR BASIN TOTAL DEMAND	**2,375**	**2,460**	**2,559**	**2,673**	**2,802**	**2,940**
TITUS COUNTY TOTAL DEMAND	**70,997**	**80,919**	**92,827**	**107,178**	**124,935**	**146,127**
UPSHUR COUNTY						
CYPRESS BASIN						
BI COUNTY WSC	401	417	434	455	478	500
DIANA SUD	423	435	447	466	489	512
EAST MOUNTAIN	29	31	32	33	35	36
GILMER	1,051	1,108	1,157	1,217	1,280	1,340

Water User Group (WUG) Demand

REGION D	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
UPSHUR COUNTY						
CYPRESS BASIN						
ORE CITY	148	154	159	166	175	183
PRITCHETT WSC	191	196	200	208	218	229
SHARON WSC	143	145	146	154	161	169
COUNTY-OTHER	1,013	1,054	1,091	1,142	1,199	1,255
MANUFACTURING	272	291	312	330	355	382
MINING	299	574	609	481	355	263
LIVESTOCK	1,005	1,005	1,005	1,005	1,005	1,005
IRRIGATION	165	165	165	165	165	165
CYPRESS BASIN TOTAL DEMAND	**5,140**	**5,575**	**5,757**	**5,822**	**5,915**	**6,039**
SABINE BASIN						
BIG SANDY	223	234	243	255	268	280
EAST MOUNTAIN	75	78	81	85	89	93
FOUKE WSC	11	12	12	13	13	14
GLADEWATER	445	467	486	511	537	562
PRITCHETT WSC	458	470	481	500	525	549
COUNTY-OTHER	485	504	522	546	573	600
MINING	80	152	162	128	95	70
LIVESTOCK	353	353	353	353	353	353
IRRIGATION	20	20	20	20	20	20
SABINE BASIN TOTAL DEMAND	**2,150**	**2,290**	**2,360**	**2,411**	**2,473**	**2,541**
UPSHUR COUNTY TOTAL DEMAND	**7,290**	**7,865**	**8,117**	**8,233**	**8,388**	**8,580**
VAN ZANDT COUNTY						
NECHES BASIN						
BETHEL-ASH WSC	73	92	106	120	134	145
R-P-M WSC	251	299	336	375	409	438
VAN	238	256	270	286	302	315
COUNTY-OTHER	908	910	913	925	943	961
MINING	81	86	97	107	116	127
LIVESTOCK	1,167	1,167	1,167	1,167	1,167	1,167
IRRIGATION	356	356	356	356	356	356
NECHES BASIN TOTAL DEMAND	**3,074**	**3,166**	**3,245**	**3,336**	**3,427**	**3,509**
SABINE BASIN						
ABLES SPRINGS WSC	3	3	3	3	4	4
CANTON	957	1,028	1,081	1,138	1,191	1,237
COMBINED CONSUMERS SUD	92	95	98	102	107	111
EDGEWOOD	273	286	295	307	319	329
GOLDEN WSC	57	58	59	61	63	65
GRAND SALINE	374	375	375	380	388	395
MACBEE SUD	177	194	207	220	231	240
SOUTH TAWAKONI WSC	400	432	455	484	513	539
VAN	133	143	151	160	168	176
WILLS POINT	247	243	240	239	239	241
COUNTY-OTHER	1,198	1,284	1,348	1,425	1,499	1,565
MANUFACTURING	674	717	756	789	851	919
MINING	141	150	168	186	202	221
LIVESTOCK	760	760	760	760	760	760
IRRIGATION	52	52	52	52	52	52

Water User Group (WUG) Demand

REGION D	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
VAN ZANDT COUNTY						
SABINE BASIN TOTAL DEMAND	**5,538**	**5,820**	**6,048**	**6,306**	**6,587**	**6,854**
TRINITY BASIN						
BETHEL-ASH WSC	21	26	30	35	38	41
CANTON	4	4	4	5	5	5
MACBEE SUD	287	315	336	357	375	390
WILLS POINT	371	366	360	358	361	362
COUNTY-OTHER	674	726	766	812	856	896
MANUFACTURING	7	7	8	8	9	9
MINING	78	83	93	103	112	122
LIVESTOCK	245	245	245	245	245	245
IRRIGATION	29	29	29	29	29	29
TRINITY BASIN TOTAL DEMAND	**1,716**	**1,801**	**1,871**	**1,952**	**2,030**	**2,099**
VAN ZANDT COUNTY TOTAL DEMAND	**10,328**	**10,787**	**11,164**	**11,594**	**12,044**	**12,462**
WOOD COUNTY						
CYPRESS BASIN						
CYPRESS SPRINGS SUD	33	33	33	33	33	33
SHARON WSC	98	96	92	94	95	95
WINNSBORO	211	214	213	216	219	220
COUNTY-OTHER	86	88	90	91	93	93
MINING	2	2	2	2	2	2
LIVESTOCK	271	271	271	271	271	271
IRRIGATION	114	114	114	114	114	114
CYPRESS BASIN TOTAL DEMAND	**815**	**818**	**815**	**821**	**827**	**828**
SABINE BASIN						
ALBA	66	67	66	66	67	68
BRIGHT STAR-SALEM SUD	126	123	118	121	121	122
FOUKE WSC	792	798	792	800	807	813
GOLDEN WSC	216	213	207	207	208	210
HAWKINS	350	357	358	364	368	371
HOLLY RANCH WATER COMPANY	185	193	196	201	203	205
JONES WSC	349	344	335	335	338	341
MINEOLA	764	772	767	775	783	789
NEW HOPE SUD	330	333	330	333	336	339
PRITCHETT WSC	8	8	7	7	7	7
QUITMAN	300	302	300	304	307	309
RAMEY WSC	265	261	253	256	260	262
SHARON WSC	200	195	188	191	192	195
WINNSBORO	334	340	339	344	346	350
COUNTY-OTHER	391	403	407	416	419	422
MANUFACTURING	759	801	837	867	933	1,004
MINING	23	23	21	19	18	17
LIVESTOCK	1,539	1,539	1,539	1,539	1,539	1,539
IRRIGATION	607	607	607	607	607	607
SABINE BASIN TOTAL DEMAND	**7,604**	**7,679**	**7,667**	**7,752**	**7,859**	**7,970**
WOOD COUNTY TOTAL DEMAND	**8,419**	**8,497**	**8,482**	**8,573**	**8,686**	**8,798**
REGION D TOTAL DEMAND	**634,172**	**682,374**	**733,956**	**790,027**	**866,209**	**956,972**

Water User Group (WUG) Demand

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APPENDIX C

CHAPTER 3

Identification of Water Needs

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APPENDIX C
CHAPTER 3

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Water User Group Name	Basin	County	Source Name	2020	2030	2040	2050	2060	2070	Sellers Name
BOWIE COUNTY										
CENTRAL BOWIE COUNTY WSC	RED	BOWIE	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	TEXARKANA
COUNTY-OTHER, BOWIE	RED	BOWIE	NACATOCH AQUIFER | BOWIE COUNTY	1,105	1,128	1,149	1,130	1,119	1,119	OWNS SYSTEM
COUNTY-OTHER, BOWIE	RED	BOWIE	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	TEXARKANA
DE KALB	RED	BOWIE	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	TEXARKANA
HOOKS	RED	BOWIE	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	TEXARKANA
NEW BOSTON	RED	BOWIE	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	TEXARKANA
RED LICK	RED	BOWIE	CARRIZO-WILCOX AQUIFER | BOWIE COUNTY	66	66	66	66	66	66	OWNS SYSTEM
TEXAMERICAS CENTER	RED	BOWIE	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	TEXARKANA
TEXARKANA	RED	BOWIE	RED RUN-OF-RIVER	0	0	0	0	0	0	OWNS SYSTEM
CENTRAL BOWIE COUNTY WSC	SULPHUR	BOWIE	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	TEXARKANA
COUNTY-OTHER, BOWIE	SULPHUR	BOWIE	CARRIZO-WILCOX AQUIFER | BOWIE COUNTY	2,396	2,442	2,484	2,440	2,416	2,416	OWNS SYSTEM
COUNTY-OTHER, BOWIE	SULPHUR	BOWIE	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	TEXARKANA
DE KALB	SULPHUR	BOWIE	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	TEXARKANA
MACEDONIA- EYLAU MUD #1	SULPHUR	BOWIE	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	TEXARKANA
MAUD	SULPHUR	BOWIE	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	TEXARKANA
NASH	SULPHUR	BOWIE	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	TEXARKANA
NEW BOSTON	SULPHUR	BOWIE	SULPHUR RUN-OF-RIVER	0	0	0	0	0	0	OWNS SYSTEM
NEW BOSTON	SULPHUR	BOWIE	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	TEXARKANA
RED LICK	SULPHUR	BOWIE	CARRIZO-WILCOX AQUIFER | BOWIE COUNTY	55	55	55	55	55	55	OWNS SYSTEM
REDWATER	SULPHUR	BOWIE	CARRIZO-WILCOX AQUIFER | BOWIE COUNTY	66	66	66	66	66	66	OWNS SYSTEM
REDWATER	SULPHUR	BOWIE	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	TEXARKANA
TEXAMERICAS CENTER	SULPHUR	BOWIE	CANEY CREEK LAKE/RESERVOIR	0	0	0	0	0	0	OWNS SYSTEM
TEXAMERICAS CENTER	SULPHUR	BOWIE	ELLIOT CREEK LAKE/RESERVOIR	0	0	0	0	0	0	OWNS SYSTEM
TEXAMERICAS CENTER	SULPHUR	BOWIE	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	TEXARKANA
TEXARKANA	SULPHUR	BOWIE	RED RUN-OF-RIVER	0	0	0	0	0	0	OWNS SYSTEM
TEXARKANA	SULPHUR	BOWIE	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	OWNS SYSTEM
WAKE VILLAGE	SULPHUR	BOWIE	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	TEXARKANA
County Total - Round IV				**3,688**	**3,757**	**3,820**	**3,757**	**3,722**	**3,722**	
County Total - Round III				**60,773**	**54,284**	**48,045**	**42,149**	**32,307**		
Round IV minus Round III				**-57,085**	**-50,527**	**-44,225**	**-38,392**	**-28,585**		

Water User Group Name	Basin	County	Source Name	2020	2030	2040	2050	2060	2070	Sellers Name
CAMP COUNTY										
BI COUNTY WSC	CYPRESS	CAMP	CARRIZO-WILCOX AQUIFER | CAMP COUNTY	985	985	985	985	985	985	OWNS SYSTEM
BI COUNTY WSC	CYPRESS	CAMP	CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	0	0	0	34	33	30	OWNS SYSTEM
COUNTY-OTHER, CAMP	CYPRESS	CAMP	CARRIZO-WILCOX AQUIFER | CAMP COUNTY	432	444	453	461	469	478	OWNS SYSTEM
PITTSBURG	CYPRESS	CAMP	BOB SANDLIN LAKE/RESERVOIR	1,344	1,344	1,344	1,344	1,344	1,344	NORTHEAST TEXAS MWD
PITTSBURG	CYPRESS	CAMP	CARRIZO-WILCOX AQUIFER | CAMP COUNTY	433	433	433	433	433	433	OWNS SYSTEM
County Total - Round IV				**3,194**	**3,206**	**3,215**	**3,257**	**3,264**	**3,270**	
County Total - Round III				**14,242**	**14,248**	**14,253**	**14,258**	**14,263**		
Round IV minus Round III				**-11,048**	**-11,042**	**-11,038**	**-11,001**	**-10,999**		
CASS COUNTY										
ATLANTA	CYPRESS	CASS	WRIGHT PATMAN LAKE/RESERVOIR	999	978	955	947	945	945	TEXARKANA
COUNTY-OTHER, CASS	CYPRESS	CASS	CARRIZO-WILCOX AQUIFER | CASS COUNTY	1,245	1,286	1,327	1,368	1,368	1,399	OWNS SYSTEM
COUNTY-OTHER, CASS	CYPRESS	CASS	O' THE PINES LAKE/RESERVOIR	302	302	302	302	302	302	NORTHEAST TEXAS MWD
EASTERN CASS WSC	CYPRESS	CASS	CARRIZO-WILCOX AQUIFER | CASS COUNTY	581	581	581	581	581	581	OWNS SYSTEM
HUGHES SPRINGS	CYPRESS	CASS	O' THE PINES LAKE/RESERVOIR	642	642	642	642	642	642	NORTHEAST TEXAS MWD
LINDEN	CYPRESS	CASS	CARRIZO-WILCOX AQUIFER | CASS COUNTY	444	444	444	444	444	444	OWNS SYSTEM
QUEEN CITY	CYPRESS	CASS	CARRIZO-WILCOX AQUIFER | CASS COUNTY	169	169	169	169	169	169	OWNS SYSTEM
QUEEN CITY	CYPRESS	CASS	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	TEXARKANA
ATLANTA	SULPHUR	CASS	WRIGHT PATMAN LAKE/RESERVOIR	1	1	1	1	1	1	TEXARKANA
COUNTY-OTHER, CASS	SULPHUR	CASS	QUEEN CITY AQUIFER | CASS COUNTY	1,175	1,215	1,256	1,297	1,297	1,328	OWNS SYSTEM
COUNTY-OTHER, CASS	SULPHUR	CASS	WRIGHT PATMAN LAKE/RESERVOIR	44	44	44	44	44	44	TEXARKANA
EASTERN CASS WSC	SULPHUR	CASS	CARRIZO-WILCOX AQUIFER | CASS COUNTY	38	38	38	38	38	38	OWNS SYSTEM
QUEEN CITY	SULPHUR	CASS	CARRIZO-WILCOX AQUIFER | CASS COUNTY	100	100	100	100	100	100	OWNS SYSTEM
QUEEN CITY	SULPHUR	CASS	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	TEXARKANA
County Total - Round IV				**5,740**	**5,800**	**5,859**	**5,933**	**5,931**	**5,993**	
County Total - Round III				**9,875**	**9,956**	**10,038**	**10,120**	**10,120**		
Round IV minus Round III				**-4,135**	**-4,156**	**-4,179**	**-4,187**	**-4,189**		
DELTA COUNTY										
COOPER	SULPHUR	DELTA	BIG CREEK LAKE/RESERVOIR	980	980	980	980	980	980	OWNS SYSTEM
COOPER	SULPHUR	DELTA	CHAPMAN/COOPER LAKE/RESERVOIR NON- SYSTEM PORTION	690	669	647	623	591	571	SULPHUR RIVER MWD
COOPER	SULPHUR	DELTA	SULPHUR RUN-OF-RIVER	100	140	140	140	140	100	OWNS SYSTEM
COUNTY-OTHER, DELTA	SULPHUR	DELTA	BIG CREEK LAKE/RESERVOIR	471	474	477	479	479	481	COOPER

Water User Group Name	Basin	County	Source Name	2020	2030	2040	2050	2060	2070	Sellers Name
COUNTY-OTHER, DELTA	SULPHUR	DELTA	NACATOCH AQUIFER | DELTA COUNTY	84	85	86	86	86	12	COMMERCE WD
COUNTY-OTHER, DELTA	SULPHUR	DELTA	TAWAKONI LAKE/RESERVOIR	471	474	477	479	479	481	COMMERCE WD
COUNTY-OTHER, DELTA	SULPHUR	DELTA	TRINITY AQUIFER | DELTA COUNTY	122	48	48	48	48	48	OWNS SYSTEM
NORTH HUNT SUD	SULPHUR	DELTA	TAWAKONI LAKE/RESERVOIR	32	13	14	15	16	16	COMMERCE WD
NORTH HUNT SUD	SULPHUR	DELTA	WOODBINE AQUIFER | HUNT COUNTY	5	4	3	2	1	1	OWNS SYSTEM
County Total - Round IV				**2,955**	**2,887**	**2,872**	**2,852**	**2,820**	**2,690**	
County Total - Round III				**2,373**	**2,289**	**2,281**	**2,257**	**2,225**		
Round IV minus Round III				**582**	**598**	**591**	**595**	**595**		
FRANKLIN COUNTY										
COUNTY-OTHER, FRANKLIN	CYPRESS	FRANKLIN	CARRIZO-WILCOX AQUIFER | FRANKLIN COUNTY	72	77	82	82	82	82	OWNS SYSTEM
CYPRESS SPRINGS SUD	CYPRESS	FRANKLIN	CARRIZO-WILCOX AQUIFER | FRANKLIN COUNTY	67	67	67	67	67	67	OWNS SYSTEM
CYPRESS SPRINGS SUD	CYPRESS	FRANKLIN	CYPRESS SPRINGS LAKE/RESERVOIR	2,298	2,298	2,243	2,201	2,096	1,982	FRANKLIN COUNTY WD
WINNSBORO	CYPRESS	FRANKLIN	CYPRESS SPRINGS LAKE/RESERVOIR	971	971	971	971	971	971	FRANKLIN COUNTY WD
COUNTY-OTHER, FRANKLIN	SULPHUR	FRANKLIN	BOB SANDLIN LAKE/RESERVOIR	14	16	17	17	17	17	MOUNT PLEASANT
COUNTY-OTHER, FRANKLIN	SULPHUR	FRANKLIN	CARRIZO-WILCOX AQUIFER | FRANKLIN COUNTY	111	123	133	133	133	133	OWNS SYSTEM
CYPRESS SPRINGS SUD	SULPHUR	FRANKLIN	CYPRESS SPRINGS LAKE/RESERVOIR	355	355	346	339	322	305	FRANKLIN COUNTY WD
MOUNT VERNON	SULPHUR	FRANKLIN	CYPRESS SPRINGS LAKE/RESERVOIR	1,120	1,120	1,120	1,120	1,120	1,120	FRANKLIN COUNTY WD
MOUNT VERNON	SULPHUR	FRANKLIN	SULPHUR RUN-OF-RIVER	170	160	160	160	160	160	OWNS SYSTEM
County Total - Round IV				**5,178**	**5,187**	**5,139**	**5,090**	**4,968**	**4,837**	
County Total - Round III				**7,127**	**7,150**	**7,169**	**7,169**	**7,169**		
Round IV minus Round III				**-1,949**	**-1,963**	**-2,030**	**-2,079**	**-2,201**		
GREGG COUNTY										
COUNTY-OTHER, GREGG	CYPRESS	GREGG	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	196	207	220	237	261	278	OWNS SYSTEM
COUNTY-OTHER, GREGG	CYPRESS	GREGG	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	19	19	19	19	19	19	OWNS SYSTEM
COUNTY-OTHER, GREGG	CYPRESS	GREGG	FORK LAKE/RESERVOIR	17	17	17	17	17	17	KILGORE
TRYON ROAD SUD	CYPRESS	GREGG	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	159	159	159	158	147	133	OWNS SYSTEM
TRYON ROAD SUD	CYPRESS	GREGG	O' THE PINES LAKE/RESERVOIR	948	948	948	948	948	948	NORTHEAST TEXAS MWD
CLARKSVILLE CITY	SABINE	GREGG	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	245	245	245	245	245	245	OWNS SYSTEM
COUNTY-OTHER, GREGG	SABINE	GREGG	BIG SANDY CREEK LAKE/RESERVOIR	50	50	50	50	50	50	WHITE OAK
COUNTY-OTHER, GREGG	SABINE	GREGG	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	722	789	867	972	1,124	1,134	OWNS SYSTEM
COUNTY-OTHER, GREGG	SABINE	GREGG	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	18	18	18	18	18	18	OWNS SYSTEM
COUNTY-OTHER, GREGG	SABINE	GREGG	FORK LAKE/RESERVOIR	94	94	94	94	94	94	KILGORE
COUNTY-OTHER, GREGG	SABINE	GREGG	GLADEWATER LAKE/RESERVOIR	154	154	154	154	154	54	GLADEWATER
COUNTY-OTHER, GREGG	SABINE	GREGG	CHEROKEE LAKE/RESERVOIR	18	18	18	18	18	18	LONGVIEW
CROSS ROADS SUD	SABINE	GREGG	FORK LAKE/RESERVOIR	32	32	31	31	32	32	KILGORE
CROSS ROADS SUD	SABINE	GREGG	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	52	51	50	50	51	52	OWNS SYSTEM

Water User Group Name	Basin	County	Source Name	2020	2030	2040	2050	2060	2070	Sellers Name
EASTON	SABINE	GREGG	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	51	51	51	51	51	51	ELDERVILLE WSC
EASTON	SABINE	GREGG	CHEROKEE LAKE/RESERVOIR	38	42	46	51	53	52	ELDERVILLE WSC
ELDERVILLE WSC	SABINE	GREGG	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	352	352	352	352	352	352	OWNS SYSTEM
ELDERVILLE WSC	SABINE	GREGG	FORK LAKE/RESERVOIR	188	188	188	188	188	189	LONGVIEW
ELDERVILLE WSC	SABINE	GREGG	CHEROKEE LAKE/RESERVOIR	186	185	185	185	186	187	LONGVIEW
GLADEWATER	SABINE	GREGG	GLADEWATER LAKE/RESERVOIR	982	987	999	1,013	1,030	1,113	OWNS SYSTEM
KILGORE	SABINE	GREGG	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	1,189	1,184	1,184	1,185	1,188	1,193	OWNS SYSTEM
KILGORE	SABINE	GREGG	FORK LAKE/RESERVOIR	1,648	2,692	2,692	2,694	2,701	2,712	SABINE RIVER AUTHORITY
LAKEPORT	SABINE	GREGG	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	88	88	88	88	88	88	ELDERVILLE WSC
LAKEPORT	SABINE	GREGG	CHEROKEE LAKE/RESERVOIR	95	99	105	112	112	112	ELDERVILLE WSC
LIBERTY CITY WSC	SABINE	GREGG	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	832	832	832	832	832	832	OWNS SYSTEM
LONGVIEW	SABINE	GREGG	BIG SANDY CREEK LAKE/RESERVOIR	0	0	0	0	0	0	OWNS SYSTEM
LONGVIEW	SABINE	GREGG	FORK LAKE/RESERVOIR	10,870	10,870	10,870	10,870	10,870	10,870	SABINE RIVER AUTHORITY
LONGVIEW	SABINE	GREGG	O' THE PINES LAKE/RESERVOIR	17,200	17,200	17,200	17,200	17,200	17,200	NORTHEAST TEXAS MWD
LONGVIEW	SABINE	GREGG	SABINE RUN-OF-RIVER	0	0	0	0	0	0	OWNS SYSTEM
LONGVIEW	SABINE	GREGG	CHEROKEE LAKE/RESERVOIR	3,915	3,915	3,915	3,915	8,915	8,915	CHEROKEE WATER COMPANY
TRYON ROAD SUD	SABINE	GREGG	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	128	128	128	128	128	128	OWNS SYSTEM
TRYON ROAD SUD	SABINE	GREGG	O' THE PINES LAKE/RESERVOIR	765	765	765	765	765	765	NORTHEAST TEXAS MWD
WEST GREGG SUD	SABINE	GREGG	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	496	495	495	496	496	483	OWNS SYSTEM
WHITE OAK	SABINE	GREGG	BIG SANDY CREEK LAKE/RESERVOIR	1,910	1,910	1,910	1,910	1,910	1,910	LONGVIEW
WHITE OAK	SABINE	GREGG	FORK LAKE/RESERVOIR	592	592	592	592	592	592	LONGVIEW
County Total - Round IV				**44,249**	**45,376**	**45,487**	**45,638**	**50,835**	**50,836**	
County Total - Round III				**70,718**	**70,673**	**70,641**	**70,615**	**70,667**		
Round IV minus Round III				**-26,469**	**-25,297**	**-25,154**	**-24,977**	**-19,832**		
HARRISON COUNTY										
COUNTY-OTHER, HARRISON	CYPRESS	HARRISON	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	15	15	15	15	15	15	OWNS SYSTEM
COUNTY-OTHER, HARRISON	CYPRESS	HARRISON	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	2,032	2,088	2,130	2,179	2,252	2,307	OWNS SYSTEM
COUNTY-OTHER, HARRISON	CYPRESS	HARRISON	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	30	30	30	30	30	30	OWNS SYSTEM
COUNTY-OTHER, HARRISON	CYPRESS	HARRISON	O' THE PINES LAKE/RESERVOIR	321	321	321	321	321	321	MARSHALL
COUNTY-OTHER, HARRISON	CYPRESS	HARRISON	CHEROKEE LAKE/RESERVOIR	54	54	54	54	54	54	LONGVIEW
DIANA SUD	CYPRESS	HARRISON	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	47	47	47	47	47	47	OWNS SYSTEM
DIANA SUD	CYPRESS	HARRISON	O' THE PINES LAKE/RESERVOIR	47	47	47	47	47	47	NORTHEAST TEXAS MWD
GUM SPRINGS WSC	CYPRESS	HARRISON	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	43	43	43	43	43	43	OWNS SYSTEM
GUM SPRINGS WSC	CYPRESS	HARRISON	FORK LAKE/RESERVOIR	31	31	31	31	31	31	LONGVIEW

Water User Group Name	Basin	County	Source Name	2020	2030	2040	2050	2060	2070	Sellers Name
GUM SPRINGS WSC	CYPRESS	HARRISON	CHEROKEE LAKE/RESERVOIR	178	178	178	178	178	178	LONGVIEW
MARSHALL	CYPRESS	HARRISON	CYPRESS RUN-OF-RIVER	0	0	0	0	0	0	OWNS SYSTEM
MARSHALL	CYPRESS	HARRISON	O' THE PINES LAKE/RESERVOIR	1,158	1,158	1,158	1,158	1,158	1,158	NORTHEAST TEXAS MWD
TRYON ROAD SUD	CYPRESS	HARRISON	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	0	0	0	1	12	26	OWNS SYSTEM
TRYON ROAD SUD	CYPRESS	HARRISON	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	20	20	20	20	20	20	OWNS SYSTEM
TRYON ROAD SUD	CYPRESS	HARRISON	O' THE PINES LAKE/RESERVOIR	109	109	109	109	109	109	NORTHEAST TEXAS MWD
WASKOM	CYPRESS	HARRISON	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	339	339	339	339	339	339	OWNS SYSTEM
COUNTY-OTHER, HARRISON	SABINE	HARRISON	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	1,350	1,425	1,482	1,549	1,646	1,720	OWNS SYSTEM
COUNTY-OTHER, HARRISON	SABINE	HARRISON	O' THE PINES LAKE/RESERVOIR	70	70	70	70	70	70	MARSHALL
COUNTY-OTHER, HARRISON	SABINE	HARRISON	CHEROKEE LAKE/RESERVOIR	328	328	328	328	328	328	LONGVIEW
GILL WSC	SABINE	HARRISON	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	250	250	250	250	250	250	OWNS SYSTEM
GILL WSC	SABINE	HARRISON	O' THE PINES LAKE/RESERVOIR	67	67	67	67	67	67	MARSHALL
GUM SPRINGS WSC	SABINE	HARRISON	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	320	320	320	320	320	320	OWNS SYSTEM
GUM SPRINGS WSC	SABINE	HARRISON	FORK LAKE/RESERVOIR	231	231	231	231	231	231	LONGVIEW
GUM SPRINGS WSC	SABINE	HARRISON	CHEROKEE LAKE/RESERVOIR	466	466	466	466	466	466	LONGVIEW
HALLSVILLE	SABINE	HARRISON	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	77	77	77	77	77	77	LONGVIEW
HALLSVILLE	SABINE	HARRISON	FORK LAKE/RESERVOIR	334	334	334	334	334	334	LONGVIEW
HALLSVILLE	SABINE	HARRISON	CHEROKEE LAKE/RESERVOIR	403	403	403	403	403	403	LONGVIEW
LONGVIEW	SABINE	HARRISON	O' THE PINES LAKE/RESERVOIR	400	400	400	400	400	400	NORTHEAST TEXAS MWD
LONGVIEW	SABINE	HARRISON	SABINE RUN-OF-RIVER	0	0	0	0	0	0	OWNS SYSTEM
LONGVIEW	SABINE	HARRISON	CHEROKEE LAKE/RESERVOIR	5,485	5,485	5,485	5,485	485	485	CHEROKEE WATER COMPANY
MARSHALL	SABINE	HARRISON	CYPRESS RUN-OF-RIVER	0	0	0	0	0	0	OWNS SYSTEM
MARSHALL	SABINE	HARRISON	O' THE PINES LAKE/RESERVOIR	5,419	5,419	5,419	5,419	5,419	5,419	NORTHEAST TEXAS MWD
County Total - Round IV				**19,624**	**19,755**	**19,854**	**19,971**	**15,152**	**15,295**	
County Total - Round III				**44,306**	**44,459**	**44,532**	**44,561**	**44,690**		
Round IV minus Round III				**-24,682**	**-24,704**	**-24,678**	**-24,590**	**-29,538**		
HOPKINS COUNTY										
COUNTY-OTHER, HOPKINS	CYPRESS	HOPKINS	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	179	179	178	178	178	178	OWNS SYSTEM
CYPRESS SPRINGS SUD	CYPRESS	HOPKINS	CYPRESS SPRINGS LAKE/RESERVOIR	420	420	410	403	383	363	FRANKLIN COUNTY WD
CASH SUD	SABINE	HOPKINS	TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	2	2	2	1	1	1	NORTH TEXAS MWD
CASH SUD	SABINE	HOPKINS	TRINITY INDIRECT REUSE	2	2	3	3	3	3	OWNS SYSTEM
CASH SUD	SABINE	HOPKINS	CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	1	1	1	1	1	0	NORTH TEXAS MWD
CASH SUD	SABINE	HOPKINS	TAWAKONI LAKE/RESERVOIR	8	8	7	9	10	11	NORTH TEXAS MWD
COMO	SABINE	HOPKINS	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	110	107	105	105	105	105	OWNS SYSTEM

Water User Group Name	Basin	County	Source Name	2020	2030	2040	2050	2060	2070	Sellers Name
COUNTY-OTHER, HOPKINS	SABINE	HOPKINS	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	464	465	466	464	461	461	OWNS SYSTEM
COUNTY-OTHER, HOPKINS	SABINE	HOPKINS	CARRIZO-WILCOX AQUIFER | RAINS COUNTY	112	112	112	112	112	112	OWNS SYSTEM
COUNTY-OTHER, HOPKINS	SABINE	HOPKINS	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	7	7	7	7	7	7	OWNS SYSTEM
COUNTY-OTHER, HOPKINS	SABINE	HOPKINS	CHAPMAN/COOPER LAKE/RESERVOIR NON- SYSTEM PORTION	213	222	227	208	191	173	SULPHUR SPRINGS
CUMBY	SABINE	HOPKINS	NACATOCH AQUIFER | HOPKINS COUNTY	109	109	109	109	109	109	OWNS SYSTEM
JONES WSC	SABINE	HOPKINS	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	24	28	30	34	39	42	OWNS SYSTEM
MARTIN SPRINGS WSC	SABINE	HOPKINS	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	376	375	374	376	377	377	OWNS SYSTEM
MARTIN SPRINGS WSC	SABINE	HOPKINS	CHAPMAN/COOPER LAKE/RESERVOIR NON- SYSTEM PORTION	188	188	188	189	189	188	SULPHUR SPRINGS
SULPHUR SPRINGS	SABINE	HOPKINS	CHAPMAN/COOPER LAKE/RESERVOIR NON- SYSTEM PORTION	35	34	32	34	32	33	SULPHUR RIVER MWD
SULPHUR SPRINGS	SABINE	HOPKINS	SULPHUR SPRINGS LAKE/RESERVOIR	23	22	20	21	20	20	OWNS SYSTEM
BRINKER WSC	SULPHUR	HOPKINS	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	252	251	251	252	253	253	OWNS SYSTEM
BRINKER WSC	SULPHUR	HOPKINS	SULPHUR SPRINGS LAKE/RESERVOIR	77	77	77	77	77	77	SULPHUR SPRINGS
COMO	SULPHUR	HOPKINS	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	30	33	35	35	35	35	OWNS SYSTEM
COUNTY-OTHER, HOPKINS	SULPHUR	HOPKINS	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	390	392	393	390	387	387	OWNS SYSTEM
COUNTY-OTHER, HOPKINS	SULPHUR	HOPKINS	CHAPMAN/COOPER LAKE/RESERVOIR NON- SYSTEM PORTION	174	183	189	169	150	130	SULPHUR SPRINGS
COUNTY-OTHER, HOPKINS	SULPHUR	HOPKINS	NACATOCH AQUIFER | HOPKINS COUNTY	166	143	140	139	137	137	OWNS SYSTEM
CUMBY	SULPHUR	HOPKINS	NACATOCH AQUIFER | HOPKINS COUNTY	11	11	11	11	11	11	ON
CYPRESS SPRINGS SUD	SULPHUR	HOPKINS	CYPRESS SPRINGS LAKE/RESERVOIR	69	69	67	66	63	59	FRANKLIN COUNTY WD
MARTIN SPRINGS WSC	SULPHUR	HOPKINS	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	69	69	69	69	69	69	OWNS SYSTEM
MARTIN SPRINGS WSC	SULPHUR	HOPKINS	CHAPMAN/COOPER LAKE/RESERVOIR NON- SYSTEM PORTION	35	35	35	34	34	35	SULPHUR SPRINGS
NORTH HOPKINS WSC	SULPHUR	HOPKINS	CHAPMAN/COOPER LAKE/RESERVOIR NON- SYSTEM PORTION	921	921	921	921	921	921	SULPHUR SPRINGS
SULPHUR SPRINGS	SULPHUR	HOPKINS	CHAPMAN/COOPER LAKE/RESERVOIR NON- SYSTEM PORTION	11,225	11,007	10,804	10,716	10,577	10,388	SULPHUR RIVER MWD

Water User Group Name	Basin	County	Source Name	2020	2030	2040	2050	2060	2070	Sellers Name
SULPHUR SPRINGS	SULPHUR	HOPKINS	SULPHUR RUN-OF-RIVER	130	130	130	130	130	130	OWNS SYSTEM
SULPHUR SPRINGS	SULPHUR	HOPKINS	SULPHUR SPRINGS LAKE/RESERVOIR	7,192	7,059	6,838	6,781	6,509	6,381	OWNS SYSTEM
County Total - Round IV				**23,014**	**22,661**	**22,231**	**22,044**	**21,571**	**21,196**	
County Total - Round III				**22,661**	**22,308**	**21,890**	**21,697**	**21,236**		
Round IV minus Round III				**353**	**353**	**341**	**347**	**335**		
HUNT COUNTY										
ABLES SPRINGS WSC	SABINE	HUNT	LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	14	18	24	30	39	51	NORTH TEXAS MWD
ABLES SPRINGS WSC	SABINE	HUNT	TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	11	15	20	25	33	43	NORTH TEXAS MWD
ABLES SPRINGS WSC	SABINE	HUNT	TRINITY INDIRECT REUSE	16	26	38	57	80	107	NORTH TEXAS MWD
ABLES SPRINGS WSC	SABINE	HUNT	CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	8	9	13	16	21	27	NORTH TEXAS MWD
ABLES SPRINGS WSC	SABINE	HUNT	FORK LAKE/RESERVOIR	3	0	0	0	0	0	NORTH TEXAS MWD
ABLES SPRINGS WSC	SABINE	HUNT	TAWAKONI LAKE/RESERVOIR	5	2	3	4	5	7	NORTH TEXAS MWD
BLACKLAND WSC	SABINE	HUNT	LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	2	1	1	1	1	1	NORTH TEXAS MWD
BLACKLAND WSC	SABINE	HUNT	TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	1	1	1	1	1	1	NORTH TEXAS MWD
BLACKLAND WSC	SABINE	HUNT	TRINITY INDIRECT REUSE	2	2	2	2	2	2	NORTH TEXAS MWD
BLACKLAND WSC	SABINE	HUNT	CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	0	1	1	1	0	0	NORTH TEXAS MWD
BLACKLAND WSC	SABINE	HUNT	FORK LAKE/RESERVOIR	0	0	0	0	0	0	NORTH TEXAS MWD
BLACKLAND WSC	SABINE	HUNT	TAWAKONI LAKE/RESERVOIR	1	0	0	0	0	0	NORTH TEXAS MWD
CADDO BASIN SUD	SABINE	HUNT	LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	164	179	202	238	295	373	NORTH TEXAS MWD
CADDO BASIN SUD	SABINE	HUNT	TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	133	148	168	201	249	315	NORTH TEXAS MWD
CADDO BASIN SUD	SABINE	HUNT	TRINITY INDIRECT REUSE	179	249	330	451	594	779	NORTH TEXAS MWD
CADDO BASIN SUD	SABINE	HUNT	CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	78	86	98	114	142	180	NORTH TEXAS MWD
CADDO BASIN SUD	SABINE	HUNT	FORK LAKE/RESERVOIR	39	0	0	0	0	0	NORTH TEXAS MWD
CADDO BASIN SUD	SABINE	HUNT	TAWAKONI LAKE/RESERVOIR	60	23	27	31	39	50	NORTH TEXAS MWD
CADDO MILLS	SABINE	HUNT	TAWAKONI LAKE/RESERVOIR	178	186	201	242	309	319	GREENVILLE
CAMPBELL	SABINE	HUNT	NACATOCH AQUIFER | HUNT COUNTY	105	107	117	142	180	184	OWNS SYSTEM
CASH SUD	SABINE	HUNT	TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	234	265	305	283	259	237	NORTH TEXAS MWD
CASH SUD	SABINE	HUNT	TRINITY INDIRECT REUSE	318	449	599	636	622	589	NORTH TEXAS MWD

Water User Group Name	Basin	County	Source Name	2020	2030	2040	2050	2060	2070	Sellers Name
CASH SUD	SABINE	HUNT	CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	137	154	174	161	147	136	NORTH TEXAS MWD
CASH SUD	SABINE	HUNT	FORK LAKE/RESERVOIR	870	3,933	3,900	3,819	3,725	3,640	NORTH TEXAS MWD
CASH SUD	SABINE	HUNT	TAWAKONI LAKE/RESERVOIR	626	540	534	529	524	505	NORTH TEXAS MWD
CELESTE	SABINE	HUNT	WOODBINE AQUIFER | HUNT COUNTY	199	199	199	199	199	199	OWNS SYSTEM
COMBINED CONSUMERS SUD	SABINE	HUNT	FORK LAKE/RESERVOIR	2,240	2,240	2,240	2,240	2,240	2,240	SABINE RIVER AUTHORITY
COUNTY-OTHER, HUNT	SABINE	HUNT	LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	139	144	155	170	206	236	NORTH TEXAS MWD
COUNTY-OTHER, HUNT	SABINE	HUNT	TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	113	119	133	145	174	202	NORTH TEXAS MWD
COUNTY-OTHER, HUNT	SABINE	HUNT	TRINITY INDIRECT REUSE	155	202	263	332	418	511	NORTH TEXAS MWD
COUNTY-OTHER, HUNT	SABINE	HUNT	BIG CREEK LAKE/RESERVOIR	4	6	8	12	19	21	COOPER
COUNTY-OTHER, HUNT	SABINE	HUNT	CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	66	69	77	84	99	119	NORTH TEXAS MWD
COUNTY-OTHER, HUNT	SABINE	HUNT	FORK LAKE/RESERVOIR	32	0	0	0	0	0	NORTH TEXAS MWD
COUNTY-OTHER, HUNT	SABINE	HUNT	NACATOCH AQUIFER | HUNT COUNTY	368	285	248	248	248	248	OWNS SYSTEM
COUNTY-OTHER, HUNT	SABINE	HUNT	TAWAKONI LAKE/RESERVOIR	1,406	1,516	1,648	2,692	2,640	2,778	COMMERCE WD
COUNTY-OTHER, HUNT	SABINE	HUNT	WOODBINE AQUIFER | HUNT COUNTY	29	29	29	29	29	29	OWNS SYSTEM
GREENVILLE	SABINE	HUNT	GREENVILLE CITY LAKE/RESERVOIR	2,896	2,896	2,896	2,896	2,896	2,896	OWNS SYSTEM
GREENVILLE	SABINE	HUNT	TAWAKONI LAKE/RESERVOIR	2,713	2,327	1,913	3,634	5,194	5,194	SABINE RIVER AUTHORITY
HICKORY CREEK SUD	SABINE	HUNT	WOODBINE AQUIFER | HUNT COUNTY	340	347	353	357	360	362	OWNS SYSTEM
JOSEPHINE	SABINE	HUNT	LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	5	7	9	12	11	10	NORTH TEXAS MWD
JOSEPHINE	SABINE	HUNT	TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	4	6	8	10	10	9	NORTH TEXAS MWD
JOSEPHINE	SABINE	HUNT	TRINITY INDIRECT REUSE	6	9	15	24	23	22	NORTH TEXAS MWD
JOSEPHINE	SABINE	HUNT	CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	2	3	5	6	5	5	NORTH TEXAS MWD
JOSEPHINE	SABINE	HUNT	FORK LAKE/RESERVOIR	1	0	0	0	0	0	NORTH TEXAS MWD
JOSEPHINE	SABINE	HUNT	TAWAKONI LAKE/RESERVOIR	2	1	1	2	1	1	NORTH TEXAS MWD
LONE OAK	SABINE	HUNT	TAWAKONI LAKE/RESERVOIR	164	164	164	164	164	164	CASH SUD
MACBEE SUD	SABINE	HUNT	TAWAKONI LAKE/RESERVOIR	23	123	139	160	193	237	SABINE RIVER AUTHORITY
QUINLAN	SABINE	HUNT	LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	325	365	414	380	345	313	CASH SUD
ROYSE CITY	SABINE	HUNT	LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	10	10	11	13	15	19	NORTH TEXAS MWD

Water User Group Name	Basin	County	Source Name	2020	2030	2040	2050	2060	2070	Sellers Name
ROYSE CITY	SABINE	HUNT	TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	8	9	9	11	13	16	NORTH TEXAS MWD
ROYSE CITY	SABINE	HUNT	TRINITY INDIRECT REUSE	10	15	18	24	31	39	NORTH TEXAS MWD
ROYSE CITY	SABINE	HUNT	CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	5	5	5	6	7	9	NORTH TEXAS MWD
ROYSE CITY	SABINE	HUNT	FORK LAKE/RESERVOIR	2	0	0	0	0	0	NORTH TEXAS MWD
ROYSE CITY	SABINE	HUNT	TAWAKONI LAKE/RESERVOIR	4	1	1	2	2	2	NORTH TEXAS MWD
WEST TAWAKONI	SABINE	HUNT	TAWAKONI LAKE/RESERVOIR	186	1,064	1,056	1,047	1,039	1,031	SABINE RIVER AUTHORITY
CAMPBELL	SULPHUR	HUNT	NACATOCH AQUIFER | HUNT COUNTY	4	4	6	7	9	12	OWNS SYSTEM
CASH SUD	SULPHUR	HUNT	TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	4	4	4	4	4	4	NORTH TEXAS MWD
CASH SUD	SULPHUR	HUNT	TRINITY INDIRECT REUSE	4	7	9	9	10	8	NORTH TEXAS MWD
CASH SUD	SULPHUR	HUNT	CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	2	2	3	3	3	2	NORTH TEXAS MWD
CASH SUD	SULPHUR	HUNT	FORK LAKE/RESERVOIR	1	0	0	0	0	0	NORTH TEXAS MWD
CASH SUD	SULPHUR	HUNT	TAWAKONI LAKE/RESERVOIR	21	22	24	32	41	55	NORTH TEXAS MWD
COMMERCE	SULPHUR	HUNT	NACATOCH AQUIFER | DELTA COUNTY	122	122	122	122	122	122	COMMERCE WD
COMMERCE	SULPHUR	HUNT	NACATOCH AQUIFER | HUNT COUNTY	175	175	175	175	175	175	COMMERCE WD
COMMERCE	SULPHUR	HUNT	TAWAKONI LAKE/RESERVOIR	1,130	1,259	1,452	1,743	2,177	2,812	COMMERCE WD
COUNTY-OTHER, HUNT	SULPHUR	HUNT	FORK LAKE/RESERVOIR	2	0	0	0	0	0	NORTH TEXAS MWD
COUNTY-OTHER, HUNT	SULPHUR	HUNT	NACATOCH AQUIFER | HUNT COUNTY	169	253	290	290	290	290	OWNS SYSTEM
COUNTY-OTHER, HUNT	SULPHUR	HUNT	TAWAKONI LAKE/RESERVOIR	2	1	88	249	536	882	COMMERCE WD
HICKORY CREEK SUD	SULPHUR	HUNT	WOODBINE AQUIFER | HUNT COUNTY	237	241	246	248	251	251	OWNS SYSTEM
NORTH HUNT SUD	SULPHUR	HUNT	TAWAKONI LAKE/RESERVOIR	115	134	133	132	131	131	COMMERCE WD
NORTH HUNT SUD	SULPHUR	HUNT	WOODBINE AQUIFER | HUNT COUNTY	162	174	172	171	168	164	OWNS SYSTEM
WOLFE CITY	SULPHUR	HUNT	TURKEY CREEK LAKE/RESERVOIR	200	200	200	200	200	200	OWNS SYSTEM
WOLFE CITY	SULPHUR	HUNT	WOODBINE AQUIFER | HUNT COUNTY	81	81	81	81	81	81	OWNS SYSTEM
COUNTY-OTHER, HUNT	TRINITY	HUNT	LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	2	4	4	9	2	7	NORTH TEXAS MWD
COUNTY-OTHER, HUNT	TRINITY	HUNT	TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	2	3	3	6	0	5	NORTH TEXAS MWD
COUNTY-OTHER, HUNT	TRINITY	HUNT	TRINITY INDIRECT REUSE	1	4	5	9	0	2	NORTH TEXAS MWD
COUNTY-OTHER, HUNT	TRINITY	HUNT	CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	1	1	2	4	0	0	NORTH TEXAS MWD

Water User Group Name	Basin	County	Source Name	2020	2030	2040	2050	2060	2070	Sellers Name
COUNTY-OTHER, HUNT	TRINITY	HUNT	NACATOCH AQUIFER | HUNT COUNTY	1	0	0	0	0	0	OWNS SYSTEM
COUNTY-OTHER, HUNT	TRINITY	HUNT	TAWAKONI LAKE/RESERVOIR	1	4	5	15	2	10	COMMERCE WD
COUNTY-OTHER, HUNT	TRINITY	HUNT	TRINITY AQUIFER | HUNT COUNTY	0	0	0	0	0	0	OWNS SYSTEM
COUNTY-OTHER, HUNT	TRINITY	HUNT	WOODBINE AQUIFER | HUNT COUNTY	24	19	14	4	0	0	OWNS SYSTEM
HICKORY CREEK SUD	TRINITY	HUNT	WOODBINE AQUIFER | HUNT COUNTY	117	120	121	122	123	124	OWNS SYSTEM
County Total - Round IV				**17,221**	**21,389**	**21,934**	**25,518**	**28,173**	**29,795**	
County Total - Round III				**44,057**	**43,824**	**43,820**	**44,724**	**46,535**		
Round IV minus Round III				**-26,836**	**-22,435**	**-21,886**	**-19,206**	**-18,362**		
LAMAR COUNTY										
COUNTY-OTHER, LAMAR	RED	LAMAR	PAT MAYSE LAKE/RESERVOIR	5	6	6	6	6	6	LAMAR COUNTY WSD
COUNTY-OTHER, LAMAR	RED	LAMAR	TRINITY AQUIFER | LAMAR COUNTY	59	62	65	64	62	62	OWNS SYSTEM
COUNTY-OTHER, LAMAR	RED	LAMAR	WOODBINE AQUIFER | LAMAR COUNTY	17	0	0	0	0	0	OWNS SYSTEM
LAMAR COUNTY WSD	RED	LAMAR	PAT MAYSE LAKE/RESERVOIR	5,334	5,278	5,229	5,193	5,159	5,108	PARIS
PARIS	RED	LAMAR	CROOK LAKE/RESERVOIR	806	806	806	806	806	806	OWNS SYSTEM
PARIS	RED	LAMAR	PAT MAYSE LAKE/RESERVOIR	10,352	10,234	10,119	10,023	9,839	9,742	OWNS SYSTEM
RENO	RED	LAMAR	PAT MAYSE LAKE/RESERVOIR	115	128	138	149	160	171	LAMAR COUNTY WSD
BLOSSOM	SULPHUR	LAMAR	PAT MAYSE LAKE/RESERVOIR	216	230	245	245	245	245	LAMAR COUNTY WSD
COUNTY-OTHER, LAMAR	SULPHUR	LAMAR	PAT MAYSE LAKE/RESERVOIR	269	274	279	277	275	273	LAMAR COUNTY WSD
COUNTY-OTHER, LAMAR	SULPHUR	LAMAR	TRINITY AQUIFER | LAMAR COUNTY	1	1	1	1	1	1	OWNS SYSTEM
DEPORT	SULPHUR	LAMAR	PAT MAYSE LAKE/RESERVOIR	100	106	113	113	113	113	LAMAR COUNTY WSD
LAMAR COUNTY WSD	SULPHUR	LAMAR	PAT MAYSE LAKE/RESERVOIR	3,557	3,518	3,486	3,462	3,438	3,404	PARIS
PARIS	SULPHUR	LAMAR	CROOK LAKE/RESERVOIR	1,210	1,210	1,210	1,210	1,210	1,210	OWNS SYSTEM
PARIS	SULPHUR	LAMAR	PAT MAYSE LAKE/RESERVOIR	15,528	15,351	15,179	15,035	14,759	14,614	OWNS SYSTEM
RENO	SULPHUR	LAMAR	PAT MAYSE LAKE/RESERVOIR	513	571	616	665	713	764	LAMAR COUNTY WSD
ROXTON	SULPHUR	LAMAR	PAT MAYSE LAKE/RESERVOIR	104	111	118	118	118	118	LAMAR COUNTY WSD
County Total - Round IV				**38,186**	**37,886**	**37,610**	**37,367**	**36,904**	**36,637**	
County Total - Round III				**42,922**	**42,681**	**42,456**	**42,249**	**41,819**		
Round IV minus Round III				**-4,736**	**-4,795**	**-4,846**	**-4,882**	**-4,915**		
MARION COUNTY										
COUNTY-OTHER, MARION	CYPRESS	MARION	CARRIZO-WILCOX AQUIFER | MARION COUNTY	1,553	1,553	1,553	1,553	1,553	1,553	OWNS SYSTEM
COUNTY-OTHER, MARION	CYPRESS	MARION	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	35	35	35	35	35	35	OWNS SYSTEM
COUNTY-OTHER, MARION	CYPRESS	MARION	O' THE PINES LAKE/RESERVOIR	178	178	178	178	178	178	NORTHEAST TEXAS MWD
DIANA SUD	CYPRESS	MARION	CARRIZO-WILCOX AQUIFER | MARION COUNTY	27	27	27	27	27	27	OWNS SYSTEM
DIANA SUD	CYPRESS	MARION	O' THE PINES LAKE/RESERVOIR	24	24	24	24	24	24	NORTHEAST TEXAS MWD

Water User Group Name	Basin	County	Source Name	2020	2030	2040	2050	2060	2070	Sellers Name
JEFFERSON	CYPRESS	MARION	CYPRESS RUN-OF-RIVER	148	148	148	148	148	148	OWNS SYSTEM
JEFFERSON	CYPRESS	MARION	O' THE PINES LAKE/RESERVOIR	1,509	1,509	1,509	1,509	1,509	1,509	NORTHEAST TEXAS MWD
County Total - Round IV				**3,474**	**3,474**	**3,474**	**3,474**	**3,474**	**3,474**	
County Total - Round III				**10,791**	**10,791**	**10,791**	**10,791**	**10,791**		
Round IV minus Round III				**-7,317**	**-7,317**	**-7,317**	**-7,317**	**-7,317**		
MORRIS COUNTY										
BI COUNTY WSC	CYPRESS	MORRIS	CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	167	167	167	133	134	137	OWNS SYSTEM
COUNTY-OTHER, MORRIS	CYPRESS	MORRIS	CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	353	353	353	353	353	353	OWNS SYSTEM
DAINGERFIELD	CYPRESS	MORRIS	O' THE PINES LAKE/RESERVOIR	1,582	1,582	1,582	1,582	1,582	1,582	NORTHEAST TEXAS MWD
HUGHES SPRINGS	CYPRESS	MORRIS	O' THE PINES LAKE/RESERVOIR	14	14	14	14	14	14	NORTHEAST TEXAS MWD
LONE STAR	CYPRESS	MORRIS	O' THE PINES LAKE/RESERVOIR	747	747	747	747	747	747	NORTHEAST TEXAS MWD
NAPLES	CYPRESS	MORRIS	CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	108	116	116	116	116	116	OWNS SYSTEM
OMAHA	CYPRESS	MORRIS	CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	165	165	165	165	165	165	OWNS SYSTEM
TRI SUD	CYPRESS	MORRIS	BOB SANDLIN LAKE/RESERVOIR	0	0	0	0	0	0	MOUNT PLEASANT
COUNTY-OTHER, MORRIS	SULPHUR	MORRIS	CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	187	187	187	187	187	187	OWNS SYSTEM
NAPLES	SULPHUR	MORRIS	CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	117	109	109	109	109	109	OWNS SYSTEM
OMAHA	SULPHUR	MORRIS	CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	125	125	125	125	125	125	OWNS SYSTEM
County Total - Round IV				**3,565**	**3,565**	**3,565**	**3,531**	**3,532**	**3,535**	
County Total - Round III				**13,390**	**13,390**	**13,390**	**13,390**	**13,390**		
Round IV minus Round III				**-9,825**	**-9,825**	**-9,825**	**-9,859**	**-9,858**		
RAINS COUNTY										
ALBA	SABINE	RAINS	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	2	2	2	2	2	1	OWNS SYSTEM
BRIGHT STAR- SALEM SUD	SABINE	RAINS	CARRIZO-WILCOX AQUIFER | RAINS COUNTY	434	434	434	434	434	434	OWNS SYSTEM
BRIGHT STAR- SALEM SUD	SABINE	RAINS	FORK LAKE/RESERVOIR	0	840	840	840	840	840	SABINE RIVER AUTHORITY
CASH SUD	SABINE	RAINS	TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	9	9	9	7	5	4	NORTH TEXAS MWD
CASH SUD	SABINE	RAINS	TRINITY INDIRECT REUSE	12	15	18	16	12	10	NORTH TEXAS MWD
CASH SUD	SABINE	RAINS	CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	6	6	6	4	3	3	NORTH TEXAS MWD
CASH SUD	SABINE	RAINS	FORK LAKE/RESERVOIR	3	0	0	0	0	0	NORTH TEXAS MWD
CASH SUD	SABINE	RAINS	TAWAKONI LAKE/RESERVOIR	56	52	49	55	62	65	NORTH TEXAS MWD
COUNTY-OTHER, RAINS	SABINE	RAINS	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	113	113	113	113	113	113	OWNS SYSTEM
COUNTY-OTHER, RAINS	SABINE	RAINS	CARRIZO-WILCOX AQUIFER | RAINS COUNTY	204	217	220	218	215	215	OWNS SYSTEM

Water User Group Name	Basin	County	Source Name	2020	2030	2040	2050	2060	2070	Sellers Name
COUNTY-OTHER, RAINS	SABINE	RAINS	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	7	7	7	7	7	7	OWNS SYSTEM
COUNTY-OTHER, RAINS	SABINE	RAINS	NACATOCH AQUIFER | HOPKINS COUNTY	69	75	77	76	74	74	OWNS SYSTEM
COUNTY-OTHER, RAINS	SABINE	RAINS	TAWAKONI LAKE/RESERVOIR	318	318	318	318	318	318	EMORY
EAST TAWAKONI	SABINE	RAINS	TAWAKONI LAKE/RESERVOIR	773	773	773	773	773	773	EMORY
EMORY	SABINE	RAINS	FORK LAKE/RESERVOIR	498	827	819	811	804	796	SABINE RIVER AUTHORITY
EMORY	SABINE	RAINS	TAWAKONI LAKE/RESERVOIR	0	0	0	0	0	0	SABINE RIVER AUTHORITY
GOLDEN WSC	SABINE	RAINS	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	9	9	9	9	9	9	OWNS SYSTEM
POINT	SABINE	RAINS	FORK LAKE/RESERVOIR	172	208	207	205	204	202	SABINE RIVER AUTHORITY
POINT	SABINE	RAINS	TAWAKONI LAKE/RESERVOIR	48	47	45	44	42	41	SABINE RIVER AUTHORITY
County Total - Round IV				**2,733**	**3,952**	**3,946**	**3,932**	**3,917**	**3,905**	
County Total - Round III				**3,780**	**3,794**	**3,785**	**3,764**	**3,741**		
Round IV minus Round III				**-1,047**	**158**	**161**	**168**	**176**		
RED RIVER COUNTY										
COUNTY-OTHER, RED RIVER	RED	RED RIVER	PAT MAYSE LAKE/RESERVOIR	118	118	118	118	118	118	LAMAR COUNTY WSD
COUNTY-OTHER, RED RIVER	RED	RED RIVER	TRINITY AQUIFER | RED RIVER COUNTY	23	23	23	23	23	23	OWNS SYSTEM
COUNTY-OTHER, RED RIVER	RED	RED RIVER	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	TEXARKANA
RED RIVER COUNTY WSC	RED	RED RIVER	BLOSSOM AQUIFER | RED RIVER COUNTY	29	30	30	30	30	30	OWNS SYSTEM
RED RIVER COUNTY WSC	RED	RED RIVER	PAT MAYSE LAKE/RESERVOIR	184	184	184	184	184	184	LAMAR COUNTY WSD
RED RIVER COUNTY WSC	RED	RED RIVER	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	TEXARKANA
BOGATA	SULPHUR	RED RIVER	NACATOCH AQUIFER | RED RIVER COUNTY	269	269	269	269	269	269	OWNS SYSTEM
CLARKSVILLE	SULPHUR	RED RIVER	BLOSSOM AQUIFER | RED RIVER COUNTY	383	327	0	0	0	0	OWNS SYSTEM
CLARKSVILLE	SULPHUR	RED RIVER	LANGFORD LAKE/RESERVOIR	533	333	0	0	0	0	OWNS SYSTEM
COUNTY-OTHER, RED RIVER	SULPHUR	RED RIVER	CARRIZO-WILCOX AQUIFER | TITUS COUNTY	0	0	0	0	0	0	OWNS SYSTEM
COUNTY-OTHER, RED RIVER	SULPHUR	RED RIVER	NACATOCH AQUIFER | RED RIVER COUNTY	56	55	54	54	54	54	OWNS SYSTEM
COUNTY-OTHER, RED RIVER	SULPHUR	RED RIVER	PAT MAYSE LAKE/RESERVOIR	135	132	129	129	129	129	LAMAR COUNTY WSD
COUNTY-OTHER, RED RIVER	SULPHUR	RED RIVER	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	TEXARKANA
DEPORT	SULPHUR	RED RIVER	PAT MAYSE LAKE/RESERVOIR	7	7	7	7	7	7	LAMAR COUNTY WSD
DETROIT	SULPHUR	RED RIVER	PAT MAYSE LAKE/RESERVOIR	41	41	41	41	41	41	LAMAR COUNTY WSD
DETROIT	SULPHUR	RED RIVER	TRINITY AQUIFER | RED RIVER COUNTY	59	59	59	59	59	59	OWNS SYSTEM

Water User Group Name	Basin	County	Source Name	2020	2030	2040	2050	2060	2070	Sellers Name
RED RIVER COUNTY WSC	SULPHUR	RED RIVER	BLOSSOM AQUIFER | RED RIVER COUNTY	212	223	223	223	223	223	OWNS SYSTEM
RED RIVER COUNTY WSC	SULPHUR	RED RIVER	NACATOCH AQUIFER | RED RIVER COUNTY	188	188	188	188	188	188	OWNS SYSTEM
RED RIVER COUNTY WSC	SULPHUR	RED RIVER	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0	TEXARKANA
County Total - Round IV				**2,237**	**1,989**	**1,325**	**1,325**	**1,325**	**1,325**	
County Total - Round III				**3,561**	**3,557**	**3,553**	**3,553**	**3,553**		
Round IV minus Round III				**-1,324**	**-1,568**	**-2,228**	**-2,228**	**-2,228**		
SMITH COUNTY										
COUNTY-OTHER, SMITH	SABINE	SMITH	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	2,889	3,105	3,330	3,697	4,159	4,477	TYLER
COUNTY-OTHER, SMITH	SABINE	SMITH	GLADEWATER LAKE/RESERVOIR	23	23	23	23	23	23	GLADEWATER
CRYSTAL SYSTEMS INC	SABINE	SMITH	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	392	333	270	197	92	0	OWNS SYSTEM
CRYSTAL SYSTEMS INC	SABINE	SMITH	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	195	141	89	37	0	0	OWNS SYSTEM
HIDEAWAY	SABINE	SMITH	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	744	810	893	999	1,159	1,301	CRYSTAL SYSTEMS INC
HIDEAWAY	SABINE	SMITH	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	260	330	403	481	538	538	CRYSTAL SYSTEMS INC
JACKSON WSC	SABINE	SMITH	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	197	213	235	263	301	347	OWNS SYSTEM
LIBERTY CITY WSC	SABINE	SMITH	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	10	10	10	10	10	10	OWNS SYSTEM
LIBERTY CITY WSC	SABINE	SMITH	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	17	17	17	17	17	17	OWNS SYSTEM
LINDALE	SABINE	SMITH	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	813	813	813	813	813	813	OWNS SYSTEM
LINDALE RURAL WSC	SABINE	SMITH	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	1,059	1,059	1,026	962	894	860	OWNS SYSTEM
OVERTON	SABINE	SMITH	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	0	0	0	0	0	0	OWNS SYSTEM
SMITH COUNTY MUD #1	SABINE	SMITH	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	887	887	887	887	887	887	OWNS SYSTEM
SMITH COUNTY MUD #1	SABINE	SMITH	QUEEN CITY AQUIFER | SMITH COUNTY	269	269	269	269	269	269	OWNS SYSTEM
SOUTHERN UTILITIES COMPANY	SABINE	SMITH	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	2,045	2,272	2,540	2,707	2,167	1,760	OWNS SYSTEM
SOUTHERN UTILITIES COMPANY	SABINE	SMITH	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	0	0	0	169	1,128	2,038	OWNS SYSTEM
TYLER	SABINE	SMITH	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	21	24	27	30	35	40	OWNS SYSTEM
TYLER	SABINE	SMITH	PALESTINE LAKE/RESERVOIR	80	89	99	114	129	149	OWNS SYSTEM
TYLER	SABINE	SMITH	TYLER LAKE/RESERVOIR	91	101	113	128	147	170	OWNS SYSTEM
WEST GREGG SUD	SABINE	SMITH	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	0	0	0	0	0	13	OWNS SYSTEM
WEST GREGG SUD	SABINE	SMITH	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	127	127	127	127	127	127	OWNS SYSTEM
WINONA	SABINE	SMITH	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	169	169	169	169	169	169	OWNS SYSTEM
County Total - Round IV				**10,288**	**10,792**	**11,340**	**12,099**	**13,064**	**14,008**	
County Total - Round III				**9,461**	**9,995**	**10,536**	**11,499**	**12,723**		
Round IV minus Round III				**827**	**797**	**804**	**600**	**341**		

Water User Group Name	Basin	County	Source Name	2020	2030	2040	2050	2060	2070	Sellers Name
TITUS COUNTY										
BI COUNTY WSC	CYPRESS	TITUS	CARRIZO-WILCOX AQUIFER | TITUS COUNTY	143	143	132	111	96	89	OWNS SYSTEM
COUNTY-OTHER, TITUS	CYPRESS	TITUS	BOB SANDLIN LAKE/RESERVOIR	87	87	87	87	87	87	MOUNT PLEASANT
COUNTY-OTHER, TITUS	CYPRESS	TITUS	CARRIZO-WILCOX AQUIFER | TITUS COUNTY	415	438	457	475	439	416	OWNS SYSTEM
CYPRESS SPRINGS SUD	CYPRESS	TITUS	CYPRESS SPRINGS LAKE/RESERVOIR	46	46	45	44	42	39	FRANKLIN COUNTY WD
MOUNT PLEASANT	CYPRESS	TITUS	BOB SANDLIN LAKE/RESERVOIR	2,677	2,625	2,502	2,456	3,278	4,126	TITUS COUNTY FWD #1
MOUNT PLEASANT	CYPRESS	TITUS	CYPRESS RUN-OF-RIVER	410	410	410	410	410	410	OWNS SYSTEM
MOUNT PLEASANT	CYPRESS	TITUS	CYPRESS SPRINGS LAKE/RESERVOIR	2,203	1,963	1,723	1,483	1,233	995	FRANKLIN COUNTY WD
MOUNT PLEASANT	CYPRESS	TITUS	TANKERSLEY LAKE/RESERVOIR	950	950	950	950	950	950	OWNS SYSTEM
TRI SUD	CYPRESS	TITUS	BOB SANDLIN LAKE/RESERVOIR	0	0	0	0	0	0	MOUNT PLEASANT
WINFIELD	CYPRESS	TITUS	BOB SANDLIN LAKE/RESERVOIR	17	18	20	22	24	27	MOUNT PLEASANT
COUNTY-OTHER, TITUS	SULPHUR	TITUS	BOB SANDLIN LAKE/RESERVOIR	600	656	689	723	761	803	MOUNT PLEASANT
COUNTY-OTHER, TITUS	SULPHUR	TITUS	CARRIZO-WILCOX AQUIFER | TITUS COUNTY	395	432	454	477	500	500	OWNS SYSTEM
COUNTY-OTHER, TITUS	SULPHUR	TITUS	NACATOCH AQUIFER | RED RIVER COUNTY	76	76	76	76	76	76	OWNS SYSTEM
CYPRESS SPRINGS SUD	SULPHUR	TITUS	CYPRESS SPRINGS LAKE/RESERVOIR	20	20	20	20	20	20	FRANKLIN COUNTY WD
TALCO	SULPHUR	TITUS	CARRIZO-WILCOX AQUIFER | TITUS COUNTY	453	453	453	453	453	453	OWNS SYSTEM
TRI SUD	SULPHUR	TITUS	BOB SANDLIN LAKE/RESERVOIR	0	0	0	0	0	0	MOUNT PLEASANT
WINFIELD	SULPHUR	TITUS	BOB SANDLIN LAKE/RESERVOIR	47	52	57	62	69	76	MOUNT PLEASANT
County Total - Round IV				**8,539**	**8,369**	**8,075**	**7,849**	**8,438**	**9,067**	
County Total - Round III				**10,908**	**10,594**	**10,263**	**10,867**	**9,193**		
Round IV minus Round III				**-2,369**	**-2,225**	**-2,188**	**-3,018**	**-755**		
UPSHUR COUNTY										
BI COUNTY WSC	CYPRESS	UPSHUR	CARRIZO-WILCOX AQUIFER | TITUS COUNTY	0	0	11	32	32	32	OWNS SYSTEM
BI COUNTY WSC	CYPRESS	UPSHUR	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	423	423	423	423	423	423	OWNS SYSTEM
COUNTY-OTHER, UPSHUR	CYPRESS	UPSHUR	BIG SANDY CREEK LAKE/RESERVOIR	27	27	27	27	27	27	WHITE OAK
COUNTY-OTHER, UPSHUR	CYPRESS	UPSHUR	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	1,195	1,222	1,237	1,249	1,266	1,284	OWNS SYSTEM
COUNTY-OTHER, UPSHUR	CYPRESS	UPSHUR	GLADEWATER LAKE/RESERVOIR	76	76	76	76	76	76	GLADEWATER
DIANA SUD	CYPRESS	UPSHUR	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	598	598	598	598	598	598	OWNS SYSTEM
DIANA SUD	CYPRESS	UPSHUR	O' THE PINES LAKE/RESERVOIR	524	524	524	524	524	524	NORTHEAST TEXAS MWD
EAST MOUNTAIN	CYPRESS	UPSHUR	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	53	53	53	53	53	53	OWNS SYSTEM
GILMER	CYPRESS	UPSHUR	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	1,094	1,094	1,094	1,094	1,094	1,094	OWNS SYSTEM
GILMER	CYPRESS	UPSHUR	GILMER LAKE/RESERVOIR	0	0	0	0	0	0	OWNS SYSTEM
ORE CITY	CYPRESS	UPSHUR	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	214	214	214	214	214	214	OWNS SYSTEM
ORE CITY	CYPRESS	UPSHUR	O' THE PINES LAKE/RESERVOIR	1,504	1,504	1,504	1,504	1,504	1,504	NORTHEAST TEXAS MWD

Water User Group Name	Basin	County	Source Name	2020	2030	2040	2050	2060	2070	Sellers Name
PRITCHETT WSC	CYPRESS	UPSHUR	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	441	441	441	441	441	441	OWNS SYSTEM
SHARON WSC	CYPRESS	UPSHUR	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	371	371	371	371	371	371	OWNS SYSTEM
BIG SANDY	SABINE	UPSHUR	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	285	285	285	285	285	285	OWNS SYSTEM
COUNTY-OTHER, UPSHUR	SABINE	UPSHUR	BIG SANDY CREEK LAKE/RESERVOIR	13	13	13	13	13	13	WHITE OAK
COUNTY-OTHER, UPSHUR	SABINE	UPSHUR	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	572	585	592	598	606	614	OWNS SYSTEM
COUNTY-OTHER, UPSHUR	SABINE	UPSHUR	GLADEWATER LAKE/RESERVOIR	36	36	36	36	36	36	GLADEWATER
EAST MOUNTAIN	SABINE	UPSHUR	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	307	307	307	307	307	307	OWNS SYSTEM
FOUKE WSC	SABINE	UPSHUR	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	14	14	14	14	14	14	OWNS SYSTEM
GLADEWATER	SABINE	UPSHUR	GLADEWATER LAKE/RESERVOIR	597	592	580	566	549	566	OWNS SYSTEM
PRITCHETT WSC	SABINE	UPSHUR	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	577	577	577	577	577	577	OWNS SYSTEM
County Total - Round IV				**8,921**	**8,956**	**8,977**	**9,002**	**9,010**	**9,053**	
County Total - Round III				**15,374**	**15,414**	**15,436**	**15,454**	**15,479**		
Round IV minus Round III				**-6,453**	**-6,458**	**-6,459**	**-6,452**	**-6,469**		
VAN ZANDT COUNTY										
BETHEL-ASH WSC	NECHES	VAN ZANDT	CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	147	165	175	177	182	182	OWNS SYSTEM
COUNTY-OTHER, VAN ZANDT	NECHES	VAN ZANDT	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	1,785	1,887	1,964	2,061	2,170	2,170	OWNS SYSTEM
R-P-M WSC	NECHES	VAN ZANDT	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	123	125	125	125	125	124	OWNS SYSTEM
R-P-M WSC	NECHES	VAN ZANDT	QUEEN CITY AQUIFER | VAN ZANDT COUNTY	116	118	118	118	117	117	OWNS SYSTEM
VAN	NECHES	VAN ZANDT	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	514	502	493	481	467	467	OWNS SYSTEM
ABLES SPRINGS WSC	SABINE	VAN ZANDT	LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	1	1	1	0	1	1	NORTH TEXAS MWD
ABLES SPRINGS WSC	SABINE	VAN ZANDT	TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	1	1	0	1	0	0	NORTH TEXAS MWD
ABLES SPRINGS WSC	SABINE	VAN ZANDT	TRINITY INDIRECT REUSE	0	0	0	0	0	1	NORTH TEXAS MWD
ABLES SPRINGS WSC	SABINE	VAN ZANDT	CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	0	0	0	0	0	0	NORTH TEXAS MWD
ABLES SPRINGS WSC	SABINE	VAN ZANDT	FORK LAKE/RESERVOIR	0	0	0	0	0	0	NORTH TEXAS MWD
ABLES SPRINGS WSC	SABINE	VAN ZANDT	TAWAKONI LAKE/RESERVOIR	0	1	0	0	0	0	NORTH TEXAS MWD
CANTON	SABINE	VAN ZANDT	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	382	382	382	382	339	339	OWNS SYSTEM
CANTON	SABINE	VAN ZANDT	MILL CREEK LAKE/RESERVOIR	1,146	1,146	1,146	1,145	1,145	1,145	OWNS SYSTEM
CANTON	SABINE	VAN ZANDT	SABINE RUN-OF-RIVER	12	12	12	12	12	12	OWNS SYSTEM
COMBINED CONSUMERS SUD	SABINE	VAN ZANDT	FORK LAKE/RESERVOIR	266	297	321	351	384	411	SABINE RIVER AUTHORITY
COUNTY-OTHER, VAN ZANDT	SABINE	VAN ZANDT	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	1,718	1,769	1,808	1,856	1,809	1,809	OWNS SYSTEM
COUNTY-OTHER, VAN ZANDT	SABINE	VAN ZANDT	SABINE RUN-OF-RIVER	170	170	170	170	170	170	OWNS SYSTEM

Water User Group Name	Basin	County	Source Name	2020	2030	2040	2050	2060	2070	Sellers Name
EDGEWOOD	SABINE	VAN ZANDT	EDGEWOOD CITY LAKE/RESERVOIR	160	160	160	160	160	160	OWNS SYSTEM
EDGEWOOD	SABINE	VAN ZANDT	FORK LAKE/RESERVOIR	113	781	776	770	764	759	SABINE RIVER AUTHORITY
GOLDEN WSC	SABINE	VAN ZANDT	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	99	102	105	108	110	112	OWNS SYSTEM
GRAND SALINE	SABINE	VAN ZANDT	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	645	645	645	645	611	611	OWNS SYSTEM
GRAND SALINE	SABINE	VAN ZANDT	SABINE RUN-OF-RIVER	0	0	0	0	0	0	OWNS SYSTEM
MACBEE SUD	SABINE	VAN ZANDT	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	78	78	78	78	74	74	OWNS SYSTEM
MACBEE SUD	SABINE	VAN ZANDT	TAWAKONI LAKE/RESERVOIR	99	493	496	496	496	480	SABINE RIVER AUTHORITY
SOUTH TAWAKONI WSC	SABINE	VAN ZANDT	FORK LAKE/RESERVOIR	400	1,041	1,033	1,025	1,018	1,010	SABINE RIVER AUTHORITY
VAN	SABINE	VAN ZANDT	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	134	146	155	167	181	181	OWNS SYSTEM
VAN	SABINE	VAN ZANDT	SABINE RUN-OF-RIVER	350	350	350	350	350	350	OWNS SYSTEM
WILLS POINT	SABINE	VAN ZANDT	SABINE RUN-OF-RIVER	120	120	120	120	120	120	OWNS SYSTEM
WILLS POINT	SABINE	VAN ZANDT	TAWAKONI LAKE/RESERVOIR	620	648	648	648	648	648	SABINE RIVER AUTHORITY
BETHEL-ASH WSC	TRINITY	VAN ZANDT	CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	43	47	49	52	51	51	OWNS SYSTEM
CANTON	TRINITY	VAN ZANDT	MILL CREEK LAKE/RESERVOIR	4	4	4	5	5	5	OWNS SYSTEM
COUNTY-OTHER, VAN ZANDT	TRINITY	VAN ZANDT	TRWD LAKE/RESERVOIR SYSTEM	185	212	214	215	213	210	MABANK
COUNTY-OTHER, VAN ZANDT	TRINITY	VAN ZANDT	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	600	651	689	738	785	785	OWNS SYSTEM
MACBEE SUD	TRINITY	VAN ZANDT	TAWAKONI LAKE/RESERVOIR	287	1,338	1,293	1,245	1,185	1,128	SABINE RIVER AUTHORITY
WILLS POINT	TRINITY	VAN ZANDT	TAWAKONI LAKE/RESERVOIR	1,381	1,427	1,412	1,396	1,381	1,365	SABINE RIVER AUTHORITY
County Total - Round IV				**11,699**	**14,819**	**14,942**	**15,097**	**15,073**	**14,997**	
County Total - Round III				**13,086**	**13,281**	**13,414**	**13,531**	**13,639**		
Round IV minus Round III				**-1,387**	**1,538**	**1,528**	**1,566**	**1,434**		
WOOD COUNTY										
COUNTY-OTHER, WOOD	CYPRESS	WOOD	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	795	799	808	801	810	806	OWNS SYSTEM
CYPRESS SPRINGS SUD	CYPRESS	WOOD	CYPRESS SPRINGS LAKE/RESERVOIR	72	72	71	69	66	62	FRANKLIN COUNTY WD
SHARON WSC	CYPRESS	WOOD	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	159	159	159	159	159	159	OWNS SYSTEM
WINNSBORO	CYPRESS	WOOD	CYPRESS SPRINGS LAKE/RESERVOIR	300	300	300	300	300	300	FRANKLIN COUNTY WD
ALBA	SABINE	WOOD	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	100	100	100	100	100	101	OWNS SYSTEM
BRIGHT STAR- SALEM SUD	SABINE	WOOD	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	343	343	343	343	343	343	OWNS SYSTEM
COUNTY-OTHER, WOOD	SABINE	WOOD	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	2	2	2	2	2	2	OWNS SYSTEM
COUNTY-OTHER, WOOD	SABINE	WOOD	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	3,616	3,658	3,652	3,658	3,649	3,653	OWNS SYSTEM
FOUKE WSC	SABINE	WOOD	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	978	978	978	978	978	978	OWNS SYSTEM
GOLDEN WSC	SABINE	WOOD	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	376	373	370	367	365	363	OWNS SYSTEM

Water User Group Name	Basin	County	Source Name	2020	2030	2040	2050	2060	2070	Sellers Name
HAWKINS	SABINE	WOOD	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	1,075	1,075	1,075	1,075	1,075	1,075	OWNS SYSTEM
HOLLY RANCH WATER COMPANY	SABINE	WOOD	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	575	575	575	575	575	575	OWNS SYSTEM
JONES WSC	SABINE	WOOD	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	643	639	637	633	628	625	OWNS SYSTEM
MINEOLA	SABINE	WOOD	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	941	941	941	941	941	941	OWNS SYSTEM
NEW HOPE SUD	SABINE	WOOD	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	366	366	366	366	366	366	OWNS SYSTEM
PRITCHETT WSC	SABINE	WOOD	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	3	3	3	3	3	3	OWNS SYSTEM
PRITCHETT WSC	SABINE	WOOD	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	5	5	5	5	5	5	OWNS SYSTEM
QUITMAN	SABINE	WOOD	FORK LAKE/RESERVOIR	300	1,012	1,004	997	990	983	SABINE RIVER AUTHORITY
RAMEY WSC	SABINE	WOOD	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	602	602	602	602	602	602	OWNS SYSTEM
SHARON WSC	SABINE	WOOD	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	512	512	512	512	512	512	OWNS SYSTEM
WINNSBORO	SABINE	WOOD	CYPRESS SPRINGS LAKE/RESERVOIR	500	500	500	500	500	500	FRANKLIN COUNTY WD
County Total - Round IV				**12,263**	**13,014**	**13,003**	**12,986**	**12,969**	**12,954**	
County Total - Round III				**10,240**	**10,279**	**10,274**	**10,266**	**10,259**		
Round IV minus Round III				**2,023**	**2,735**	**2,729**	**2,720**	**2,710**		
TOTAL										
County Total - Round IV				**226,768**	**236,834**	**236,668**	**240,722**	**244,142**	**246,589**	
County Total - Round III				**409,645**	**402,967**	**396,567**	**392,914**	**383,799**		
County Total - Round II				**346,058**	**346,058**	**346,058**	**346,058**	**346,058**		
Round IV minus Round III				**-182,877**	**-166,133**	**-159,899**	**-152,192**	**-139,657**		
Round III minus Round II				**63,587**	**56,909**	**50,509**	**46,856**	**37,741**		

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Values in Acre-Feet per Year							
Recipient Name	**WUG Name**	**WD2020**	**WD2030**	**WD2040**	**WD2050**	**WD2060**	**WD2070**
WUG Demands on Cash SUD							
LONE OAK	LONE OAK	164	164	164	164	164	164
QUINLAN	QUINLAN	605	605	605	605	605	605
CASH SUD	CASH SUD	137	172	212	254	302	353
CASH SUD	CASH SUD	12	13	13	14	15	15
CASH SUD	CASH SUD	2,038	2,368	2,789	3,316	3,969	4,758
CASH SUD	CASH SUD	29	34	40	48	57	68
CASH SUD	CASH SUD	80	82	82	82	82	82
		3,065	**3,438**	**3,905**	**4,483**	**5,194**	**6,045**
Current Supply							
CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM		155	174	198	182	165	151
FORK LAKE/RESERVOIR		891	3,949	3,929	3,911	3,894	3,876
INDIRECT REUSE NTMWD/ LAKE LAVON		178	239	309	322	294	269
INDIRECT REUSE NTMWD/LAKE RAY HUBBARD		180	267	366	391	400	385
LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM		325	365	414	380	345	313
TAWAKONI LAKE/RESERVOIR		958	878	878	867	856	845
TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM		265	300	343	317	289	264
		2,952	**6,172**	**6,437**	**6,370**	**6,243**	**6,103**
WUG Demands on Cherokee Water Company							
LONGVIEW	LONGVIEW	18,000	18,000	18,000	18,000	18,000	18,000
STEAM ELECTRIC POWER, GREGG	STEAM ELECTRIC POWER, GREGG	2,000	2,000	2,000	2,000	2,000	2,094
		20,000	**20,000**	**20,000**	**20,000**	**20,000**	**20,094**
Current Supply							
CHEROKEE LAKE/RESERVOIR		**28,650**	**28,415**	**28,180**	**27,945**	**27,710**	**27,477**
WUG Demands on Commerce Water District							
COMMERCE	COMMERCE	1,427	6,965	6,488	5,465	3,833	3,486
COUNTY-OTHER, DELTA	COUNTY-OTHER, DELTA	545	548	551	553	553	481
COUNTY-OTHER, HUNT	COUNTY-OTHER, HUNT	293	437	655	1,868	2,086	2,573
MANUFACTURING, HUNT	MANUFACTURING, HUNT	338	401	470	535	580	650
NORTH HUNT SUD	NORTH HUNT SUD	147	147	147	147	147	147
		2,750	**8,498**	**8,311**	**8,568**	**7,199**	**7,337**
Current Supply							
NACATOCH AQUIFER		371	371	371	371	371	371
TAWAKONI LAKE/RESERVOIR		2,379	8,127	7,940	8,197	6,828	7,040
		2,750	**8,498**	**8,311**	**8,568**	**7,199**	**7,411**
WUG Demands on City of Emory							
COUNTY-OTHER, RAINS	COUNTY-OTHER, RAINS	318	318	318	318	318	318
EAST TAWAKONI	EAST TAWAKONI	773	773	773	773	773	773
EMORY	EMORY	498	522	527	530	532	533
		1,589	**1,613**	**1,618**	**1,621**	**1,623**	**1,624**
Current Supply							
FORK LAKE/RESERVOIR		498	827	819	811	804	796
TAWAKONI LAKE/RESERVOIR		1,091	1,091	1,091	1,091	1,091	1,091
		1,589	**1,918**	**1,910**	**1,902**	**1,895**	**1,887**
WUG Demands on Franklin County WD							
CYPRESS SPRINGS SUD	CYPRESS SPRINGS SUD	4,500	4,500	4,500	4,500	4,500	4,500
MOUNT PLEASANT	MOUNT PLEASANT	3,500	3,500	3,500	3,500	3,500	3,500
MOUNT VERNON	MOUNT VERNON	3,000	3,000	3,000	3,000	3,000	3,000
WINNSBORO	WINNSBORO	2,000	2,000	2,000	2,000	2,000	2,000
		13,000	**13,000**	**13,000**	**13,000**	**13,000**	**13,000**
Current Supply							
CYPRESS SPRINGS LAKE/RESERVOIR		**12,100**	**11,700**	**11,300**	**11,000**	**10,600**	**10,200**

Values in Acre-Feet per Year							
Recipient Name	**WUG Name**	**WD2020**	**WD2030**	**WD2040**	**WD2050**	**WD2060**	**WD2070**
WUG Demands on City of Greenville							
CADDO MILLS	CADDO MILLS	178	186	201	242	309	319
COUNTY-OTHER, HUNT	COUNTY-OTHER, HUNT	1,064	1,064	1,064	1,064	1,064	1,064
MANUFACTURING, HUNT	MANUFACTURING, HUNT	797	965	1,146	1,319	1,438	1,624
MINING, HUNT	MINING, HUNT	19	20	23	24	29	30
STEAM ELECTRIC POWER, HUNT	STEAM ELECTRIC POWER, HUNT	351	351	351	351	351	351
GREENVILLE	GREENVILLE	8,908	10,070	11,709	14,051	17,451	22,405
		11,317	**12,656**	**14,494**	**17,051**	**20,642**	**25,793**
Current Supply							
GREENVILLE CITY LAKE/RESERVOIR		3,350	3,350	3,350	3,350	3,350	3,350
TAWAKONI LAKE/RESERVOIR		7,967	11,093	11,292	11,507	11,698	11,895
		11,317	**14,443**	**14,642**	**14,857**	**15,048**	**15,245**
WUG Demands on Lamar County WSD							
BLOSSOM	BLOSSOM	216	230	245	245	245	245
COUNTY-OTHER, LAMAR	COUNTY-OTHER, LAMAR	274	280	285	283	281	279
COUNTY-OTHER, RED RIVER	COUNTY-OTHER, RED RIVER	253	250	247	247	247	247
DEPORT	DEPORT	107	113	120	120	120	120
DETROIT	DETROIT	41	41	41	41	41	41
MANUFACTURING, LAMAR	MANUFACTURING, LAMAR	858	900	941	976	1,042	1,077
RED RIVER COUNTY WSC	RED RIVER COUNTY WSC	323	323	323	323	323	323
RENO	RENO	628	699	754	814	873	935
ROXTON	ROXTON	104	111	118	118	118	118
LAMAR COUNTY WSD	LAMAR COUNTY WSD	1,557	1,572	1,582	1,602	1,626	1,650
LAMAR COUNTY WSD	LAMAR COUNTY WSD	660	667	671	679	690	700
		5,021	**5,186**	**5,327**	**5,448**	**5,606**	**5,735**
Current Supply							
PAT MAYSE LAKE/RESERVOIR		**11,556**	**11,604**	**11,650**	**11,683**	**11,748**	**11,758**
WUG Demands on City of Longview							
COUNTY-OTHER, GREGG	COUNTY-OTHER, GREGG	18	18	18	18	18	18
COUNTY-OTHER, HARRISON	COUNTY-OTHER, HARRISON	382	382	382	382	382	382
ELDERVILLE WSC	ELDERVILLE WSC	737	737	737	737	737	737
GUM SPRINGS WSC	GUM SPRINGS WSC	1,105	1,105	1,105	1,105	1,105	1,105
HALLSVILLE	HALLSVILLE	737	737	737	737	737	737
MANUFACTURING, GREGG	MANUFACTURING, GREGG	6,366	6,368	6,368	6,368	6,368	6,368
MANUFACTURING, HARRISON	MANUFACTURING, HARRISON	11,285	11,285	11,285	11,285	11,285	11,285
STEAM ELECTRIC POWER, HARRISON	STEAM ELECTRIC POWER, HARRISON	6,161	6,161	6,161	6,161	6,161	6,161
WHITE OAK	WHITE OAK	2,592	2,592	2,592	2,592	2,592	2,592
LONGVIEW	LONGVIEW	23,668	25,487	27,680	30,319	33,432	36,985
LONGVIEW	LONGVIEW	552	583	616	670	731	804
		53,603	**55,455**	**57,681**	**60,374**	**63,548**	**67,174**
Current Supply							
BIG SANDY CREEK LAKE/RESERVOIR		2,000	2,000	2,000	2,000	2,000	2,000
CHEROKEE LAKE/RESERVOIR		18,000	18,000	18,000	18,000	18,000	18,000
DIRECT REUSE		6,161	6,161	6,161	6,161	6,161	6,161
FORK LAKE/RESERVOIR		20,000	20,000	20,000	20,000	20,000	20,000
O' THE PINES LAKE/RESERVOIR		20,000	20,000	20,000	20,000	20,000	20,000
SABINE RUN-OF-RIVER		1,092	1,094	1,094	1,094	1,094	1,094
		67,253	**67,255**	**67,255**	**67,255**	**67,255**	**67,255**
WUG Demands on City of Marshall							
COUNTY-OTHER, HARRISON	COUNTY-OTHER, HARRISON	323	323	323	323	323	323
GILL WSC	GILL WSC	100	100	100	100	100	100
MANUFACTURING, HARRISON	MANUFACTURING, HARRISON	2,000	2,000	2,000	2,000	2,000	2,000

Values in Acre-Feet per Year							
Recipient Name	**WUG Name**	**WD2020**	**WD2030**	**WD2040**	**WD2050**	**WD2060**	**WD2070**
MARSHALL	MARSHALL	895	938	986	1,068	1,165	1,281
MARSHALL	MARSHALL	4,190	4,388	4,613	4,999	5,453	5,997
		7,508	**7,749**	**8,022**	**8,490**	**9,041**	**9,701**
Current Supply							
CYPRESS RUN-OF-RIVER		0	0	0	0	0	0
O' THE PINES LAKE/RESERVOIR		9,000	9,000	9,000	9,000	9,000	9,000
		9,000	**9,000**	**9,000**	**9,000**	**9,000**	**9,000**
WUG Demands on City of Mount Pleasant							
COUNTY-OTHER, FRANKLIN	COUNTY-OTHER, FRANKLIN	14	16	17	17	17	17
COUNTY-OTHER, TITUS	COUNTY-OTHER, TITUS	687	743	776	810	848	890
MANUFACTURING, TITUS	MANUFACTURING, TITUS	3,345	3,409	3,472	3,483	3,617	3,651
TRI SUD	TRI SUD	880	978	1,045	1,104	1,155	1,233
WINFIELD	WINFIELD	64	70	77	84	93	103
MOUNT PLEASANT	MOUNT PLEASANT	3,918	4,334	4,780	5,299	5,871	6,481
		8,908	**9,550**	**10,167**	**10,797**	**11,601**	**12,375**
Current Supply							
BOB SANDLIN LAKE/RESERVOIR		10,000	10,000	10,000	10,000	10,000	10,000
CYPRESS RUN-OF-RIVER		410	410	410	410	410	410
CYPRESS SPRINGS LAKE/RESERVOIR		2,203	1,963	1,723	1,483	1,233	995
TANKERSLEY LAKE/RESERVOIR		1,500	1,500	1,500	1,500	1,500	1,500
		14,113	**13,873**	**13,633**	**13,393**	**13,143**	**12,905**
WUG Demands on Northeast Texas MWD							
COUNTY-OTHER, CASS	COUNTY-OTHER, CASS	1,406	1,406	1,406	1,406	1,406	1,406
COUNTY-OTHER, HARRISON	COUNTY-OTHER, HARRISON	315	315	315	315	315	315
COUNTY-OTHER, MARION	COUNTY-OTHER, MARION	828	828	828	828	828	828
DAINGERFIELD	DAINGERFIELD	7,375	7,375	7,375	7,375	7,375	7,375
DIANA SUD	DIANA SUD	739	739	739	739	739	739
HUGHES SPRINGS	HUGHES SPRINGS	3,058	3,058	3,058	3,058	3,058	3,058
JEFFERSON	JEFFERSON	7,031	7,031	7,031	7,031	7,031	7,031
LONE STAR	LONE STAR	3,482	3,482	3,482	3,482	3,482	3,482
LONGVIEW	LONGVIEW	20,000	20,000	20,000	20,000	20,000	20,000
MANUFACTURING, MORRIS	MANUFACTURING, MORRIS	45,437	45,437	45,437	45,437	45,437	45,437
MARSHALL	MARSHALL	9,000	9,000	9,000	9,000	9,000	9,000
MINING, TITUS	MINING, TITUS	1,644	1,775	1,909	2,055	2,216	2,392
ORE CITY	ORE CITY	1,869	1,869	1,869	1,869	1,869	1,869
PITTSBURG	PITTSBURG	12,588	12,588	12,588	12,588	12,588	12,588
STEAM ELECTRIC POWER, HARRISON	STEAM ELECTRIC POWER, HARRISON	18,000	18,000	18,000	18,000	18,000	18,000
STEAM ELECTRIC POWER, MARION	STEAM ELECTRIC POWER, MARION	6,668	6,668	6,668	6,668	6,668	6,668
STEAM ELECTRIC POWER, TITUS	STEAM ELECTRIC POWER, TITUS	52,423	61,288	72,096	85,270	101,329	120,703
TRYON ROAD SUD	TRYON ROAD SUD	2,263	2,263	2,263	2,263	2,263	2,263
		194,126	**203,122**	**214,064**	**227,384**	**243,604**	**263,154**
Current Supply							
BOB SANDLIN LAKE/RESERVOIR		11,885	11,883	11,881	11,879	11,876	11,874
ELLISON CREEK LAKE/RESERVOIR		13,857	13,857	13,857	13,857	13,857	13,857
MONTICELLO LAKE/RESERVOIR		5,000	4,500	4,000	3,400	2,900	2,400
O' THE PINES LAKE/RESERVOIR		151,600	151,000	150,500	150,000	149,500	149,000
WELSH LAKE/RESERVOIR		3,000	2,800	2,600	2,400	2,100	1,800
		185,342	**184,040**	**182,838**	**181,536**	**180,233**	**178,931**
WUG Demands on Sabine River Authority							
BRIGHT STAR-SALEM SUD	BRIGHT STAR-SALEM SUD	840	840	840	840	840	840
CASH SUD	CASH SUD	4,801	4,780	4,753	4,728	4,704	4,679
COMBINED CONSUMERS SUD	COMBINED CONSUMERS SUD	2,506	2,537	2,561	2,591	2,624	2,651

Values in Acre-Feet per Year							
Recipient Name	**WUG Name**	**WD2020**	**WD2030**	**WD2040**	**WD2050**	**WD2060**	**WD2070**
COMMERCE WD	COMMERCE WD	8,236	8,127	7,940	8,197	6,828	7,040
EDGEWOOD	EDGEWOOD	787	781	776	770	764	759
EMORY	EMORY	1,925	1,918	1,910	1,902	1,895	1,887
GREENVILLE	GREENVILLE	10,916	11,093	11,292	11,507	11,698	11,895
KILGORE	KILGORE	3,924	3,924	3,924	3,924	3,924	3,924
LONGVIEW	LONGVIEW	20,000	20,000	20,000	20,000	20,000	20,000
MACBEE SUD	MACBEE SUD	2,067	2,051	2,035	2,019	2,003	1,987
MINING, HARRISON	MINING, HARRISON	140	140	140	140	140	140
POINT	POINT	261	258	255	252	249	246
QUITMAN	QUITMAN	1,019	1,012	1,004	997	990	983
SOUTH TAWAKONI WSC	SOUTH TAWAKONI WSC	1,048	1,041	1,033	1,025	1,018	1,010
WEST TAWAKONI	WEST TAWAKONI	1,072	1,064	1,056	1,047	1,039	1,031
WILLS POINT	WILLS POINT	2,091	2,075	2,060	2,044	2,029	2,013
		61,633	**61,641**	**61,579**	**61,983**	**60,745**	**61,085**
Current Supply							
FORK LAKE/RESERVOIR		167,186	165,206	163,226	161,246	159,266	157,286
TAWAKONI LAKE/RESERVOIR		229,415	227,709	226,005	224,305	222,587	220,886
		396,601	**392,915**	**389,231**	**385,551**	**381,853**	**378,172**
WUG Demands on Sulphur River MWD							
COOPER	COOPER	838	832	827	822	816	811
SULPHUR SPRINGS	SULPHUR SPRINGS	14,189	14,098	14,007	13,916	13,825	13,734
		15,027	**14,930**	**14,834**	**14,738**	**14,641**	**14,545**
Current Supply							
CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION		**15,027**	**14,930**	**14,834**	**14,738**	**14,641**	**14,545**
WUG Demands on City of Paris							
LAMAR COUNTY WSD	LAMAR COUNTY WSD	13,442	13,442	13,442	13,442	13,442	13,442
MANUFACTURING, LAMAR	MANUFACTURING, LAMAR	5,091	5,340	5,580	5,787	6,183	6,386
STEAM ELECTRIC POWER, LAMAR	STEAM ELECTRIC POWER, LAMAR	8,961	8,961	8,961	8,961	8,961	8,961
PARIS	PARIS	1,179	1,172	1,163	1,169	1,186	1,203
PARIS	PARIS	1,785	1,775	1,760	1,769	1,796	1,822
		30,458	**30,690**	**30,906**	**31,128**	**31,568**	**31,814**
Current Supply							
CROOK LAKE/RESERVOIR		7,290	7,290	7,290	7,290	7,290	7,290
PAT MAYSE LAKE/RESERVOIR		51,488	51,490	51,489	51,489	51,490	51,461
		58,778	**58,780**	**58,779**	**58,779**	**58,780**	**58,751**
WUG Demands on City of Sulphur Springs							
BRINKER WSC	BRINKER WSC	77	77	77	77	77	77
COUNTY-OTHER, HOPKINS	COUNTY-OTHER, HOPKINS	387	405	416	377	341	303
LIVESTOCK, HOPKINS	LIVESTOCK, HOPKINS	1,474	1,551	1,720	1,730	1,914	1,996
MANUFACTURING, HOPKINS	MANUFACTURING, HOPKINS	1,741	1,830	1,915	1,987	2,126	2,275
MANUFACTURING, HUNT	MANUFACTURING, HUNT	50	50	50	50	50	50
MARTIN SPRINGS WSC	MARTIN SPRINGS WSC	223	223	223	223	223	223
MINING, HOPKINS	MINING, HOPKINS	200	220	240	261	285	310
MINING, TITUS	MINING, TITUS	80	80	80	80	80	80
NORTH HOPKINS WSC	NORTH HOPKINS WSC	921	921	921	921	921	921
SULPHUR SPRINGS	SULPHUR SPRINGS	10	10	10	11	11	12
SULPHUR SPRINGS	SULPHUR SPRINGS	3,186	3,268	3,350	3,476	3,624	3,777
		8,349	**8,635**	**9,002**	**9,193**	**9,652**	**10,024**

Values in Acre-Feet per Year							
Recipient Name	**WUG Name**	**WD2020**	**WD2030**	**WD2040**	**WD2050**	**WD2060**	**WD2070**
Current Supply							
CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION		14,189	14,098	14,007	13,916	13,825	13,734
SULPHUR RUN-OF-RIVER		130	130	130	130	130	130
SULPHUR SPRINGS LAKE/RESERVOIR		10,057	10,057	10,057	10,057	10,057	10,057
		24,376	**24,285**	**24,194**	**24,103**	**24,012**	**23,921**
WUG Demands on City of Texarkana							
ATLANTA	ATLANTA	1,000	979	956	948	946	946
CENTRAL BOWIE COUNTY WSC	CENTRAL BOWIE COUNTY WSC	535	529	534	534	534	534
COUNTY-OTHER, BOWIE	COUNTY-OTHER, BOWIE	640	645	649	644	641	637
COUNTY-OTHER, CASS	COUNTY-OTHER, CASS	471	474	477	479	479	481
COUNTY-OTHER, RED RIVER	COUNTY-OTHER, RED RIVER	185	185	185	185	185	185
DE KALB	DE KALB	471	471	471	471	471	471
HOOKS	HOOKS	500	500	500	500	500	500
MACEDONIA-EYLAU MUD #1	MACEDONIA-EYLAU MUD #1	552	552	552	552	552	552
MANUFACTURING, BOWIE	MANUFACTURING, BOWIE	2,515	2,733	2,944	3,125	3,379	3,575
MANUFACTURING, CASS	MANUFACTURING, CASS	120,000	120,000	120,000	120,000	120,000	120,000
MAUD	MAUD	247	247	247	247	247	247
NASH	NASH	368	368	368	368	368	368
NEW BOSTON	NEW BOSTON	1,098	1,104	1,094	1,091	1,089	1,089
QUEEN CITY	QUEEN CITY	364	364	364	364	364	364
RED RIVER COUNTY WSC	RED RIVER COUNTY WSC	216	216	216	216	216	216
REDWATER	REDWATER	82	82	79	77	77	77
TEXAMERICAS CENTER	TEXAMERICAS CENTER	25,921	25,921	25,921	25,921	25,921	25,921
WAKE VILLAGE	WAKE VILLAGE	677	675	675	675	675	675
TEXARKANA	TEXARKANA	1,507	1,530	1,527	1,518	1,517	1,517
TEXARKANA	TEXARKANA	11,264	11,430	11,411	11,347	11,335	11,334
		168,613	**169,005**	**169,170**	**169,262**	**169,496**	**169,689**
Current Supply							
RED RUN-OF-RIVER		0	0	0	0	0	0
WRIGHT PATMAN LAKE/RESERVOIR		121,044	121,023	121,000	120,992	120,990	89,000
		121,044	**121,023**	**121,000**	**120,992**	**120,990**	**89,000**
WUG Demands on Titus County FWD #1							
MOUNT PLEASANT	MOUNT PLEASANT	10,000	10,000	10,000	10,000	10,000	10,000
STEAM ELECTRIC POWER, TITUS	STEAM ELECTRIC POWER, TITUS	10,000	10,000	10,000	10,000	10,000	10,000
		20,000	**20,000**	**20,000**	**20,000**	**20,000**	**20,000**
Current Supply							
BOB SANDLIN LAKE/RESERVOIR		**48,500**	**48,500**	**48,500**	**48,500**	**48,500**	**48,500**

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Source Availability

REGION D									
				SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
GROUNDWATER	COUNTY	BASIN	SALINITY	2020	2030	2040	2050	2060	2070
BLOSSOM AQUIFER	BOWIE	RED	FRESH	21	21	21	21	21	21
BLOSSOM AQUIFER	BOWIE	SULPHUR	FRESH	180	180	180	180	180	180
BLOSSOM AQUIFER	LAMAR	RED	FRESH	323	323	323	323	323	323
BLOSSOM AQUIFER	LAMAR	SULPHUR	FRESH	71	71	71	71	71	71
BLOSSOM AQUIFER	RED RIVER	RED	FRESH	1,053	1,053	1,053	1,053	1,053	1,053
BLOSSOM AQUIFER	RED RIVER	SULPHUR	FRESH	625	625	625	625	625	625
CARRIZO-WILCOX AQUIFER	BOWIE	SULPHUR	FRESH	8,216	7,976	7,533	7,533	7,083	7,083
CARRIZO-WILCOX AQUIFER	CAMP	CYPRESS	FRESH	4,041	4,041	4,041	4,041	4,041	4,041
CARRIZO-WILCOX AQUIFER	CASS	CYPRESS	FRESH	2,955	2,955	2,955	2,955	2,955	2,955
CARRIZO-WILCOX AQUIFER	CASS	SULPHUR	FRESH	578	578	578	578	578	578
CARRIZO-WILCOX AQUIFER	FRANKLIN	CYPRESS	FRESH	7,736	7,736	7,736	7,736	7,736	7,736
CARRIZO-WILCOX AQUIFER	FRANKLIN	SULPHUR	FRESH	1,748	1,748	1,748	1,748	1,748	1,748
CARRIZO-WILCOX AQUIFER	GREGG	CYPRESS	FRESH	820	820	820	820	820	820
CARRIZO-WILCOX AQUIFER	GREGG	SABINE	FRESH	6,829	6,829	6,829	6,829	6,829	6,829
CARRIZO-WILCOX AQUIFER	HARRISON	CYPRESS	FRESH	4,873	4,839	4,787	4,772	4,728	4,728
CARRIZO-WILCOX AQUIFER	HARRISON	SABINE	FRESH	3,964	3,947	3,911	3,911	3,911	3,911
CARRIZO-WILCOX AQUIFER	HOPKINS	CYPRESS	FRESH	253	253	253	253	253	253
CARRIZO-WILCOX AQUIFER	HOPKINS	SABINE	FRESH	2,001	2,001	2,001	2,001	2,001	2,001
CARRIZO-WILCOX AQUIFER	HOPKINS	SULPHUR	FRESH	1,137	1,137	1,137	1,137	1,137	1,137
CARRIZO-WILCOX AQUIFER	MARION	CYPRESS	FRESH	2,077	2,077	2,077	2,077	2,077	2,077
CARRIZO-WILCOX AQUIFER	MORRIS	CYPRESS	FRESH	2,196	2,174	2,174	2,174	2,174	2,174
CARRIZO-WILCOX AQUIFER	MORRIS	SULPHUR	FRESH	420	384	384	384	384	384
CARRIZO-WILCOX AQUIFER	RAINS	SABINE	FRESH	1,703	1,620	1,620	1,620	1,583	1,583
CARRIZO-WILCOX AQUIFER	RED RIVER	SULPHUR	FRESH	0	0	0	0	0	0
CARRIZO-WILCOX AQUIFER	SMITH	SABINE	FRESH	12,245	12,245	12,235	12,221	12,221	12,221
CARRIZO-WILCOX AQUIFER	TITUS	CYPRESS	FRESH	7,516	7,214	7,063	6,833	6,833	6,833
CARRIZO-WILCOX AQUIFER	TITUS	SULPHUR	FRESH	2,805	2,805	2,805	2,805	2,805	2,805
CARRIZO-WILCOX AQUIFER	UPSHUR	CYPRESS	FRESH	5,426	5,426	5,426	5,426	5,426	5,426
CARRIZO-WILCOX AQUIFER	UPSHUR	SABINE	FRESH	1,689	1,689	1,689	1,689	1,689	1,689
CARRIZO-WILCOX AQUIFER	VAN ZANDT	NECHES	FRESH	4,288	4,288	4,288	4,288	4,288	4,288

Source Availability

REGION D									
				SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
GROUNDWATER	COUNTY	BASIN	SALINITY	2020	2030	2040	2050	2060	2070
CARRIZO-WILCOX AQUIFER	VAN ZANDT	SABINE	FRESH	4,611	4,611	4,611	4,611	4,379	4,379
CARRIZO-WILCOX AQUIFER	VAN ZANDT	TRINITY	FRESH	1,384	1,384	1,384	1,384	1,384	1,384
CARRIZO-WILCOX AQUIFER	WOOD	CYPRESS	FRESH	2,053	2,053	2,053	2,053	2,053	2,053
CARRIZO-WILCOX AQUIFER	WOOD	SABINE	FRESH	19,486	19,398	19,355	19,280	19,258	19,258
NACATOCH AQUIFER	BOWIE	RED	FRESH	3,071	3,071	3,071	3,071	3,071	3,071
NACATOCH AQUIFER	BOWIE	SULPHUR	FRESH	1,942	1,942	1,942	1,942	1,942	1,942
NACATOCH AQUIFER	DELTA	SULPHUR	FRESH	575	575	575	575	575	575
NACATOCH AQUIFER	FRANKLIN	SULPHUR	FRESH	30	30	30	30	30	30
NACATOCH AQUIFER	HOPKINS	SABINE	FRESH	291	291	291	291	291	291
NACATOCH AQUIFER	HOPKINS	SULPHUR	FRESH	916	916	916	916	916	916
NACATOCH AQUIFER	HUNT	SABINE	FRESH	3,303	3,303	3,303	3,303	3,303	3,303
NACATOCH AQUIFER	HUNT	SULPHUR	FRESH	491	491	491	491	491	491
NACATOCH AQUIFER	LAMAR	SULPHUR	FRESH	110	110	110	110	110	110
NACATOCH AQUIFER	RAINS	SABINE	FRESH	1	1	1	1	1	1
NACATOCH AQUIFER	RED RIVER	RED	FRESH	58	58	58	58	58	58
NACATOCH AQUIFER	RED RIVER	SULPHUR	FRESH	1,047	1,047	1,047	1,047	1,047	1,047
QUEEN CITY AQUIFER	CAMP	CYPRESS	FRESH	3,542	3,542	3,542	3,542	3,542	3,542
QUEEN CITY AQUIFER	CASS	CYPRESS	FRESH	35,970	35,970	35,970	35,970	35,970	35,970
QUEEN CITY AQUIFER	CASS	SULPHUR	FRESH	3,223	3,223	3,223	3,223	3,223	3,223
QUEEN CITY AQUIFER	GREGG	CYPRESS	FRESH	1,359	1,359	1,359	1,359	1,359	1,359
QUEEN CITY AQUIFER	GREGG	SABINE	FRESH	6,214	6,214	6,214	6,214	6,214	6,214
QUEEN CITY AQUIFER	HARRISON	CYPRESS	FRESH	7,890	7,890	7,890	7,890	7,890	7,890
QUEEN CITY AQUIFER	HARRISON	SABINE	FRESH	2,483	2,483	2,483	2,483	2,483	2,483
QUEEN CITY AQUIFER	MARION	CYPRESS	FRESH	15,549	15,549	15,549	15,549	15,549	15,549
QUEEN CITY AQUIFER	MORRIS	CYPRESS	FRESH	9,652	9,652	9,652	9,537	9,537	9,537
QUEEN CITY AQUIFER	SMITH	SABINE	FRESH	25,994	25,994	25,994	25,994	25,994	25,994
QUEEN CITY AQUIFER	TITUS	CYPRESS	FRESH	138	138	138	138	138	138
QUEEN CITY AQUIFER	UPSHUR	CYPRESS	FRESH	18,324	18,324	18,324	18,143	18,143	18,143
QUEEN CITY AQUIFER	UPSHUR	SABINE	FRESH	7,246	7,246	7,246	7,246	7,246	7,246
QUEEN CITY AQUIFER	VAN ZANDT	NECHES	FRESH	3,814	3,814	3,814	3,814	3,814	3,814
QUEEN CITY AQUIFER	WOOD	CYPRESS	FRESH	1,009	1,009	1,009	1,009	1,009	1,009
QUEEN CITY AQUIFER	WOOD	SABINE	FRESH	9,103	9,103	9,103	9,103	9,103	9,103
SPARTA AQUIFER	SMITH	SABINE	FRESH	0	0	0	0	0	0
SPARTA AQUIFER	UPSHUR	SABINE	FRESH	0	0	0	0	0	0
SPARTA AQUIFER	WOOD	SABINE	FRESH	0	0	0	0	0	0
TRINITY AQUIFER	DELTA	SULPHUR	FRESH	362	362	362	362	362	362
TRINITY AQUIFER	HUNT	SABINE	FRESH	0	0	0	0	0	0
TRINITY AQUIFER	HUNT	SULPHUR	FRESH	0	0	0	0	0	0
TRINITY AQUIFER	HUNT	TRINITY	FRESH	551	551	551	551	551	551
TRINITY AQUIFER	LAMAR	RED	FRESH	1,320	1,320	1,320	1,320	1,320	1,320

Source Availability

REGION D

GROUNDWATER	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
TRINITY AQUIFER	LAMAR	SULPHUR	FRESH	2	2	2	2	2	2
TRINITY AQUIFER	RED RIVER	RED	FRESH	263	263	263	263	263	263
TRINITY AQUIFER	RED RIVER	SULPHUR	FRESH	267	267	267	267	267	267
WOODBINE AQUIFER	HUNT	SABINE	FRESH	1,867	1,867	1,867	1,867	1,867	1,867
WOODBINE AQUIFER	HUNT	SULPHUR	FRESH	849	849	849	849	849	849
WOODBINE AQUIFER	HUNT	TRINITY	FRESH	124	124	124	124	124	124
WOODBINE AQUIFER	LAMAR	RED	FRESH	1,910	1,910	1,910	1,910	1,910	1,910
WOODBINE AQUIFER	LAMAR	SULPHUR	FRESH	1,734	1,734	1,734	1,734	1,734	1,734
WOODBINE AQUIFER	RED RIVER	RED	FRESH	162	162	162	162	162	162
WOODBINE AQUIFER	RED RIVER	SULPHUR	FRESH	4	4	4	4	4	4
GROUNDWATER TOTAL SOURCE AVAILABILITY				**288,083**	**287,261**	**286,526**	**285,896**	**285,111**	**285,111**

REGION D

REUSE	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
DIRECT REUSE	GREGG	SABINE	FRESH	6,161	6,161	6,161	6,161	6,161	6,161
DIRECT REUSE	MORRIS	CYPRESS	FRESH	72,086	66,660	61,344	62,600	71,474	65,248
DIRECT REUSE | KIMBERLY CLARK CORPORATION-PARIS PLANT	LAMAR	RED	FRESH	12	12	12	12	12	12
DIRECT REUSE | PILGRIM PRIDE INDUSTRIES INC-MT PLEASANT	TITUS	CYPRESS	FRESH	160	160	160	160	160	160
INDIRECT REUSE | UTRWD/LAKE JIM CHAPMAN	HOPKINS	SULPHUR	FRESH	5,546	5,689	5,832	5,976	6,119	6,262
REUSE TOTAL SOURCE AVAILABILITY				**83,965**	**78,682**	**73,509**	**74,909**	**83,926**	**77,843**

REGION D

SURFACE WATER	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
BIG CREEK LAKE/RESERVOIR	RESERVOIR	SULPHUR	FRESH	1,518	1,518	1,518	1,518	1,518	1,518
BIG SANDY CREEK LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	2,000	2,000	2,000	2,000	2,000	2,000
BOB SANDLIN LAKE/RESERVOIR	RESERVOIR	CYPRESS	FRESH	60,430	60,430	60,430	60,430	60,430	60,430
BRANDY BRANCH LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	19,891	19,891	19,891	19,891	19,891	19,891
CADDO LAKE/RESERVOIR	RESERVOIR	CYPRESS	FRESH	10,000	10,000	10,000	10,000	10,000	10,000
CANEY CREEK LAKE/RESERVOIR	RESERVOIR	SULPHUR	FRESH	1,010	1,010	1,010	1,010	1,010	1,010
CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	RESERVOIR	SULPHUR	FRESH	69,913	69,465	69,017	68,569	68,121	67,673
CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	RESERVOIR	SULPHUR	FRESH	44,792	44,505	44,218	43,931	43,644	43,357
CROOK LAKE/RESERVOIR	RESERVOIR	RED	FRESH	7,290	7,290	7,290	7,290	7,290	7,290

Source Availability

REGION D									
				SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
SURFACE WATER	COUNTY	BASIN	SALINITY	2020	2030	2040	2050	2060	2070
CYPRESS LIVESTOCK LOCAL SUPPLY	CAMP	CYPRESS	FRESH	534	534	571	636	698	724
CYPRESS LIVESTOCK LOCAL SUPPLY	CASS	CYPRESS	FRESH	565	565	565	565	565	565
CYPRESS LIVESTOCK LOCAL SUPPLY	FRANKLIN	CYPRESS	FRESH	291	291	291	291	291	291
CYPRESS LIVESTOCK LOCAL SUPPLY	HARRISON	CYPRESS	FRESH	276	302	329	358	387	421
CYPRESS LIVESTOCK LOCAL SUPPLY	HOPKINS	CYPRESS	FRESH	108	108	108	108	108	108
CYPRESS LIVESTOCK LOCAL SUPPLY	MORRIS	CYPRESS	FRESH	215	215	215	215	215	215
CYPRESS LIVESTOCK LOCAL SUPPLY	UPSHUR	CYPRESS	FRESH	975	975	975	975	975	975
CYPRESS LIVESTOCK LOCAL SUPPLY	WOOD	CYPRESS	FRESH	271	271	271	271	271	271
CYPRESS RUN-OF-RIVER	CAMP	CYPRESS	FRESH	1	1	1	1	1	1
CYPRESS RUN-OF-RIVER	HARRISON	CYPRESS	FRESH	920	920	920	920	920	920
CYPRESS RUN-OF-RIVER	MARION	CYPRESS	FRESH	148	148	148	148	148	148
CYPRESS RUN-OF-RIVER | WATER RIGHT 4567 4568 4569 4570 4572	TITUS	CYPRESS	FRESH	417	417	417	417	417	417
CYPRESS RUN-OF-RIVER | WATER RIGHT 4577 4579	MORRIS	CYPRESS	FRESH	70	70	70	70	70	70
CYPRESS RUN-OF-RIVER | WATER RIGHT 4584 4585 4604	UPSHUR	CYPRESS	FRESH	22	22	22	22	22	22
CYPRESS RUN-OF-RIVER | WATER RIGHT 4587 4597 4598 4599	CASS	CYPRESS	FRESH	167	167	167	167	167	167
CYPRESS RUN-OF-RIVER | WATER RIGHT 4608 5608	GREGG	CYPRESS	FRESH	44	44	44	44	44	44
CYPRESS SPRINGS LAKE/RESERVOIR	RESERVOIR	CYPRESS	FRESH	12,100	11,700	11,300	11,000	10,600	10,200
EDGEWOOD CITY LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	160	160	160	160	160	160
ELLIOT CREEK LAKE/RESERVOIR	RESERVOIR	SULPHUR	FRESH	1,910	1,910	1,910	1,910	1,910	1,910
ELLISON CREEK LAKE/RESERVOIR	RESERVOIR	CYPRESS	FRESH	33,700	33,700	33,700	33,700	33,700	33,700
FORK LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	171,260	169,280	167,300	165,320	163,340	161,360
GILMER LAKE/RESERVOIR	RESERVOIR	CYPRESS	FRESH	6,180	6,180	6,180	6,180	6,180	6,180
GLADEWATER LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	4,900	4,380	3,850	3,000	2,000	2,000
GRAYS CREEK RUN-OF-RIVER | WATER RIGHT 4254	HARRISON	CYPRESS	FRESH	16,084	16,084	16,084	16,084	16,084	16,084
GREENVILLE CITY LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	3,350	3,350	3,350	3,350	3,350	3,350
JOHNSON CREEK LAKE/RESERVOIR	RESERVOIR	CYPRESS	FRESH	2,000	2,000	2,000	2,000	2,000	2,000
LANGFORD LAKE/RESERVOIR	RESERVOIR	SULPHUR	FRESH	540	340	0	0	0	0
LOMA LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	1,000	1,000	1,000	1,000	1,000	1,000
MILL CREEK LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	1,150	1,150	1,150	1,150	1,150	1,150

Source Availability

REGION D									
				SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
SURFACE WATER	**COUNTY**	**BASIN**	**SALINITY**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
MONTICELLO LAKE/RESERVOIR	RESERVOIR	CYPRESS	FRESH	5,000	4,500	4,000	3,400	2,900	2,400
NECHES LIVESTOCK LOCAL SUPPLY	VAN ZANDT	NECHES	FRESH	1,136	1,136	1,136	1,136	1,136	1,136
O' THE PINES LAKE/RESERVOIR	RESERVOIR	CYPRESS	FRESH	151,600	151,000	150,500	150,000	149,500	149,000
PAT MAYSE LAKE/RESERVOIR	RESERVOIR	RED	FRESH	59,670	59,670	59,670	59,670	59,670	59,670
RED LIVESTOCK LOCAL SUPPLY	BOWIE	RED	FRESH	17	17	14	23	36	43
RED LIVESTOCK LOCAL SUPPLY	LAMAR	RED	FRESH	0	0	0	0	0	0
RED LIVESTOCK LOCAL SUPPLY	RED RIVER	RED	FRESH	474	474	474	474	474	474
RED RUN-OF-RIVER	BOWIE	RED	FRESH	2,818	2,818	2,818	2,818	2,818	2,818
RED RUN-OF-RIVER	LAMAR	RED	FRESH	10	10	10	10	10	10
RED RUN-OF-RIVER	RED RIVER	RED	FRESH	330	330	330	330	330	330
SABINE LIVESTOCK LOCAL SUPPLY	FRANKLIN	SABINE	FRESH	1	1	1	1	1	1
SABINE LIVESTOCK LOCAL SUPPLY	HOPKINS	SABINE	FRESH	1,208	1,208	1,208	1,208	1,208	1,208
SABINE LIVESTOCK LOCAL SUPPLY	HUNT	SABINE	FRESH	812	812	812	812	812	812
SABINE LIVESTOCK LOCAL SUPPLY	RAINS	SABINE	FRESH	675	675	675	675	675	675
SABINE LIVESTOCK LOCAL SUPPLY	UPSHUR	SABINE	FRESH	352	352	352	352	352	352
SABINE LIVESTOCK LOCAL SUPPLY	VAN ZANDT	SABINE	FRESH	1,035	1,035	1,035	1,035	1,035	1,035
SABINE LIVESTOCK LOCAL SUPPLY	WOOD	SABINE	FRESH	1,897	1,897	1,897	1,897	1,897	1,897
SABINE OTHER LOCAL SUPPLY	GREGG	SABINE	FRESH	2,500	2,500	2,500	2,500	2,500	2,500
SABINE OTHER LOCAL SUPPLY	VAN ZANDT	SABINE	FRESH	847	1,007	1,170	1,337	1,498	1,661
SABINE RUN-OF-RIVER	GREGG	SABINE	FRESH	1,230	1,232	1,232	1,232	1,232	1,232
SABINE RUN-OF-RIVER	HARRISON	SABINE	FRESH	11,198	11,198	11,198	11,198	11,198	11,198
SABINE RUN-OF-RIVER	HUNT	SABINE	FRESH	0	0	0	0	0	0
SABINE RUN-OF-RIVER	SMITH	SABINE	FRESH	994	994	994	994	994	994
SABINE RUN-OF-RIVER	WOOD	SABINE	FRESH	597	597	597	597	597	597
SABINE RUN-OF-RIVER | WATER RIGHT 3899 3969 4763	UPSHUR	SABINE	FRESH	10	10	10	10	10	10
SABINE RUN-OF-RIVER | WATER RIGHT 4671 4673 4675 4676 4679 4682 4684 4688 4689	VAN ZANDT	SABINE	FRESH	566	566	566	566	566	566
SABINE RUN-OF-RIVER | WATER RIGHT 4681 4700	RAINS	SABINE	FRESH	55	55	55	55	55	55
SABINE RUN-OF-RIVER | WATER RIGHT 4699 4702 4703 5217	HOPKINS	SABINE	FRESH	19	19	19	19	19	19
SULPHUR LIVESTOCK LOCAL SUPPLY	BOWIE	SULPHUR	FRESH	625	625	559	465	385	353

Source Availability

REGION D

SURFACE WATER	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
SULPHUR LIVESTOCK LOCAL SUPPLY	CASS	SULPHUR	FRESH	114	114	114	115	115	115
SULPHUR LIVESTOCK LOCAL SUPPLY	DELTA	SULPHUR	FRESH	231	231	231	231	231	231
SULPHUR LIVESTOCK LOCAL SUPPLY	FRANKLIN	SULPHUR	FRESH	393	393	393	393	393	393
SULPHUR LIVESTOCK LOCAL SUPPLY	HOPKINS	SULPHUR	FRESH	1,570	1,493	1,324	1,314	1,130	1,049
SULPHUR LIVESTOCK LOCAL SUPPLY	HUNT	SULPHUR	FRESH	300	300	300	300	300	300
SULPHUR LIVESTOCK LOCAL SUPPLY	LAMAR	SULPHUR	FRESH	1,623	1,623	1,623	1,623	1,623	1,623
SULPHUR LIVESTOCK LOCAL SUPPLY	MORRIS	SULPHUR	FRESH	207	207	207	207	212	212
SULPHUR LIVESTOCK LOCAL SUPPLY	RED RIVER	SULPHUR	FRESH	911	911	911	911	911	911
SULPHUR LIVESTOCK LOCAL SUPPLY	TITUS	SULPHUR	FRESH	156	156	156	156	156	156
SULPHUR OTHER LOCAL SUPPLY	DELTA	SULPHUR	FRESH	25	26	26	26	26	26
SULPHUR RUN-OF-RIVER	DELTA	SULPHUR	FRESH	4,545	4,585	4,585	4,585	4,585	4,505
SULPHUR RUN-OF-RIVER	RED RIVER	SULPHUR	FRESH	8,960	8,970	8,970	8,970	8,970	9,730
SULPHUR RUN-OF-RIVER | WATER RIGHT 4795 4796	HUNT	SULPHUR	FRESH	2	2	2	2	2	2
SULPHUR RUN-OF-RIVER | WATER RIGHT 4803 4816 4817 4818 5392	FRANKLIN	SULPHUR	FRESH	470	460	460	460	460	460
SULPHUR RUN-OF-RIVER | WATER RIGHT 4805 4820 4821 4822 4823 4824 4825 4826 5285 5510 5562	TITUS	SULPHUR	FRESH	1,071	1,071	1,071	1,071	1,071	1,071
SULPHUR RUN-OF-RIVER | WATER RIGHT 4812 4813 4814 5150	HOPKINS	SULPHUR	FRESH	205	205	205	205	205	205
SULPHUR RUN-OF-RIVER | WATER RIGHT 4829 4830 4831 4832 4833 4834 4835 4837	BOWIE	SULPHUR	FRESH	131	131	131	131	131	131
SULPHUR RUN-OF-RIVER | WATER RIGHT 5200	LAMAR	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR SPRINGS LAKE/RESERVOIR	RESERVOIR	SULPHUR	FRESH	11,530	11,530	11,530	11,530	11,520	11,550
TANKERSLEY LAKE/RESERVOIR	RESERVOIR	CYPRESS	FRESH	1,500	1,500	1,500	1,500	1,500	1,500
TAWAKONI LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	229,710	228,030	226,350	224,670	222,990	221,310
TRINITY LIVESTOCK LOCAL SUPPLY	HUNT	TRINITY	FRESH	34	34	34	34	35	35
TRINITY LIVESTOCK LOCAL SUPPLY	VAN ZANDT	TRINITY	FRESH	599	527	449	340	282	193
TURKEY CREEK LAKE/RESERVOIR	RESERVOIR	SULPHUR	FRESH	200	200	200	200	200	200
WELSH LAKE/RESERVOIR	RESERVOIR	CYPRESS	FRESH	3,000	2,800	2,600	2,400	2,100	1,800
WRIGHT PATMAN LAKE/RESERVOIR	RESERVOIR	SULPHUR	FRESH	294,000	263,830	232,000	200,000	166,000	123,000

Source Availability

SURFACE WATER TOTAL SOURCE AVAILABILITY	**1,283,365**	**1,246,460**	**1,207,676**	**1,168,889**	**1,127,733**	**1,079,376**
REGION D TOTAL SOURCE AVAILABILITY	**1,655,413**	**1,612,403**	**1,567,711**	**1,529,694**	**1,496,770**	**1,442,330**

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Water User Group (WUG) Existing Water Supply

REGION D	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
BOWIE COUNTY							
RED BASIN							
TEXARKANA	D | RED RUN-OF-RIVER	0	0	0	0	0	0
DE KALB	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
HOOKS	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
NEW BOSTON	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
RED LICK	D | CARRIZO-WILCOX AQUIFER | BOWIE COUNTY	66	66	66	66	66	66
TEXAMERICAS CENTER	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
CENTRAL BOWIE COUNTY WSC	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
COUNTY-OTHER	D | NACATOCH AQUIFER | BOWIE COUNTY	1,105	1,128	1,149	1,130	1,119	1,119
COUNTY-OTHER	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
MANUFACTURING	D | RED RUN-OF-RIVER	7	7	7	7	7	7
MANUFACTURING	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
LIVESTOCK	D | NACATOCH AQUIFER | BOWIE COUNTY	418	418	381	316	254	228
LIVESTOCK	D | RED LIVESTOCK LOCAL SUPPLY	17	17	14	23	36	43
IRRIGATION	D | RED RUN-OF-RIVER	891	891	891	891	891	891
RED BASIN TOTAL EXISTING SUPPLY		**2,504**	**2,527**	**2,508**	**2,433**	**2,373**	**2,354**
SULPHUR BASIN							
TEXARKANA	D | RED RUN-OF-RIVER	0	0	0	0	0	0
TEXARKANA	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
DE KALB	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
MACEDONIA-EYLAU MUD #1	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
MAUD	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
NASH	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
NEW BOSTON	D | SULPHUR RUN-OF-RIVER	0	0	0	0	0	0
NEW BOSTON	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
RED LICK	D | CARRIZO-WILCOX AQUIFER | BOWIE COUNTY	55	55	55	55	55	55
REDWATER	D | CARRIZO-WILCOX AQUIFER | BOWIE COUNTY	66	66	66	66	66	66
REDWATER	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
WAKE VILLAGE	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
TEXAMERICAS CENTER	D | CANEY CREEK LAKE/RESERVOIR	0	0	0	0	0	0
TEXAMERICAS CENTER	D | ELLIOT CREEK LAKE/RESERVOIR	0	0	0	0	0	0
TEXAMERICAS CENTER	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
CENTRAL BOWIE COUNTY WSC	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | BOWIE COUNTY	2,396	2,442	2,484	2,440	2,416	2,416
COUNTY-OTHER	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
MANUFACTURING	D | CARRIZO-WILCOX AQUIFER | BOWIE COUNTY	28	28	28	28	28	28
MANUFACTURING	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | BOWIE COUNTY	672	672	610	502	396	354
LIVESTOCK	D | SULPHUR LIVESTOCK LOCAL SUPPLY	49	49	45	59	85	95

Water User Group (WUG) Existing Water Supply

REGION D	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
BOWIE COUNTY							
SULPHUR BASIN							
IRRIGATION	D | SULPHUR RUN-OF-RIVER	90	90	90	90	90	90
SULPHUR BASIN TOTAL EXISTING SUPPLY		**3,356**	**3,402**	**3,378**	**3,240**	**3,136**	**3,104**
BOWIE COUNTY TOTAL EXISTING SUPPLY		**5,860**	**5,929**	**5,886**	**5,673**	**5,509**	**5,458**
CAMP COUNTY							
CYPRESS BASIN							
PITTSBURG	D | BOB SANDLIN LAKE/RESERVOIR	1,344	1,344	1,344	1,344	1,344	1,344
PITTSBURG	D | CARRIZO-WILCOX AQUIFER | CAMP COUNTY	433	433	433	433	433	433
BI COUNTY WSC	D | CARRIZO-WILCOX AQUIFER | CAMP COUNTY	985	985	985	985	985	985
BI COUNTY WSC	D | CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	0	0	0	34	33	30
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | CAMP COUNTY	432	444	453	461	469	478
MANUFACTURING	D | BOB SANDLIN LAKE/RESERVOIR	45	47	49	51	54	56
MANUFACTURING	D | CARRIZO-WILCOX AQUIFER | CAMP COUNTY	2	2	2	2	2	2
MINING	D | CARRIZO-WILCOX AQUIFER | CAMP COUNTY	23	23	23	23	23	23
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | CAMP COUNTY	335	335	335	335	335	335
LIVESTOCK	D | CYPRESS LIVESTOCK LOCAL SUPPLY	481	481	481	481	481	481
LIVESTOCK	D | QUEEN CITY AQUIFER | CAMP COUNTY	136	136	136	136	136	136
CYPRESS BASIN TOTAL EXISTING SUPPLY		**4,216**	**4,230**	**4,241**	**4,285**	**4,295**	**4,303**
CAMP COUNTY TOTAL EXISTING SUPPLY		**4,216**	**4,230**	**4,241**	**4,285**	**4,295**	**4,303**
CASS COUNTY							
CYPRESS BASIN							
ATLANTA	D | WRIGHT PATMAN LAKE/RESERVOIR	999	978	955	947	945	945
HUGHES SPRINGS	D | O' THE PINES LAKE/RESERVOIR	642	642	642	642	642	642
LINDEN	D | CARRIZO-WILCOX AQUIFER | CASS COUNTY	444	444	444	444	444	444
QUEEN CITY	D | CARRIZO-WILCOX AQUIFER | CASS COUNTY	169	169	169	169	169	169
QUEEN CITY	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
EASTERN CASS WSC	D | CARRIZO-WILCOX AQUIFER | CASS COUNTY	581	581	581	581	581	581
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | CASS COUNTY	1,245	1,286	1,327	1,368	1,368	1,399
COUNTY-OTHER	D | O' THE PINES LAKE/RESERVOIR	302	302	302	302	302	302
MANUFACTURING		0	0	0	0	0	0
MINING	D | CARRIZO-WILCOX AQUIFER | CASS COUNTY	33	33	33	20	20	20
MINING	D | QUEEN CITY AQUIFER | CASS COUNTY	806	829	851	884	906	932
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | CASS COUNTY	19	19	19	19	19	19
LIVESTOCK	D | CYPRESS LIVESTOCK LOCAL SUPPLY	400	400	400	400	400	400
LIVESTOCK	D | CYPRESS RUN-OF-RIVER	7	7	7	7	7	7
LIVESTOCK	D | SULPHUR LIVESTOCK LOCAL SUPPLY	58	58	58	58	58	58
CYPRESS BASIN TOTAL EXISTING SUPPLY		**5,705**	**5,748**	**5,788**	**5,841**	**5,861**	**5,918**
SULPHUR BASIN							
ATLANTA	D | WRIGHT PATMAN LAKE/RESERVOIR	1	1	1	1	1	1
QUEEN CITY	D | CARRIZO-WILCOX AQUIFER | CASS COUNTY	100	100	100	100	100	100
QUEEN CITY	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
EASTERN CASS WSC	D | CARRIZO-WILCOX AQUIFER | CASS COUNTY	38	38	38	38	38	38

Water User Group (WUG) Existing Water Supply

REGION D		EXISTING SUPPLY (ACRE-FEET PER YEAR)					
	SOURCE REGION | SOURCE NAME	2020	2030	2040	2050	2060	2070
CASS COUNTY							
SULPHUR BASIN							
COUNTY-OTHER	D | QUEEN CITY AQUIFER | CASS COUNTY	1,175	1,215	1,256	1,297	1,297	1,328
COUNTY-OTHER	D | WRIGHT PATMAN LAKE/RESERVOIR	44	44	44	44	44	44
MANUFACTURING	D | CARRIZO-WILCOX AQUIFER | CASS COUNTY	51	50	48	47	47	46
MANUFACTURING	D | WRIGHT PATMAN LAKE/RESERVOIR	120,000	120,000	120,000	120,000	120,000	88,010
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | CASS COUNTY	20	20	20	20	20	20
LIVESTOCK	D | CYPRESS LIVESTOCK LOCAL SUPPLY	165	165	165	165	165	165
LIVESTOCK	D | QUEEN CITY AQUIFER | CASS COUNTY	114	114	114	115	115	115
LIVESTOCK	D | SULPHUR LIVESTOCK LOCAL SUPPLY	56	56	56	57	57	57
SULPHUR BASIN TOTAL EXISTING SUPPLY		**121,764**	**121,803**	**121,842**	**121,884**	**121,884**	**89,924**
CASS COUNTY TOTAL EXISTING SUPPLY		**127,469**	**127,551**	**127,630**	**127,725**	**127,745**	**95,842**
DELTA COUNTY							
SULPHUR BASIN							
COOPER	D | BIG CREEK LAKE/RESERVOIR	980	980	980	980	980	980
COOPER	D | CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	690	669	647	623	591	571
COOPER	D | SULPHUR RUN-OF-RIVER	100	140	140	140	140	100
NORTH HUNT SUD	D | TAWAKONI LAKE/RESERVOIR	32	13	14	15	16	16
NORTH HUNT SUD	D | WOODBINE AQUIFER | HUNT COUNTY	5	4	3	2	1	1
COUNTY-OTHER	D | BIG CREEK LAKE/RESERVOIR	471	474	477	479	479	481
COUNTY-OTHER	D | NACATOCH AQUIFER | DELTA COUNTY	84	85	86	86	86	12
COUNTY-OTHER	D | TAWAKONI LAKE/RESERVOIR	471	474	477	479	479	481
COUNTY-OTHER	D | TRINITY AQUIFER | DELTA COUNTY	122	48	48	48	48	48
LIVESTOCK	D | NACATOCH AQUIFER | DELTA COUNTY	20	20	20	20	20	20
LIVESTOCK	D | SULPHUR LIVESTOCK LOCAL SUPPLY	231	231	231	231	231	231
LIVESTOCK	D | TRINITY AQUIFER | DELTA COUNTY	122	122	122	122	122	122
IRRIGATION	D | NACATOCH AQUIFER | DELTA COUNTY	38	51	61	66	66	78
IRRIGATION	D | SULPHUR RUN-OF-RIVER	4,445	4,445	4,445	4,445	4,445	4,405
IRRIGATION	D | TRINITY AQUIFER | DELTA COUNTY	118	99	82	71	65	47
SULPHUR BASIN TOTAL EXISTING SUPPLY		**7,929**	**7,855**	**7,833**	**7,807**	**7,769**	**7,593**
DELTA COUNTY TOTAL EXISTING SUPPLY		**7,929**	**7,855**	**7,833**	**7,807**	**7,769**	**7,593**
FRANKLIN COUNTY							
CYPRESS BASIN							
WINNSBORO	D | CYPRESS SPRINGS LAKE/RESERVOIR	971	971	971	971	971	971
CYPRESS SPRINGS SUD	D | CARRIZO-WILCOX AQUIFER | FRANKLIN COUNTY	67	67	67	67	67	67
CYPRESS SPRINGS SUD	D | CYPRESS SPRINGS LAKE/RESERVOIR	2,298	2,298	2,243	2,201	2,096	1,982
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | FRANKLIN COUNTY	72	77	82	82	82	82
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | FRANKLIN COUNTY	133	133	133	133	133	133
LIVESTOCK	D | CYPRESS LIVESTOCK LOCAL SUPPLY	291	291	291	291	291	291
IRRIGATION	D | SULPHUR RUN-OF-RIVER	10	10	10	10	10	10
CYPRESS BASIN TOTAL EXISTING SUPPLY		**3,842**	**3,847**	**3,797**	**3,755**	**3,650**	**3,536**

Water User Group (WUG) Existing Water Supply

REGION D	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
FRANKLIN COUNTY							
SABINE BASIN							
LIVESTOCK	D | SABINE LIVESTOCK LOCAL SUPPLY	1	1	1	1	1	1
SABINE BASIN TOTAL EXISTING SUPPLY		**1**	**1**	**1**	**1**	**1**	**1**
SULPHUR BASIN							
MOUNT VERNON	D | CYPRESS SPRINGS LAKE/RESERVOIR	1,120	1,120	1,120	1,120	1,120	1,120
MOUNT VERNON	D | SULPHUR RUN-OF-RIVER	170	160	160	160	160	160
CYPRESS SPRINGS SUD	D | CYPRESS SPRINGS LAKE/RESERVOIR	355	355	346	339	322	305
COUNTY-OTHER	D | BOB SANDLIN LAKE/RESERVOIR	14	16	17	17	17	17
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | FRANKLIN COUNTY	111	123	133	133	133	133
MINING	D | CARRIZO-WILCOX AQUIFER | FRANKLIN COUNTY	1,040	1,016	994	974	954	954
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | FRANKLIN COUNTY	228	228	228	228	228	228
LIVESTOCK	D | SULPHUR LIVESTOCK LOCAL SUPPLY	393	393	393	393	393	393
IRRIGATION	D | SULPHUR RUN-OF-RIVER	290	290	290	290	290	290
SULPHUR BASIN TOTAL EXISTING SUPPLY		**3,721**	**3,701**	**3,681**	**3,654**	**3,617**	**3,600**
FRANKLIN COUNTY TOTAL EXISTING SUPPLY		**7,564**	**7,549**	**7,479**	**7,410**	**7,268**	**7,137**
GREGG COUNTY							
CYPRESS BASIN							
TRYON ROAD SUD	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	159	159	159	158	147	133
TRYON ROAD SUD	D | O' THE PINES LAKE/RESERVOIR	948	948	948	948	948	948
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	196	207	220	237	261	278
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	19	19	19	19	19	19
COUNTY-OTHER	D | FORK LAKE/RESERVOIR	17	17	17	17	17	17
MINING		0	0	0	0	0	0
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	11	11	11	11	11	11
IRRIGATION	D | CYPRESS RUN-OF-RIVER	44	44	44	44	44	44
CYPRESS BASIN TOTAL EXISTING SUPPLY		**1,394**	**1,405**	**1,418**	**1,434**	**1,447**	**1,450**
SABINE BASIN							
LONGVIEW	D | BIG SANDY CREEK LAKE/RESERVOIR	0	0	0	0	0	0
LONGVIEW	D | FORK LAKE/RESERVOIR	10,870	10,870	10,870	10,870	10,870	10,870
LONGVIEW	D | O' THE PINES LAKE/RESERVOIR	17,200	17,200	17,200	17,200	17,200	17,200
LONGVIEW	D | SABINE RUN-OF-RIVER	0	0	0	0	0	0
LONGVIEW	I | CHEROKEE LAKE/RESERVOIR	3,915	3,915	3,915	3,915	8,915	8,915
CLARKSVILLE CITY	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	245	245	245	245	245	245
EASTON	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	51	51	51	51	51	51
EASTON	I | CHEROKEE LAKE/RESERVOIR	38	42	46	51	53	52
ELDERVILLE WSC	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	352	352	352	352	352	352
ELDERVILLE WSC	D | FORK LAKE/RESERVOIR	188	188	188	188	188	189
ELDERVILLE WSC	I | CHEROKEE LAKE/RESERVOIR	186	185	185	185	186	187
GLADEWATER	D | GLADEWATER LAKE/RESERVOIR	982	987	999	1,013	1,030	1,113
KILGORE	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	1,189	1,184	1,184	1,185	1,188	1,193

Water User Group (WUG) Existing Water Supply

REGION D	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
GREGG COUNTY							
SABINE BASIN							
KILGORE	D | FORK LAKE/RESERVOIR	1,648	2,692	2,692	2,694	2,701	2,712
LAKEPORT	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	88	88	88	88	88	88
LAKEPORT	I | CHEROKEE LAKE/RESERVOIR	95	99	105	112	112	112
LIBERTY CITY WSC	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	832	832	832	832	832	832
WHITE OAK	D | BIG SANDY CREEK LAKE/RESERVOIR	1,910	1,910	1,910	1,910	1,910	1,910
WHITE OAK	D | FORK LAKE/RESERVOIR	592	592	592	592	592	592
TRYON ROAD SUD	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	128	128	128	128	128	128
TRYON ROAD SUD	D | O' THE PINES LAKE/RESERVOIR	765	765	765	765	765	765
WEST GREGG SUD	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	496	495	495	496	496	483
CROSS ROADS SUD	D | FORK LAKE/RESERVOIR	32	32	31	31	32	32
CROSS ROADS SUD	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	52	51	50	50	51	52
COUNTY-OTHER	D | BIG SANDY CREEK LAKE/RESERVOIR	50	50	50	50	50	50
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	722	789	867	972	1,124	1,134
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	18	18	18	18	18	18
COUNTY-OTHER	D | FORK LAKE/RESERVOIR	94	94	94	94	94	94
COUNTY-OTHER	D | GLADEWATER LAKE/RESERVOIR	154	154	154	154	154	54
COUNTY-OTHER	I | CHEROKEE LAKE/RESERVOIR	18	18	18	18	18	18
MANUFACTURING	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	30	30	30	30	30	30
MANUFACTURING	D | FORK LAKE/RESERVOIR	1,934	1,934	1,934	1,934	1,934	1,934
MANUFACTURING	D | O' THE PINES LAKE/RESERVOIR	2,000	2,000	2,000	2,000	2,000	2,000
MANUFACTURING	D | SABINE OTHER LOCAL SUPPLY	450	450	450	450	450	450
MANUFACTURING	D | SABINE RUN-OF-RIVER	1,092	1,094	1,094	1,094	1,094	1,094
MANUFACTURING	I | CHEROKEE LAKE/RESERVOIR	1,340	1,340	1,340	1,340	1,340	1,340
MINING	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	70	79	88	98	107	116
STEAM ELECTRIC POWER	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	242	242	242	242	242	242
STEAM ELECTRIC POWER	I | CHEROKEE LAKE/RESERVOIR	2,000	2,000	2,000	2,000	2,000	2,000
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	204	204	204	204	204	204
IRRIGATION	D | SABINE RUN-OF-RIVER	138	138	138	138	138	138
SABINE BASIN TOTAL EXISTING SUPPLY		**52,410**	**53,537**	**53,644**	**53,789**	**58,982**	**58,989**
GREGG COUNTY TOTAL EXISTING SUPPLY		**53,804**	**54,942**	**55,062**	**55,223**	**60,429**	**60,439**
HARRISON COUNTY							
CYPRESS BASIN							
MARSHALL	D | CYPRESS RUN-OF-RIVER	0	0	0	0	0	0
MARSHALL	D | O' THE PINES LAKE/RESERVOIR	1,158	1,158	1,158	1,158	1,158	1,158
GUM SPRINGS WSC	D | CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	43	43	43	43	43	43
GUM SPRINGS WSC	D | FORK LAKE/RESERVOIR	31	31	31	31	31	31
GUM SPRINGS WSC	I | CHEROKEE LAKE/RESERVOIR	178	178	178	178	178	178

Water User Group (WUG) Existing Water Supply

REGION D		EXISTING SUPPLY (ACRE-FEET PER YEAR)					
	SOURCE REGION | SOURCE NAME	2020	2030	2040	2050	2060	2070
HARRISON COUNTY							
CYPRESS BASIN							
WASKOM	D | CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	339	339	339	339	339	339
TRYON ROAD SUD	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	0	0	0	1	12	26
TRYON ROAD SUD	D | CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	20	20	20	20	20	20
TRYON ROAD SUD	D | O' THE PINES LAKE/RESERVOIR	109	109	109	109	109	109
DIANA SUD	D | CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	47	47	47	47	47	47
DIANA SUD	D | O' THE PINES LAKE/RESERVOIR	47	47	47	47	47	47
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	15	15	15	15	15	15
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	2,032	2,088	2,130	2,179	2,252	2,307
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	30	30	30	30	30	30
COUNTY-OTHER	D | O' THE PINES LAKE/RESERVOIR	321	321	321	321	321	321
COUNTY-OTHER	I | CHEROKEE LAKE/RESERVOIR	54	54	54	54	54	54
MANUFACTURING	D | CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	147	147	147	147	147	147
MANUFACTURING	D | CYPRESS RUN-OF-RIVER	810	810	810	810	810	810
MINING	D | CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	217	233	241	250	257	267
MINING	D | FORK LAKE/RESERVOIR	29	29	29	29	29	29
MINING	D | QUEEN CITY AQUIFER | HARRISON COUNTY	7	0	0	0	0	0
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	167	196	225	255	287	317
LIVESTOCK	D | CYPRESS LIVESTOCK LOCAL SUPPLY	276	302	329	358	366	366
LIVESTOCK	D | CYPRESS RUN-OF-RIVER	90	90	90	90	90	90
LIVESTOCK	D | QUEEN CITY AQUIFER | HARRISON COUNTY	26	26	26	26	26	26
IRRIGATION	D | CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	25	25	25	25	25	25
IRRIGATION	D | CYPRESS RUN-OF-RIVER	10	10	10	10	10	10
CYPRESS BASIN TOTAL EXISTING SUPPLY		**6,228**	**6,348**	**6,454**	**6,572**	**6,703**	**6,812**
SABINE BASIN							
LONGVIEW	D | O' THE PINES LAKE/RESERVOIR	400	400	400	400	400	400
LONGVIEW	D | SABINE RUN-OF-RIVER	0	0	0	0	0	0
LONGVIEW	I | CHEROKEE LAKE/RESERVOIR	5,485	5,485	5,485	5,485	485	485
MARSHALL	D | CYPRESS RUN-OF-RIVER	0	0	0	0	0	0
MARSHALL	D | O' THE PINES LAKE/RESERVOIR	5,419	5,419	5,419	5,419	5,419	5,419
GILL WSC	D | CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	250	250	250	250	250	250
GILL WSC	D | O' THE PINES LAKE/RESERVOIR	67	67	67	67	67	67
GUM SPRINGS WSC	D | CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	320	320	320	320	320	320
GUM SPRINGS WSC	D | FORK LAKE/RESERVOIR	231	231	231	231	231	231
GUM SPRINGS WSC	I | CHEROKEE LAKE/RESERVOIR	466	466	466	466	466	466
HALLSVILLE	D | CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	77	77	77	77	77	77
HALLSVILLE	D | FORK LAKE/RESERVOIR	334	334	334	334	334	334

Water User Group (WUG) Existing Water Supply

REGION D	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
HARRISON COUNTY							
SABINE BASIN							
HALLSVILLE	I | CHEROKEE LAKE/RESERVOIR	403	403	403	403	403	403
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	1,350	1,425	1,482	1,549	1,646	1,720
COUNTY-OTHER	D | O' THE PINES LAKE/RESERVOIR	70	70	70	70	70	70
COUNTY-OTHER	I | CHEROKEE LAKE/RESERVOIR	328	328	328	328	328	328
MANUFACTURING	D | CYPRESS RUN-OF-RIVER	0	0	0	0	0	0
MANUFACTURING	D | FORK LAKE/RESERVOIR	5,524	5,524	5,524	5,524	5,524	5,524
MANUFACTURING	D | GRAYS CREEK RUN-OF-RIVER	16,084	16,084	16,084	16,084	16,084	16,084
MANUFACTURING	D | O' THE PINES LAKE/RESERVOIR	2,400	2,400	2,400	2,400	2,400	2,400
MANUFACTURING	D | SABINE RUN-OF-RIVER	10,630	10,630	10,630	10,630	10,630	10,630
MANUFACTURING	I | CHEROKEE LAKE/RESERVOIR	5,361	5,361	5,361	5,361	5,361	5,361
MINING	D | CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	96	105	115	124	132	141
MINING	D | FORK LAKE/RESERVOIR	111	111	111	111	111	111
MINING	D | SABINE RUN-OF-RIVER	405	405	405	405	405	405
STEAM ELECTRIC POWER	D | DIRECT REUSE	6,161	6,161	6,161	6,161	6,161	6,161
STEAM ELECTRIC POWER	D | O' THE PINES LAKE/RESERVOIR	18,000	18,000	18,000	18,000	18,000	18,000
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	405	425	447	469	492	514
IRRIGATION	D | CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	14	14	14	14	14	14
IRRIGATION	D | SABINE RUN-OF-RIVER	163	163	163	163	163	163
SABINE BASIN TOTAL EXISTING SUPPLY		**80,554**	**80,658**	**80,747**	**80,845**	**75,973**	**76,078**
HARRISON COUNTY TOTAL EXISTING SUPPLY		**86,782**	**87,006**	**87,201**	**87,417**	**82,676**	**82,890**
HOPKINS COUNTY							
CYPRESS BASIN							
CYPRESS SPRINGS SUD	D | CYPRESS SPRINGS LAKE/RESERVOIR	420	420	410	403	383	363
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	179	179	178	178	178	178
MINING	D | NACATOCH AQUIFER | HOPKINS COUNTY	18	19	18	19	19	19
MINING	D | SULPHUR SPRINGS LAKE/RESERVOIR	6	7	7	8	9	9
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	38	38	38	38	38	38
LIVESTOCK	D | CYPRESS LIVESTOCK LOCAL SUPPLY	108	108	108	108	108	108
IRRIGATION	D | SULPHUR RUN-OF-RIVER	3	3	3	3	3	3
CYPRESS BASIN TOTAL EXISTING SUPPLY		**772**	**774**	**762**	**757**	**738**	**718**
SABINE BASIN							
CASH SUD	C | TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	2	2	2	1	1	1
CASH SUD	C | TRINITY INDIRECT REUSE	2	2	3	3	3	3
CASH SUD	D | CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	1	1	1	1	1	0
CASH SUD	D | TAWAKONI LAKE/RESERVOIR	8	8	7	9	10	11
SULPHUR SPRINGS	D | CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	35	34	32	34	32	33
SULPHUR SPRINGS	D | SULPHUR SPRINGS LAKE/RESERVOIR	23	22	20	21	20	20

Water User Group (WUG) Existing Water Supply

REGION D	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
HOPKINS COUNTY							
SABINE BASIN							
COMO	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	110	107	105	105	105	105
CUMBY	D | NACATOCH AQUIFER | HOPKINS COUNTY	109	109	109	109	109	109
MARTIN SPRINGS WSC	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	376	375	374	376	377	377
MARTIN SPRINGS WSC	D | CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	188	188	188	189	189	188
JONES WSC	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	24	28	30	34	39	42
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	464	465	466	464	461	461
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | RAINS COUNTY	112	112	112	112	112	112
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	7	7	7	7	7	7
COUNTY-OTHER	D | CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	213	222	227	208	191	173
MINING	D | NACATOCH AQUIFER | HOPKINS COUNTY	187	192	193	193	195	195
MINING	D | SULPHUR SPRINGS LAKE/RESERVOIR	62	68	74	81	88	96
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	249	249	249	249	249	249
LIVESTOCK	D | SABINE LIVESTOCK LOCAL SUPPLY	1,208	1,208	1,208	1,208	1,208	1,208
IRRIGATION	D | SABINE RUN-OF-RIVER	19	19	19	19	19	19
IRRIGATION	D | SULPHUR RUN-OF-RIVER	16	16	16	16	16	16
SABINE BASIN TOTAL EXISTING SUPPLY		**3,415**	**3,434**	**3,442**	**3,439**	**3,432**	**3,425**
SULPHUR BASIN							
SULPHUR SPRINGS	D | CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	11,225	11,007	10,804	10,716	10,577	10,388
SULPHUR SPRINGS	D | SULPHUR RUN-OF-RIVER	130	130	130	130	130	130
SULPHUR SPRINGS	D | SULPHUR SPRINGS LAKE/RESERVOIR	7,192	7,059	6,838	6,781	6,509	6,381
COMO	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	30	33	35	35	35	35
CUMBY	D | NACATOCH AQUIFER | HOPKINS COUNTY	11	11	11	11	11	11
MARTIN SPRINGS WSC	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	69	69	69	69	69	69
MARTIN SPRINGS WSC	D | CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	35	35	35	34	34	35
NORTH HOPKINS WSC	D | CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	921	921	921	921	921	921
BRINKER WSC	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	252	251	251	252	253	253
BRINKER WSC	D | SULPHUR SPRINGS LAKE/RESERVOIR	77	77	77	77	77	77
CYPRESS SPRINGS SUD	D | CYPRESS SPRINGS LAKE/RESERVOIR	69	69	67	66	63	59
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	390	392	393	390	387	387
COUNTY-OTHER	D | CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	174	183	189	169	150	130
COUNTY-OTHER	D | NACATOCH AQUIFER | HOPKINS COUNTY	166	143	140	139	137	137
MANUFACTURING	D | CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	1,268	1,378	1,481	1,515	1,601	1,736
MANUFACTURING	D | SULPHUR SPRINGS LAKE/RESERVOIR	473	452	434	472	525	539
MINING	D | NACATOCH AQUIFER | HOPKINS COUNTY	399	410	411	412	414	414

Water User Group (WUG) Existing Water Supply

REGION D	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
HOPKINS COUNTY							
SULPHUR BASIN							
MINING	D | SULPHUR SPRINGS LAKE/RESERVOIR	132	145	159	172	188	205
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	130	130	130	130	131	131
LIVESTOCK	D | NACATOCH AQUIFER | HOPKINS COUNTY	77	77	77	77	77	77
LIVESTOCK	D | SULPHUR LIVESTOCK LOCAL SUPPLY	1,570	1,493	1,324	1,314	1,130	1,049
LIVESTOCK	D | SULPHUR SPRINGS LAKE/RESERVOIR	1,474	1,551	1,720	1,730	1,914	1,996
IRRIGATION	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	49	49	49	49	49	49
IRRIGATION	D | SULPHUR RUN-OF-RIVER	56	56	56	56	56	56
SULPHUR BASIN TOTAL EXISTING SUPPLY		**26,369**	**26,121**	**25,801**	**25,717**	**25,438**	**25,265**
HOPKINS COUNTY TOTAL EXISTING SUPPLY		**30,556**	**30,329**	**30,005**	**29,913**	**29,608**	**29,408**
HUNT COUNTY							
SABINE BASIN							
CASH SUD	C | TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	234	265	305	283	259	237
CASH SUD	C | TRINITY INDIRECT REUSE	318	449	599	636	622	589
CASH SUD	D | CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	137	154	174	161	147	136
CASH SUD	D | FORK LAKE/RESERVOIR	870	3,933	3,900	3,819	3,725	3,640
CASH SUD	D | TAWAKONI LAKE/RESERVOIR	626	540	534	529	524	505
GREENVILLE	D | GREENVILLE CITY LAKE/RESERVOIR	2,896	2,896	2,896	2,896	2,896	2,896
GREENVILLE	D | TAWAKONI LAKE/RESERVOIR	2,713	2,327	1,913	3,634	5,194	5,194
ABLES SPRINGS WSC	C | LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	14	18	24	30	39	51
ABLES SPRINGS WSC	C | TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	11	15	20	25	33	43
ABLES SPRINGS WSC	C | TRINITY INDIRECT REUSE	16	26	38	57	80	107
ABLES SPRINGS WSC	D | CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	8	9	13	16	21	27
ABLES SPRINGS WSC	D | FORK LAKE/RESERVOIR	3	0	0	0	0	0
ABLES SPRINGS WSC	D | TAWAKONI LAKE/RESERVOIR	5	2	3	4	5	7
BLACKLAND WSC	C | LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	2	1	1	1	1	1
BLACKLAND WSC	C | TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	1	1	1	1	1	1
BLACKLAND WSC	C | TRINITY INDIRECT REUSE	2	2	2	2	2	2
BLACKLAND WSC	D | CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	0	1	1	1	0	0
BLACKLAND WSC	D | FORK LAKE/RESERVOIR	0	0	0	0	0	0
BLACKLAND WSC	D | TAWAKONI LAKE/RESERVOIR	1	0	0	0	0	0
CADDO BASIN SUD	C | LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	164	179	202	238	295	373
CADDO BASIN SUD	C | TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	133	148	168	201	249	315
CADDO BASIN SUD	C | TRINITY INDIRECT REUSE	179	249	330	451	594	779
CADDO BASIN SUD	D | CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	78	86	98	114	142	180
CADDO BASIN SUD	D | FORK LAKE/RESERVOIR	39	0	0	0	0	0

Water User Group (WUG) Existing Water Supply

REGION D		EXISTING SUPPLY (ACRE-FEET PER YEAR)					
	SOURCE REGION | SOURCE NAME	2020	2030	2040	2050	2060	2070
HUNT COUNTY							
SABINE BASIN							
CADDO BASIN SUD	D | TAWAKONI LAKE/RESERVOIR	60	23	27	31	39	50
CADDO MILLS	D | TAWAKONI LAKE/RESERVOIR	178	186	201	242	309	319
CAMPBELL	D | NACATOCH AQUIFER | HUNT COUNTY	105	107	117	142	180	184
CELESTE	D | WOODBINE AQUIFER | HUNT COUNTY	199	199	199	199	199	199
HICKORY CREEK SUD	D | WOODBINE AQUIFER | HUNT COUNTY	340	347	353	357	360	362
JOSEPHINE	C | LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	5	7	9	12	11	10
JOSEPHINE	C | TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	4	6	8	10	10	9
JOSEPHINE	C | TRINITY INDIRECT REUSE	6	9	15	24	23	22
JOSEPHINE	D | CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	2	3	5	6	5	5
JOSEPHINE	D | FORK LAKE/RESERVOIR	1	0	0	0	0	0
JOSEPHINE	D | TAWAKONI LAKE/RESERVOIR	2	1	1	2	1	1
LONE OAK	D | TAWAKONI LAKE/RESERVOIR	164	164	164	164	164	164
MACBEE SUD	D | TAWAKONI LAKE/RESERVOIR	23	123	139	160	193	237
QUINLAN	C | LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	325	365	414	380	345	313
ROYSE CITY	C | LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	10	10	11	13	15	19
ROYSE CITY	C | TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	8	9	9	11	13	16
ROYSE CITY	C | TRINITY INDIRECT REUSE	10	15	18	24	31	39
ROYSE CITY	D | CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	5	5	5	6	7	9
ROYSE CITY	D | FORK LAKE/RESERVOIR	2	0	0	0	0	0
ROYSE CITY	D | TAWAKONI LAKE/RESERVOIR	4	1	1	2	2	2
WEST TAWAKONI	D | TAWAKONI LAKE/RESERVOIR	186	1,064	1,056	1,047	1,039	1,031
COMBINED CONSUMERS SUD	D | FORK LAKE/RESERVOIR	2,240	2,240	2,240	2,240	2,240	2,240
COUNTY-OTHER	C | LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	139	144	155	170	206	236
COUNTY-OTHER	C | TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	113	119	133	145	174	202
COUNTY-OTHER	C | TRINITY INDIRECT REUSE	155	202	263	332	418	511
COUNTY-OTHER	D | BIG CREEK LAKE/RESERVOIR	4	6	8	12	19	21
COUNTY-OTHER	D | CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	66	69	77	84	99	119
COUNTY-OTHER	D | FORK LAKE/RESERVOIR	32	0	0	0	0	0
COUNTY-OTHER	D | NACATOCH AQUIFER | HUNT COUNTY	368	285	248	248	248	248
COUNTY-OTHER	D | TAWAKONI LAKE/RESERVOIR	1,406	1,516	1,648	2,692	2,640	2,778
COUNTY-OTHER	D | WOODBINE AQUIFER | HUNT COUNTY	29	29	29	29	29	29
MANUFACTURING	C | LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	1	1	1	1	1	1
MANUFACTURING	D | CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	50	50	50	50	50	50
MANUFACTURING	D | GREENVILLE CITY LAKE/RESERVOIR	103	103	103	103	103	103
MANUFACTURING	D | NACATOCH AQUIFER | HUNT COUNTY	200	200	200	200	200	200

Water User Group (WUG) Existing Water Supply

REGION D	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
HUNT COUNTY							
SABINE BASIN							
MANUFACTURING	D | TAWAKONI LAKE/RESERVOIR	694	862	1,043	1,216	1,335	1,521
MINING	D | NACATOCH AQUIFER | HUNT COUNTY	36	34	30	28	22	20
MINING	D | TAWAKONI LAKE/RESERVOIR	13	14	16	17	19	16
STEAM ELECTRIC POWER	D | GREENVILLE CITY LAKE/RESERVOIR	351	351	351	351	351	351
LIVESTOCK	D | SABINE LIVESTOCK LOCAL SUPPLY	812	812	812	812	812	812
IRRIGATION	D | NACATOCH AQUIFER | HUNT COUNTY	106	106	106	106	106	106
IRRIGATION	D | SABINE RUN-OF-RIVER	0	0	0	0	0	0
SABINE BASIN TOTAL EXISTING SUPPLY		**17,007**	**21,088**	**21,487**	**24,767**	**26,847**	**27,638**
SULPHUR BASIN							
CASH SUD	C | TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	4	4	4	4	4	4
CASH SUD	C | TRINITY INDIRECT REUSE	4	7	9	9	10	8
CASH SUD	D | CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	2	2	3	3	3	2
CASH SUD	D | FORK LAKE/RESERVOIR	1	0	0	0	0	0
CASH SUD	D | TAWAKONI LAKE/RESERVOIR	21	22	24	32	41	55
CAMPBELL	D | NACATOCH AQUIFER | HUNT COUNTY	4	4	6	7	9	12
COMMERCE	D | NACATOCH AQUIFER | DELTA COUNTY	122	122	122	122	122	122
COMMERCE	D | NACATOCH AQUIFER | HUNT COUNTY	175	175	175	175	175	175
COMMERCE	D | TAWAKONI LAKE/RESERVOIR	1,130	1,259	1,452	1,743	2,177	2,812
HICKORY CREEK SUD	D | WOODBINE AQUIFER | HUNT COUNTY	237	241	246	248	251	251
WOLFE CITY	D | TURKEY CREEK LAKE/RESERVOIR	200	200	200	200	200	200
WOLFE CITY	D | WOODBINE AQUIFER | HUNT COUNTY	81	81	81	81	81	81
NORTH HUNT SUD	D | TAWAKONI LAKE/RESERVOIR	115	134	133	132	131	131
NORTH HUNT SUD	D | WOODBINE AQUIFER | HUNT COUNTY	162	174	172	171	168	164
COUNTY-OTHER	D | FORK LAKE/RESERVOIR	2	0	0	0	0	0
COUNTY-OTHER	D | NACATOCH AQUIFER | HUNT COUNTY	169	253	290	290	290	290
COUNTY-OTHER	D | TAWAKONI LAKE/RESERVOIR	2	1	88	249	536	882
MANUFACTURING	D | TAWAKONI LAKE/RESERVOIR	338	401	470	535	580	650
MINING	D | TAWAKONI LAKE/RESERVOIR	5	5	6	6	9	13
LIVESTOCK	D | SULPHUR LIVESTOCK LOCAL SUPPLY	300	300	300	300	300	300
IRRIGATION	D | SULPHUR RUN-OF-RIVER	2	2	2	2	2	2
SULPHUR BASIN TOTAL EXISTING SUPPLY		**3,076**	**3,387**	**3,783**	**4,309**	**5,089**	**6,154**
TRINITY BASIN							
HICKORY CREEK SUD	D | WOODBINE AQUIFER | HUNT COUNTY	117	120	121	122	123	124
COUNTY-OTHER	C | LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	2	4	4	9	2	7
COUNTY-OTHER	C | TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	2	3	3	6	0	5
COUNTY-OTHER	C | TRINITY INDIRECT REUSE	1	4	5	9	0	2
COUNTY-OTHER	D | CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	1	1	2	4	0	0
COUNTY-OTHER	D | NACATOCH AQUIFER | HUNT COUNTY	1	0	0	0	0	0

Water User Group (WUG) Existing Water Supply

REGION D	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
HUNT COUNTY							
TRINITY BASIN							
COUNTY-OTHER	D | TAWAKONI LAKE/RESERVOIR	1	4	5	15	2	10
COUNTY-OTHER	D | TRINITY AQUIFER | HUNT COUNTY	0	0	0	0	0	0
COUNTY-OTHER	D | WOODBINE AQUIFER | HUNT COUNTY	24	19	14	4	0	0
MINING	D | TAWAKONI LAKE/RESERVOIR	1	1	1	1	1	1
LIVESTOCK	D | TRINITY AQUIFER | HUNT COUNTY	4	4	4	4	3	3
LIVESTOCK	D | TRINITY LIVESTOCK LOCAL SUPPLY	34	34	34	34	35	35
IRRIGATION		0	0	0	0	0	0
TRINITY BASIN TOTAL EXISTING SUPPLY		**188**	**194**	**193**	**208**	**166**	**187**
HUNT COUNTY TOTAL EXISTING SUPPLY		**20,271**	**24,669**	**25,463**	**29,284**	**32,102**	**33,979**
LAMAR COUNTY							
RED BASIN							
LAMAR COUNTY WSD	D | PAT MAYSE LAKE/RESERVOIR	5,334	5,278	5,229	5,193	5,159	5,108
PARIS	D | CROOK LAKE/RESERVOIR	806	806	806	806	806	806
PARIS	D | PAT MAYSE LAKE/RESERVOIR	10,352	10,234	10,119	10,023	9,839	9,742
RENO	D | PAT MAYSE LAKE/RESERVOIR	115	128	138	149	160	171
COUNTY-OTHER	D | PAT MAYSE LAKE/RESERVOIR	5	6	6	6	6	6
COUNTY-OTHER	D | TRINITY AQUIFER | LAMAR COUNTY	59	62	65	64	62	62
COUNTY-OTHER	D | WOODBINE AQUIFER | LAMAR COUNTY	17	0	0	0	0	0
MANUFACTURING	D | DIRECT REUSE	12	12	12	12	12	12
MANUFACTURING	D | PAT MAYSE LAKE/RESERVOIR	858	900	941	976	1,042	1,077
STEAM ELECTRIC POWER	D | PAT MAYSE LAKE/RESERVOIR	8,961	8,961	8,961	8,961	8,961	8,961
LIVESTOCK	D | RED LIVESTOCK LOCAL SUPPLY	0	0	0	0	0	0
LIVESTOCK	D | TRINITY AQUIFER | LAMAR COUNTY	264	264	235	235	192	186
LIVESTOCK	D | WOODBINE AQUIFER | LAMAR COUNTY	1,370	1,370	1,399	1,399	1,442	1,443
IRRIGATION	D | RED RUN-OF-RIVER	10	10	10	10	10	10
IRRIGATION	D | TRINITY AQUIFER | LAMAR COUNTY	533	533	475	475	413	396
IRRIGATION	D | WOODBINE AQUIFER | LAMAR COUNTY	523	540	511	511	468	467
RED BASIN TOTAL EXISTING SUPPLY		**29,219**	**29,104**	**28,907**	**28,820**	**28,572**	**28,447**
SULPHUR BASIN							
LAMAR COUNTY WSD	D | PAT MAYSE LAKE/RESERVOIR	3,557	3,518	3,486	3,462	3,438	3,404
PARIS	D | CROOK LAKE/RESERVOIR	1,210	1,210	1,210	1,210	1,210	1,210
PARIS	D | PAT MAYSE LAKE/RESERVOIR	15,528	15,351	15,179	15,035	14,759	14,614
BLOSSOM	D | PAT MAYSE LAKE/RESERVOIR	216	230	245	245	245	245
DEPORT	D | PAT MAYSE LAKE/RESERVOIR	100	106	113	113	113	113
RENO	D | PAT MAYSE LAKE/RESERVOIR	513	571	616	665	713	764
ROXTON	D | PAT MAYSE LAKE/RESERVOIR	104	111	118	118	118	118
COUNTY-OTHER	D | PAT MAYSE LAKE/RESERVOIR	269	274	279	277	275	273
COUNTY-OTHER	D | TRINITY AQUIFER | LAMAR COUNTY	1	1	1	1	1	1
MANUFACTURING	D | PAT MAYSE LAKE/RESERVOIR	5,091	5,340	5,580	5,787	6,183	6,386
LIVESTOCK	D | SULPHUR LIVESTOCK LOCAL SUPPLY	1,623	1,623	1,623	1,623	1,623	1,623

Water User Group (WUG) Existing Water Supply

REGION D	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
LAMAR COUNTY							
SULPHUR BASIN							
LIVESTOCK	D | TRINITY AQUIFER | LAMAR COUNTY	1	1	1	1	1	1
IRRIGATION	D | WOODBINE AQUIFER | LAMAR COUNTY	1,567	1,488	1,512	1,450	1,494	1,447
SULPHUR BASIN TOTAL EXISTING SUPPLY		**29,780**	**29,824**	**29,963**	**29,987**	**30,173**	**30,199**
LAMAR COUNTY TOTAL EXISTING SUPPLY		**58,999**	**58,928**	**58,870**	**58,807**	**58,745**	**58,646**
MARION COUNTY							
CYPRESS BASIN							
JEFFERSON	D | CYPRESS RUN-OF-RIVER	148	148	148	148	148	148
JEFFERSON	D | O' THE PINES LAKE/RESERVOIR	1,509	1,509	1,509	1,509	1,509	1,509
DIANA SUD	D | CARRIZO-WILCOX AQUIFER | MARION COUNTY	27	27	27	27	27	27
DIANA SUD	D | O' THE PINES LAKE/RESERVOIR	24	24	24	24	24	24
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | MARION COUNTY	1,553	1,553	1,553	1,553	1,553	1,553
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	35	35	35	35	35	35
COUNTY-OTHER	D | O' THE PINES LAKE/RESERVOIR	178	178	178	178	178	178
MANUFACTURING	D | CARRIZO-WILCOX AQUIFER | MARION COUNTY	72	76	79	83	89	95
MINING	D | CARRIZO-WILCOX AQUIFER | MARION COUNTY	116	119	122	124	126	128
STEAM ELECTRIC POWER	D | CARRIZO-WILCOX AQUIFER | MARION COUNTY	75	75	75	75	75	75
STEAM ELECTRIC POWER	D | O' THE PINES LAKE/RESERVOIR	1,777	2,090	2,472	2,937	3,505	3,892
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | MARION COUNTY	130	130	130	130	130	130
LIVESTOCK	D | QUEEN CITY AQUIFER | MARION COUNTY	281	281	281	281	281	281
CYPRESS BASIN TOTAL EXISTING SUPPLY		**5,925**	**6,245**	**6,633**	**7,104**	**7,680**	**8,075**
MARION COUNTY TOTAL EXISTING SUPPLY		**5,925**	**6,245**	**6,633**	**7,104**	**7,680**	**8,075**
MORRIS COUNTY							
CYPRESS BASIN							
DAINGERFIELD	D | O' THE PINES LAKE/RESERVOIR	1,582	1,582	1,582	1,582	1,582	1,582
HUGHES SPRINGS	D | O' THE PINES LAKE/RESERVOIR	14	14	14	14	14	14
LONE STAR	D | O' THE PINES LAKE/RESERVOIR	747	747	747	747	747	747
NAPLES	D | CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	108	116	116	116	116	116
OMAHA	D | CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	165	165	165	165	165	165
TRI SUD	D | BOB SANDLIN LAKE/RESERVOIR	0	0	0	0	0	0
BI COUNTY WSC	D | CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	167	167	167	133	134	137
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	353	353	353	353	353	353
MANUFACTURING	D | DIRECT REUSE	72,086	66,660	61,344	62,600	71,474	65,248
MANUFACTURING	D | ELLISON CREEK LAKE/RESERVOIR	26,074	26,074	26,074	26,074	26,074	26,074
MANUFACTURING	D | O' THE PINES LAKE/RESERVOIR	32,400	32,400	32,400	32,400	32,400	32,400
MANUFACTURING	D | QUEEN CITY AQUIFER | MORRIS COUNTY	4,383	4,383	4,383	4,383	4,383	4,383
STEAM ELECTRIC POWER	D | ELLISON CREEK LAKE/RESERVOIR	820	820	820	820	820	820

Water User Group (WUG) Existing Water Supply

REGION D	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
MORRIS COUNTY							
CYPRESS BASIN							
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	81	78	78	78	78	78
LIVESTOCK	D | CYPRESS LIVESTOCK LOCAL SUPPLY	112	112	112	112	112	112
LIVESTOCK	D | QUEEN CITY AQUIFER | MORRIS COUNTY	60	60	60	60	60	60
LIVESTOCK	D | SULPHUR LIVESTOCK LOCAL SUPPLY	73	76	76	76	76	76
CYPRESS BASIN TOTAL EXISTING SUPPLY		**139,225**	**133,807**	**128,491**	**129,713**	**138,588**	**132,365**
SULPHUR BASIN							
NAPLES	D | CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	117	109	109	109	109	109
OMAHA	D | CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	125	125	125	125	125	125
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	187	187	187	187	187	187
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	74	72	72	72	72	72
LIVESTOCK	D | CYPRESS LIVESTOCK LOCAL SUPPLY	103	103	103	103	103	103
LIVESTOCK	D | QUEEN CITY AQUIFER | MORRIS COUNTY	55	55	55	55	55	55
LIVESTOCK	D | SULPHUR LIVESTOCK LOCAL SUPPLY	68	70	70	70	70	70
SULPHUR BASIN TOTAL EXISTING SUPPLY		**729**	**721**	**721**	**721**	**721**	**721**
MORRIS COUNTY TOTAL EXISTING SUPPLY		**139,954**	**134,528**	**129,212**	**130,434**	**139,309**	**133,086**
RAINS COUNTY							
SABINE BASIN							
CASH SUD	C | TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	9	9	9	7	5	4
CASH SUD	C | TRINITY INDIRECT REUSE	12	15	18	16	12	10
CASH SUD	D | CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	6	6	6	4	3	3
CASH SUD	D | FORK LAKE/RESERVOIR	3	0	0	0	0	0
CASH SUD	D | TAWAKONI LAKE/RESERVOIR	56	52	49	55	62	65
EMORY	D | FORK LAKE/RESERVOIR	498	827	819	811	804	796
EMORY	D | TAWAKONI LAKE/RESERVOIR	0	0	0	0	0	0
EAST TAWAKONI	D | TAWAKONI LAKE/RESERVOIR	773	773	773	773	773	773
POINT	D | FORK LAKE/RESERVOIR	172	208	207	205	204	202
POINT	D | TAWAKONI LAKE/RESERVOIR	48	47	45	44	42	41
GOLDEN WSC	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	9	9	9	9	9	9
ALBA	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	2	2	2	2	2	1
BRIGHT STAR-SALEM SUD	D | CARRIZO-WILCOX AQUIFER | RAINS COUNTY	434	434	434	434	434	434
BRIGHT STAR-SALEM SUD	D | FORK LAKE/RESERVOIR	0	840	840	840	840	840
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	113	113	113	113	113	113
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | RAINS COUNTY	204	217	220	218	215	215
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	7	7	7	7	7	7
COUNTY-OTHER	D | NACATOCH AQUIFER | HOPKINS COUNTY	69	75	77	76	74	74
COUNTY-OTHER	D | TAWAKONI LAKE/RESERVOIR	318	318	318	318	318	318
MANUFACTURING	D | TAWAKONI LAKE/RESERVOIR	5	5	5	5	5	5
LIVESTOCK	D | SABINE LIVESTOCK LOCAL SUPPLY	506	506	506	506	506	506

Water User Group (WUG) Existing Water Supply

REGION D	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
RAINS COUNTY							
SABINE BASIN							
IRRIGATION	D | SABINE RUN-OF-RIVER	55	55	55	55	55	55
SABINE BASIN TOTAL EXISTING SUPPLY		**3,299**	**4,518**	**4,512**	**4,498**	**4,483**	**4,471**
RAINS COUNTY TOTAL EXISTING SUPPLY		**3,299**	**4,518**	**4,512**	**4,498**	**4,483**	**4,471**
RED RIVER COUNTY							
RED BASIN							
RED RIVER COUNTY WSC	D | BLOSSOM AQUIFER | RED RIVER COUNTY	29	30	30	30	30	30
RED RIVER COUNTY WSC	D | PAT MAYSE LAKE/RESERVOIR	184	184	184	184	184	184
RED RIVER COUNTY WSC	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
COUNTY-OTHER	D | PAT MAYSE LAKE/RESERVOIR	118	118	118	118	118	118
COUNTY-OTHER	D | TRINITY AQUIFER | RED RIVER COUNTY	23	23	23	23	23	23
COUNTY-OTHER	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
LIVESTOCK	D | BLOSSOM AQUIFER | RED RIVER COUNTY	94	94	94	94	94	94
LIVESTOCK	D | NACATOCH AQUIFER | RED RIVER COUNTY	8	8	8	8	8	8
LIVESTOCK	D | RED LIVESTOCK LOCAL SUPPLY	474	474	474	474	474	474
LIVESTOCK	D | WOODBINE AQUIFER | RED RIVER COUNTY	162	162	162	162	162	162
IRRIGATION	D | RED RUN-OF-RIVER	330	330	330	330	330	330
RED BASIN TOTAL EXISTING SUPPLY		**1,422**	**1,423**	**1,423**	**1,423**	**1,423**	**1,423**
SULPHUR BASIN							
BOGATA	D | NACATOCH AQUIFER | RED RIVER COUNTY	269	269	269	269	269	269
CLARKSVILLE	D | BLOSSOM AQUIFER | RED RIVER COUNTY	383	327	0	0	0	0
CLARKSVILLE	D | LANGFORD LAKE/RESERVOIR	533	333	0	0	0	0
DEPORT	D | PAT MAYSE LAKE/RESERVOIR	7	7	7	7	7	7
DETROIT	D | PAT MAYSE LAKE/RESERVOIR	41	41	41	41	41	41
DETROIT	D | TRINITY AQUIFER | RED RIVER COUNTY	59	59	59	59	59	59
RED RIVER COUNTY WSC	D | BLOSSOM AQUIFER | RED RIVER COUNTY	212	223	223	223	223	223
RED RIVER COUNTY WSC	D | NACATOCH AQUIFER | RED RIVER COUNTY	188	188	188	188	188	188
RED RIVER COUNTY WSC	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | TITUS COUNTY	0	0	0	0	0	0
COUNTY-OTHER	D | NACATOCH AQUIFER | RED RIVER COUNTY	56	55	54	54	54	54
COUNTY-OTHER	D | PAT MAYSE LAKE/RESERVOIR	135	132	129	129	129	129
COUNTY-OTHER	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
MANUFACTURING	D | BLOSSOM AQUIFER | RED RIVER COUNTY	1	1	1	1	1	1
MANUFACTURING	D | LANGFORD LAKE/RESERVOIR	7	7	0	0	0	0
MANUFACTURING	D | TRINITY AQUIFER | RED RIVER COUNTY	1	1	1	1	1	1
MINING	D | BLOSSOM AQUIFER | RED RIVER COUNTY	4	4	3	3	3	3
STEAM ELECTRIC POWER	D | SULPHUR RUN-OF-RIVER	8,510	8,510	8,510	8,510	8,510	9,290
LIVESTOCK	D | NACATOCH AQUIFER | RED RIVER COUNTY	38	38	38	38	38	38
LIVESTOCK	D | SULPHUR LIVESTOCK LOCAL SUPPLY	911	911	911	911	911	911
IRRIGATION	D | SULPHUR RUN-OF-RIVER	450	460	460	460	460	440

Water User Group (WUG) Existing Water Supply

REGION D	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
RED RIVER COUNTY							
SULPHUR BASIN TOTAL EXISTING SUPPLY		**11,805**	**11,566**	**10,894**	**10,894**	**10,894**	**11,654**
RED RIVER COUNTY TOTAL EXISTING SUPPLY		**13,227**	**12,989**	**12,317**	**12,317**	**12,317**	**13,077**
SMITH COUNTY							
SABINE BASIN							
TYLER	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	21	24	27	30	35	40
TYLER	I | PALESTINE LAKE/RESERVOIR	80	89	99	114	129	149
TYLER	I | TYLER LAKE/RESERVOIR	91	101	113	128	147	170
CRYSTAL SYSTEMS INC	D | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	392	333	270	197	92	0
CRYSTAL SYSTEMS INC	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	195	141	89	37	0	0
JACKSON WSC	D | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	197	213	235	263	301	347
LIBERTY CITY WSC	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	10	10	10	10	10	10
LIBERTY CITY WSC	D | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	17	17	17	17	17	17
LINDALE	D | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	813	813	813	813	813	813
LINDALE RURAL WSC	D | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	1,059	1,059	1,026	962	894	860
OVERTON		0	0	0	0	0	0
SOUTHERN UTILITIES COMPANY	D | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	2,045	2,272	2,540	2,707	2,167	1,760
SOUTHERN UTILITIES COMPANY	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	0	0	0	169	1,128	2,038
WINONA	D | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	169	169	169	169	169	169
SMITH COUNTY MUD #1	D | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	887	887	887	887	887	887
SMITH COUNTY MUD #1	D | QUEEN CITY AQUIFER | SMITH COUNTY	269	269	269	269	269	269
WEST GREGG SUD	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	0	0	0	0	0	13
WEST GREGG SUD	D | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	127	127	127	127	127	127
HIDEAWAY	D | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	744	810	893	999	1,159	1,301
HIDEAWAY	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	260	330	403	481	538	538
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	2,889	3,105	3,330	3,697	4,159	4,477
COUNTY-OTHER	D | GLADEWATER LAKE/RESERVOIR	23	23	23	23	23	23
MANUFACTURING		0	0	0	0	0	0
MINING	D | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	48	88	106	137	158	180
MINING	D | QUEEN CITY AQUIFER | SMITH COUNTY	272	272	272	272	272	272
STEAM ELECTRIC POWER	D | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	12	14	16	19	23	27
LIVESTOCK	D | QUEEN CITY AQUIFER | SMITH COUNTY	468	468	468	468	468	468
IRRIGATION	D | QUEEN CITY AQUIFER | SMITH COUNTY	370	389	408	428	450	475
SABINE BASIN TOTAL EXISTING SUPPLY		**11,458**	**12,023**	**12,610**	**13,423**	**14,435**	**15,430**
SMITH COUNTY TOTAL EXISTING SUPPLY		**11,458**	**12,023**	**12,610**	**13,423**	**14,435**	**15,430**
TITUS COUNTY							
CYPRESS BASIN							
MOUNT PLEASANT	D | BOB SANDLIN LAKE/RESERVOIR	2,677	2,625	2,502	2,456	3,278	4,126

Water User Group (WUG) Existing Water Supply

REGION D	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
TITUS COUNTY							
CYPRESS BASIN							
MOUNT PLEASANT	D | CYPRESS RUN-OF-RIVER	410	410	410	410	410	410
MOUNT PLEASANT	D | CYPRESS SPRINGS LAKE/RESERVOIR	2,203	1,963	1,723	1,483	1,233	995
MOUNT PLEASANT	D | TANKERSLEY LAKE/RESERVOIR	950	950	950	950	950	950
TRI SUD	D | BOB SANDLIN LAKE/RESERVOIR	0	0	0	0	0	0
WINFIELD	D | BOB SANDLIN LAKE/RESERVOIR	17	18	20	22	24	27
BI COUNTY WSC	D | CARRIZO-WILCOX AQUIFER | TITUS COUNTY	143	143	132	111	96	89
CYPRESS SPRINGS SUD	D | CYPRESS SPRINGS LAKE/RESERVOIR	46	46	45	44	42	39
COUNTY-OTHER	D | BOB SANDLIN LAKE/RESERVOIR	87	87	87	87	87	87
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | TITUS COUNTY	415	438	457	475	439	416
MANUFACTURING	D | BOB SANDLIN LAKE/RESERVOIR	2,795	2,859	2,922	2,933	3,067	3,101
MANUFACTURING	D | CARRIZO-WILCOX AQUIFER | TITUS COUNTY	1,887	2,027	2,150	2,163	2,027	2,005
MANUFACTURING	D | DIRECT REUSE	160	160	160	160	160	160
MANUFACTURING	D | TANKERSLEY LAKE/RESERVOIR	550	550	550	550	550	550
MINING	D | BOB SANDLIN LAKE/RESERVOIR	860	690	647	689	834	728
MINING	D | CARRIZO-WILCOX AQUIFER | TITUS COUNTY	2,714	3,109	3,376	3,559	3,273	3,376
MINING	D | CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	80	80	80	80	80	80
MINING	D | MONTICELLO LAKE/RESERVOIR	538	538	538	538	461	0
STEAM ELECTRIC POWER	D | BOB SANDLIN LAKE/RESERVOIR	10,000	10,000	10,000	10,000	10,000	10,000
STEAM ELECTRIC POWER	D | CARRIZO-WILCOX AQUIFER | TITUS COUNTY	3	3	3	3	578	548
STEAM ELECTRIC POWER	D | MONTICELLO LAKE/RESERVOIR	4,462	3,962	3,462	2,862	2,439	2,400
STEAM ELECTRIC POWER	D | O' THE PINES LAKE/RESERVOIR	14,400	14,400	14,400	14,400	14,400	14,400
STEAM ELECTRIC POWER	D | WELSH LAKE/RESERVOIR	3,000	2,800	2,600	2,400	2,100	1,800
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | TITUS COUNTY	433	433	433	433	428	428
IRRIGATION	D | CYPRESS RUN-OF-RIVER	7	7	7	7	7	7
IRRIGATION	D | SULPHUR RUN-OF-RIVER	75	75	75	75	75	75
CYPRESS BASIN TOTAL EXISTING SUPPLY		**48,912**	**48,373**	**47,729**	**46,890**	**47,038**	**46,797**
SULPHUR BASIN							
TALCO	D | CARRIZO-WILCOX AQUIFER | TITUS COUNTY	453	453	453	453	453	453
TRI SUD	D | BOB SANDLIN LAKE/RESERVOIR	0	0	0	0	0	0
WINFIELD	D | BOB SANDLIN LAKE/RESERVOIR	47	52	57	62	69	76
CYPRESS SPRINGS SUD	D | CYPRESS SPRINGS LAKE/RESERVOIR	20	20	20	20	20	20
COUNTY-OTHER	D | BOB SANDLIN LAKE/RESERVOIR	600	656	689	723	761	803
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | TITUS COUNTY	395	432	454	477	500	500
COUNTY-OTHER	D | NACATOCH AQUIFER | RED RIVER COUNTY	76	76	76	76	76	76
MINING	D | CARRIZO-WILCOX AQUIFER | TITUS COUNTY	361	383	406	429	453	475
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | TITUS COUNTY	418	418	418	418	378	357
LIVESTOCK	D | SULPHUR LIVESTOCK LOCAL SUPPLY	156	156	156	156	156	156

Water User Group (WUG) Existing Water Supply

REGION D	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
TITUS COUNTY							
SULPHUR BASIN							
LIVESTOCK	D | SULPHUR RUN-OF-RIVER	1	1	1	1	1	1
IRRIGATION	D | SULPHUR RUN-OF-RIVER	995	995	995	995	995	995
SULPHUR BASIN TOTAL EXISTING SUPPLY		**3,522**	**3,642**	**3,725**	**3,810**	**3,862**	**3,912**
TITUS COUNTY TOTAL EXISTING SUPPLY		**52,434**	**52,015**	**51,454**	**50,700**	**50,900**	**50,709**
UPSHUR COUNTY							
CYPRESS BASIN							
EAST MOUNTAIN	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	53	53	53	53	53	53
GILMER	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	1,094	1,094	1,094	1,094	1,094	1,094
GILMER	D | GILMER LAKE/RESERVOIR	0	0	0	0	0	0
ORE CITY	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	214	214	214	214	214	214
ORE CITY	D | O' THE PINES LAKE/RESERVOIR	1,504	1,504	1,504	1,504	1,504	1,504
PRITCHETT WSC	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	441	441	441	441	441	441
SHARON WSC	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	371	371	371	371	371	371
BI COUNTY WSC	D | CARRIZO-WILCOX AQUIFER | TITUS COUNTY	0	0	11	32	32	32
BI COUNTY WSC	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	423	423	423	423	423	423
DIANA SUD	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	598	598	598	598	598	598
DIANA SUD	D | O' THE PINES LAKE/RESERVOIR	524	524	524	524	524	524
COUNTY-OTHER	D | BIG SANDY CREEK LAKE/RESERVOIR	27	27	27	27	27	27
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	1,195	1,222	1,237	1,249	1,266	1,284
COUNTY-OTHER	D | GLADEWATER LAKE/RESERVOIR	76	76	76	76	76	76
MANUFACTURING	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	6	6	6	6	6	6
MANUFACTURING	D | GILMER LAKE/RESERVOIR	0	0	0	0	0	0
MINING	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	1	1	1	1	1	1
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	183	183	183	183	183	183
LIVESTOCK	D | CYPRESS LIVESTOCK LOCAL SUPPLY	975	975	975	975	975	975
IRRIGATION	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	230	230	230	230	230	230
IRRIGATION	D | CYPRESS RUN-OF-RIVER	22	22	22	22	22	22
CYPRESS BASIN TOTAL EXISTING SUPPLY		**7,937**	**7,964**	**7,990**	**8,023**	**8,040**	**8,058**
SABINE BASIN							
BIG SANDY	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	285	285	285	285	285	285
EAST MOUNTAIN	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	307	307	307	307	307	307
GLADEWATER	D | GLADEWATER LAKE/RESERVOIR	597	592	580	566	549	566
PRITCHETT WSC	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	577	577	577	577	577	577
FOUKE WSC	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	14	14	14	14	14	14
COUNTY-OTHER	D | BIG SANDY CREEK LAKE/RESERVOIR	13	13	13	13	13	13

Water User Group (WUG) Existing Water Supply

REGION D	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
UPSHUR COUNTY							
SABINE BASIN							
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	572	585	592	598	606	614
COUNTY-OTHER	D | GLADEWATER LAKE/RESERVOIR	36	36	36	36	36	36
MINING		0	0	0	0	0	0
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	60	60	60	60	60	60
LIVESTOCK	D | SABINE LIVESTOCK LOCAL SUPPLY	293	293	293	293	293	293
IRRIGATION	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	10	10	10	10	10	10
IRRIGATION	D | SABINE RUN-OF-RIVER	10	10	10	10	10	10
SABINE BASIN TOTAL EXISTING SUPPLY		**2,774**	**2,782**	**2,777**	**2,769**	**2,760**	**2,785**
UPSHUR COUNTY TOTAL EXISTING SUPPLY		**10,711**	**10,746**	**10,767**	**10,792**	**10,800**	**10,843**
VAN ZANDT COUNTY							
NECHES BASIN							
BETHEL-ASH WSC	I | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	147	165	175	177	182	182
VAN	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	514	502	493	481	467	467
R-P-M WSC	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	123	125	125	125	125	124
R-P-M WSC	D | QUEEN CITY AQUIFER | VAN ZANDT COUNTY	116	118	118	118	117	117
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	1,785	1,887	1,964	2,061	2,170	2,170
MINING	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	126	137	147	158	168	179
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	59	59	59	59	59	59
LIVESTOCK	D | NECHES LIVESTOCK LOCAL SUPPLY	1,108	1,108	1,108	1,108	1,108	1,108
IRRIGATION	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	4	4	4	4	4	4
IRRIGATION	D | SABINE RUN-OF-RIVER	22	22	22	22	22	22
NECHES BASIN TOTAL EXISTING SUPPLY		**4,004**	**4,127**	**4,215**	**4,313**	**4,422**	**4,432**
SABINE BASIN							
ABLES SPRINGS WSC	C | LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	1	1	1	0	1	1
ABLES SPRINGS WSC	C | TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	1	1	0	1	0	0
ABLES SPRINGS WSC	C | TRINITY INDIRECT REUSE	0	0	0	0	0	1
ABLES SPRINGS WSC	D | CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	0	0	0	0	0	0
ABLES SPRINGS WSC	D | FORK LAKE/RESERVOIR	0	0	0	0	0	0
ABLES SPRINGS WSC	D | TAWAKONI LAKE/RESERVOIR	0	1	0	0	0	0
CANTON	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	382	382	382	382	339	339
CANTON	D | MILL CREEK LAKE/RESERVOIR	1,146	1,146	1,146	1,145	1,145	1,145
CANTON	D | SABINE RUN-OF-RIVER	12	12	12	12	12	12
EDGEWOOD	D | EDGEWOOD CITY LAKE/RESERVOIR	160	160	160	160	160	160
EDGEWOOD	D | FORK LAKE/RESERVOIR	113	781	776	770	764	759
GRAND SALINE	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	645	645	645	645	611	611

Water User Group (WUG) Existing Water Supply

REGION D		EXISTING SUPPLY (ACRE-FEET PER YEAR)					
	SOURCE REGION | SOURCE NAME	2020	2030	2040	2050	2060	2070
VAN ZANDT COUNTY							
SABINE BASIN							
GRAND SALINE	D | SABINE RUN-OF-RIVER	0	0	0	0	0	0
MACBEE SUD	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	78	78	78	78	74	74
MACBEE SUD	D | TAWAKONI LAKE/RESERVOIR	99	493	496	496	496	480
SOUTH TAWAKONI WSC	D | FORK LAKE/RESERVOIR	400	1,041	1,033	1,025	1,018	1,010
VAN	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	134	146	155	167	181	181
VAN	D | SABINE RUN-OF-RIVER	350	350	350	350	350	350
WILLS POINT	D | SABINE RUN-OF-RIVER	120	120	120	120	120	120
WILLS POINT	D | TAWAKONI LAKE/RESERVOIR	620	648	648	648	648	648
GOLDEN WSC	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	99	102	105	108	110	112
COMBINED CONSUMERS SUD	D | FORK LAKE/RESERVOIR	266	297	321	351	384	411
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	1,718	1,769	1,808	1,856	1,809	1,809
COUNTY-OTHER	D | SABINE RUN-OF-RIVER	170	170	170	170	170	170
MANUFACTURING	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	205	205	205	205	194	194
MANUFACTURING	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	2	2	2	2	2	2
MANUFACTURING	D | SABINE RUN-OF-RIVER	20	20	20	20	20	20
MANUFACTURING	D | TAWAKONI LAKE/RESERVOIR	293	319	343	363	401	422
MINING	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	1,100	1,100	1,100	1,100	1,041	1,041
MINING	D | SABINE OTHER LOCAL SUPPLY	842	1,003	1,162	1,325	1,483	1,642
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	89	89	89	89	84	84
LIVESTOCK	D | SABINE LIVESTOCK LOCAL SUPPLY	1,035	1,035	1,035	1,035	1,035	1,035
IRRIGATION	D | SABINE RUN-OF-RIVER	52	52	52	52	52	52
SABINE BASIN TOTAL EXISTING SUPPLY		**10,152**	**12,168**	**12,414**	**12,675**	**12,704**	**12,885**
TRINITY BASIN							
BETHEL-ASH WSC	I | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	43	47	49	52	51	51
CANTON	D | MILL CREEK LAKE/RESERVOIR	4	4	4	5	5	5
MACBEE SUD	D | TAWAKONI LAKE/RESERVOIR	287	1,338	1,293	1,245	1,185	1,128
WILLS POINT	D | TAWAKONI LAKE/RESERVOIR	1,381	1,427	1,412	1,396	1,381	1,365
COUNTY-OTHER	C | TRWD LAKE/RESERVOIR SYSTEM	185	212	214	215	213	210
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	600	651	689	738	785	785
MANUFACTURING	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	3	3	3	3	3	3
MINING	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	73	79	85	91	97	103
MINING	D | SABINE OTHER LOCAL SUPPLY	5	4	8	12	15	19
LIVESTOCK	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	38	110	188	297	355	444
LIVESTOCK	D | TRINITY LIVESTOCK LOCAL SUPPLY	599	527	449	340	282	193
IRRIGATION	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	29	29	29	29	29	29
TRINITY BASIN TOTAL EXISTING SUPPLY		**3,247**	**4,431**	**4,423**	**4,423**	**4,401**	**4,335**

Water User Group (WUG) Existing Water Supply

REGION D	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
VAN ZANDT COUNTY TOTAL EXISTING SUPPLY		**17,403**	**20,726**	**21,052**	**21,411**	**21,527**	**21,652**
WOOD COUNTY							
CYPRESS BASIN							
SHARON WSC	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	159	159	159	159	159	159
WINNSBORO	D | CYPRESS SPRINGS LAKE/RESERVOIR	300	300	300	300	300	300
CYPRESS SPRINGS SUD	D | CYPRESS SPRINGS LAKE/RESERVOIR	72	72	71	69	66	62
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	795	799	808	801	810	806
MINING	D | QUEEN CITY AQUIFER | WOOD COUNTY	25	25	28	31	32	35
LIVESTOCK	D | CYPRESS LIVESTOCK LOCAL SUPPLY	165	165	165	165	165	165
LIVESTOCK	D | SABINE LIVESTOCK LOCAL SUPPLY	284	284	284	284	284	284
IRRIGATION	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	125	125	125	125	125	125
CYPRESS BASIN TOTAL EXISTING SUPPLY		**1,925**	**1,929**	**1,940**	**1,934**	**1,941**	**1,936**
SABINE BASIN							
HAWKINS	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	1,075	1,075	1,075	1,075	1,075	1,075
MINEOLA	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	941	941	941	941	941	941
PRITCHETT WSC	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	3	3	3	3	3	3
PRITCHETT WSC	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	5	5	5	5	5	5
QUITMAN	D | FORK LAKE/RESERVOIR	300	1,012	1,004	997	990	983
RAMEY WSC	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	602	602	602	602	602	602
SHARON WSC	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	512	512	512	512	512	512
WINNSBORO	D | CYPRESS SPRINGS LAKE/RESERVOIR	500	500	500	500	500	500
FOUKE WSC	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	978	978	978	978	978	978
GOLDEN WSC	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	376	373	370	367	365	363
HOLLY RANCH WATER COMPANY	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	575	575	575	575	575	575
JONES WSC	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	643	639	637	633	628	625
NEW HOPE SUD	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	366	366	366	366	366	366
ALBA	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	100	100	100	100	100	101
BRIGHT STAR-SALEM SUD	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	343	343	343	343	343	343
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	2	2	2	2	2	2
COUNTY-OTHER	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	3,616	3,658	3,652	3,658	3,649	3,653
MANUFACTURING	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	1,502	1,502	1,502	1,502	1,502	1,502
MINING	D | QUEEN CITY AQUIFER | WOOD COUNTY	284	288	289	290	292	293
LIVESTOCK	D | SABINE LIVESTOCK LOCAL SUPPLY	1,613	1,613	1,613	1,613	1,613	1,613
LIVESTOCK	D | SABINE RUN-OF-RIVER	30	30	30	30	30	30
IRRIGATION	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	22	22	22	22	22	22
IRRIGATION	D | QUEEN CITY AQUIFER | WOOD COUNTY	226	226	226	226	226	226
IRRIGATION	D | SABINE RUN-OF-RIVER	567	567	567	567	567	567
SABINE BASIN TOTAL EXISTING SUPPLY		**15,181**	**15,932**	**15,914**	**15,907**	**15,886**	**15,880**
WOOD COUNTY TOTAL EXISTING SUPPLY		**17,106**	**17,861**	**17,854**	**17,841**	**17,827**	**17,816**
	REGION D TOTAL EXISTING SUPPLY	**674,967**	**680,639**	**676,081**	**682,064**	**695,424**	**660,854**

Water User Group (WUG) Existing Water Supply

Source Water Balance (Availability- WUG Supply)

REGION D									
				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
GROUNDWATER	COUNTY	BASIN	SALINITY	2020	2030	2040	2050	2060	2070
BLOSSOM AQUIFER	BOWIE	RED	FRESH	21	21	21	21	21	21
BLOSSOM AQUIFER	BOWIE	SULPHUR	FRESH	180	180	180	180	180	180
BLOSSOM AQUIFER	LAMAR	RED	FRESH	323	323	323	323	323	323
BLOSSOM AQUIFER	LAMAR	SULPHUR	FRESH	71	71	71	71	71	71
BLOSSOM AQUIFER	RED RIVER	RED	FRESH	955	955	956	956	956	956
BLOSSOM AQUIFER	RED RIVER	SULPHUR	FRESH	0	44	371	371	371	371
CARRIZO-WILCOX AQUIFER	BOWIE	SULPHUR	FRESH	4,933	4,647	4,224	4,376	4,056	4,098
CARRIZO-WILCOX AQUIFER	CAMP	CYPRESS	FRESH	1,831	1,819	1,810	1,802	1,794	1,785
CARRIZO-WILCOX AQUIFER	CASS	CYPRESS	FRESH	472	431	390	361	361	330
CARRIZO-WILCOX AQUIFER	CASS	SULPHUR	FRESH	361	362	364	366	366	367
CARRIZO-WILCOX AQUIFER	FRANKLIN	CYPRESS	FRESH	6,853	6,862	6,871	6,882	6,894	6,894
CARRIZO-WILCOX AQUIFER	FRANKLIN	SULPHUR	FRESH	980	978	976	985	993	993
CARRIZO-WILCOX AQUIFER	GREGG	CYPRESS	FRESH	439	428	415	398	374	357
CARRIZO-WILCOX AQUIFER	GREGG	SABINE	FRESH	1,778	1,702	1,615	1,500	1,339	1,320
CARRIZO-WILCOX AQUIFER	HARRISON	CYPRESS	FRESH	1,211	1,042	884	750	549	420
CARRIZO-WILCOX AQUIFER	HARRISON	SABINE	FRESH	1,951	1,864	1,766	1,699	1,616	1,545
CARRIZO-WILCOX AQUIFER	HOPKINS	CYPRESS	FRESH	211	211	212	212	212	212
CARRIZO-WILCOX AQUIFER	HOPKINS	SABINE	FRESH	731	730	729	731	734	734
CARRIZO-WILCOX AQUIFER	HOPKINS	SULPHUR	FRESH	0	0	0	0	0	0
CARRIZO-WILCOX AQUIFER	MARION	CYPRESS	FRESH	104	97	91	85	77	69
CARRIZO-WILCOX AQUIFER	MORRIS	CYPRESS	FRESH	1,216	1,186	1,186	1,186	1,186	1,186
CARRIZO-WILCOX AQUIFER	MORRIS	SULPHUR	FRESH	23	0	0	0	0	0
CARRIZO-WILCOX AQUIFER	RAINS	SABINE	FRESH	953	857	854	856	822	822
CARRIZO-WILCOX AQUIFER	RED RIVER	SULPHUR	FRESH	0	0	0	0	0	0
CARRIZO-WILCOX AQUIFER	SMITH	SABINE	FRESH	2,484	1,973	1,450	888	952	982
CARRIZO-WILCOX AQUIFER	TITUS	CYPRESS	FRESH	1,921	1,061	501	57	0	0
CARRIZO-WILCOX AQUIFER	TITUS	SULPHUR	FRESH	1,178	1,119	1,074	1,028	981	959
CARRIZO-WILCOX AQUIFER	UPSHUR	CYPRESS	FRESH	388	348	326	308	283	257
CARRIZO-WILCOX AQUIFER	UPSHUR	SABINE	FRESH	0	0	0	0	0	0
CARRIZO-WILCOX AQUIFER	VAN ZANDT	NECHES	FRESH	1,493	1,380	1,293	1,185	1,066	1,055

Source Water Balance (Availability- WUG Supply)

REGION D									
				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
GROUNDWATER	COUNTY	BASIN	SALINITY	2020	2030	2040	2050	2060	2070
CARRIZO-WILCOX AQUIFER	VAN ZANDT	SABINE	FRESH	260	209	170	122	100	100
CARRIZO-WILCOX AQUIFER	VAN ZANDT	TRINITY	FRESH	771	642	520	356	238	143
CARRIZO-WILCOX AQUIFER	WOOD	CYPRESS	FRESH	1,740	1,738	1,738	1,738	1,738	1,738
CARRIZO-WILCOX AQUIFER	WOOD	SABINE	FRESH	6,900	6,768	6,722	6,648	6,626	6,626
NACATOCH AQUIFER	BOWIE	RED	FRESH	1,548	1,525	1,541	1,625	1,698	1,724
NACATOCH AQUIFER	BOWIE	SULPHUR	FRESH	1,942	1,942	1,942	1,942	1,942	1,942
NACATOCH AQUIFER	DELTA	SULPHUR	FRESH	311	297	286	281	281	343
NACATOCH AQUIFER	FRANKLIN	SULPHUR	FRESH	30	30	30	30	30	30
NACATOCH AQUIFER	HOPKINS	SABINE	FRESH	171	171	171	171	171	171
NACATOCH AQUIFER	HOPKINS	SULPHUR	FRESH	0	0	0	0	0	0
NACATOCH AQUIFER	HUNT	SABINE	FRESH	2,604	2,604	2,596	2,572	2,538	2,533
NACATOCH AQUIFER	HUNT	SULPHUR	FRESH	26	26	26	26	26	26
NACATOCH AQUIFER	LAMAR	SULPHUR	FRESH	110	110	110	110	110	110
NACATOCH AQUIFER	RAINS	SABINE	FRESH	1	1	1	1	1	1
NACATOCH AQUIFER	RED RIVER	RED	FRESH	50	50	50	50	50	50
NACATOCH AQUIFER	RED RIVER	SULPHUR	FRESH	420	421	422	422	422	422
QUEEN CITY AQUIFER	CAMP	CYPRESS	FRESH	3,406	3,406	3,406	3,406	3,406	3,406
QUEEN CITY AQUIFER	CASS	CYPRESS	FRESH	34,450	34,400	34,350	34,287	34,278	34,234
QUEEN CITY AQUIFER	CASS	SULPHUR	FRESH	2,648	2,635	2,622	2,610	2,597	2,584
QUEEN CITY AQUIFER	GREGG	CYPRESS	FRESH	1,359	1,359	1,359	1,359	1,359	1,359
QUEEN CITY AQUIFER	GREGG	SABINE	FRESH	6,214	6,214	6,214	6,214	6,214	6,214
QUEEN CITY AQUIFER	HARRISON	CYPRESS	FRESH	7,857	7,864	7,864	7,864	7,864	7,864
QUEEN CITY AQUIFER	HARRISON	SABINE	FRESH	2,483	2,483	2,483	2,483	2,483	2,483
QUEEN CITY AQUIFER	MARION	CYPRESS	FRESH	15,268	15,268	15,268	15,268	15,268	15,268
QUEEN CITY AQUIFER	MORRIS	CYPRESS	FRESH	5,154	5,154	5,154	5,039	5,039	5,039
QUEEN CITY AQUIFER	SMITH	SABINE	FRESH	24,615	24,596	24,577	24,557	24,535	24,510
QUEEN CITY AQUIFER	TITUS	CYPRESS	FRESH	138	138	138	138	138	138
QUEEN CITY AQUIFER	UPSHUR	CYPRESS	FRESH	18,324	18,324	18,324	18,143	18,143	18,143
QUEEN CITY AQUIFER	UPSHUR	SABINE	FRESH	7,246	7,246	7,246	7,246	7,246	7,246
QUEEN CITY AQUIFER	VAN ZANDT	NECHES	FRESH	3,647	3,647	3,647	3,647	3,647	3,647
QUEEN CITY AQUIFER	WOOD	CYPRESS	FRESH	1,009	1,009	1,009	1,009	1,009	1,009
QUEEN CITY AQUIFER	WOOD	SABINE	FRESH	8,568	8,564	8,560	8,556	8,553	8,549
SPARTA AQUIFER	SMITH	SABINE	FRESH	0	0	0	0	0	0
SPARTA AQUIFER	UPSHUR	SABINE	FRESH	0	0	0	0	0	0
SPARTA AQUIFER	WOOD	SABINE	FRESH	0	0	0	0	0	0
TRINITY AQUIFER	DELTA	SULPHUR	FRESH	0	93	110	121	127	145
TRINITY AQUIFER	HUNT	SABINE	FRESH	0	0	0	0	0	0
TRINITY AQUIFER	HUNT	SULPHUR	FRESH	0	0	0	0	0	0
TRINITY AQUIFER	HUNT	TRINITY	FRESH	547	547	547	547	548	548
TRINITY AQUIFER	LAMAR	RED	FRESH	464	461	545	546	653	676

Source Water Balance (Availability- WUG Supply)

REGION D

GROUNDWATER	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
TRINITY AQUIFER	LAMAR	SULPHUR	FRESH	0	0	0	0	0	0
TRINITY AQUIFER	RED RIVER	RED	FRESH	240	240	240	240	240	240
TRINITY AQUIFER	RED RIVER	SULPHUR	FRESH	207	207	207	207	207	207
WOODBINE AQUIFER	HUNT	SABINE	FRESH	1,342	1,342	1,342	1,342	1,342	1,342
WOODBINE AQUIFER	HUNT	SULPHUR	FRESH	192	194	194	194	194	194
WOODBINE AQUIFER	HUNT	TRINITY	FRESH	0	5	10	20	24	24
WOODBINE AQUIFER	LAMAR	RED	FRESH	0	0	0	0	0	0
WOODBINE AQUIFER	LAMAR	SULPHUR	FRESH	167	246	222	284	240	287
WOODBINE AQUIFER	RED RIVER	RED	FRESH	0	0	0	0	0	0
WOODBINE AQUIFER	RED RIVER	SULPHUR	FRESH	4	4	4	4	4	4
GROUNDWATER TOTAL SOURCE WATER BALANCE				**195,494**	**192,871**	**190,920**	**189,002**	**187,906**	**187,626**

REGION D

REUSE	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
DIRECT REUSE	GREGG	SABINE	FRESH	0	0	0	0	0	0
DIRECT REUSE	MORRIS	CYPRESS	FRESH	0	0	0	0	0	0
DIRECT REUSE | KIMBERLY CLARK CORPORATION-PARIS PLANT	LAMAR	RED	FRESH	0	0	0	0	0	0
DIRECT REUSE | PILGRIM PRIDE INDUSTRIES INC-MT PLEASANT	TITUS	CYPRESS	FRESH	0	0	0	0	0	0
INDIRECT REUSE | UTRWD/LAKE JIM CHAPMAN	HOPKINS	SULPHUR	FRESH	1,302	1,294	1,590	1,686	1,723	3,310
REUSE TOTAL SOURCE WATER BALANCE				**1,302**	**1,294**	**1,590**	**1,686**	**1,723**	**3,310**

REGION D

SURFACE WATER	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
BIG CREEK LAKE/RESERVOIR	RESERVOIR	SULPHUR	FRESH	63	58	53	47	40	36
BIG SANDY CREEK LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	0	0	0	0	0	0
BOB SANDLIN LAKE/RESERVOIR	RESERVOIR	CYPRESS	FRESH	41,944	42,036	42,096	42,046	40,895	40,065
BRANDY BRANCH LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	19,891	19,891	19,891	19,891	19,891	19,891
CADDO LAKE/RESERVOIR	RESERVOIR	CYPRESS	FRESH	10,000	10,000	10,000	10,000	10,000	10,000
CANEY CREEK LAKE/RESERVOIR	RESERVOIR	SULPHUR	FRESH	1,010	1,010	1,010	1,010	1,010	1,010
CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	RESERVOIR	SULPHUR	FRESH	3,118	3,016	4,285	4,307	4,350	7,122
CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	RESERVOIR	SULPHUR	FRESH	5,343	5,730	6,223	6,708	7,153	7,436
CROOK LAKE/RESERVOIR	RESERVOIR	RED	FRESH	5,274	5,274	5,274	5,274	5,274	5,274

Source Water Balance (Availability- WUG Supply)

REGION D									
				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
SURFACE WATER	COUNTY	BASIN	SALINITY	2020	2030	2040	2050	2060	2070
CYPRESS LIVESTOCK LOCAL SUPPLY	CAMP	CYPRESS	FRESH	53	53	90	155	217	243
CYPRESS LIVESTOCK LOCAL SUPPLY	CASS	CYPRESS	FRESH	0	0	0	0	0	0
CYPRESS LIVESTOCK LOCAL SUPPLY	FRANKLIN	CYPRESS	FRESH	0	0	0	0	0	0
CYPRESS LIVESTOCK LOCAL SUPPLY	HARRISON	CYPRESS	FRESH	0	0	0	0	21	55
CYPRESS LIVESTOCK LOCAL SUPPLY	HOPKINS	CYPRESS	FRESH	0	0	0	0	0	0
CYPRESS LIVESTOCK LOCAL SUPPLY	MORRIS	CYPRESS	FRESH	0	0	0	0	0	0
CYPRESS LIVESTOCK LOCAL SUPPLY	UPSHUR	CYPRESS	FRESH	0	0	0	0	0	0
CYPRESS LIVESTOCK LOCAL SUPPLY	WOOD	CYPRESS	FRESH	106	106	106	106	106	106
CYPRESS RUN-OF-RIVER	CAMP	CYPRESS	FRESH	1	1	1	1	1	1
CYPRESS RUN-OF-RIVER	HARRISON	CYPRESS	FRESH	10	10	10	10	10	10
CYPRESS RUN-OF-RIVER	MARION	CYPRESS	FRESH	0	0	0	0	0	0
CYPRESS RUN-OF-RIVER | WATER RIGHT 4567 4568 4569 4570 4572	TITUS	CYPRESS	FRESH	0	0	0	0	0	0
CYPRESS RUN-OF-RIVER | WATER RIGHT 4577 4579	MORRIS	CYPRESS	FRESH	70	70	70	70	70	70
CYPRESS RUN-OF-RIVER | WATER RIGHT 4584 4585 4604	UPSHUR	CYPRESS	FRESH	0	0	0	0	0	0
CYPRESS RUN-OF-RIVER | WATER RIGHT 4587 4597 4598 4599	CASS	CYPRESS	FRESH	160	160	160	160	160	160
CYPRESS RUN-OF-RIVER | WATER RIGHT 4608 5608	GREGG	CYPRESS	FRESH	0	0	0	0	0	0
CYPRESS SPRINGS LAKE/RESERVOIR	RESERVOIR	CYPRESS	FRESH	3,726	3,566	3,484	3,484	3,484	3,484
EDGEWOOD CITY LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	0	0	0	0	0	0
ELLIOT CREEK LAKE/RESERVOIR	RESERVOIR	SULPHUR	FRESH	1,910	1,910	1,910	1,910	1,910	1,910
ELLISON CREEK LAKE/RESERVOIR	RESERVOIR	CYPRESS	FRESH	6,806	6,806	6,806	6,806	6,806	6,806
FORK LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	71,324	75,907	69,771	64,025	59,618	54,621
GILMER LAKE/RESERVOIR	RESERVOIR	CYPRESS	FRESH	6,180	6,180	6,180	6,180	6,180	6,180
GLADEWATER LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	3,032	2,512	1,982	1,132	132	132
GRAYS CREEK RUN-OF-RIVER | WATER RIGHT 4254	HARRISON	CYPRESS	FRESH	0	0	0	0	0	0
GREENVILLE CITY LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	0	0	0	0	0	0
JOHNSON CREEK LAKE/RESERVOIR	RESERVOIR	CYPRESS	FRESH	2,000	2,000	2,000	2,000	2,000	2,000
LANGFORD LAKE/RESERVOIR	RESERVOIR	SULPHUR	FRESH	0	0	0	0	0	0
LOMA LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	1,000	1,000	1,000	1,000	1,000	1,000
MILL CREEK LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	0	0	0	0	0	0

Source Water Balance (Availability- WUG Supply)

REGION D									
				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
SURFACE WATER	COUNTY	BASIN	SALINITY	2020	2030	2040	2050	2060	2070
MONTICELLO LAKE/RESERVOIR	RESERVOIR	CYPRESS	FRESH	0	0	0	0	0	0
NECHES LIVESTOCK LOCAL SUPPLY	VAN ZANDT	NECHES	FRESH	28	28	28	28	28	28
O' THE PINES LAKE/RESERVOIR	RESERVOIR	CYPRESS	FRESH	47,060	46,147	45,265	44,300	43,232	42,345
PAT MAYSE LAKE/RESERVOIR	RESERVOIR	RED	FRESH	8,182	8,180	8,181	8,181	8,180	8,209
RED LIVESTOCK LOCAL SUPPLY	BOWIE	RED	FRESH	0	0	0	0	0	0
RED LIVESTOCK LOCAL SUPPLY	LAMAR	RED	FRESH	0	0	0	0	0	0
RED LIVESTOCK LOCAL SUPPLY	RED RIVER	RED	FRESH	0	0	0	0	0	0
RED RUN-OF-RIVER	BOWIE	RED	FRESH	1,920	1,920	1,920	1,920	1,920	1,920
RED RUN-OF-RIVER	LAMAR	RED	FRESH	0	0	0	0	0	0
RED RUN-OF-RIVER	RED RIVER	RED	FRESH	0	0	0	0	0	0
SABINE LIVESTOCK LOCAL SUPPLY	FRANKLIN	SABINE	FRESH	0	0	0	0	0	0
SABINE LIVESTOCK LOCAL SUPPLY	HOPKINS	SABINE	FRESH	0	0	0	0	0	0
SABINE LIVESTOCK LOCAL SUPPLY	HUNT	SABINE	FRESH	0	0	0	0	0	0
SABINE LIVESTOCK LOCAL SUPPLY	RAINS	SABINE	FRESH	169	169	169	169	169	169
SABINE LIVESTOCK LOCAL SUPPLY	UPSHUR	SABINE	FRESH	59	59	59	59	59	59
SABINE LIVESTOCK LOCAL SUPPLY	VAN ZANDT	SABINE	FRESH	0	0	0	0	0	0
SABINE LIVESTOCK LOCAL SUPPLY	WOOD	SABINE	FRESH	0	0	0	0	0	0
SABINE OTHER LOCAL SUPPLY	GREGG	SABINE	FRESH	2,050	2,050	2,050	2,050	2,050	2,050
SABINE OTHER LOCAL SUPPLY	VAN ZANDT	SABINE	FRESH	0	0	0	0	0	0
SABINE RUN-OF-RIVER	GREGG	SABINE	FRESH	0	0	0	0	0	0
SABINE RUN-OF-RIVER	HARRISON	SABINE	FRESH	0	0	0	0	0	0
SABINE RUN-OF-RIVER	HUNT	SABINE	FRESH	0	0	0	0	0	0
SABINE RUN-OF-RIVER	SMITH	SABINE	FRESH	644	644	644	644	644	644
SABINE RUN-OF-RIVER	WOOD	SABINE	FRESH	0	0	0	0	0	0
SABINE RUN-OF-RIVER | WATER RIGHT 3899 3969 4763	UPSHUR	SABINE	FRESH	0	0	0	0	0	0
SABINE RUN-OF-RIVER | WATER RIGHT 4671 4673 4675 4676 4679 4682 4684 4688 4689	VAN ZANDT	SABINE	FRESH	170	170	170	170	170	170
SABINE RUN-OF-RIVER | WATER RIGHT 4681 4700	RAINS	SABINE	FRESH	0	0	0	0	0	0
SABINE RUN-OF-RIVER | WATER RIGHT 4699 4702 4703 5217	HOPKINS	SABINE	FRESH	0	0	0	0	0	0
SULPHUR LIVESTOCK LOCAL SUPPLY	BOWIE	SULPHUR	FRESH	576	576	514	406	300	258
SULPHUR LIVESTOCK LOCAL SUPPLY	CASS	SULPHUR	FRESH	0	0	0	0	0	0

Source Water Balance (Availability- WUG Supply)

REGION D									
				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
SURFACE WATER	COUNTY	BASIN	SALINITY	2020	2030	2040	2050	2060	2070
SULPHUR LIVESTOCK LOCAL SUPPLY	DELTA	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR LIVESTOCK LOCAL SUPPLY	FRANKLIN	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR LIVESTOCK LOCAL SUPPLY	HOPKINS	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR LIVESTOCK LOCAL SUPPLY	HUNT	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR LIVESTOCK LOCAL SUPPLY	LAMAR	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR LIVESTOCK LOCAL SUPPLY	MORRIS	SULPHUR	FRESH	66	61	61	61	66	66
SULPHUR LIVESTOCK LOCAL SUPPLY	RED RIVER	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR LIVESTOCK LOCAL SUPPLY	TITUS	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR OTHER LOCAL SUPPLY	DELTA	SULPHUR	FRESH	25	26	26	26	26	26
SULPHUR RUN-OF-RIVER	DELTA	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR RUN-OF-RIVER	RED RIVER	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR RUN-OF-RIVER | WATER RIGHT 4795 4796	HUNT	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR RUN-OF-RIVER | WATER RIGHT 4803 4816 4817 4818 5392	FRANKLIN	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR RUN-OF-RIVER | WATER RIGHT 4805 4820 4821 4822 4823 4824 4825 4826 5285 5510 5562	TITUS	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR RUN-OF-RIVER | WATER RIGHT 4812 4813 4814 5150	HOPKINS	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR RUN-OF-RIVER | WATER RIGHT 4829 4830 4831 4832 4833 4834 4835 4837	BOWIE	SULPHUR	FRESH	41	41	41	41	41	41
SULPHUR RUN-OF-RIVER | WATER RIGHT 5200	LAMAR	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR SPRINGS LAKE/RESERVOIR	RESERVOIR	SULPHUR	FRESH	2,091	2,149	2,201	2,188	2,190	2,227
TANKERSLEY LAKE/RESERVOIR	RESERVOIR	CYPRESS	FRESH	0	0	0	0	0	0
TAWAKONI LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	16,387	36,751	41,753	44,076	49,912	54,631
TRINITY LIVESTOCK LOCAL SUPPLY	HUNT	TRINITY	FRESH	0	0	0	0	0	0
TRINITY LIVESTOCK LOCAL SUPPLY	VAN ZANDT	TRINITY	FRESH	0	0	0	0	0	0
TURKEY CREEK LAKE/RESERVOIR	RESERVOIR	SULPHUR	FRESH	0	0	0	0	0	0
WELSH LAKE/RESERVOIR	RESERVOIR	CYPRESS	FRESH	0	0	0	0	0	0
WRIGHT PATMAN LAKE/RESERVOIR	RESERVOIR	SULPHUR	FRESH	172,956	142,807	111,000	79,008	45,010	34,000
SURFACE WATER TOTAL SOURCE WATER BALANCE				**435,445**	**429,074**	**396,484**	**359,649**	**324,325**	**314,455**
REGION D TOTAL SOURCE WATER BALANCE				**632,241**	**623,239**	**588,994**	**550,337**	**513,954**	**505,391**

Source Water Balance (Availability- WUG Supply)

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System Name	Address	City	State	Zip Code	County	Phone Number	Fax	Salutation	First Name	Last Name	Title	Date Survey Mailed	Response	Follow up Call #1	Follow up Call #2
City of Alba	PO Box 197	Alba	TX	75410	Rains	903-765-2396	903-765-9043	Mr	Orvin	Carroll	Mayor				
City of Atlanta	315 N. Buckner	Altlanta	TX	75551	Cass	903-796-2192	903-799-4072	Mr	David	Cockrell	City Manager				
City of Big Sandy	P.O. Box 986	Big Sandy	TX	75755	Upshur	903-636-4343	903-636-4413	Mr	Wayne	Weese	Mayor				
City of Blossom	P.O. Box 291	Blossom	TX	75416	Lamar	903-982-5900	903-982-6599	Mr		Johnson				6/13/13: Spoke with Mr. Johnson, sent fax.	6/25/13: Spoke w/ Mr. Johnson, no automatic contract renewal, both sides envision renewal hence sufficient to set supply = demand.
City of Bogata	P.O. Box 400	Bogata	TX	75417	Red River	903-632-5315	903-632-4631	Mr	Vincent	Lum	Mayor			9/12/13: Spoke to Reese Hayter, 2 wells each 250 gpm, constructing 3rd well.	
City of Caddo Mills	2313 Main St.	Caddo Mills	TX	75135	Hunt	903-527-3116	903-527-4582	Mr	Mike	Jump	GM				
City of Campbell	P.O. Box 27	Campbell	TX	75422	Hunt	903-862-3191	903-862-2149	Mr	Carter	Ketchem	Mayor				
City of Canton	290 E. Tyler	Canton	TX	75103	Van Zandt	903-567-2826	903-567-1753	Mr	Lonny	Luck	City Manager			Initial discussion on 6/10/2013, will have plant manager call.	
City of Canton	290 E. Tyler	Canton	TX	75103	Van Zandt	903-567-2826	903-567-1753	Mr	Al	Campbell	Water Department			7/24/13: Call w/ Mr. Campbell, have added new well, pop./demands appear fine. Mr. Campbell will send email as documentation.	
City of Celeste	P.O. Box 399	Celeste	TX	75423	Hunt	903-568-4512	903-568-4448	Mr	Larry	Godwin	Mayor				
City of Clarksville	800 W. Main	Clarksville	TX	75426	Red River	903-427-3834	903-427-3907	Mr.	Wayne	Dial	City Manager			6/25/13: Mr. Dial indicated that sedimentation is a significant present issue in the reservoir. Presently covering up intake.	9/16/13: Telephone call & Email w/ Dan Broyles, MTG Eng
City of Clarksville City	P.O. Box 1111	Clarksville City	TX	75693	Gregg	903-845-2681	903-845-2411	Mr	Larry	Allen	Mayor				
City of Commerce	1119 Alamo	Commerce	TX	75428	Hunt	903-886-1100	903-886-8929	Mr	Bryan	Creed				1/16/2014 email sent	
City of Como	P.O. Box 208	Como	TX	75431	Hopkins	903-488-3434	903-488-0048	Ms	Sue	Jones	Secretary			6/11/2013 Spoke w/ Ms. Jones, suggested speak with KSA.	9/24/13: Left msg. Sue Jones indicated no change.
City of Cooper	91 North Side Square	Cooper	TX	75432	Delta	903-395-2217	903-395-0377	Mr	Thomas	Stegall	Mayor			6/17/13: Spoke with Emily, provided clarification.	6/21/13: Received letter from Hayter Engineering
City of Cumby	P.O. Box 349	Cumby	TX	75433	Hopkins	903-994-2272	903-994-2650	Mr	Roger	Petty				6/11/2013 Call. Sent email.	
City of Daingerfield	108 Coffey St.	Daingerfield	TX	75638	Morris	903-645-3906	903-645-5488	Mr	Lou	Irvin	Mayor				
City of De Kalb	110 E. Grizzly Drive	Dekalb	TX	75559	Bowie	903-667-2410	903-667-2689	Mr	Matt	McAdoo	Head of Public Works			6/18/13: Spoke w/ Mr. McAdoo, sent email.	7/17/13: Resent at request of Riverbend WRD.
City of Deport	P.O. Box A 354	Deport	TX	75435	Lamar / Red River			Mr.	Mike	Francies	Mayor				
City of Detroit	190 East Garner	Detroit	TX	75436	Red River	903-674-4573	903-674-6029	Mr	Richard	Shipp	Director of Public Works			9/11/2013 phone call: Due to WQ concerns, TCEQ denied Detroit the capability to use their well for municipal water consumption; it is only allowed to be used (and is currently in operation for) the supply of water for the fire station. This is why there was a GW supply in the previous round, but not in the present round.	
City of East Mountain	103 Municipal Drive	Gilmer	TX	75645	Upshur	903-297-6041	903-297-4346	Mr	Ronnie	Hilliard	Mayor				
City of Easton	P.O. Box 7	Easton	TX	75641	Gregg	903-643-7819	903-643-2219	Mr	Walter Dale	Ward	Mayor				
City of East Tawakoni	288 Briggs Blvd.	East Tawakoni	TX	75472	Rains	903-447-2444	903-447-5080	Mrs.	Tammy	Dowdy				6/11/13: Spoke w/ Ms. Dowdy, sent email.	
City of Edgewood	P.O. Box 377	Edgewood	TX	75117	Van Zandt	903-896-4448	903-896-7033	Mr	Armando	Gomez	Water Operator			6/12/13: Spoke w/ Mr. Gonzales.	
City of Emory	P.O. Box 100	Emory	TX	75440	Rains	903-473-2465	903-473-2110	Mr	Mike	Dunn				Spoke with Mike Dunn (903-473-2465x111) re: 2010-2011 water use surveys	
City of Gilmer	P.O. Box 760	Gilmer	TX	75644	Upshur	903-843-2552	903-843-3508	Mr	R.D.	Cross	Mayor				
City of Gladewater	P.O. Box 1725	Gladewater	TX	75647	Gregg	903-845-2196	903-845-6891	Mr	Walter	Derrick	Mayor				
City of Grand Saline	132 E. Frank St.	Grand Saline	TX	75140	Van Zandt	903-962-3122	903-962-3363	Mr	Gene	Putnam	Public Works Director			6/12/13: Left msg for Mr. Putman	7/10/13: Received email from City filling out supply survey.

System Name	Address	City	State	Zip Code	County	Phone Number	Fax	Salutation	First Name	Last Name	Title	Date Survey Mailed	Response	Follow up Call #1	Follow up Call #2
City of Greenville	P.O. Box 1049	Greenville	TX	75401	Hunt	903-457-3116	903-457-0506	Mr	James	Belcher	Water Treatment Plant Superintendent			6/12/13: Spoke w/ Mr. Belcher, sent email.	12/17/13: Spoke w/ Mr Belcher, got approximate physical production capabilaties (Michael Pinckney)
City of Hallsville	P.O. Box 899	Hallsville	TX	75650	Harrison	903-668-2313	903-668-3959	Mr	Jerri	Medrano	Mayor				
City of Hawkins	P.O. Box 329	Hawkins	TX	75765	Wood	903-769-2224	903-769-2781	Mr	Sam	Bradley	Mayor				
City of Hideaway	101-B Hideaway Lane Central	Hideaway	TX	75771	Smith	903-882-3889		Mr	Duane	Spaeth	Mayor				
City of Hooks	P.O. Box 37	Hooks	TX	75561	Bowie	903-547-2261	903-547-1107	Mr	Don	Buchanan	Water Department			6/13/13: Spoke with Mr. Buchanan, sent email.	7/25/13: Received email confirming no changes necessary to projections.
City of Hughes Springs	P.O. Box 805	Hughes Springs	TX	75656	Cass	903-639-7519	903-639-3769	Ms	Reba	Simpson	Mayor				
City of Jefferson	102 N. Polk	Jefferson	TX	75657	Marion	903-665-3922	903-665-1002	Mr	Jeff	Fratangelo	Mayor				
City of Josephine	P.O. Box 99	Josephine	TX	75164	Hunt	972-843-8282	972-843-8377	Mr	Mike	Holmes	Mayor				
City of Kilgore	815 N. Kilgove St.	Kilgore	TX	75662	Gregg	903-984-5081 x112	903-988-4131	Mr	Ronnie	Spradlin	Mayor				
City of Lakeport	207 Milam Road	Longview	TX	75603	Gregg	903-643-2562	903-643-9187	Mr	Johnny	Sammons	Mayor				
City of Lindale	P.O. Box 130	Lindale	TX	75771	Smith	903-882-3422	903-882-1054	Mr	Jim	Mallory	Mayor				
City of Linden	P.O. Box 419	Linden	TX	75563	Cass	903-756-7502	903-756-7980	Mr	Clarence	Burns	Mayor				
City of Lone Oak	P.O. Box 127	Lone Oak	TX	75453	Hunt	903-662-5116	903-662-5334	Mr	Neil	Dent	Mayor				
City of Lone Star	P.O. Box 0218	Lone Star	TX	75668	Morris	903-656-2311	903-656-3355	Mr	C.E.	Nichols	Mayor				
City of Longview	P.O. Box 1952	Longview	TX	75606	Gregg	903-237-1080	903-237-1092	Mr.	Jay	Dean	Mayor				
City of Marshall	P.O. Box 698	Marshall	TX	75670	Harrison	903-935-4421	903-938-3531	Mr.	Ed	Smith	Mayor				
City of Maud	P.O. Box 100	Maud	TX	75567	Bowie	903-585-2294	903-585-2752		Brandy	Gibson	City Clerk			6/13/13: Spoke w/ Ms. Gibson, will pass info to appropriate staff, sent email.	
City of Mineola	P.O. Box 179	Mineola	TX	75773	Wood	903-569-6183	903-569-6551	Mr	E.F.	Whitus	Mayor				
City of Mount Pleasant	501 N. Madison	Mount Pleasant	TX	75455	Titus	903-575-4000	903-577-1828	Mr	John	Hall				6/28/13: Spoke w/ Mr. Hall; he indicated projections looked appropriate; He will send an email for documentation, and will later look into the supply amounts when needed.	12/17/13: Spoke w/ Mr. Hall; indicated supply is 17 MGD Raw, 17 MGD Treatment and 17 MGD pumping of treated. All connected WUGs on same pressure plane, ie WUG strorage served by Mount Pleasant Pumps. 3500 gpm emergency supply from second lake, name not recalled. (Michael Pinckney)
City of Mount Vernon	P.O. Drawer 591	Mount Vernon	TX	75457	Franklin	903-537-2252	903-537-2634	Ms	Margaret	Sears	Mayor				
City of Naples	P.O. Box 340	Naples	TX	75568	Morris	903-897-2271	903-897-2913	Mr	Danny	Mills	Mayor				
City of Nash	P.O. Box 520	Nash	TX	75569	Morris	903-838-0751	903-831-3411	Mr	Darrin	Lafayette	Director of Public Works			6/17/13: Spoke w/ Mr. Lafayette, sent email.	7/17/13: Resent at request of Riverbend WRD.
City of New Boston	P.O. Box 5	New Boston	TX	75570	Bowie	903-628-5596	903-628-6034	Mr	Mark	Mayo	Mayor			6/14/13: Left msg. for Mr. Mayo 7/17/13: Resent at request of Riverbend WRD.	2/28/14: Spoke with Mark Mayo; provided present supply info.
City of Omaha	305 White Oak Ave. P.O. Box 937	Omaha	TX	75571	Morris	903-884-2746	903-884-2746	Ms	Janet	Blackburn	Mayor				
City of Ore City	P.O. Box 327	Ore City	TX	75683	Upshur	903-968-2511	903-968-6996	Mr	Glenn	Breazeale	Mayor				
City of Overton	P.O. Drawer D	Overton	TX	75684	Smith	903-834-3171	903-834-3174	Mr	John	Welch	Mayor				
City of Paris	P.O. Box 9037	Paris	TX	75461	Lamar	903-785-8519	903-785-8519		Doug	Harris	Manager			4/2/13: Spoke w/ Mr. Harris, sent email.	6/17/13: Spoke w/ Rodney Brashier (Env. Services Supervisor), he identified issues with the 2011 use. Is going to send revised Table and supporting documentation.
City of Pittsburg	200 Rusk St.	Pittsburg	TX	75686	Camp	903-856-0544	903-856-0544	Mr	Shawn	Kennington	Mayor				
City of Point	365 Locust	Point	TX	75472	Rains	903-598-3296 x5	903-598-3371	Mr	Steve	Bursey	Director of Public Works				
City of Queen City	P.O. Box 301	Queen City	TX	75572	Cass	903-796-7986	903-796-0213	Mr	Harold	Martin	Mayor				
City of Quinlan	P.O. Box 2740	Quinlan	TX	75474	Hunt	903-356-3306	903-356-4267	Mr	Rick	Morgan	Director of Public Works			6/14/13: Spoke w/ Mr. Morgan, sent email.	
City of Quitman	401 E. Goode	Quitman	TX	75783	Wood	903-763-2223	903-763-5631	Mr	Jerry	Edwards	Mayor				
City of Red Lick	3193 Old Redlick Road	Texarkana	TX	75503	Bowie	903-831-3691	903-831-3691	Ms	Sandra	Hartline				6/18/13: Spoke w/ Sandra, sent email to her and mayor.	
City of Redwater	P.O. Box 209	Redwater	TX	75573	Bowie	903-671-2775	903-671-2625	Mr	Robert	Lorance	Mayor				

System Name	Address	City	State	Zip Code	County	Phone Number	Fax	Salutation	First Name	Last Name	Title	Date Survey Mailed	Response	Follow up Call #1	Follow up Call #2
City of Reno	160 Blackburn St	Reno	TX	75462	Lamar	903-785-6581	903-785-0453		Cara	Hubbard				6/14/13: Left msg.	
City of Roxton	P.O. Box 176	Roxton	TX	75477	Lamar	903-346-3535	903-346-3759	Mr	Craig	Hantanbille	Director of Public Works			6/24/13: Spoke w/ Mr. Hatanbille, sent email.	
City of Royse City	P.O. Box 638	Royse City	TX	75189	Hunt	972-636-2250	972-635-2434	Mr	Jerrell	Baley	Mayor				
City of Sulphur Springs	125 S. Davis	Sulphur Springs	TX	75482	Hopkins	903-885-7541	903-439-2092	Mr	Mark	Maxwell	City Manager			6/14/13: Left msg. w/ Mr. Maxwell	12/17/13: email sent to Mr. Maxwell Email reply 12/20/2013 from Russle Ham via Robert Lee
City of Talco	P.O. Box 365	Talco	TX	75487	Titus	903-379-3731	903-379-3311		Jackie	Moore				6/14/13: Spoke w/ Ms. Moore, sent email.	
City of Texarkana	P.O. Box 1967	Texarkana	TX	75504	Bowie	903-798-3900	903-798-3448		Pam	White	Admin Coordinator			6/14/13: Spoke w/ Ms. White, sent email.	
City of Tyler	P.O. Box 2039	Tyler	TX	75702	Smith	903-531-1250	903-531-1166	Ms	Barbara	Bass	Mayor				
City of Van	189 S. Maple	Van	TX	75790	Van Zandt	903-963-7216	903-963-5643	Mr	John	Beall	Director of Public Works			6/18/13: Left msg. for Mr. Beall.	6/24/13: Left msg. for Mr. Beall.
City of Wake Village	P.O. Box 3776	Wake Village	TX	75501	Bowie	903-838-0515	903-831-4327	Mr		Burke				6/17/13: Spoke w/ Mr. Burke, received fax, sent email.	7/8/13: Follow up email on supply, and phone call: Mr. Burke said the contract has no maximum, limited only by infrastructure, which is a 10" line from TWU. He said TWU will know how much they can push through the 10" line.
City of Waskom	P.O. Box 730	Waskom	TX	75692	Harrison	903-687-3374	903-687-2574		Jesse	Moore	Mayor				
City of West Tawakoni	1533 E. Hwy 276	West Tawakoni	TX	75474	Hunt	903-447-2285	903-447-4935	Mr	Lamont	Jenkins				6/18/13: Spoke w/ Mr. Jenkins, sent email.	
City of White Oak	906 S. White Oak Road	White Oak	TX	75693	Gregg	903-759-3936	903-297-3452	Mr	Rick	May	Mayor				
City of Wills Point	P.O. Box 505	Wills Point	TX	75169	Van Zandt	903-873-2578	903-873-5512	Mr.	Scott	Drake	Director of Public Works			6/18/13: Spoke w/ Mr. Drake, sent email.	
City of Winfield	P.O. Box 98	Winfield	TX	75493	Titus	903-524-2020	903-524-2098	Mr	James	Moran	Director of Public Works			6/24/13: Spoke w/ Mr. Moran, sent email.	9/11/13: Left msg. w/ Mr. Moran.
City of Winnsboro	501 S. Main St	Winnsboro	TX	75494	Franklin	903-342-3654	903-342-5708	Ms	Carolyn	Jones	Mayor				
City of Winona	P.O. Box 97	Winona	TX	75792	Smith	903-877-3381	903-877-2370	Mr	Rusty	Smith	Mayor				
City of Wolfe City	P.O. Box 106	Wolfe City	TX	75496	Hunt	903-496-2251	903-496-2335	Mr	Jason	Shive				6/18/13: Left msg. with Diane, will forward to appropriate person.	
Brinker Water Supply Corporation	107 Jefferson St	Como	TX	75431	Hopkins	903-488-3835		Mr	Scott	Courson	General Manager			9/26/13: Obtained Mr. Courson's cell. Spoke w/ Mr. Courson, have two wells and a contract with the City of Sulphur Springs, will send info by end of week.	
Cross Roads Special Utility District	P.O. Box 1001	Kilgore	TX	75663	Gregg	903-984-8014		Mr	Fred	Mason	President				
Eastern Cass Water Supply Corporation	P.O. Box 26	Blivins	TX	75555	Cass	903-796-3901									
Fouke Water Supply Corporation	156 FM 1254	Mineola	TX	75773	Upshur	903-967-3304		Ms	Kristi	Hirsch	General Manager				
Golden Water Supply Corporation	P.O. BOX 148	GOLDEN	TX	75444	Rains	903-768-2861		MR.	Wendell	Baker	GM			6/12/13: spoke w/ Mr. Baker, sent email.	
Holly Ranch Water Company	FM 2869	Hawkins	TX	75765	Wood	903-769-2095									
Jones Water Supply Corporation	1650 N State Highway 37	Quitman	TX	75783	Hopkins	903-967-2840		Ms	Frances	Delk	Manager				
New Hope Special Utility District	413 County Rd 2651	Mineola	TX	75773	Wood	903-569-3820									
Ables Springs Water Supply Corporation	P.O. Box 1567	Terrell	TX	75160	Hunt	972-563-9704	972-563-7048								
Bethel-Ash Water Supply Corporation	801 North Palestine St	Athens	TX	75751	Trinity	903-675-8466									
Bi-County Water Supply Corporation	P.O. BOX 848	PITTSBURG	TX	75686	CAMP	903-856-5840	903-856-1385	MR.	HORTON	TAYLER	MANAGER				
Blackland Water Supply	P.O. Box 215	Fate	TX	75132	Hunt	972-771-6375	972-771-3276	MR.	Jim	Myers	President				

System Name	Address	City	State	Zip Code	County	Phone Number	Fax	Salutation	First Name	Last Name	Title	Date Survey Mailed	Response	Follow up Call #1	Follow up Call #2
Bright Star-Salem Special Utility District	P.O. Box 620	Alba	TX	75410	Rains	903-765-2701		Ms	Wanda	Gaby	General Manager			6/24/13: Spoke w/ Ms. Gaby, Call on 6/25/13 to discuss questions.	
Caddo Basin Special Utility District	156 CO. RD. 1118	GREENVILLE	TX	75401	HUNT	903-527-3504		MR.	LEAHMON	BRYANT	GENERAL MANAGER				
Cash Special Utility District	P.O. Box 8129	Greenville	TX	75404	Hopkins	903-883-2695		Mr	Clay	Hodges	GM			6/25/13: Spoke w/ Mr. Hodges, discussed what info was immediately needed, what info there's more time on.	12/17/13: Spoke with Mr. Hodges and received information about existing infrastructure
Central Bowie County Water Supply Corporation	2811 Hwy 82 West P.O. Box 306	New Boston	TX	75570	Bowie	903-628-5601	903-628-9258	Mr	Calvin	Pierce	President				
Combined Consumers Special Utility District	P.O. Box 2829	Quinlan	TX	75474	Hunt	903-356-3321	903-356-3322	Mr	Drew	Roberts				6/25/13: Spoke w/ Mr. Roberts, said the numbers looked appropriate and that it is safe to assume the contract will be renewed.	
Crystal Systems Inc	2519 S Main St.	Lindale	TX	75771	Smith	903-881-800									
Cypress Springs Special Utility District	P.O. Box 591	Mt. Vernon	TX	75457	Camp	903-588-2081	903-588-2092	MR.	RICHARD	ZACHARY	MANAGER				
Diana Special Utility District	P.O. Box 74	Diana	TX	75640	Harrison	903-663-4837									
Elderville Water Supply Corporation	1033 Gardiner Mitchell Pkwy	Longview	TX	75603	Gregg	903-643-2692									
Gill Water Supply Corporation	2323 FM 2625 W	Marshall	TX	75672	Harrison	903-938-5130									
Gum Springs Water Supply Corporation	801 Mount Pleasant Road	Hallsville	TX	75650	Harrison	903-660-3420									
Hickory Creek Specil Utility District	P.O. Box 540	Celeste	TX	75423	Hunt	903-568-4760	903-568-4867	Mr	Mike	Wemhoener	General Manager				
Jackson Water Supply Corporation	17764 County Road 26	Tyler	TX	75707	Smith	903-566-1320	903-566-1377	Ms	Patricia	Watkins	Office Manager				
Lamar County Water Supply	P.O. Box 188	Brookston	TX	75486	Lamar	903-785-5586	903-784-7148	MR.	ALTON	DOCKREY	MANAGER			Email sent 1/16/2014, call response from staff gave Reese Hayter	
Liberty City Water Supply Corporation	6144 Gateway Center, PMB 349	Kilgore	TX	75662	Gregg	903-984-9593		Mr	Max	Conlin	Manager				
Lindale Rural Water Supply Corporation	P.O. Box 756	Lindale	TX	75771	Smith	903-882-3335		Mr	Sam	Beeler	General Manager				
Macbee Special Utility District	P.O. Box 780	Wills Point	TX	75169	Hunt	903-873-2109	903-873-2748	Mr	John	Simmons	GM			6/13/13: Spoke w/ Mr. Simmons, sent email.	
Macedonia-Eylau Multiple Utility District #1	RT 11, BOX 228-C	TEXARKANA	TX	75501	BOWIE	903-832-1691	903-832-3159		Carrie	McCreery	Manager			6/13/13: Spoke with Ms. McCreery, sent email.	7/24/13: Email from Ms. McCreery, identified population error.
Martin Springs Water Supply Corporation	P.O. BOX 9	COMO	TX	75431	HOPKINS	903-488-3835	903-488-2121	MS.	JULIE	PERRY					
North Hopkins Water Supply Corporation	P.O. BOX 407	SULPHUR SPRINGS	TX	75482	FRANKLIN	903-945-2619	903-945-2019	MR.	BILLY	EMERSON	MANAGER			6/14/13: Spoke w/ Mr. Emerson, sent email.	
North Hunt Special Utility District	P.O. BOX 1170	COMMERCE	TX	75429	Delta	903-456-0269			Stacey	Nicholson	GM			6/14/13: Spoke w/ Ms. Nicholson, sent email.	
Pritchett Water Supply Corporation	3670 State Highway 155 S	Gilmer	TX	75645	Upshur	903-734-5438									
R P M Water Supply Corporation	200 VZ CR 4913	BEN WHEELER	TX	75754	VAN ZANDT	903-852-3115		Mr.	Elliot	Owen				6/14/13: Spoke w/ Elliot, sent email.	
Ramey Water Supply Corporation	P.O. Box 58	Mineola	TX	75773	Wood	903-569-6502									
Riverbend WRD	28 Morris Lane #118	Texarkana	TX	75503	Bowie	903-223-3905		Mr.	Scott	Albert					
Red River County Water Supply Corporation	1404 E. MAIN STREET	CLARKSVILLE	TX	75426	RED RIVER	903-427-2891		MR.	Wendell	Davis				6/14/13: Left msg for Mr. Davis.	
Sharon Water Supply Corporation	6175 N State Highway 37	Winnsboro	TX	75494	Upshur	903-342-3525									
Smith County Multiple Utility District	11928 Constantine	Tyler	TX	75708	Smith	903-877-3644									

System Name	Address	City	State	Zip Code	County	Phone Number	Fax	Salutation	First Name	Last Name	Title	Date Survey Mailed	Response	Follow up Call #1	Follow up Call #2
South Tawakoni Water Supply Corporation	P.O. BOX 485	WILLS POINT	TX	75169	VAN ZANDT	903-873-2509		Mr.	Richard	Phillips				6/17/13: Spoke w/ Mr. Phillips: Tawakoni was booked up, except for local entities were not using	7/8/13: Follow up call RE: 6/18/13 email: Use of 1461 meters is appropriate for 2011, but trend is currently downward from 2008 rather than upward as TWDB projects, however Mr. Phillips understands the estimate is conservative and doesn't suggest revision at this time.
Southern Utilities Company	218 N Broadway Ave	Tyler	TX	75702	Smith	903-593-2588									
Tri Special Utiliity District	300 W 16TH STREET	MT PLEASANT	TX	75455	Morris	903-572-3676		MR.	Aaron	Glann				7/9/2014: Spoke w/ Aaron Gann.	
Tryon Road Water Supply Corporation	P.O. Box 190	Judson	TX	75660	Gregg	903-663-1447	903-663-5875	MR.	Lee	Pigeon	PRESIDENT				
West Gregg Special Utility District	P.O. Box 1196	Kilgore	TX	75662	Gregg	903-983-1816	903-984-0707	MR.	Neill	Flemister	President				

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APPENDIX C

CHAPTER 4

Identification of Water Needs

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APPENDIX C
CHAPTER 4

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Water User Group (WUG) Needs/Surplus

REGION D	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
BOWIE COUNTY						
RED BASIN						
CENTRAL BOWIE COUNTY WSC	(84)	(83)	(84)	(84)	(84)	(84)
DE KALB	(47)	(47)	(46)	(46)	(46)	(46)
HOOKS	(265)	(258)	(249)	(244)	(243)	(243)
NEW BOSTON	(323)	(325)	(322)	(321)	(321)	(321)
RED LICK	0	0	1	2	2	2
TEXAMERICAS CENTER	(88)	(90)	(90)	(90)	(90)	(90)
TEXARKANA	(1,507)	(1,530)	(1,527)	(1,518)	(1,517)	(1,517)
COUNTY-OTHER	289	324	358	343	334	334
MANUFACTURING	(9)	(10)	(11)	(13)	(14)	(16)
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	(2,935)	(2,935)	(2,836)	(2,588)	(2,357)	(2,259)
SULPHUR BASIN						
CENTRAL BOWIE COUNTY WSC	(451)	(446)	(450)	(450)	(450)	(450)
DE KALB	(257)	(256)	(253)	(252)	(251)	(251)
MACEDONIA-EYLAU MUD #1	(565)	(574)	(577)	(577)	(577)	(577)
MAUD	(170)	(169)	(167)	(165)	(164)	(164)
NASH	(206)	(212)	(214)	(214)	(214)	(214)
NEW BOSTON	(775)	(779)	(772)	(770)	(768)	(768)
RED LICK	0	0	1	2	2	2
REDWATER	(82)	(82)	(79)	(77)	(77)	(77)
TEXAMERICAS CENTER	(426)	(437)	(439)	(438)	(438)	(438)
TEXARKANA	(11,264)	(11,430)	(11,411)	(11,347)	(11,335)	(11,334)
WAKE VILLAGE	(677)	(669)	(654)	(644)	(642)	(642)
COUNTY-OTHER	833	891	954	915	897	897
MANUFACTURING	(1,535)	(1,669)	(1,799)	(1,909)	(2,066)	(2,235)
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	(2,305)	(2,305)	(2,243)	(2,088)	(1,943)	(1,881)
CAMP COUNTY						
CYPRESS BASIN						
BI COUNTY WSC	277	165	78	0	(113)	(226)
PITTSBURG	946	928	915	888	857	824
COUNTY-OTHER	296	328	353	379	405	430
MANUFACTURING	1	1	1	1	1	0
MINING	11	12	13	14	15	16
LIVESTOCK	0	0	0	0	0	0
CASS COUNTY						
CYPRESS BASIN						
ATLANTA	0	0	0	0	0	0
EASTERN CASS WSC	429	434	439	441	442	442
HUGHES SPRINGS	441	448	456	457	458	458
LINDEN	155	164	171	172	172	173
QUEEN CITY	27	31	34	34	35	35
COUNTY-OTHER	304	405	502	563	567	598
MANUFACTURING	(115)	(121)	(127)	(132)	(141)	(151)
MINING	800	804	824	859	896	932
LIVESTOCK	121	121	121	121	121	121

Water User Group (WUG) Needs/Surplus

REGION D	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
CASS COUNTY						
SULPHUR BASIN						
ATLANTA	0	0	0	0	0	0
EASTERN CASS WSC	26	26	27	27	27	27
QUEEN CITY	14	16	19	19	19	19
COUNTY-OTHER	873	929	986	1,032	1,034	1,065
MANUFACTURING	4,967	(1,184)	(7,062)	(12,145)	(21,111)	(62,676)
LIVESTOCK	3	3	3	5	5	5
DELTA COUNTY						
SULPHUR BASIN						
COOPER	1,329	1,354	1,340	1,317	1,286	1,226
NORTH HUNT SUD	21	0	0	0	0	0
COUNTY-OTHER	941	871	878	882	882	812
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	1,826	1,849	1,876	1,899	1,922	1,904
FRANKLIN COUNTY						
CYPRESS BASIN						
CYPRESS SPRINGS SUD	1,982	1,982	1,931	1,887	1,776	1,657
WINNSBORO	833	830	829	827	825	823
COUNTY-OTHER	3	6	10	9	7	6
LIVESTOCK	10	10	10	10	10	10
IRRIGATION	2	2	2	2	2	2
SABINE BASIN						
LIVESTOCK	0	0	0	0	0	0
SULPHUR BASIN						
CYPRESS SPRINGS SUD	126	126	118	110	90	70
MOUNT VERNON	742	720	715	706	696	688
COUNTY-OTHER	41	51	60	58	57	56
MINING	1,035	1,011	990	970	951	952
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	272	272	272	272	272	272
GREGG COUNTY						
CYPRESS BASIN						
TRYON ROAD SUD	502	465	417	354	268	166
COUNTY-OTHER	120	125	131	135	146	146
MINING	(14)	(22)	(21)	(17)	(12)	(9)
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	43	43	43	43	43	43
SABINE BASIN						
CLARKSVILLE CITY	144	139	133	123	111	97
CROSS ROADS SUD	53	51	48	45	43	40
EASTON	55	56	56	57	54	48
ELDERVILLE WSC	494	471	446	418	387	353
GLADEWATER	250	208	161	99	23	0
KILGORE	482	1,351	1,141	888	592	258
LAKEPORT	88	88	88	87	76	63
LIBERTY CITY WSC	328	303	269	222	161	90
LONGVIEW	8,317	6,498	4,305	1,666	3,553	0
TRYON ROAD SUD	850	847	844	840	834	828

Water User Group (WUG) Needs/Surplus

REGION D	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
GREGG COUNTY						
SABINE BASIN						
WEST GREGG SUD	188	174	154	127	90	35
WHITE OAK	1,131	1,035	916	769	593	390
COUNTY-OTHER	450	487	522	561	637	461
MANUFACTURING	2,595	2,135	1,683	1,294	820	306
MINING	(190)	(332)	(320)	(222)	(127)	(55)
STEAM ELECTRIC POWER	1,264	1,099	897	651	352	148
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	115	115	115	115	115	115
HARRISON COUNTY						
CYPRESS BASIN						
DIANA SUD	63	62	61	58	55	51
GUM SPRINGS WSC	69	65	59	45	27	5
MARSHALL	263	220	172	90	(7)	(123)
TRYON ROAD SUD	19	14	9	0	0	0
WASKOM	(6)	(20)	(37)	(67)	(104)	(148)
COUNTY-OTHER	501	493	454	343	215	25
MANUFACTURING	862	853	844	836	826	816
MINING	(272)	(174)	(95)	(18)	58	116
LIVESTOCK	45	74	103	134	145	141
IRRIGATION	(232)	(232)	(232)	(232)	(232)	(232)
SABINE BASIN						
GILL WSC	149	144	139	123	106	85
GUM SPRINGS WSC	521	510	493	456	407	346
HALLSVILLE	291	269	242	196	140	73
LONGVIEW	5,333	5,302	5,269	5,215	154	81
MARSHALL	1,229	1,031	806	420	(34)	(578)
COUNTY-OTHER	523	558	565	531	502	423
MANUFACTURING	(55,006)	(64,084)	(73,156)	(81,083)	(90,381)	(100,394)
MINING	(1,361)	(1,020)	(744)	(475)	(212)	(18)
STEAM ELECTRIC POWER	4,323	968	(3,122)	(8,107)	(14,184)	(22,464)
LIVESTOCK	63	65	69	73	76	75
IRRIGATION	(1)	(1)	(1)	(1)	(1)	(1)
HOPKINS COUNTY						
CYPRESS BASIN						
CYPRESS SPRINGS SUD	392	393	384	378	358	338
COUNTY-OTHER	127	123	118	112	106	100
MINING	(7)	(8)	(11)	(13)	(16)	(19)
LIVESTOCK	53	53	53	53	53	53
IRRIGATION	0	0	0	0	0	0
SABINE BASIN						
CASH SUD	1	0	0	0	0	0
COMO	45	39	33	29	23	18
CUMBY	3	(11)	(23)	(38)	(54)	(70)
JONES WSC	11	13	14	16	18	19
MARTIN SPRINGS WSC	177	126	80	23	(36)	(97)
SULPHUR SPRINGS	48	46	42	44	41	41
COUNTY-OTHER	290	328	356	351	340	330

Water User Group (WUG) Needs/Surplus

REGION D	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
HOPKINS COUNTY						
SABINE BASIN						
MINING	(71)	(88)	(112)	(138)	(165)	(198)
LIVESTOCK	309	309	309	309	309	309
IRRIGATION	0	0	0	0	0	0
SULPHUR BASIN						
BRINKER WSC	88	60	35	4	(29)	(63)
COMO	7	9	10	8	6	4
CUMBY	0	(1)	(2)	(4)	(5)	(7)
CYPRESS SPRINGS SUD	14	17	16	16	13	9
MARTIN SPRINGS WSC	33	24	15	4	(7)	(18)
NORTH HOPKINS WSC	459	440	421	382	338	293
SULPHUR SPRINGS	15,361	14,928	14,422	14,151	13,592	13,122
COUNTY-OTHER	464	441	436	396	352	311
MANUFACTURING	0	0	0	0	0	0
MINING	(149)	(187)	(237)	(293)	(352)	(422)
LIVESTOCK	256	256	256	256	257	258
IRRIGATION	(2,126)	(2,126)	(2,126)	(2,126)	(2,126)	(2,126)
HUNT COUNTY						
SABINE BASIN						
ABLES SPRINGS WSC	(4)	(22)	(38)	(64)	(103)	(170)
BLACKLAND WSC	(1)	(2)	(2)	(2)	(3)	(3)
CADDO BASIN SUD	(54)	(213)	(343)	(520)	(799)	(1,242)
CADDO MILLS	25	(1)	(36)	(68)	(108)	(255)
CAMPBELL	56	46	40	43	49	7
CASH SUD	147	2,973	2,723	2,112	1,308	349
CELESTE	77	54	21	(28)	(100)	(204)
COMBINED CONSUMERS SUD	1,738	1,651	1,522	1,330	1,045	628
GREENVILLE	(3,299)	(4,847)	(6,900)	(7,521)	(9,361)	(14,315)
HICKORY CREEK SUD	137	62	(47)	(204)	(432)	(769)
JOSEPHINE	0	(8)	(16)	(27)	(31)	(34)
LONE OAK	101	88	70	43	3	(56)
MACBEE SUD	0	94	103	114	132	155
QUINLAN	198	239	287	247	200	149
ROYSE CITY	(4)	(12)	(20)	(26)	(40)	(61)
WEST TAWAKONI	0	856	813	753	670	551
COUNTY-OTHER	231	(433)	(1,314)	(1,759)	(4,100)	(7,554)
MANUFACTURING	484	546	613	677	721	825
MINING	(41)	(35)	(16)	(5)	0	3
STEAM ELECTRIC POWER	(12,085)	(14,188)	(16,751)	(19,877)	(23,687)	(28,213)
LIVESTOCK	9	9	9	9	9	9
IRRIGATION	(108)	(108)	(108)	(108)	(108)	(108)
SULPHUR BASIN						
CAMPBELL	0	0	0	0	0	0
CASH SUD	3	1	0	0	1	1
COMMERCE	0	0	0	0	0	0
HICKORY CREEK SUD	95	43	(32)	(142)	(301)	(536)
NORTH HUNT SUD	42	2	(99)	(235)	(431)	(713)
WOLFE CITY	112	82	38	(30)	(128)	(271)

Water User Group (WUG) Needs/Surplus

REGION D	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
HUNT COUNTY						
SULPHUR BASIN						
COUNTY-OTHER	4	1	1	1	0	1
MANUFACTURING	197	234	274	312	338	388
MINING	(30)	(27)	(18)	(13)	(7)	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	(33)	(33)	(33)	(33)	(33)	(33)
TRINITY BASIN						
HICKORY CREEK SUD	47	22	(16)	(70)	(149)	(263)
COUNTY-OTHER	0	0	0	4	0	0
MINING	(2)	(2)	(1)	(1)	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	(5)	(5)	(5)	(5)	(5)	(5)
LAMAR COUNTY						
RED BASIN						
LAMAR COUNTY WSD	3,777	3,706	3,647	3,591	3,533	3,458
PARIS	9,979	9,868	9,762	9,660	9,459	9,345
RENO	42	54	63	73	83	93
COUNTY-OTHER	(46)	(61)	(61)	(65)	(69)	(71)
MANUFACTURING	99	103	108	111	117	88
STEAM ELECTRIC POWER	458	(980)	(2,733)	(4,870)	(7,474)	(10,568)
LIVESTOCK	458	458	458	458	458	453
IRRIGATION	(16,012)	(15,941)	(15,974)	(15,921)	(15,974)	(15,942)
SULPHUR BASIN						
BLOSSOM	78	94	111	111	110	108
DEPORT	58	66	73	72	71	71
LAMAR COUNTY WSD	2,897	2,851	2,815	2,783	2,748	2,704
PARIS	14,953	14,786	14,629	14,476	14,173	14,002
RENO	37	88	129	171	210	254
ROXTON	38	46	54	54	53	52
COUNTY-OTHER	(21)	(20)	(22)	(31)	(38)	(45)
MANUFACTURING	(565)	(592)	(620)	(642)	(685)	(951)
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	(2,300)	(2,367)	(2,331)	(2,381)	(2,325)	(2,360)
MARION COUNTY						
CYPRESS BASIN						
DIANA SUD	17	19	20	20	21	21
JEFFERSON	1,268	1,278	1,286	1,291	1,292	1,292
COUNTY-OTHER	1,221	1,221	1,221	1,221	1,221	1,221
MANUFACTURING	0	0	0	0	0	0
MINING	(373)	(645)	(590)	(471)	(352)	(265)
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
MORRIS COUNTY						
CYPRESS BASIN						
BI COUNTY WSC	35	37	37	1	0	0
DAINGERFIELD	1,109	1,113	1,115	1,106	1,096	1,085
HUGHES SPRINGS	13	13	13	13	13	13
LONE STAR	561	565	568	566	563	559

Water User Group (WUG) Needs/Surplus

REGION D	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
MORRIS COUNTY						
CYPRESS BASIN						
NAPLES	33	43	44	43	41	40
OMAHA	54	55	55	53	51	49
TRI SUD	(164)	(161)	(160)	(163)	(166)	(170)
COUNTY-OTHER	10	19	22	14	8	0
MANUFACTURING	39,012	27,416	16,406	13,037	13,037	(2,763)
STEAM ELECTRIC POWER	777	770	761	751	738	729
LIVESTOCK	4	4	4	4	4	4
SULPHUR BASIN						
NAPLES	27	21	23	21	19	17
OMAHA	50	51	51	50	48	46
COUNTY-OTHER	85	88	89	86	84	82
LIVESTOCK	4	4	4	4	4	4
RAINS COUNTY						
SABINE BASIN						
ALBA	1	1	1	1	1	0
BRIGHT STAR-SALEM SUD	265	1,107	1,112	1,112	1,112	1,112
CASH SUD	6	0	0	0	0	0
EAST TAWAKONI	576	568	568	567	566	566
EMORY	0	305	292	281	272	263
GOLDEN WSC	4	4	4	4	4	4
POINT	0	26	23	19	15	12
COUNTY-OTHER	124	124	129	126	120	119
MANUFACTURING	2	2	2	2	2	2
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	17	17	17	17	17	17
RED RIVER COUNTY						
RED BASIN						
RED RIVER COUNTY WSC	96	97	97	90	70	64
COUNTY-OTHER	21	38	50	62	129	139
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	(1,106)	(1,092)	(1,077)	(1,062)	(1,048)	(1,034)
SULPHUR BASIN						
BOGATA	147	153	157	157	158	158
CLARKSVILLE	296	58	(593)	(592)	(591)	(591)
DEPORT	3	3	3	3	3	3
DETROIT	50	50	50	50	50	50
RED RIVER COUNTY WSC	76	89	87	69	64	46
COUNTY-OTHER	73	106	135	168	145	179
MANUFACTURING	0	0	(7)	(7)	(8)	(9)
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	8,021	7,938	7,837	7,714	7,564	8,242
LIVESTOCK	203	203	203	203	203	203
IRRIGATION	(3,270)	(3,221)	(3,183)	(3,146)	(3,107)	(3,091)
SMITH COUNTY						
SABINE BASIN						
CRYSTAL SYSTEMS INC	(29)	(221)	(432)	(669)	(944)	(1,194)
HIDEAWAY	0	0	0	0	0	(117)

Water User Group (WUG) Needs/Surplus

REGION D	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
SMITH COUNTY						
SABINE BASIN						
JACKSON WSC	0	0	0	0	0	0
LIBERTY CITY WSC	13	12	10	8	5	2
LINDALE	(100)	(278)	(485)	(731)	(1,025)	(1,375)
LINDALE RURAL WSC	630	594	514	387	237	104
OVERTON	(17)	(18)	(21)	(23)	(27)	(31)
SMITH COUNTY MUD #1	692	631	560	477	376	257
SOUTHERN UTILITIES COMPANY	0	0	0	0	0	0
TYLER	0	0	0	0	0	0
WEST GREGG SUD	48	41	32	21	6	0
WINONA	33	18	0	(23)	(51)	(85)
COUNTY-OTHER	1,541	1,649	1,734	1,921	2,156	2,200
MANUFACTURING	(300)	(327)	(354)	(377)	(408)	(442)
MINING	33	51	37	15	(8)	(45)
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
TITUS COUNTY						
CYPRESS BASIN						
BI COUNTY WSC	105	102	87	61	41	29
CYPRESS SPRINGS SUD	37	37	35	33	30	26
MOUNT PLEASANT	2,322	1,614	805	0	0	0
TRI SUD	(918)	(1,000)	(1,091)	(1,202)	(1,329)	(1,466)
WINFIELD	0	0	0	0	0	0
COUNTY-OTHER	220	214	199	176	99	33
MANUFACTURING	(3,603)	(3,719)	(3,833)	(4,058)	(4,733)	(5,440)
MINING	2,680	2,784	2,885	2,975	2,609	1,983
STEAM ELECTRIC POWER	(20,558)	(30,123)	(41,631)	(55,605)	(71,812)	(91,555)
LIVESTOCK	5	5	5	5	0	0
IRRIGATION	0	0	0	0	0	0
SULPHUR BASIN						
CYPRESS SPRINGS SUD	7	6	5	3	2	0
TALCO	383	377	371	362	352	342
TRI SUD	(478)	(520)	(568)	(626)	(692)	(763)
WINFIELD	0	0	0	0	0	0
COUNTY-OTHER	856	928	955	983	1,012	1,020
MINING	229	241	253	265	276	284
LIVESTOCK	73	73	73	73	33	12
IRRIGATION	77	77	77	77	77	77
UPSHUR COUNTY						
CYPRESS BASIN						
BI COUNTY WSC	22	6	0	0	(23)	(45)
DIANA SUD	699	687	675	656	633	610
EAST MOUNTAIN	24	22	21	20	18	17
GILMER	43	(14)	(63)	(123)	(186)	(246)
ORE CITY	1,570	1,564	1,559	1,552	1,543	1,535
PRITCHETT WSC	250	245	241	233	223	212
SHARON WSC	228	226	225	217	210	202

Water User Group (WUG) Needs/Surplus

REGION D	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
UPSHUR COUNTY						
CYPRESS BASIN						
COUNTY-OTHER	285	271	249	210	170	132
MANUFACTURING	(266)	(285)	(306)	(324)	(349)	(376)
MINING	(298)	(573)	(608)	(480)	(354)	(262)
LIVESTOCK	153	153	153	153	153	153
IRRIGATION	87	87	87	87	87	87
SABINE BASIN						
BIG SANDY	62	51	42	30	17	5
EAST MOUNTAIN	232	229	226	222	218	214
FOUKE WSC	3	2	2	1	1	0
GLADEWATER	152	125	94	55	12	4
PRITCHETT WSC	119	107	96	77	52	28
COUNTY-OTHER	136	130	119	101	82	63
MINING	(80)	(152)	(162)	(128)	(95)	(70)
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
VAN ZANDT COUNTY						
NECHES BASIN						
BETHEL-ASH WSC	74	73	69	57	48	37
R-P-M WSC	(12)	(56)	(93)	(132)	(167)	(197)
VAN	276	246	223	195	165	152
COUNTY-OTHER	877	977	1,051	1,136	1,227	1,209
MINING	45	51	50	51	52	52
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	(330)	(330)	(330)	(330)	(330)	(330)
SABINE BASIN						
ABLES SPRINGS WSC	(1)	0	(2)	(2)	(3)	(2)
CANTON	583	512	459	401	305	259
COMBINED CONSUMERS SUD	174	202	223	249	277	300
EDGEWOOD	0	655	641	623	605	590
GOLDEN WSC	42	44	46	47	47	47
GRAND SALINE	271	270	270	265	223	216
MACBEE SUD	0	377	367	354	339	314
SOUTH TAWAKONI WSC	0	609	578	541	505	471
VAN	351	353	354	357	363	355
WILLS POINT	493	525	528	529	529	527
COUNTY-OTHER	690	655	630	601	480	414
MANUFACTURING	(154)	(171)	(186)	(199)	(234)	(281)
MINING	1,801	1,953	2,094	2,239	2,322	2,462
LIVESTOCK	364	364	364	364	359	359
IRRIGATION	0	0	0	0	0	0
TRINITY BASIN						
BETHEL-ASH WSC	22	21	19	17	13	10
CANTON	0	0	0	0	0	0
MACBEE SUD	0	1,023	957	888	810	738
WILLS POINT	1,010	1,061	1,052	1,038	1,020	1,003
COUNTY-OTHER	111	137	137	141	142	99
MANUFACTURING	(4)	(4)	(5)	(5)	(6)	(6)

Water User Group (WUG) Needs/Surplus

REGION D	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
VAN ZANDT COUNTY						
TRINITY BASIN						
MINING	0	0	0	0	0	0
LIVESTOCK	392	392	392	392	392	392
IRRIGATION	0	0	0	0	0	0
WOOD COUNTY						
CYPRESS BASIN						
CYPRESS SPRINGS SUD	39	39	38	36	33	29
SHARON WSC	61	63	67	65	64	64
WINNSBORO	89	86	87	84	81	80
COUNTY-OTHER	709	711	718	710	717	713
MINING	23	23	26	29	30	33
LIVESTOCK	178	178	178	178	178	178
IRRIGATION	11	11	11	11	11	11
SABINE BASIN						
ALBA	34	33	34	34	33	33
BRIGHT STAR-SALEM SUD	217	220	225	222	222	221
FOUKE WSC	186	180	186	178	171	165
GOLDEN WSC	160	160	163	160	157	153
HAWKINS	725	718	717	711	707	704
HOLLY RANCH WATER COMPANY	390	382	379	374	372	370
JONES WSC	294	295	302	298	290	284
MINEOLA	177	169	174	166	158	152
NEW HOPE SUD	36	33	36	33	30	27
PRITCHETT WSC	0	0	1	1	1	1
QUITMAN	0	710	704	693	683	674
RAMEY WSC	337	341	349	346	342	340
SHARON WSC	312	317	324	321	320	317
WINNSBORO	166	160	161	156	154	150
COUNTY-OTHER	3,227	3,257	3,247	3,244	3,232	3,233
MANUFACTURING	743	701	665	635	569	498
MINING	261	265	268	271	274	276
LIVESTOCK	104	104	104	104	104	104
IRRIGATION	208	208	208	208	208	208

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Water User Group (WUG) Category Summary

REGION D	2020	2030	2040	2050	2060	2070
MUNICIPAL						
POPULATION	647,877	707,728	771,044	847,553	938,435	1,052,152
DEMANDS (acre-feet per year)	113,990	121,155	129,482	140,821	155,364	173,785
EXISTING SUPPLIES (acre-feet per year)	190,039	198,986	197,642	199,498	201,668	203,061
NEEDS (acre-feet per year)*	(22,274)	(24,792)	(28,453)	(30,569)	(34,796)	(43,720)
COUNTY-OTHER						
POPULATION	183,592	199,803	217,815	241,644	273,544	318,286
DEMANDS (acre-feet per year)	20,320	21,476	23,054	25,564	29,176	34,347
EXISTING SUPPLIES (acre-feet per year)	36,729	37,848	39,026	41,224	42,474	43,528
NEEDS (acre-feet per year)*	(67)	(514)	(1,397)	(1,855)	(4,207)	(7,670)
MANUFACTURING						
DEMANDS (acre-feet per year)	332,070	355,072	377,273	396,249	425,638	457,217
EXISTING SUPPLIES (acre-feet per year)	319,475	314,897	310,403	312,260	321,933	284,400
NEEDS (acre-feet per year)*	(61,557)	(72,166)	(87,466)	(100,894)	(120,136)	(175,740)
MINING						
DEMANDS (acre-feet per year)	7,115	7,748	7,670	7,280	6,914	6,795
EXISTING SUPPLIES (acre-feet per year)	11,145	11,678	12,175	12,694	12,697	12,541
NEEDS (acre-feet per year)*	(2,888)	(3,265)	(2,935)	(2,274)	(1,700)	(1,363)
STEAM ELECTRIC POWER						
DEMANDS (acre-feet per year)	96,574	112,905	132,815	157,084	186,668	222,648
EXISTING SUPPLIES (acre-feet per year)	78,774	78,389	78,073	77,741	78,165	78,967
NEEDS (acre-feet per year)*	(32,643)	(45,291)	(64,237)	(88,459)	(117,157)	(152,800)
LIVESTOCK						
DEMANDS (acre-feet per year)	23,237	23,281	23,220	23,116	23,036	23,042
EXISTING SUPPLIES (acre-feet per year)	26,044	26,119	26,091	26,024	25,909	25,885
NEEDS (acre-feet per year)*	0	0	0	0	0	0
IRRIGATION						
DEMANDS (acre-feet per year)	40,866	40,737	40,442	39,913	39,413	39,138
EXISTING SUPPLIES (acre-feet per year)	12,761	12,722	12,671	12,623	12,578	12,472
NEEDS (acre-feet per year)*	(30,763)	(30,696)	(30,479)	(30,021)	(29,589)	(29,402)
REGION TOTALS						
POPULATION	831,469	907,531	988,859	1,089,197	1,211,979	1,370,438
DEMANDS (acre-feet per year)	634,172	682,374	733,956	790,027	866,209	956,972
EXISTING SUPPLIES (acre-feet per year)	674,967	680,639	676,081	682,064	695,424	660,854
NEEDS (acre-feet per year)*	(150,192)	(176,724)	(214,967)	(254,072)	(307,585)	(410,695)

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

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

REGION D	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
BOWIE COUNTY						
RED BASIN						
CENTRAL BOWIE COUNTY WSC	84	83	84	84	84	84
DE KALB	47	47	46	46	46	46
HOOKS	265	258	249	244	243	243
NEW BOSTON	323	325	322	321	321	321
RED LICK	0	0	0	0	0	0
TEXAMERICAS CENTER	88	90	90	90	90	90
TEXARKANA	1,507	1,530	1,527	1,518	1,517	1,517
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	9	10	11	13	14	16
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	2,935	2,935	2,836	2,588	2,357	2,259
SULPHUR BASIN						
CENTRAL BOWIE COUNTY WSC	451	446	450	450	450	450
DE KALB	257	256	253	252	251	251
MACEDONIA-EYLAU MUD #1	565	574	577	577	577	577
MAUD	170	169	167	165	164	164
NASH	206	212	214	214	214	214
NEW BOSTON	775	779	772	770	768	768
RED LICK	0	0	0	0	0	0
REDWATER	82	82	79	77	77	77
TEXAMERICAS CENTER	426	437	439	438	438	438
TEXARKANA	4,861	4,766	4,596	4,605	4,606	4,606
WAKE VILLAGE	677	669	654	644	642	642
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	1,535	1,669	1,799	1,909	2,066	2,235
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	2,305	2,305	2,243	2,088	1,943	1,881
CAMP COUNTY						
CYPRESS BASIN						
BI COUNTY WSC	0	0	0	0	113	226
PITTSBURG	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
CASS COUNTY						
CYPRESS BASIN						
ATLANTA	0	0	0	0	0	0
EASTERN CASS WSC	0	0	0	0	0	0
HUGHES SPRINGS	0	0	0	0	0	0
LINDEN	0	0	0	0	0	0
QUEEN CITY	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	115	121	127	132	141	151
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
SULPHUR BASIN						
ATLANTA	0	0	0	0	0	0

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

REGION D	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
CASS COUNTY						
SULPHUR BASIN						
EASTERN CASS WSC	0	0	0	0	0	0
QUEEN CITY	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	6,995	47,603
LIVESTOCK	0	0	0	0	0	0
DELTA COUNTY						
SULPHUR BASIN						
COOPER	0	0	0	0	0	0
NORTH HUNT SUD	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
FRANKLIN COUNTY						
CYPRESS BASIN						
CYPRESS SPRINGS SUD	0	0	0	0	0	0
WINNSBORO	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
SABINE BASIN						
LIVESTOCK	0	0	0	0	0	0
SULPHUR BASIN						
CYPRESS SPRINGS SUD	0	0	0	0	0	0
MOUNT VERNON	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
GREGG COUNTY						
CYPRESS BASIN						
TRYON ROAD SUD	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	14	22	21	17	12	9
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
SABINE BASIN						
CLARKSVILLE CITY	0	0	0	0	0	0
CROSS ROADS SUD	0	0	0	0	0	0
EASTON	0	0	0	0	0	0
ELDERVILLE WSC	0	0	0	0	0	0
GLADEWATER	0	0	0	0	0	0
KILGORE	0	0	0	0	0	0
LAKEPORT	0	0	0	0	0	0
LIBERTY CITY WSC	0	0	0	0	0	0
LONGVIEW	0	0	0	0	0	0
TRYON ROAD SUD	0	0	0	0	0	0
WEST GREGG SUD	0	0	0	0	0	0
WHITE OAK	0	0	0	0	0	0

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

REGION D	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
GREGG COUNTY						
SABINE BASIN						
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	190	332	320	222	127	55
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
HARRISON COUNTY						
CYPRESS BASIN						
DIANA SUD	0	0	0	0	0	0
GUM SPRINGS WSC	0	0	0	0	0	0
MARSHALL	0	0	0	0	7	123
TRYON ROAD SUD	0	0	0	0	0	0
WASKOM	6	20	37	67	104	148
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	272	174	95	18	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	232	232	232	232	232	232
SABINE BASIN						
GILL WSC	0	0	0	0	0	0
GUM SPRINGS WSC	0	0	0	0	0	0
HALLSVILLE	0	0	0	0	0	0
LONGVIEW	0	0	0	0	0	0
MARSHALL	0	0	0	0	34	578
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	45,505	53,676	61,840	68,975	77,343	86,355
MINING	1,361	1,020	744	475	212	18
STEAM ELECTRIC POWER	0	0	3,122	8,107	14,184	22,464
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	1	1	1	1	1	1
HOPKINS COUNTY						
CYPRESS BASIN						
CYPRESS SPRINGS SUD	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	7	8	11	13	16	19
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
SABINE BASIN						
CASH SUD	0	0	0	0	0	0
COMO	0	0	0	0	0	0
CUMBY	0	11	23	38	54	70
JONES WSC	0	0	0	0	0	0
MARTIN SPRINGS WSC	0	0	0	0	36	97
SULPHUR SPRINGS	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	71	88	112	138	165	198
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0

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

REGION D	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
HOPKINS COUNTY						
SULPHUR BASIN						
BRINKER WSC	0	0	0	0	29	63
COMO	0	0	0	0	0	0
CUMBY	0	1	2	4	5	7
CYPRESS SPRINGS SUD	0	0	0	0	0	0
MARTIN SPRINGS WSC	0	0	0	0	7	18
NORTH HOPKINS WSC	0	0	0	0	0	0
SULPHUR SPRINGS	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	149	187	237	293	352	422
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	2,126	2,126	2,126	2,126	2,126	2,126
HUNT COUNTY						
SABINE BASIN						
ABLES SPRINGS WSC	4	21	37	62	100	165
BLACKLAND WSC	1	2	2	2	3	3
CADDO BASIN SUD	52	210	340	515	792	1,231
CADDO MILLS	0	1	36	68	108	255
CAMPBELL	0	0	0	0	0	0
CASH SUD	0	0	0	0	0	0
CELESTE	0	0	0	28	100	204
COMBINED CONSUMERS SUD	0	0	0	0	0	0
GREENVILLE	3,299	4,847	6,900	7,521	9,361	14,315
HICKORY CREEK SUD	0	0	42	197	423	758
JOSEPHINE	0	8	16	26	30	33
LONE OAK	0	0	0	0	0	56
MACBEE SUD	0	0	0	0	0	0
QUINLAN	0	0	0	0	0	0
ROYSE CITY	4	12	19	25	38	58
WEST TAWAKONI	0	0	0	0	0	0
COUNTY-OTHER	0	433	1,314	1,759	4,100	7,554
MANUFACTURING	0	0	0	0	0	0
MINING	41	35	16	5	0	0
STEAM ELECTRIC POWER	4,637	6,790	7,610	10,889	14,649	16,152
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	108	108	108	108	108	108
SULPHUR BASIN						
CAMPBELL	0	0	0	0	0	0
CASH SUD	0	0	0	0	0	0
COMMERCE	0	0	0	0	0	0
HICKORY CREEK SUD	0	0	29	137	295	529
NORTH HUNT SUD	0	0	99	234	430	712
WOLFE CITY	0	0	0	30	128	271
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	30	27	18	13	7	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	33	33	33	33	33	33

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

REGION D	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
HUNT COUNTY						
TRINITY BASIN						
HICKORY CREEK SUD	0	0	15	68	146	259
COUNTY-OTHER	0	0	0	0	0	0
MINING	2	2	1	1	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	5	5	5	5	5	5
LAMAR COUNTY						
RED BASIN						
LAMAR COUNTY WSD	0	0	0	0	0	0
PARIS	0	0	0	0	0	0
RENO	0	0	0	0	0	0
COUNTY-OTHER	46	61	61	65	69	71
MANUFACTURING	0	0	0	0	0	0
STEAM ELECTRIC POWER	0	980	2,733	4,870	7,474	10,568
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	16,012	15,941	15,974	15,921	15,974	15,942
SULPHUR BASIN						
BLOSSOM	0	0	0	0	0	0
DEPORT	0	0	0	0	0	0
LAMAR COUNTY WSD	0	0	0	0	0	0
PARIS	0	0	0	0	0	0
RENO	0	0	0	0	0	0
ROXTON	0	0	0	0	0	0
COUNTY-OTHER	21	20	22	31	38	45
MANUFACTURING	0	0	0	0	0	117
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	2,300	2,367	2,331	2,381	2,325	2,360
MARION COUNTY						
CYPRESS BASIN						
DIANA SUD	0	0	0	0	0	0
JEFFERSON	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	373	645	590	471	352	265
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
MORRIS COUNTY						
CYPRESS BASIN						
BI COUNTY WSC	0	0	0	0	0	0
DAINGERFIELD	0	0	0	0	0	0
HUGHES SPRINGS	0	0	0	0	0	0
LONE STAR	0	0	0	0	0	0
NAPLES	0	0	0	0	0	0
OMAHA	0	0	0	0	0	0
TRI SUD	164	161	160	163	166	170
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0

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

REGION D	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
MORRIS COUNTY						
SULPHUR BASIN						
NAPLES	0	0	0	0	0	0
OMAHA	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
RAINS COUNTY						
SABINE BASIN						
ALBA	0	0	0	0	0	0
BRIGHT STAR-SALEM SUD	0	0	0	0	0	0
CASH SUD	0	0	0	0	0	0
EAST TAWAKONI	0	0	0	0	0	0
EMORY	0	0	0	0	0	0
GOLDEN WSC	0	0	0	0	0	0
POINT	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
RED RIVER COUNTY						
RED BASIN						
RED RIVER COUNTY WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	1,106	1,092	1,077	1,062	1,048	1,034
SULPHUR BASIN						
BOGATA	0	0	0	0	0	0
CLARKSVILLE	0	0	593	592	591	591
DEPORT	0	0	0	0	0	0
DETROIT	0	0	0	0	0	0
RED RIVER COUNTY WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	7	7	8	9
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	3,270	3,221	3,183	3,146	3,107	3,091
SMITH COUNTY						
SABINE BASIN						
CRYSTAL SYSTEMS INC	26	214	424	658	932	1,179
HIDEAWAY	0	0	0	0	0	117
JACKSON WSC	0	0	0	0	0	0
LIBERTY CITY WSC	0	0	0	0	0	0
LINDALE	95	267	471	714	1,003	1,348
LINDALE RURAL WSC	0	0	0	0	0	0
OVERTON	0	0	0	0	0	0
SMITH COUNTY MUD #1	0	0	0	0	0	0
SOUTHERN UTILITIES COMPANY	0	0	0	0	0	0
TYLER	0	0	0	0	0	0
WEST GREGG SUD	0	0	0	0	0	0

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

REGION D	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
SMITH COUNTY						
SABINE BASIN						
WINONA	0	0	0	23	51	85
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	300	327	354	377	408	442
MINING	0	0	0	0	8	45
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
TITUS COUNTY						
CYPRESS BASIN						
BI COUNTY WSC	0	0	0	0	0	0
CYPRESS SPRINGS SUD	0	0	0	0	0	0
MOUNT PLEASANT	0	0	0	0	0	0
TRI SUD	918	1,000	1,091	1,202	1,329	1,466
WINFIELD	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	2,703	2,787	2,871	3,072	3,679	4,314
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	20,558	30,123	41,631	55,605	71,812	91,555
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
SULPHUR BASIN						
CYPRESS SPRINGS SUD	0	0	0	0	0	0
TALCO	0	0	0	0	0	0
TRI SUD	478	520	568	626	692	763
WINFIELD	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
UPSHUR COUNTY						
CYPRESS BASIN						
BI COUNTY WSC	0	0	0	0	23	45
DIANA SUD	0	0	0	0	0	0
EAST MOUNTAIN	0	0	0	0	0	0
GILMER	0	14	63	123	186	246
ORE CITY	0	0	0	0	0	0
PRITCHETT WSC	0	0	0	0	0	0
SHARON WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	266	285	306	324	349	376
MINING	298	573	608	480	354	262
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
SABINE BASIN						
BIG SANDY	0	0	0	0	0	0
EAST MOUNTAIN	0	0	0	0	0	0
FOUKE WSC	0	0	0	0	0	0
GLADEWATER	0	0	0	0	0	0

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

REGION D	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
UPSHUR COUNTY						
SABINE BASIN						
PRITCHETT WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	80	152	162	128	95	70
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
VAN ZANDT COUNTY						
NECHES BASIN						
BETHEL-ASH WSC	0	0	0	0	0	0
R-P-M WSC	11	50	83	117	148	174
VAN	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	330	330	330	330	330	330
SABINE BASIN						
ABLES SPRINGS WSC	1	0	2	2	3	2
CANTON	0	0	0	0	0	0
COMBINED CONSUMERS SUD	0	0	0	0	0	0
EDGEWOOD	0	0	0	0	0	0
GOLDEN WSC	0	0	0	0	0	0
GRAND SALINE	0	0	0	0	0	0
MACBEE SUD	0	0	0	0	0	0
SOUTH TAWAKONI WSC	0	0	0	0	0	0
VAN	0	0	0	0	0	0
WILLS POINT	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	154	171	186	199	234	281
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
TRINITY BASIN						
BETHEL-ASH WSC	0	0	0	0	0	0
CANTON	0	0	0	0	0	0
MACBEE SUD	0	0	0	0	0	0
WILLS POINT	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	4	4	5	5	6	6
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
WOOD COUNTY						
CYPRESS BASIN						
CYPRESS SPRINGS SUD	0	0	0	0	0	0
SHARON WSC	0	0	0	0	0	0
WINNSBORO	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

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

REGION D	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
WOOD COUNTY						
CYPRESS BASIN						
IRRIGATION	0	0	0	0	0	0
SABINE BASIN						
ALBA	0	0	0	0	0	0
BRIGHT STAR-SALEM SUD	0	0	0	0	0	0
FOUKE WSC	0	0	0	0	0	0
GOLDEN WSC	0	0	0	0	0	0
HAWKINS	0	0	0	0	0	0
HOLLY RANCH WATER COMPANY	0	0	0	0	0	0
JONES WSC	0	0	0	0	0	0
MINEOLA	0	0	0	0	0	0
NEW HOPE SUD	0	0	0	0	0	0
PRITCHETT WSC	0	0	0	0	0	0
QUITMAN	0	0	0	0	0	0
RAMEY WSC	0	0	0	0	0	0
SHARON WSC	0	0	0	0	0	0
WINNSBORO	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

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

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APPENDIX C

CHAPTER 5

Identification, Evaluation, and Selection of Water Management Strategies Based on Needs

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APPENDIX C
CHAPTER 5

Table of Contents

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1.1 MODEL WATER CONSERVATION PLAN

General Information

Introduction

Water conservation includes those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or increase the recycling and reuse of water so that a water supply is made available for future or alternative uses. As the prospect of acquiring new water source supplies is diminishing, Texans are realizing that saving the water we currently have is an important strategy for ensuring sufficient water supply for future generations. Even in the North East Texas Region, which is dotted with surface reservoirs and subsurface aquifers, water conservation is a vital tactic in the effort to protect our water resources.

Having well-managed and adequate water supplies is not only important for current residents of the North East Texas Region, but it also aids residential and commercial growth of the area, and encourages industry to locate in our region. If we are to remain in competition with metropolitan areas for residential and industrial growth, we must protect and preserve our natural resources, one of the most important being our water supplies. With this in mind, NETRWPG supports water conservation as a water management strategy, and has developed this guidance to assist those in the region who are incorporating a water conservation plan into their policies.

The holder of an existing permit, certified filing, or certificate of adjudication for the appropriation of surface water in the amount of 1,000 acre-feet a year or more for municipal, industrial, and non-irrigation…use shall develop, submit, and implement a water conservation plan meeting the requirements of Subchapter A of this chapter (relating to Water Conservation Plans). The water conservation plan must be submitted to the executive director not later than May 1, 2005. Thereafter, the next revision of the water conservation plan…must be submitted not later than May 1, 2009, and every five years after that date to coincide with the regional water planning group. Any revised plans must be submitted to the executive director within 90 days of adoption. The revised plans must include implementation reports. The requirement for a water conservation plan under this section must not result in the need for an amendment to an existing permit, certified filing, or certificate of adjudication. –30 TAC Chapter 288, Subchapter C

If you fall into one of the categories listed above, you are required to submit a plan to the TCEQ. Send your plan to the following address: TCEQ, Resource Protection Team, Mail Code 160, P.O. Box 13087, Austin, TX 78711-3087 for regular and certified mail, or 12100 Park 35 Circle, Austin, TX 78753 for express carrier deliveries (U.S. Post Office Express Mail, FedEx, UPS, etc.). If you do not fall into an above category, but are creating a plan for another reason, you are not required to submit your plan to TCEQ.

Each entity required to submit a Water Conservation Plan (WCP) to TCEQ must also submit a copy to TWDB no later than May 1, 2009. In addition, retail public water suppliers providing water service to 3,300 or more connections must develop, submit and implement a WCP to

TWDB. These plans should be sent to TWDB, 1700 North Congress Ave., PO Box 13231, Austin, Texas 78711-3231.

This guidance document was created using several reference materials, including Texas Administrative Code (TAC) Title 30 Chapter 288, TAC Chapter 363, the Texas Water Development Board's (TWDB) 'Water Conservation Plan Guidance Checklist,' and the TWDB and Texas Commission on Environmental Quality (TCEQ) websites. Example wording that you may want to use in your plan will be included throughout in bold italics. Water conservation forms are available in MSWord and PDF formats on the TCEQ website (www.tceq.state.tx.us), water conservation page.

The _________________(water system) recognizes that water conservation is a viable strategy to protecting its water supply. This Water Conservation Plan (Plan) has been developed to protect the system's water source and extend its useful life in order to ensure that a sufficient water supply is available for both present and future needs. The water conservation portion of the Plan looks at year-round methods for reducing water use. It will consider methods that should result in a continuous reduction of water use. However, because some of the methods take place primarily in summer months, these impacts may be more noticeable on a seasonal basis. The drought contingency portion of the Plan will look at measures designed to reduce water use on a temporary basis in the event of a period of drought or an emergency situation such as water source contamination. Methods considered here are not necessarily needed on a continual basis, but should be achievable in the short term.

Include a description of your service area so that users can become familiar with the service area. The following is a very general guideline.

The ________________ (water system) is located in ___________ County, along _____________ (give a general location using major highways or rivers). It is a rural community comprised of around ____ citizens. (Locate nearest bodies of water, important landmasses, etc.). ________'s (water system) water supply comes from ______________ (water rights, contract with…, etc. List contract amounts and lengths). __________ (water system) treats its own water, and also owns its own wastewater treatment facility.

It is also helpful to include in the introduction a detailed description of your water supply and your storage and distribution systems. You can summarize your systems here, but need to complete the TCEQ 'Utility Profile' form, which will provide specific system information. This form can be downloaded in MSWord or PDF from the Conservation Program page of the TCEQ website or by calling 512-239-4691.

All water conservation plans for municipal uses by public drinking water suppliers must include … a utility profile including, but not limited to, information regarding population and customer data, water use data, water supply system data, and wastewater system data. –30 TAC Chapter 288

Coordination with the North East Texas Regional Water Planning Group

The NETRWPG's Regional Water Plan contains population and water use projections for the next 50 years for all water systems within the North East Texas Region. We request that you review the latest version of this plan and use our projections in your plan. If you are unable to use our projections, please document your reasons.

In order to ensure that the water conservation plan is in agreement with the policies of the NETRWPG, we request that you submit a copy of your plan, once approved, to: NETRWPG, c/o Mr. Walt Sears, Northeast Texas Municipal Water District, P.O. Box 955, Hughes Springs, Texas 75656.

> ***A copy of this plan was submitted to the NETRWPG on _________ (date).***

Coordination with Wholesale Water Provider

If you purchase all or a portion of your supply from a wholesaler, then please include this section. If you own your own water rights, or use groundwater, then disregard this section.

In order to create cohesive plans between water users, it is recommended that you review your wholesaler's water conservation plan before you create your own plan. You are not required to imitate the wholesaler's plan, but your plan should not contradict your wholesaler's plan.

> ***We have reviewed the _________________ (wholesale provider) water conservation plan and have created our plan to compliment that plan.***

Coordination with the Public

> ***The _________________________________(water supplier) gave the public an opportunity to provide input into this plan by ___________________________(public notice, public hearing, letter requesting comments, etc.). Public comments included ________________.***

WATER CONSERVATION GOALS

All water conservation plans for municipal uses by public drinking water suppliers must include … beginning May 1, 2005, specific, quantified five-year and ten-year targets for water savings to include goals for water loss programs and goals for municipal use, in gallons per capita per day. The goals established by a public water supplier under this subparagraph are not enforceable. –30 TAC Chapter 288

The _____________ (water system) average daily water use is _______gpcpd according to ________ (source). The _____________ (water system) utilized Regional Water Planning Group projections when setting water savings goals. The system's 5-year goal for municipal use is to reduce daily water use (by/to) ___ gpcpd. Our water loss goal is ______________. The system's 10-year goal is to reduce daily water use (by/to) ___ gpcpd, thus achieving the projected ____ gpcpd by _____ (year) as stated in the Regional Water Plan. Our water loss goal is ____________.

Note that there should be a goal for water loss and a goal for municipal water use; water use should be calculated in gpcpd.

PLAN FOR MEETING GOALS

Required Programs

Master Meter

All water conservation plans for municipal uses by public drinking water suppliers must include…metering devices with an accuracy of plus or minus 5.0% in order to measure and account for the amount of water diverted from the source of supply. –30 TAC Chapter 288

Discuss the type of master meter you currently have, and any plans for a new meter. If you cannot comply with the requirements, please explain.

Universal Metering

All water conservation plans for municipal uses by public drinking water suppliers must include…a program for universal metering of both customer and public uses of water… –30 TAC Chapter 288

Discuss your existing and/or proposed universal metering program. If you do not comply with these requirements, please explain.

Meter Testing & Repair Program

All water conservation plans for municipal uses by public drinking water suppliers must include…a program for meter testing and repair… –30 TAC Chapter 288

Discuss your existing and/or proposed meter testing and repair program. If you cannot comply with these requirements, please explain.

Meter Replacement Program

All water conservation plans for municipal uses by public drinking water suppliers must include…a program for periodic meter replacement. –30 TAC Chapter 288

Discuss plans for meter replacement. List any replacement schedules you have in place. If you do not have a meter replacement program, please explain.

Unaccounted for Water

All water conservation plans for municipal uses by public drinking water suppliers must include…measures to determine and control unaccounted-for uses of water (for example, periodic visual inspections along distribution lines; annual or monthly audit of the water system to determine illegal connections; abandoned services, etc.). –30 TAC Chapter 288

Discuss your existing and/or proposed measures to find and control unaccounted-for water use. This should include discussion of leak detection and repair programs. The TWDB offers free assistance for water loss determination, including on-site water audit assistance and free water loss audit workshops. In addition, TWDB will loan out leak detection and flow meter testing equipment to aid in determining water loss. You may also find the Water Loss Audit Manual for Texas Utilities helpful in determining water loss. More information can be found on TWDB's website or by calling the Water Conservation Division.

In addition to the examples above, some systems have water-billing programs that note accounts with higher than normal activity, which could be a water leak. If you have this program, please discuss it here.

Public Education and Information Program

All water conservation plans for municipal uses by public drinking water suppliers must include…a program of continuing public education and information regarding water conservation. –30 TAC Chapter 288

There are numerous ways to inform and educate the public about water conservation. Some examples include:

- Provide conservation pamphlets, available at City Hall or your water office. The TWDB offers free and low cost pamphlets on its website, www.twdb.state.tx.us.
- Add water conservation slogans to your monthly water bill, e.g., "Every drop counts – Be water smart!"; "Conserve water – It makes cents!"; "Please use the month of May to check your toilets for leaks."

- Set up a water conservation booth at local fairs and festivals. Offer conservation oriented handouts.
- Sponsor a school project related to conservation in your local elementary school. TWDB offers the Major Rivers Water Education curriculum for 4^{th} and 5^{th} graders, and the Raising Your Water IQ curriculum for 6^{th} graders. In addition, there is a TWDB kid's page which promotes conservation with interactive games, coloring pages, and water facts. These can be accessed on TWDB's website or by calling TWDB.
- Create a running banner on your website with water conservation tips that change periodically.
- Present a water conservation program at local service club meetings and industry group meetings. Free brochures from TWDB could be dispersed.
- Offer field trips of your water treatment facility to local schools, and use the opportunity to talk about conservation.
- Include "Keep Texas Beautiful" affiliate groups in conservation projects.
- Encourage your agricultural extension agency to present xeriscape programs to local high school horticulture classes, garden clubs, and other interested groups.

Discuss your program for public awareness.

Non-promotional Water Rates

All water conservation plans for municipal uses by public drinking water suppliers must include…a water rate structure which is not "promotional," i.e., a rate structure which is cost-based and which does not encourage the excessive use of water. –30 TAC Chapter 288

Attach a copy of your water rates to the plan and summarize your rates here. If you need to impose a non-promotional water rate structure, or otherwise update your rates, discuss your plan here.

Reservoir Systems Operations Plan

All water conservation plans for municipal uses by public drinking water suppliers must include…a reservoir systems operations plan, if applicable, providing for the coordinated operation of reservoirs owned by the applicant within a common watershed or river basin in order to optimize available water supplies. –30 TAC Chapter 288

If this section applies to you, discuss your plan here. If you do not comply, please explain.

Additional Programs

If necessary to meet the 5 and 10-year target goals, you can add any other water conservation strategies to your plan. They should be discussed in detail here, and can include, but are not limited to:

- Conservation-oriented rate structures.

- Requiring structures undergoing substantial modification or addition to install water conserving plumbing fixtures
- Creating a program for the replacement or retrofit of water-conserving plumbing fixtures in existing structures
- Reusing and/or recycling of wastewater and/or graywater
- Creating a program for pressure control and/or reduction in the distribution system and/or for customer connections
- Creating a program and/or ordinance(s) for landscape water management

Additional Requirements for Systems Serving over 5,000 Population

Water conservation plans for municipal uses by public drinking water suppliers serving a current population of 5,000 or more and/or a projected population of 5,000 or more within the next ten years subsequent to the effective date of the plan must include the following elements: (A) a program of leak detection, repair, and water loss accounting for the water transmission, delivery, and distribution system in order to control unaccounted-for uses of water; (B) a record management system to record water pumped, water deliveries, water sales, and water losses which allows for the desegregation of water sales and uses into the following user classes: (i) residential; (ii) commercial; (iii) public and institutional; and (iv) industrial; and (C) a requirement in every wholesale water supply contract entered into or renewed after official adoption of the plan (by either ordinance, resolution, or tariff), and including any contract extension, that each successive wholesale customer develop and implement a water conservation plan or water conservation measures using the applicable elements in this chapter. If the customer intends to resell the water, the contract between the initial supplier and customer must provide that the contract for the resale of the water must have water conservation requirements so that each successive customer in the resale of the water will be required to implement water conservation measures in accordance with the provisions of this chapter. –30 TAC Chapter 288

If you are selling to a water provider who, in turn, intends to wholesale the water to a retail customer, your water supply contract, when renewed, must state that the subsequent wholesaler is required to have a water conservation plan in place. If this section applies, discuss the proposed contract changes here. If it does not apply, state why.

Schedule for Meeting Targets

In this section, please discuss your estimated timeline for implementing any programs noted in the “Required Program” section. For example, if you are proposing a meter replacement program, please discuss the schedule here.

Means of Implementation and Enforcement

All water conservation plans for municipal uses by public drinking water suppliers must include…a means of implementation and enforcement which shall be evidenced by: (i) a copy of the ordinance, resolution, or tariff indicating official adoption of the water conservation plan by the water supplier; and (ii) a description of the authority by which the water supplier will implement and enforce the conservation plan. –30 TAC Chapter 288

The ________________ (Mayor, President, etc.), or his/her designee, is hereby authorized to implement and enforce the water conservation plan.

The water conservation plan has made this plan official policy by means of a __________ (resolution, tariff, ordinance), passed on _______________ (date). A copy of the _______________ has been included at the end of the plan.

Revision/Updates

Beginning May 1, 2005, a public water supplier for municipal use shall review and update its water conservation plan, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information. The public water supplier for municipal use shall review and update the next revision of its water conservation plan not later than May 1, 2009, and every five years after that date to coincide with the regional water planning group. – 30 TAC Chapter 288

The ______________ (authorized representative) shall be responsible for updating and revising this plan five years after its adoption, or May 1, 2014, whichever is earlier.

PLAN FOR EMERGENCIES (DROUGHT CONTINGENCY)

A drought contingency plan is required for all public water suppliers, in addition to this Water conservation Plan. Please see the NETRWPG guidance documents for drought contingency plans Sections 6.6 and 6.7 herein, and use the one that is appropriate for you – either wholesale or retail.

1.2 MODEL WATER CONSERVATION PLAN – RETAIL WATER PROVIDERS

General Information

Introduction

Drought is a very real natural disaster that occurs in Texas, even in the verdant bottomlands, green pastures, and piney woods of northeast Texas. As recently as 2008, drought strained water systems in the northeast Texas region. In addition to natural drought, there are also water supply emergencies that occur from time to time in which water supply becomes contaminated. A good example of this is the Methyl Tertiary Butyl Ether (MTBE) spill into Lake Tawakoni in May 2000, which contaminated supply for several Hunt County water systems for multiple days.

In an effort to better respond to drought conditions than we've been able to in the past, the North East Texas Regional Water Planning Group (NETRWPG) has prepared this document, with the idea that if water providers study their water supply system before a drought or emergency occurs, then they will be better prepared to respond. In preparing this document, several references were used, including Chapters 288 and 363 of the Texas Administrative Code, the

Texas Commission on Environmental Quality's (TCEQ) 'Handbook for Drought Contingency Planning for Retail Public Water Suppliers,' Texas Water Code § 11.1272, and the TCEQ and TWDB websites. All of these resources are available to you if you need further information or clarification. You may also contact the TCEQ at 512-239-4691 with questions or for information. Example wording for your plan will be found throughout in bold italics.

According to the requirements set forth in the amended Chapter 288, Subchapter C of the Texas Administrative Code, retail public water suppliers providing water service to 3,300 or more connections must submit revisions to existing drought contingency plans to the executive director not later than May 1, 2009, and every five years after that date to coincide with the regional water planning group. Any new or revised plans must be submitted to the executive director within 90 days of adoption by the community water system. Any new retail public water suppliers providing water service to 3,300 or more connections shall prepare and adopt a drought contingency plan within 180 days of commencement of operation, and submit the plan to the executive director within 90 days of adoption. If you are a retail supplier, but serve less than 3,300 connections, you are still required to develop and implement a plan, but you do not need to submit the plan unless specifically requested by TCEQ. If you provide wholesale supply in addition to retail supply, you will also need to develop a wholesale drought contingency plan. Please see the North East Texas Region's guidance document for wholesale drought contingency plans.

The __________________(water provider) understands that water conservation is a viable strategy for protecting water resources both now and in the future, and that adequate planning for times of drought or emergency is a necessary part of conservation. The purpose of this plan is to prepare for the possibility of a drought or emergency situation where water is in short supply. This plan will help to ensure that _______________________(water supplier) uses water wisely and efficiently during periods of drought.

Though not specifically required by rule, it is helpful to the reader if you summarize your water supply and distribution systems in the introduction. This will familiarize users of the Plan with your system, and help them to make sense of the actions that you intend to take. In addition, discussing your water system here will assist those who update the plan in five years, because they will know exactly what the system looked like when the plan was created.

The ______________(water supplier) utilizes groundwater /surface water from _______________(source). Supply is secured by a (water right, water supply contract, etc.) through the year _____. We currently have _____ connections, and our average daily use is ____. Our storage and distribution systems consist of ____.

Coordination with the North East Texas Regional Water Planning Group

The drought contingency plan must document coordination with the regional water planning groups for the service area of the retail public water supplier to ensure consistency with the appropriate approved regional water plans. – 30 TAC Chapter 288

A copy of this adopted plan will be submitted to the NETRWPG via its administrator, Mr. Walt Sears, Northeast Texas Municipal Water District, P. O. Box 955, Hughes Springs, Texas 75656.

Informing the Public/Requesting Input

Preparation of the plan shall include provisions to actively inform the public and to affirmatively provide opportunity for user input. Such acts may include, but are not limited to, having a public meeting at a time and location convenient to the public and providing written notice to the public concerning the proposed plan and meeting. – 30 TAC Chapter 288

The ___________________________________(water supplier) gave the public an opportunity to provide input into this plan by ____________________________(public notice, public hearing, letter requesting comments, etc.). Public comments included _________________.

Efforts to inform the public about each stage of the plan, and when stages are implemented or rescinded, will be through ____________________________ (newspaper articles, radio announcements, website announcements, etc.).

Authorization/Applicability

The _________________ (mayor, president, city administrator, etc.) is hereby authorized to monitor the weather as well as water supply and demand conditions and to implement the Drought Contingency Plan as appropriate.

The ________________________(City Council, Board of Directors, etc.) authorizes the Plan by a ________________(resolution, ordinance), which has been included in this Plan.

Coordination with the Texas Commission on Environmental Quality

According to 30 TAC Chapter 288, Subchapter C, "For retail public water suppliers providing water service to 3,300 or more connections, the drought contingency plan must be submitted to the executive director not later than May 1, 2005. Thereafter, the retail public water suppliers providing service to 3,300 or more connections shall submit the next revision of the plan not later than May 1, 2009, and every five years after that date to coincide with the regional water planning group. Any new or revised plans must be submitted to the executive director within 90 days of adoption by the community water system. Any new retail public water suppliers providing water service to 3,300 or more connections shall prepare and adopt a drought contingency plan within 180 days of commencement of operation, and submit the plan to the executive director within 90 days of adoption."

This plan was submitted to the executive director of the Texas Commission on Environmental Quality on ________________________(date).

Send your plan to the following address: TCEQ, Resource Protection Team, Mail Code 160, P.O. Box 13087, Austin, TX 78711-3087 for regular and certified mail, or 12100 Park 35 Circle, Austin, TX 78753 for express carrier deliveries (U.S. Post Office Express Mail, FedEx, UPS, etc.).

If you serve less than 3,300 connections, the following rule applies:

For all the retail public water suppliers, the drought contingency plan must be prepared and adopted not later than May 1, 2005 and must be available for inspection by the executive director upon request. Thereafter, the retail public water suppliers shall prepare and adopt the next revision of the plan not later than May 1, 2009, and every five years after that date to coincide with the regional water planning group. Any new retail public water supplier providing water service to less than 3,300 connections shall prepare and adopt a drought contingency plan within 180 days of commencement of operation, and shall make the plan available for inspection by the executive director upon request. – 30 TAC Chapter 288

In other words, if you serve less than 3,300 connections, you are still required to prepare and adopt a plan, but you do not have to turn it in unless TCEQ asks for it. Your section would read:

Submission of this plan to the TCEQ was not required; however, the plan will be made available to TCEQ if requested.

For questions to the TCEQ, you can check the website at www.tceq.state.tx.us, or call 512/239-4691.

Coordination with Wholesale Water Supplier

This section only applies if you purchase supply from a wholesale provider. If you have a contract or an agreement with a water provider, then complete this section. If you have water rights or otherwise own your supply, this section does not apply.

This plan has been created with consideration of our water provider, ________________'s drought contingency plan. We have included __________________'s (water provider) requirements within our plan and have created this plan to compliment _____________'s (water provider) plan. ______________(water provider) has been provided a copy of this plan.

Plan Definitions

For the purposes of this Plan, the following definitions, taken from TCEQ guidance, shall apply:

<u>Aesthetic water use</u>: water use for ornamental or decorative purposes such as fountains, reflecting pools, and water gardens.

<u>Commercial and institutional water use</u>: water use which is integral to the operations of commercial and non-profit establishments and governmental entities such as retail establishments, hotels and motels, restaurants, and office buildings.

***Conservation**: those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water or increase the recycling and reuse of water so that a supply is conserved and made available for future or alternative uses.*

***Customer**: any person, company, or organization using water supplied by _________________ (name of water supplier).*

***Domestic water use**: water use for personal needs or for household or sanitary purposes such as drinking, bathing, heating, cooking, sanitation, or for cleaning a residence, business, industry, or institution.*

***Even number address**: street addresses, box numbers, or rural postal route numbers ending in 0, 2, 4, 6, or 8 and locations without addresses.*

***Industrial water use**: the use of water in processes designed to convert materials of lower value into forms having greater usability and value.*

***Landscape irrigation use**: water used for the irrigation and maintenance of landscaped areas, whether publicly or privately owned, including residential and commercial lawns, gardens, golf courses, parks, rights-of-way and medians.*

***Non-essential water use**: water uses that are not essential nor required for the protection of public, health, safety, and welfare, including:*

- *(a) irrigation of landscape areas, including parks, athletic fields, and golf courses, except otherwise provided under this Plan;*
- *(b) use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle;*
- *(c) use of water to wash down any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;*
- *(d) use of water to wash down buildings or structures for purposes other than immediate fire protection;*
- *(e) flushing gutters or permitting water to run or accumulate in any gutter or street;*
- *(f) use of water to fill, refill, or add to any indoor or outdoor swimming pools or jacuzzi-type pools;*
- *(g) use of water in a fountain or pond for aesthetic or scenic purposes except where necessary to support aquatic life;*
- *(h) failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s); and*
- *(i) use of water from hydrants for construction purposes or any other purposes other than fire fighting.*

***Odd numbered address**: street addresses, box numbers, or rural postal route numbers ending in 1, 3, 5, 7, or 9.*

RESPONSE TO A DROUGHT EVENT

In this portion of the plan, it will need to be determined whether a water constraint will more likely be caused by a shortage in water supply or by constraints in your storage and distribution system. Associated goals and water management measures should correspond to the type of constraint expected. For example, if insufficient storage is determined to be the most likely cause of water shortage during a drought, then an emergency back-up supply source would not solve the problem; reduced use during peak hours (banning lawn watering, etc.) would more likely solve the problem by giving storage tanks a better opportunity to refill.

The drought contingency plan should be designed for a drought condition at least as severe as the drought of record according to TCEQ rules. Since the drought of record in Texas occurred in the 1950's, few systems will have water use records still available to plan by. Therefore, the NETRWPG suggests using the most recent drought for the State, which occurred in 1996. If your system does not have records for 1996, use the time period in your records when your system was the most strained by dry weather conditions.

During each stage, it will need to be determined what will trigger initiation, what the water use reduction target goal is, what water management strategies will be put into place, and, finally, what will terminate the stage. Keep in mind that a supplier which is also a customer of its wholesale provider must comply with its provider's Drought Contingency Plan (DCP). Do not develop stages or management strategies that are in conflict with your water provider's DCP.

Stage 1 – Mild Water Shortage

Initiation: The _______________________(water supplier) will consider that a mild water shortage exists when__________________________________ (i.e. water levels in the reservoir reach_____; average daily water use reaches ___% of capacity for three consecutive days; water level in elevated storage tank is at or below ____ for more than 12 hours, etc***.), or when requested by __________*** (entity's water provider) if applicable.

Target Goal: When a mild water shortage exists, the ____________________(water supplier) will implement water management strategies in an attempt to reduce daily water use to ___________________________(i.e. 2 MGD; ___% of average daily water use, etc.) Please note that this goal must be quantifiable. Goals established in this section are not enforceable.

Termination: Stage 1 shall be rescinded when ____________________________ (i.e. water levels in the reservoir rise above ___ for 7 consecutive days; average daily water use falls below ___% of capacity for three consecutive days; storage facilities return to normal levels for 24 consecutive hours, etc.), ***or when Stage I is rescinded by ___________________________***(entity's water provider) if applicable.

Water Management Strategies: During Stage 1, we will take the following steps to reduce water use:_______________.

The following are examples of strategies that are commonly used during this stage. These are not mandatory, only suggestive. When determining strategies, remember the type of constraint you expect on your system and plan accordingly.

- Request voluntary water conservation from all customers
- Reduce operating procedures that use water (i.e. flushing of mains) as appropriate
- Cease providing potable water for dust control, road building and similar construction purposes
- Enhance water supply and demand monitoring, as well as leak detection and repair efforts
- Request that water customers voluntarily limit the irrigation of landscaped areas
- Request that non-essential water uses be eliminated, including:

    1. Wash down of any sidewalks, walkways, driveways, parking lots, or other hard-surfaced areas;
    2. Wash down of buildings or structures for purposes other than immediate fire protection;
    3. Use of water for dust control;
    4. Flushing gutters or permitting water to run or accumulate in any gutter or street; and,
    5. Failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s).

Stage 2 – Moderate Water Shortage

Initiation: The ______________________(water supplier) will consider that a moderate water shortage exists when_________________________________(i.e. water levels in the reservoir reach_____; average daily water use reaches ___% of capacity for three consecutive days; water level in elevated storage tank is at or below ____ for more than 12 hours, etc.), ***or when requested by __________*** (entity's water provider) if applicable.

Target Goal: When a moderate water shortage exists, the ____________________(water supplier) will implement water management strategies in an attempt to reduce daily water use to __________________________(i.e. 2 MGD; ___% of average daily water use, etc.) Please note that this goal must be quantifiable. Goals established in this section are not enforceable.

Termination: Stage 2 shall be rescinded when ___________________________ (i.e. water levels in the reservoir rise above ___ for 7 consecutive days; average daily water use falls below ___% of capacity for three consecutive days; storage facilities return to normal levels for 24 consecutive hours, etc.), ***or when Stage 2 is rescinded by _________________________***(entity's water provider) if applicable. ***Upon termination of Stage 2, Stage 1 becomes operative.***

Water Management Strategies: During Stage 2, we will take the following steps to reduce water use:_______________.

The following are examples of strategies that are commonly used during this stage. These are not mandatory, only suggestive. When determining strategies, remember the type of constraint you expect on your system and plan accordingly.

- Modify reservoir operations if applicable
- Cease providing potable water for dust control, road building and similar construction purposes
- Enhance water supply and demand monitoring, as well as leak detection and repair efforts
- Limit use of water from hydrants to fire fighting, related activities, or other activities necessary to maintain public health, safety, and welfare
- Restrict irrigation of landscaped areas, for example, "Irrigation of landscape areas with hose-end sprinklers or automatic irrigation systems shall be prohibited except during the evening hours between 10:00 p.m. and 6:00 a.m. However, irrigation of landscaped areas is permitted at anytime if it is by means of a hand-held hose, a faucet filled bucket or watering can of five (5) gallons or less, or a drip irrigation system." Please consider your individual system when restricting landscape watering. Allow watering when other types of water use are low to prevent strain on your system. Only use even/odd water days if you know it will work for your system – this type of watering plan can sometimes encourage lawn watering that otherwise wouldn't take place.
- Prohibit use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle. Vehicle washing may be done at any time on the immediate premises of a commercial car wash or commercial service station.
- Prohibit use of water to fill, refill, or add to any indoor or outdoor swimming pools, wading pools, or Jacuzzi-type pools.
- Prohibit operation of any ornamental fountain or pond for aesthetic or scenic purposes except where necessary to support aquatic life.
- Prohibit non-essential water uses such as:
    1. Wash down of any sidewalks, walkways, driveways, parking lots, or other hard-surfaced areas;
    2. Wash down of buildings or structures for purposes other than immediate fire protection;
    3. Use of water for dust control;
    4. Flushing gutters or permitting water to run or accumulate in any gutter or street;
    5. Failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s).

Stage 3 – Severe Water Shortage

***Initiation: The ______________________(water supplier) will consider that a severe water shortage exists when*__________________________________**(i.e. water levels in the reservoir reach_____; average daily water use reaches ___% of capacity for three consecutive days; water level in elevated storage tank is at or below ____ for more than 12 hours, etc.), ***or when requested by* __________** (entity's water provider) if applicable.

Target Goal: When a severe water shortage exists, the ____________________(water supplier) ***will implement water management strategies in an attempt to reduce daily water use to __________________________***(i.e. 2 MGD; ___% of average daily water use, etc.) Please note that this goal must be quantifiable. Goals established in this section are not enforceable.

Termination: Stage 3 shall be rescinded when ____________________________ (i.e. water levels in the reservoir rise above ___ for 7 consecutive days; average daily water use falls below ___% of capacity for three consecutive days; storage facilities return to normal levels for 24 consecutive hours, etc.), ***or when Stage 3 is rescinded by*** ___________________________(entity's water provider) if applicable. ***Upon termination of Stage 3, Stage 2 becomes operative.***

Water Management Strategies: During Stage 3, we will take the following steps to reduce water use:_______________.

The following are examples of strategies that are commonly used during this stage. These are not mandatory, only suggestive. When determining strategies, remember the type of constraint you expect on your system and plan accordingly.

- All of the strategies in Stage 2 are appropriate in Stage 3, except that landscape watering may need to be prohibited
- Implement water rate surcharges *(i.e. a set charge for any use above average monthly use)*
- Implement price adjustments *(i.e. increase the price per 1,000 gallons of water used above the average monthly use)*
- Utilize alternate or emergency water sources

<u>Stage 4 – Emergency Water Shortage</u>

This stage could apply in the instance of a major water line break, a contamination of the water supply source, or other urgent water system conditions. Most likely, this stage would be initiated by decision of the authorized plan implementer (Mayor, President, Manager, etc.)

Initiation: The _______________________(water supplier) will consider that an emergency water shortage exists when___________________________________ (i.e. the water main at the water treatment plant bursts or is otherwise significantly damaged; the reservoir is contaminated by oil spill; etc.,), ***or when requested by ___________*** (entity's water provider) if applicable.

Target Goal: When an emergency water shortage exists, the _____________________(water supplier) will implement water management strategies in an attempt to reduce daily water use to ___________________________(i.e. 2 MGD; ___% of average daily water use, etc.) Please note that this goal must be quantifiable. Goals established in this section are not enforceable.

Termination: Stage 4 shall be rescinded when __________________________ (i.e. the main at the water treatment plant is restored and storage tanks have been allowed to refill; analysis of the source water indicates that supply is safe to use; etc.), ***or when Stage 4 is rescinded by __________________________***(entity's water provider) if applicable.

Water Management Strategies: During Stage 4, we will take the following steps to reduce water use:________________.

The following are examples of strategies that are commonly used during this stage. These are not mandatory, only suggestive. When determining strategies, remember the type of constraint you expect on your system and plan accordingly.

- Utilize alternative or emergency water supplies (i.e. tying into a neighboring water system, etc. (This may require approval by the TCEQ Executive Director)
- Modify reservoir operations
- All strategies that are used in Stage 3 could be applicable in Stage 4

PLAN EXECUTION

Public Involvement

This section should discuss the ways in which the supplier will inform its customers about the initiation and termination of drought stages, as well as management strategies that customers are expected to follow. Public involvement can be in the form of special public hearings, articles and notices in the local newspaper, radio announcements, announcements on local television stations, notices in billing statements, etc.

The _____________________ (water provider) will keep its customers apprised of initiation of the drought contingency plan, and changes in stages, by means of ___________________________.

Enforcement

The ______________ (Mayor, City Manager, President, etc.), or his/her designee, is responsible for monitoring weather conditions and water supply and determining when to initiate and terminate the stages of the DCP.

The _______________ (governing body) ***has adopted this plan through ___________*** (ordinance, resolution), ***and has made it an official _________*** (city, Corporation, etc.) ***policy. The _______________*** (ordinance, resolution, etc.) ***is attached hereto as Figure ___.***

Provision for responding to wholesale provider restrictions

Any water supplier that receives all or a portion of its water supply from another water supplier shall consult with that supplier and shall include in the drought contingency plan appropriate provisions for responding to reductions in that water supply. – 30 TAC Chapter 288

If you have a wholesale provider, then add this section. If you own your own supply, please skip this section.

> ***As stated in each water shortage stage, we intend to comply with all requirements of our wholesale provider's drought contingency plan. This plan is as stringent as our provider's plan, and in some cases may be more so.***

Notification of TCEQ on mandatory provisions

A wholesale or retail water supplier shall notify the executive director within five business days of the implementation of any mandatory provisions of the drought contingency plan. – 30 TAC Chapter 288

> ***The Executive Director at TCEQ shall be notified with 5 business days if any mandatory provisions of this plan are implemented.*** *The Executive Director can be reached at 512-239-3900.*

Variance procedures

The drought contingency plan must include procedures for granting variances to the plan. – 30 TAC Chapter 288

The _____________ (authorized representative) may, in writing, grant temporary variance for existing water uses otherwise prohibited under this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the health, sanitation, or fire protection for the public or the customer requesting such variance and if one or more of the following conditions are met:

- ***a) Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.***
- ***b) Alternative methods can be implemented which will achieve the same level of reduction in water use.***

Customers requesting an exemption from the provisions of this Plan shall file a petition for variance with the ______________ (water supplier) within 5 days after the Plan or a particular drought response stage has been invoked. All petitions for variances shall be reviewed by the _________ (authorized representative), and shall include the following:

- ***a) Name and address of the petitioner(s).***

b) ***Purpose of water use.***
c) ***Specific provision(s) of the Plan from which the petitioner is requesting relief.***
d) ***Detailed statement as to how the specific provision of the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Ordinance.***
e) ***Description of the relief requested.***
f) ***Period of time for which the variance is sought.***
g) ***Alternative water use restrictions or other measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.***
h) ***Other pertinent information.***

Variances granted by the _______________ (water supplier) shall be subject to the following conditions, unless waived or modified:

a) ***Variances granted shall include a timetable for compliance.***
b) ***Variances granted shall expire when the Plan is no longer in effect, unless the petitioner has failed to meet specified requirements.***

No variance shall be retroactive or otherwise justify any violation of this Plan occurring prior to the issuance of the variance.

5-year updates

The retail public water supplier shall review and update, as appropriate, the drought contingency plan, at least every five years, based on new or updated information, such as the adoption or revision of the regional water plan. – 30 TAC Chapter 288

This plan shall be revaluated and updated every five years based on the most recent information; especially the latest adopted NETRWPG Regional Water Plan.

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County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Year 2020	2030	2040	2050	2060	2070	Strategy	Contingency	Seller (if applicable)	Supply Source Groundwater	Supply Source Surface Water	County	Basin	Reliability of Source	Total Capital Cost	Total Annual Cost
BOWIE	DE KALB	-304	-303	-299	-298	-297	-297										
		304	303	299	298	297	297	RENEW EXISTING CONTRACT	TEXARKANA/RIVERBEND STRATEGIES	TEXARKANA		WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	SULPHUR	HIGH	$ -	$ 74,000
BOWIE	HOOKS	-265	-258	-249	-244	-243	-243										
		265	258	249	244	243	243	RENEW EXISTING CONTRACT	TEXARKANA/RIVERBEND STRATEGIES	TEXARKANA		WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	SULPHUR	HIGH	$ -	$ 64,000
BOWIE	IRRIGATION BOWIE	-5,240	-5,240	-5,079	-4,676	-4,300	-4,140										
		3,700	3,700	3,638	3,483	3,338	3,276	DRILL NEW WELLS			CARRIZO-WILCOX AQUIFER		BOWIE	SULPHUR	HIGH	$ 2,021,000	$ 2,053,000
		1,540	1,525	1,441	1,193	1,000	1,000	DRILL NEW WELLS			NACATOCH AQUIFER		BOWIE	RED	HIGH	$ 1,466,000	$ 923,000
		0	15	0	0	0	0	VOLUNTARY REALLOCATION BOWIE COUNTY OTHER TO IRRIGATION			NACATOCH AQUIFER		BOWIE		HIGH	$ -	$ -
BOWIE	MACEDONIA-EYLAU MUD #1	-565	-574	-577	-577	-577	-577										
		565	574	577	577	577	577	RENEW EXISTING CONTRACT	TEXARKANA/RIVERBEND STRATEGIES	TEXARKANA		WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	SULPHUR	HIGH	$ -	$ 278,000
BOWIE	MAUD	-170	-169	-167	-165	-164	-164										
		170	169	167	165	164	164	RENEW EXISTING CONTRACT	TEXARKANA/RIVERBEND STRATEGIES	TEXARKANA		WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	SULPHUR	HIGH	$ -	$ 41,000
BOWIE	NASH	-206	-212	-214	-214	-214	-214										
		206	212	214	214	214	214	RENEW EXISTING CONTRACT	TEXARKANA/RIVERBEND STRATEGIES	TEXARKANA		WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	SULPHUR	HIGH	$ -	$ 52,000
BOWIE	NEW BOSTON	-1,098	-1,104	-1,094	-1,091	-1,089	-1,089										
		1,098	1,104	1,094	1,091	1,089	1,089	RENEW EXISTING CONTRACT	TEXARKANA/RIVERBEND STRATEGIES	TEXARKANA		WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	SULPHUR	HIGH	$ -	$ 268,000
BOWIE	REDWATER	-82	-82	-79	-77	-77	-77										
		82	82	79	77	77	77	RENEW EXISTING CONTRACT	TEXARKANA/RIVERBEND STRATEGIES	TEXARKANA		WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	SULPHUR	HIGH	$ -	$ 20,000
BOWIE	TEXAMERICAS CENTER	-514	-527	-529	-528	-528	-528										
		514	527	530	530	530	530	RENEW EXISTING CONTRACT	TEXARKANA/RIVERBEND STRATEGIES	TEXARKANA		WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	SULPHUR	HIGH	$ -	$ 256,000
BOWIE	TEXARKANA	0	0	-12,938	-12,865	-12,852	-12,851										
		6,403	6,664	6,815	6,742	6,729	6,728	ADVANCED WATER CONSERVATION					BOWIE	SULPHUR	HIGH	$ -	$ 4,037,000
						2,000	18,000	DREDGE WRIGHT PATMAN				WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	SULPHUR	HIGH	$ 205,862,000	$ 17,226,000
		6,368	6,664	6,815	6,742	6,729	6,728	RIVERBEND STRATEGY				WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	SULPHUR	HIGH	$ 117,116,000	$ 16,386,000
BOWIE	WAKE VILLAGE	-677	-669	-654	-644	-642	-642										
		677	669	654	644	642	642	RENEW EXISTING CONTRACT	TEXARKANA/RIVERBEND STRATEGIES	TEXARKANA		WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	SULPHUR	HIGH	$ -	$ 164,000
CAMP	BI COUNTY WSC	0	0	0	0	-113	-226										
		0	0	0	0	161	269	DRILL NEW WELLS			QUEEN CITY AQUIFER		CAMP	CYPRESS	HIGH	$ 2,493,000	$ 254,000
CASS	MANUFACTURING CASS	-115	-1,305	-7,189	-12,277	-21,252	-62,827										
		0	0	0	0	16,000	47,990	INCREASE EXISTING CONTRACT	TEXARKANA ADVANCED WATER CONSERVATION DREDGE WRIGHT PATMAN	TEXARKANA		WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	SULPHUR	HIGH		
		151	151	151	151	151	151	DRILL NEW WELLS			CARRIZO-WILCOX AQUIFER		CASS	CYPRESS	HIGH	$ 894,000	$ 164,000
		11,508	12,123	12,711	13,219	14,116	15,073	ADVANCED WATER CONSERVATION			CARRIZO-WILCOX AQUIFER		CASS	CYPRESS	HIGH	$ -	$ -
GREGG	MINING GREGG	-204	-354	-341	-239	-139	-64										
		54	54	54	54	54	54	DRILL NEW WELLS			CARRIZO-WILCOX AQUIFER		GREGG	CYPRESS	HIGH	$ 377,000	$ 37,000
		226	339	339	339	339	339	DRILL NEW WELLS			CARRIZO-WILCOX AQUIFER		GREGG	SABINE	HIGH	$ 1,566,000	$ 144,000

County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Year						Strategy	Contingency	Seller (if applicable)	Supply Source		County	Basin	Reliability of Source	Total Capital Cost	Total Annual Cost
		2020	2030	2040	2050	2060	2070				Groundwater	Surface Water					
HARRISON	IRRIGATION HARRISON	-233	-233	-233	-233	-233	-233										
		236	236	236	236	236	236	DRILL NEW WELLS			CARRIZO-WILCOX AQUIFER		HARRISON	CYPRESS	HIGH	$ 1,092,000	$ 102,000
		54	54	54	54	54	54	DRILL NEW WELLS			CARRIZO-WILCOX AQUIFER		HARRISON	SABINE	HIGH	$ 377,000	$ 37,000
HARRISON	MANUFACTURING HARRISON	-55,006	-64,084	-73,156	-81,083	-90,381	-100,394										
		9,501	10,408	11,316	12,108	13,038	14,039	ADVANCED WATER CONSERVATION					HARRISON	SABINE	HIGH	$ -	$ -
		50,000	55,000	65,000	70,000	80,000	0	TOLEDO BEND INTAKE AND RAW WATER PIPELINE		SABINE RIVER AUTHORITY		TOLEDO BEND RESERVOIR	SHELBY	SABINE	HIGH	$ 498,773,000	$ 53,051,000
		0	0	0	0	0	86,355	UNMET NEED									
HARRISON	MARSHALL	0	0	0	0	-41	-701										
		0	0	0	0	41	701	INCREASE EXISTING CONTRACT		NETMWD		O' THE PINES LAKE/RESERVOIR	MARION	CYPRESS	HIGH	$ 4,738,000	$ 1,088,000
HARRISON	MINING HARRISON	-1,633	-1,194	-839	-493	-212	-18										
		324	324	324	324	108	0	DRILL NEW WELLS			CARRIZO-WILCOX AQUIFER		HARRISON	CYPRESS	HIGH	$ 1,438,000	$ 134,000
		1,398	1,398	1,398	1,398	1,398	1,398	DRILL NEW WELLS			CARRIZO-WILCOX AQUIFER		HARRISON	SABINE	HIGH	$ 5,994,000	$ 578,000
HARRISON	STEAM ELECTRIC POWER HARRISON	-1,838	-5,193	-9,283	-14,268	-20,345	-28,625										
		2,000	6,000	10,000	15,000	21,000	47,000	TOLEDO BEND INTAKE AND RAW WATER PIPELINE		SABINE RIVER AUTHORITY		TOLEDO BEND RESERVOIR	SHELBY	SABINE	HIGH	$ 498,773,000	$ 53,051,000
HARRISON	WASKOM	-6	-20	-37	-67	-104	-148										
		46	46	46	92	138	184	DRILL NEW WELLS			CARRIZO-WILCOX AQUIFER		HARRISON	CYPRESS	HIGH	$ 1,495,000	$ 161,000
HOPKINS	BRINKER WSC	0	0	0	0	-29	-63										
		0	0	0	0	29	63	INCREASE EXISTING CONTRACT		SULPHUR SPRINGS		SULPHUR SPRINGS LAKE/RESERVOIR	HOPKINS	SULPHUR	HIGH	$ -	$ 74,100
HOPKINS	CUMBY	0	-12	-25	-42	-59	-77										
		0	79	78	76	75	73	DRILL NEW WELLS			NACATOCH AQUIFER		HOPKINS	SABINE	HIGH	$ 772,000	$ 128,000
		0	1	2	4	5	7	DRILL NEW WELLS			NACATOCH AQUIFER		HOPKINS	SULPHUR	HIGH	SEE ABOVE	SEE ABOVE
HOPKINS	IRRIGATION HOPKINS	-2,126	-2,126	-2,126	-2,126	-2,126	-2,126										
		210	210	210	210	210	210	DRILL NEW WELLS			CARRIZO-WILCOX AQUIFER		HOPKINS	CYPRESS	HIGH	$ 33,000	$ 140,000
		610	610	610	610	610	610	DRILL NEW WELLS			CARRIZO-WILCOX AQUIFER		HOPKINS	SABINE	HIGH	$ 681,000	$ 374,000
		1,306	1,306	1,306	1,306	1,306	1,306	SULPHUR SPRINGS RAW WATER PIPELINE		SULPHUR SPRINGS		SULPHUR SPRINGS LAKE/RESERVOIR	HOPKINS	SULPHUR	HIGH	$ 4,758,000	$ 2,132,000
HOPKINS	MARTIN SPRINGS WSC	0	0	0	0	-43	-115										
		0	0	0	0	60	120	DRILL NEW WELLS			CARRIZO-WILCOX AQUIFER		HOPKINS	SABINE	HIGH	$ 1,184,000	$ 184,000
HOPKINS	MINING HOPKINS	-227	-283	-360	-444	-533	-639										
		320	320	440	540	540	640	UNMET NEED									
HUNT	ABLES SPRINGS WSC	-4	-22	-38	-64	-103	-170										
		2	4	3	6	9	15	ADVANCED WATER CONSERVATION	REGION C STRATEGY				HUNT	SABINE	HIGH	REGION C COSTING	
		86	184	278	391	544	756	INCREASE EXISTING CONTRACT	REGION C STRATEGY	NTMWD			HUNT	SABINE	HIGH	REGION C COSTING	
HUNT	BLACKLAND WSC	-1	-2	-2	-2	-3	-3										
		12	19	22	26	31	36	ADVANCED WATER CONSERVATION	REGION C STRATEGY				HUNT	SABINE	HIGH	REGION C COSTING	
		48	153	204	246	296	356	DIRECT CONNECTION AND ADDITIONAL WATER	REGION C STRATEGY	NTMWD			HUNT	SABINE	HIGH	REGION C COSTING	
HUNT	CADDO BASIN SUD	-77	-285	-466	-515	-792	-1,235										
		2	3	4	7	10	14	ADVANCED WATER CONSERVATION	REGION C STRATEGY				HUNT	SABINE	HIGH	REGION C COSTING	
		75	282	462	609	613	570	NEW CONTRACT	GREENVILLE WTP EXPANSION AND VOLUNTARY REALLOC OF HUNT MAN SURPLUS	GREENVILLE		TAWAKONI LAKE /RESERVOIR	HUNT	SABINE	HIGH	$ -	$ 1,357,000
		0	0	0	77	409	967	NEW CONTRACT	GREENVILLE CHAPMAN RAW WATER PIPELINE	GREENVILLE		CHAPMAN /COOPER LAKE /RESERVOIR NON-SYSTEM PORTION	HUNT	SULPHUR	HIGH	SEE ABOVE	SEE ABOVE

County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Year						Strategy	Contingency	Seller (if applicable)	Supply Source		County	Basin	Reliability of Source	Total Capital Cost	Total Annual Cost
		2020	2030	2040	2050	2060	2070				Groundwater	Surface Water					
HUNT	CADDO MILLS	0	-1	-36	-68	-108	-255										
		0	1	36	68	108	255	INCREASE EXISTING CONTRACT	GREENVILLE WTP EXPANSION AND VOLUNTARY REALLOC OF HUNT MAN SURPLUS	GREENVILLE		TAWAKONI LAKE /RESERVOIR	HUNT	SABINE	HIGH	$ -	$ 225,000
HUNT	CELESTE	0	0	0	-28	-100	-204										
		0	0	0	102	102	204	DRILL NEW WELLS			WOODBINE AQUIFER		HUNT	SABINE	HIGH	$ 2,368,000	$ 324,000
HUNT	COMMERCE WD	0	0	0	0	0	0										
		0	36	134	268	338	388	VOLUNTARY REALLOCATION OF HUNT MANUFACTURING SUPPLY FROM TAWAKONI TO NORTH HUNT SUD				TAWAKONI LAKE /RESERVOIR	HUNT	SABINE	HIGH	$ -	$ -
HUNT	COUNTY-OTHER HUNT	0	-433	-1,314	-1,759	-4,102	-7,564										
		0	600	1,200	1,800	2,385	2,387	DRILL NEW WELLS			NACATOCH AQUIFER		HUNT	SABINE	HIGH	$ 9,582,000	$ 2,203,000
		0	0	670	670	670	551	POETRY WSC INCREASE CONTRACT	SRA VOLUNTARY REALLOCATION WEST TAWAKONI SURPLUS TO POETRY WSC	SABINE RIVER AUTHORITY		TAWAKONI LAKE /RESERVOIR	HUNT	SABINE	HIGH	$ -	$ 1,150,000
		0	0	0	0	1,045	628	POETRY WSC INCREASE CONTRACT	SRA VOLUNTARY REALLOCATION COMBINED CONSUMERS SUD SURPLUS TO POETRY WSC	SABINE RIVER AUTHORITY		FORK LAKE /RESERVOIR	HUNT	SABINE	HIGH	$ -	$ 1,794,000
		0	0	0	0	0	3,990	GREENVILLE TIE-IN PIPELINE	SRA TOLEDO BEND TRANSFER AND GREENVILLE TOLEDO BEND TIE-IN PIPELINE	GREENVILLE		TOLEDO BEND RESERVOIR	SHELBY	SABINE	HIGH	$ 25,670,000	$ 6,000,000
HUNT	GREENVILLE	-3,299	-4,847	-6,900	-7,521	-9,361	-14,315										
		484	546	613	677	721	825	VOLUNTARY REALLOCATION OF HUNT MANUFACTURING SURPLUS	GREENVILLE WTP EXPANSION			TAWAKONI LAKE /RESERVOIR	HUNT	SABINE	HIGH	$ -	$ -
		3,224	6,351	6,550	4,650	3,046	2,942	WTP EXPANSION				GREENVILLE SYSTEM	HUNT	SABINE	HIGH	$ 36,074,000	$ 5,601,000
		0	0	0	10,223	9,891	9,333	CHAPMAN RAW WATER PIPELINE AND NEW WTP		SULPHUR SPRINGS		CHAPMAN /COOPER LAKE /RESERVOIR NON-SYSTEM PORTION	HUNT	SULPHUR	HIGH	$ 193,438,000	$ 28,159,000
		0	0	0	0	0	5,100	TOLEDO BEND TIE-IN PIPELINE	SRA TOLEDO BEND TRANSFER	SABINE RIVER AUTHORITY		TOLEDO BEND RESERVOIR	SHELBY	SABINE	HIGH	$ 42,470,000	$ 5,171,000
HUNT	HICKORY CREEK SUD	0	0	-95	-416	-882	-1,568										
		0	0	0	189	378	463	DRILL NEW WELLS			TRINITY AQUIFER		HUNT	SABINE	HIGH	$ 4,597,000	$ 702,000
		0	0	189	378	567	1,138	DRILL NEW WELLS			WOODBINE AQUIFER		HUNT	SABINE	HIGH	$ 9,190,000	$ 1,500,000
HUNT	IRRIGATION HUNT	-146	-146	-146	-146	-146	-146										
		150	150	150	150	146	146	DRILL NEW WELLS			NACATOCH AQUIFER		HUNT	SABINE	HIGH	$ 282,000	$ 108,000
HUNT	JOSEPHINE	0	-8	-16	-27	-31	-34										
		2	4	5	9	11	13	ADVANCED WATER CONSERVATION	REGION C STRATEGY				HUNT	SABINE	HIGH	REGION C COSTING	
		38	121	201	286	311	339	INCREASE EXISTING CONTRACT	REGION C STRATEGY	NTMWD			HUNT	SABINE	HIGH	REGION C COSTING	
HUNT	LONE OAK	0	0	0	0	0	-56						HUNT	SABINE			
		0	0	0	0	0	56	INCREASE EXISTING CONTRACT		CASH SUD		TAWAKONI LAKE /RESERVOIR	HUNT	SABINE	HIGH	$ -	$ 96,000
HUNT	MINING HUNT	-73	-64	-35	-19	-7	0										
		75	75	75	75	7	0	DRILL NEW WELLS			NACATOCH AQUIFER		HUNT	SABINE	HIGH	$ 254,000	$ 68,000
HUNT	NORTH HUNT SUD	0	-36	-134	-268	-460	-738										
		0	36	134	268	338	388	INCREASE EXISTING CONTRACT	COMMERCE VOLUNTARY REALLOCATION OF HUNT MANUFACTURING SUPPLY FROM CHAPMAN TO NORTH HUNT SUD	COMMERCE WD		CHAPMAN LAKE/RESERVOIR	HUNT	SULPHUR	HIGH	$ -	$ -
		0	0	0	0	122	350	DELTA COUNTY PIPELINE		DELTA COUNTY-OTHER (DELTA CO. MUD)		BIG CREEK LAKE /RESERVOIR	HUNT	SULPHUR	HIGH	$ 1,774,000	$ 495,000

		Projected Deficit (-) / Recommendation (ac-ft/yr) by Year									Supply Source						
County	Entity	2020	2030	2040	2050	2060	2070	Strategy	Contingency	Seller (if applicable)	Groundwater	Surface Water	County	Basin	Reliability of Source	Total Capital Cost	Total Annual Cost
HUNT	ROYSE CITY	-4	-12	-20	-26	-40	-61										
		4	12	20	26	40	61	ADVANCED WATER CONSERVATION	REGION C STRATEGY				HUNT	SABINE	HIGH	REGION C COSTING	
HUNT	SABINE RIVER AUTHORITY	0	0	0	0	0	0										
		0	0	670	670	670	551	SRA VOLUNTARY REALLOCATION WEST TAWAKONI SURPLUS TO POETRY WSC				TAWAKONI LAKE/RESERVOIR	HUNT	SABINE	HIGH	$ -	$ -
		0	0	0	0	1,045	628	VOLUNTARY REALLOCATION COMBINED CONSUMERS SUD SURPLUS PURCHASE FROM SRA TO POETRY WSC				FORK LAKE/RESERVOIR	HUNT	SABINE	HIGH	$ -	$ -
HUNT	STEAM ELECTRIC POWER HUNT	-12,085	-14,188	-16,751	-19,877	-23,687	-28,213										
		7,448	7,398	9,141	8,988	9,038	12,061	ADVANCED WATER CONSERVATION					HUNT	SABINE	HIGH	$ -	$ -
		-4,637	-6,790	-7,610	-10,889	-14,649	-16,152	UNMET NEED									
HUNT	WOLFE CITY	0	0	0	-30	-128	-271										
		0	0	0	81	192	271	DRILL NEW WELLS			WOODBINE AQUIFER		HUNT	SULPHUR	HIGH	$ 3,889,000	$ 465,000
LAMAR	COUNTY-OTHER LAMAR	-67	-81	-83	-96	-107	-116										
		116	116	116	116	116	116	INCREASE EXISTING CONTRACT		LAMAR COUNTY WSD		PAT MAYSE LAKE/RESERVOIR	LAMAR	RED	HIGH	$ -	$ 189,000
LAMAR	IRRIGATION LAMAR	-18,312	-18,308	-18,305	-18,302	-18,299	-18,302										
		18,312	18,308	18,305	18,302	18,299	18,302	PAT MAYSE RAW WATER PIPELINE		PARIS		PAT MAYSE LAKE/RESERVOIR	LAMR	RED	HIGH	$ 7,875,000	$ 5,364,000
LAMAR	MANUFACTURING LAMAR	-565	-592	-620	-642	-685	-951										
		565	592	620	642	685	834	ADVANCED WATER CONSERVATION					LAMAR	RED	HIGH	$ -	$ -
		0	0	0	0	0	120	DRILL NEW WELLS			BLOSSOM AQUIFER		LAMAR	RED	HIGH	$ 76,000	$ 68,000
LAMAR	STEAM ELECTRIC LAMAR	0	-980	-2,733	-4,870	-7,474	-10,568										
		0	1,415	2,733	4,870	7,474	10,568	INCREASE EXISTING CONTRACT		PARIS		PAT MAYSE LAKE/RESERVOIR	LAMAR	RED	HIGH	$ -	$ 1,722,000
MARION	MINING MARION	-373	-645	-590	-471	-352	-265										
		432	648	648	648	648	648	DRILL NEW WELLS			QUEEN CITY AQUIFER		MARION	CYPRESS	HIGH	$ 3,108,000	$ 294,000
MORRIS	MANUFACTURING MORRIS	0	0	0	0	0	-2,763										
		9,593	10,210	10,780	11,242	12,129	13,087	ADVANCED WATER CONSERVATION					MORRIS	CYPRESS	HIGH		
MORRIS	TRI SUD	-164	-161	-160	-163	-166	-170										
		164	161	160	163	166	170	RENEW AND INCREASE EXISTING CONTRACT		MOUNT PLEASANT		BOB SANDLIN LAKE/RESERVOIR	TITUS	CYPRESS	HIGH	SEE TITUS COUNTY	SEE TITUS COUNTY
RED RIVER	CLARKSVILLE	0	0	-593	-592	-591	-591										
		0	0	371	371	371	371	BLEND GROUNDWATER WITH SURFACE WATER	CONTRACT FOR ADDITIONAL SURFACE WATER		BLOSSOM AQUIFER		RED RIVER		HIGH	$ -	$ -
		0	0	303	303	303	303	CONTRACT WITH TEXARKANA AND TREATED WATER PIPELINE TO DEKALB	CITY OF CLARKSVILLE'S EXISTING SURFACE WATER SUPPLIES	TEXARKANA /RIVERBEND		WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	SULPHUR	HIGH	$ 10,053,000	$ 1,178,000
RED RIVER	COUNTY-OTHER	0	0	0	0	0	0										
		94	144	185	230	274	318	RENEW EXISTING CONTRACT	TEXARKANA/RIVERBEND STRATEGIES	TEXARKANA /RIVERBEND		WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	SULPHUR	HIGH	$ -	$ 89,000
RED RIVER	IRRIGATION RED RIVER	-4,376	-4,313	-4,260	-4,208	-4,155	-4,125										
		4,376	4,313	4,260	4,208	4,155	4,125	UNMET NEED									
RED RIVER	MANUFACTURING RED RIVER	0	0	-7	-7	-8	-9										
		0	0	20	20	20	20	DRILL NEW WELLS			TRINITY AQUIFER		RED RIVER	SULPHUR	HIGH	$ 136,000	$ 22,000
SMITH	CRYSTAL SYSTEMS INC	-29	-221	-432	-669	-944	-1,194										
		644	644	966	1,610	1,610	1,936	DRILL NEW WELLS			QUEEN CITY AQUIFER		SMITH	SABINE	HIGH	$ 6,605,000	$ 814,000
SMITH	HIDEAWAY	0	0	0	0	0	-117										
		0	0	0	0	0	117	INCREASE EXISTING CONTRACT	CRYSTAL SYSTEMS INC DRILL NEW WELLS	CRYSTAL SYSTEMS INC	QUEEN CITY AQUIFER		SMITH	SABINE	HIGH	$ -	$ 152,000

County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Year 2020	2030	2040	2050	2060	2070	Strategy	Contingency	Seller (if applicable)	Supply Source Groundwater	Surface Water	County	Basin	Reliability of Source	Total Capital Cost	Total Annual Cost
SMITH	LINDALE	-152	-458	-795	-1,182	-1,621	-2,121										
		966	1,288	1,610	1,932	2,576	2,898	DRILL NEW WELLS			QUEEN CITY AQUIFER		SMITH	SABINE	HIGH	$ 4,012,000	$ 769,000
SMITH	MANUFACTURING SMITH	-300	-327	-354	-377	-408	-442										
		300	327	354	377	408	442	INCREASE EXISTING CONTRACT		TYLER		TYLER SURFACE SUPPLY	SMITH	SABINE	HIGH	REGION I COSTING	
SMITH	MINING SMITH	0	0	0	0	-8	-45										
		0	0	0	0	108	108	DRILL NEW WELLS			QUEEN CITY AQUIFER		SMITH	SABINE	HIGH	$ 607,000	$ 57,000
SMITH	OVERTON	-17	-18	-21	-23	-27	-31										
		17	18	21	23	27	31	ADVANCED WATER CONSERVATION					SMITH	SABINE	HIGH	$ -	$ -
SMITH	WINONA	0	0	0	-23	-51	-85										
		0	0	0	108	108	108	DRILL NEW WELLS			QUEEN CITY AQUIFER		SMITH	SABINE	HIGH	$ 755,000	$ 88,000
TITUS	MANUFACTURING TITUS	-3,603	-3,719	-3,833	-4,058	-4,733	-5,440										
		900	932	962	986	1,054	1,126	ADVANCED WATER CONSERVATION					TITUS	CYPRESS	HIGH	$ -	$ -
		45	45	45	45	45	45	DRILL NEW WELLS			QUEEN CITY AQUIFER		TITUS	CYPRESS	HIGH	$ 113,000	$ 37,000
		2,658	2,742	2,826	3,027	3,634	4,269	INCREASE EXISTING CONTRACT		MOUNT PLEASANT		BOB SANDLIN LAKE/RESERVOIR	TITUS	CYPRESS	HIGH	$ -	$ 3,338,000
TITUS	NETMWD	0	0	0	0	0	0										
		0	0	0	0	0	18,000	VOLUNTARY REALLOCATION OF HARRISON STEAM ELECTRIC				O' THE PINES LAKE/RESERVOIR	MARION	CYPRESS	HIGH	$ -	$ -
		0	0	0	0	0	1,592	VOLUNTARY REALLOCATION OF MARION STEAM ELECTRIC				O' THE PINES LAKE/RESERVOIR	MARION	CYPRESS	HIGH	$ -	$ -
TITUS	STEAM ELECTRIC POWER TITUS	-20,558	-30,123	-41,631	-55,605	-71,812	-91,555										
		24,942	24,826	24,712	24,487	23,812	22,592	INCREASE EXISTING CONTRACT		TITUS COUNTY FWD #1		BOB SANDLIN LAKE/RESERVOIR	TITUS	CYPRESS	HIGH	$ -	$ 2,494,000
		0	9,849	9,890	9,846	9,698	9,802	INCREASE EXISTING CONTRACT		NETMWD		BOB SANDLIN LAKE/RESERVOIR	TITUS	CYPRESS	HIGH	$ -	$ 989,000
		0	0	41,069	40,569	40,028	38,868	INCREASE EXISTING CONTRACT		NETMWD		O' THE PINES LAKE/RESERVOIR	MARION	CYPRESS	HIGH	$ -	$ 4,107,000
		0	0	0	0	0	18,000	INCREASE EXISTING CONTRACT	NETMWD VOLUNTARY REALLOCATION OF HARRISON STEAM ELECTRIC	NETMWD		O' THE PINES LAKE/RESERVOIR	MARION	CYPRESS	HIGH	$ -	$ 1,800,000
		0	0	0	0	0	2,293	INCREASE EXISTING CONTRACT	NETMWD VOLUNTARY REALOCATION OF MARION STEAM ELECTRIC	NETMWD		O' THE PINES LAKE/RESERVOIR	MARION	CYPRESS	HIGH	$ -	$ 159,000
TITUS	TRI SUD	-1,396	-1,520	-1,659	-1,828	-2,021	-2,229										
		918	1,000	1,091	1,202	1,329	1,466	RENEW AND INCREASE EXISTING CONTRACT		MOUNT PLEASANT		BOB SANDLIN LAKE/RESERVOIR	TITUS	CYPRESS	HIGH	$ -	$ 1,876,000
		478	520	568	626	692	763	RENEW AND INCREASE EXISTING CONTRACT		MOUNT PLEASANT		BOB SANDLIN LAKE/RESERVOIR	TITUS	SULPHUR	HIGH	SEE ABOVE	SEE ABOVE
UPSHUR	BI COUNTY WSC	0	0	0	0	-23	-45										
		0	0	0	0	54	54	DRILL NEW WELLS			QUEEN CITY AQUIFER		UPSHUR	CYPRESS	HIGH	SEE CAMP COUNTY	SEE CAMP CO
UPSHUR	GILMER	0	-14	-63	-123	-186	-246										
		0	269	269	269	269	269	DRILL NEW WELLS			QUEEN CITY AQUIFER		UPSHUR	CYPRESS	HIGH	$ 1,075,000	$ 131,000
UPSHUR	MANUFACTURING UPSHUR	-266	-285	-306	-324	-349	-376										
		324	324	324	324	430	430	DRILL NEW WELLS			QUEEN CITY AQUIFER		UPSHUR	CYPRESS	HIGH	$ 2,785,000	$ 258,000
UPSHUR	MINING UPSHUR	-378	-725	-770	-608	-449	-332										
		430	860	860	860	860	860	DRILL NEW WELLS			QUEEN CITY AQUIFER		UPSHUR	CYPRESS /SABINE	HIGH	$ 6,760,000	$ 637,000
VAN ZANDT	ABLES SPRINGS WSC	-1	0	-2	-2	-3	-2										
		1	0	2	2	3	2	ADVANCED WATER CONSERVATION	REGION C STRATEGY				SEE HUNT COUNTY	SEE HUNT COUNTY	HIGH	SEE HUNT COUNTY	SEE HUNT COUNTY
VAN ZANDT	CANTON	0	0	0	0	0	0										
		100	100	100	100	100	100	DRILL NEW WELLS			CARRIZO-WILCOX AQUIFER		VAN ZANDT	SABINE	HIGH	$ 863,000	$ 154,000
		323	323	323	323	323	323	INDIRECT REUSE					VAN ZANDT	SABINE	HIGH	$ 6,803,000	$ 667,000
VAN ZANDT	IRRIGATION VAN ZANDT	-330	-330	-330	-330	-330	-330										
		330	330	330	330	330	330	DRILL NEW WELLS			QUEEN CITY AQUIFER		VAN ZANDT	NECHES	HIGH	$ 227,000	$ 188,000
VAN ZANDT	MANUFACTURING VAN ZANDT	-158	-175	-191	-204	-240	-287										
		194	194	194	290	290	290	DRILL NEW WELLS			CARRIZO-WILCOX AQUIFER		VAN ZANDT	NECHES	HIGH	$ 734,000	$ 220,000

County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Year 2020	2030	2040	2050	2060	2070	Strategy	Contingency	Seller (if applicable)	Supply Source: Groundwater	Supply Source: Surface Water	County	Basin	Reliability of Source	Total Capital Cost	Total Annual Cost
VAN ZANDT	R-P-M WSC	-12	-56	-93	-132	-167	-197										
		1	6	10	15	19	23	ADVANCED WATER CONSERVATION	REGION I STRATEGY				VAN ZANDT	NECHES	HIGH	REGION I STRATEGY	
		75	150	150	225	285	285	DRILL NEW WELLS			CARRIZO-WILCOX AQUIFER		VAN ZANDT	NECHES	HIGH	$ 1,244,000	$ 184,000

Recommended Projects Associated with Water Management Strategies

Project Sponosr Region: D

Sponsor Name	Is Sponsor a WWP?	Project Name	Project Description	Capital Cost	Online Decade
BI COUNTY WSC	N	DRILL NEW WELLS (BI COUNTY WSC, QUEEN, CYPRESS, CAMP, 2060)	MULTIPLE WELLS/WELL FIELD	$1,320,000	2060
BI COUNTY WSC	N	DRILL NEW WELLS (BI COUNTY WSC, QUEEN, CYPRESS, CAMP, 2070)	MULTIPLE WELLS/WELL FIELD	$912,000	2070
BI COUNTY WSC	N	DRILL NEW WELLS (BI COUNTY WSC, QUEEN, CYPRESS, UPSHUR, 2060)	SINGLE WELL	$510,000	2060
CANTON	N	CANTON INDIRECT REUSE	CONVEYANCE/TRANSMISSION PIPELINE; DIVERSION AND CONTROL STRUCTURE; NEW WATER RIGHT/PERMIT; PUMP STATION; STORAGE TANK	$6,803,000	2020
CANTON	N	DRILL NEW WELLS (CANTON, CARRIZO-WILCOX, SABINE)	SINGLE WELL	$863,000	2020
CELESTE	N	DRILL NEW WELLS (CELESTE, WOODBINE, SABINE, 2050)	SINGLE WELL	$1,275,000	2050
CELESTE	N	DRILL NEW WELLS (CELESTE, WOODBINE, SABINE, 2070)	SINGLE WELL	$1,275,000	2070
CLARKSVILLE	N	CONTRACT WITH TEXARKANA AND TREATED WATER PIPELINE TO DEKALB (CLARKSVILLE, SULPHUR)	CONVEYANCE/TRANSMISSION PIPELINE; NEW CONTRACT; PUMP STATION; STORAGE TANK	$10,053,000	2040
COUNTY-OTHER, HUNT	N	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2030)	MULTIPLE WELLS/WELL FIELD	$2,396,000	2030
COUNTY-OTHER, HUNT	N	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2040)	MULTIPLE WELLS/WELL FIELD	$2,396,000	2040
COUNTY-OTHER, HUNT	N	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2050)	MULTIPLE WELLS/WELL FIELD	$2,396,000	2050
COUNTY-OTHER, HUNT	N	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2060)	MULTIPLE WELLS/WELL FIELD	$2,396,000	2060
COUNTY-OTHER, HUNT	N	GREENVILLE TIE-IN PIPELINE (COUNTY-OTHER HUNT, SABINE)	CONVEYANCE/TRANSMISSION PIPELINE	$25,670,000	2070
CRYSTAL SYSTEMS INC	N	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2020)	MULTIPLE WELLS/WELL FIELD	$2,330,000	2020
CRYSTAL SYSTEMS INC	N	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2040)	SINGLE WELL	$1,212,000	2040
CRYSTAL SYSTEMS INC	N	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2050)	MULTIPLE WELLS/WELL FIELD	$2,330,000	2050
CRYSTAL SYSTEMS INC	N	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2070)	SINGLE WELL	$1,212,000	2070
CUMBY	N	DRILL NEW WELLS (CUMBY, NACATOCH)	MULTIPLE WELLS/WELL FIELD	$772,000	2030
GILMER	N	DRILL NEW WELLS (GILMER, QUEEN, CYPRESS)	MULTIPLE WELLS/WELL FIELD	$1,051,000	2030
GREENVILLE	Y	CHAPMAN RAW WATER PIPELINE AND NEW WTP (GREENVILLE, SULPHUR)	CONVEYANCE/TRANSMISSION PIPELINE; NEW CONTRACT; NEW WATER TREATMENT PLANT	$193,438,000	2050
GREENVILLE	Y	TOLEDO BEND TIE-IN PIPELINE (GREENVILLE, SABINE)	CONVEYANCE/TRANSMISSION PIPELINE	$42,470,000	2070
GREENVILLE	Y	WTP EXPANSION (GREENVILLE, SABINE)	WATER TREATMENT PLANT EXPANSION	$36,074,000	2020
HICKORY CREEK SUD	N	DRILL NEW WELLS (HICKORY CREEK SUD, TRINITY, TRINITY, 2050)	SINGLE WELL	$1,607,000	2050
HICKORY CREEK SUD	N	DRILL NEW WELLS (HICKORY CREEK SUD, TRINITY, TRINITY, 2060)	SINGLE WELL	$1,607,000	2060
HICKORY CREEK SUD	N	DRILL NEW WELLS (HICKORY CREEK SUD, TRINITY, TRINITY, 2070)	SINGLE WELL	$1,607,000	2070
HICKORY CREEK SUD	N	DRILL NEW WELLS (HICKORY CREEK SUD, WOODBINE, SABINE, 2040)	SINGLE WELL	$1,705,000	2040
HICKORY CREEK SUD	N	DRILL NEW WELLS (HICKORY CREEK SUD, WOODBINE, SABINE, 2050)	SINGLE WELL	$1,705,000	2050
HICKORY CREEK SUD	N	DRILL NEW WELLS (HICKORY CREEK SUD, WOODBINE, SABINE, 2060)	SINGLE WELL	$1,705,000	2060
HICKORY CREEK SUD	N	DRILL NEW WELLS (HICKORY CREEK SUD, WOODBINE, SABINE, 2070)	MULTIPLE WELLS/WELL FIELD	$3,210,000	2070
IRRIGATION, BOWIE	N	DRILL NEW WELLS (BOWIE IRRIGATION, CARRIZO-WILCOX, SULPHUR)	MULTIPLE WELLS/WELL FIELD	$2,021,000	2020
IRRIGATION, BOWIE	N	DRILL NEW WELLS (BOWIE IRRIGATION, NACATOCH, RED)	MULTIPLE WELLS/WELL FIELD	$1,466,000	2020

Recommended Projects Associated with Water Management Strategies

Sponsor Name	Is Sponsor a WWP?	Project Name	Project Description	Capital Cost	Online Decade
IRRIGATION, HARRISON	N	DRILL NEW WELLS (IRRIGATION HARRISON, CARRIZO-WILCOX, CYPRESS)	MULTIPLE WELLS/WELL FIELD	$1,092,000	2020
IRRIGATION, HARRISON	N	DRILL NEW WELLS (IRRIGATION HARRISON, CARRIZO-WILCOX, SABINE)	MULTIPLE WELLS/WELL FIELD	$377,000	2020
IRRIGATION, HOPKINS	N	DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, CYPRESS)	MULTIPLE WELLS/WELL FIELD	$33,000	2020
IRRIGATION, HOPKINS	N	DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, SABINE)	MULTIPLE WELLS/WELL FIELD	$681,000	2020
IRRIGATION, HOPKINS	N	SULPHUR SPRINGS RAW WATER PIPELINE (IRRIGATION HOPKINS, SULPHUR)	CONVEYANCE/TRANSMISSION PIPELINE; NEW CONTRACT; NEW SURFACE WATER INTAKE; STORAGE TANK	$4,758,000	2020
IRRIGATION, HUNT	N	DRILL NEW WELLS (IRRIGATION HUNT, NACATOCH, SABINE)	MULTIPLE WELLS/WELL FIELD	$282,000	2020
IRRIGATION, LAMAR	N	PAT MAYSE RAW WATER PIPELINE (IRRIGATION LAMAR, RED)	CONVEYANCE/TRANSMISSION PIPELINE	$3,717,000	2020
IRRIGATION, VAN ZANDT	N	DRILL NEW WELLS (IRRIGATION VAN ZANDT, QUEEN, NECHES)	MULTIPLE WELLS/WELL FIELD	$227,000	2020
LINDALE	N	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2020)	MULTIPLE WELLS/WELL FIELD	$3,470,000	2020
LINDALE	N	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2030)	SINGLE WELL	$1,278,000	2030
LINDALE	N	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2040)	SINGLE WELL	$1,278,000	2040
LINDALE	N	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2050)	SINGLE WELL	$1,278,000	2050
LINDALE	N	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2060)	MULTIPLE WELLS/WELL FIELD	$2,395,000	2060
LINDALE	N	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2070)	SINGLE WELL	$1,278,000	2070
MANUFACTURING, CASS	N	DRILL NEW WELLS (MANUFACTURING CASS, CARRIZO-WILCOX , CYPRESS)	MULTIPLE WELLS/WELL FIELD	$894,000	2020
MANUFACTURING, HARRISON	N	TOLEDO BEND INTAKE AND RAW WATER PIPELINE (MANUFACTURING HARRISON, SABINE)	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE	$498,773,000	2020
MANUFACTURING, LAMAR	N	DRILL NEW WELLS (MANUFACTURING LAMAR, BLOSSOM, RED)	MULTIPLE WELLS/WELL FIELD	$76,000	2070
MANUFACTURING, RED RIVER	N	DRILL NEW WELLS (MANUFACTURING RED RIVER, TRINITY, SULPHUR)	SINGLE WELL	$136,000	2040
MANUFACTURING, TITUS	N	DRILL NEW WELLS (MANUFACTURING TITUS, QUEEN, CYPRESS)	SINGLE WELL	$113,000	2020
MANUFACTURING, UPSHUR	N	DRILL NEW WELLS (MANUFACTURING UPSHUR, QUEEN, CYPRESS, 2020)	MULTIPLE WELLS/WELL FIELD	$2,151,000	2020
MANUFACTURING, UPSHUR	N	DRILL NEW WELLS (MANUFACTURING UPSHUR, QUEEN, CYPRESS, 2060)	SINGLE WELL	$703,000	2060
MANUFACTURING, VAN ZANDT	N	DRILL NEW WELLS (MANUFACTURING VAN ZANDT, CARRIZO-WILCOX, NECHES, 2020)	MULTIPLE WELLS/WELL FIELD	$489,000	2020
MANUFACTURING, VAN ZANDT	N	DRILL NEW WELLS (MANUFACTURING VAN ZANDT, CARRIZO-WILCOX, NECHES, 2050)	SINGLE WELL	$245,000	2050
MARSHALL	Y	INCREASE EXISTING CONTRACT (MARSHALL, CYPRESS)	CONTRACT AMENDMENT	$4,738,000	2060
MARTIN SPRINGS WSC	N	DRILL NEW WELLS (MARTIN SPRINGS WSC, CARRIZO-WILCOX, SABINE, 2060)	SINGLE WELL	$922,000	2060
MARTIN SPRINGS WSC	N	DRILL NEW WELLS (MARTIN SPRINGS WSC, CARRIZO-WILCOX, SABINE, 2070)	SINGLE WELL	$922,000	2070
MINING, GREGG	N	DRILL NEW WELLS (MINING GREGG, CARRIZO-WILCOX, CYPRESS)	MULTIPLE WELLS/WELL FIELD	$377,000	2020
MINING, GREGG	N	DRILL NEW WELLS (MINING GREGG, CARRIZO-WILCOX, SABINE, 2020)	MULTIPLE WELLS/WELL FIELD	$1,045,000	2020
MINING, GREGG	N	DRILL NEW WELLS (MINING GREGG, CARRIZO-WILCOX, SABINE, 2030)	SINGLE WELL	$524,000	2030
MINING, HARRISON	N	DRILL NEW WELLS (MINING HARRISON, CARRIZO-WILCOX, CYPRESS, 2020)	SINGLE WELL	$526,000	2020
MINING, HARRISON	N	DRILL NEW WELLS (MINING HARRISON, CARRIZO-WILCOX, CYPRESS, 2030)	SINGLE WELL	$526,000	2030
MINING, HARRISON	N	DRILL NEW WELLS (MINING HARRISON, CARRIZO-WILCOX, CYPRESS, 2040)	SINGLE WELL	$526,000	2040

Recommended Projects Associated with Water Management Strategies

Sponsor Name	Is Sponsor a WWP?	Project Name	Project Description	Capital Cost	Online Decade
MINING, HARRISON	N	DRILL NEW WELLS (MINING HARRISON, CARRIZO-WILCOX, SABINE)	MULTIPLE WELLS/WELL FIELD	$5,994,000	2020
MINING, HUNT	N	DRILL NEW WELLS (MINING HUNT, NACATOCH , SABINE)	SINGLE WELL	$254,000	2020
MINING, MARION	N	DRILL NEW WELLS (MINING MARION, QUEEN CITY, CYPRESS, 2020)	MULTIPLE WELLS/WELL FIELD	$1,043,000	2020
MINING, MARION	N	DRILL NEW WELLS (MINING MARION, QUEEN CITY, CYPRESS, 2030)	SINGLE WELL	$526,000	2030
MINING, SMITH	N	DRILL NEW WELLS (MINING SMITH, QUEEN, SABINE)	MULTIPLE WELLS/WELL FIELD	$607,000	2060
MINING, UPSHUR	N	DRILL NEW WELLS (MINING UPSHUR, QUEEN , CYPRESS/SABINE, 2020)	MULTIPLE WELLS/WELL FIELD	$2,785,000	2020
MINING, UPSHUR	N	DRILL NEW WELLS (MINING UPSHUR, QUEEN , CYPRESS/SABINE, 2030)	MULTIPLE WELLS/WELL FIELD	$2,785,000	2030
NORTH HUNT SUD	N	DELTA COUNTY PIPELINE (NORTH HUNT SUD, SULPHUR)	CONVEYANCE/TRANSMISSION PIPELINE	$1,774,000	2060
R-P-M WSC	N	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2020)	SINGLE WELL	$959,000	2020
R-P-M WSC	N	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2030)	SINGLE WELL	$959,000	2030
R-P-M WSC	N	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2050)	SINGLE WELL	$959,000	2050
R-P-M WSC	N	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2060)	SINGLE WELL	$959,000	2060
TEXARKANA	Y	DREDGE WRIGHT PATMAN (TEXARKANA)	DREDGE TO RECOVER CAPACITY	$205,862,000	2050
TEXARKANA	Y	RIVERBEND STRATEGY (TEXARKANA)	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE; NEW WATER TREATMENT PLANT	$117,116,000	2020
WASKOM	N	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2020)	SINGLE WELL	$445,000	2020
WASKOM	N	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2050)	SINGLE WELL	$445,000	2050
WASKOM	N	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2060)	SINGLE WELL	$445,000	2060
WASKOM	N	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2070)	SINGLE WELL	$445,000	2070
WINONA	N	DRILL NEW WELLS (WINONA, QUEEN, SABINE)	MULTIPLE WELLS/WELL FIELD	$695,000	2050
WOLFE CITY	N	DRILL NEW WELLS (WOLFE CITY, TRINITY, TRINITY, 2070)	SINGLE WELL	$1,155,000	2070
WOLFE CITY	N	DRILL NEW WELLS (WOLFE CITY, WOODBINE, SULPHUR, 2050)	SINGLE WELL	$1,155,000	2050
WOLFE CITY	N	DRILL NEW WELLS (WOLFE CITY, WOODBINE, SULPHUR, 2060)	MULTIPLE WELLS/WELL FIELD	$2,066,000	2060

Region D Total Recommended Capital Cost	**$1,241,050,000**

***Projects with a capital cost of zero are excluded from the report list.**

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

WUG Entity Primary Region: D

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
BI COUNTY WSC	D	DRILL NEW WELLS (BI COUNTY WSC, QUEEN CITY, CYPRESS)	D | QUEEN CITY AQUIFER | CAMP COUNTY	0	0	0	0	161	269	N/A	$840
BI COUNTY WSC	D	DRILL NEW WELLS (BI COUNTY WSC, QUEEN CITY, CYPRESS)	D | QUEEN CITY AQUIFER | UPSHUR COUNTY	0	0	0	0	54	54	N/A	$1111
BRINKER WSC	D	INCREASE EXISTING CONTRACT (BRINKER WSC, SULPHUR)	D | SULPHUR SPRINGS LAKE/RESERVOIR	0	0	0	0	29	63	N/A	$1176
CADDO BASIN SUD	C	CONSERVATION - CADDO BASIN SUD	DEMAND REDUCTION	1	2	4	7	10	14	$0	$0
CADDO BASIN SUD	C	CONSERVATION, WATER LOSS CONTROL - CADDO BASIN SUD	DEMAND REDUCTION	1	1	0	0	0	0	$436	N/A
CADDO BASIN SUD	C	NTMWD - ADDITIONAL LAKE LAVON	C | LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	17	33	44	67	61	57	$225	$84
CADDO BASIN SUD	C	NTMWD - LOWER BOIS D'ARC CREEK RESERVOIR	C | LOWER BOIS D ARC LAKE/RESERVOIR	13	185	266	420	403	398	$506	$71
CADDO BASIN SUD	C	NTMWD - MAIN STEM PUMP STATION	C | TRINITY INDIRECT REUSE	42	58	56	46	2	0	$153	N/A
CADDO BASIN SUD	C	NTMWD - OKLAHOMA	OK | OKLAHOMA RUN-OF-RIVER	0	0	0	0	0	175	N/A	$509
CADDO BASIN SUD	C	NTMWD - TEXOMA BLENDING	C | TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	0	0	88	140	235	235	N/A	$1315
CADDO BASIN SUD	C	NTMWD - TOLEDO BEND PHASE I	I | TOLEDO BEND LAKE/RESERVOIR	0	0	0	0	304	350	N/A	$955
CADDO BASIN SUD	C	REMOVAL OF CHAPMAN SILT BARRIER	D | CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	4	5	8	12	14	11	$19	$0
CADDO BASIN SUD	D	CHAPMAN RAW WATER PIPELINE AND NEW WTP (GREENVILLE)	D | CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	0	0	0	77	409	967	N/A	$2619
CADDO BASIN SUD	D	WTP EXPANSION (GREENVILLE)	D | TAWAKONI LAKE/RESERVOIR	75	282	462	609	613	570	$883	$883
CADDO MILLS	D	WTP EXPANSION (GREENVILLE)	D | TAWAKONI LAKE/RESERVOIR	0	1	36	68	108	255	N/A	$882
CANTON	D	CANTON REUSE	D | SABINE INDIRECT REUSE	323	323	323	323	323	323	$2068	$305
CANTON	D	DRILL NEW WELLS (CANTON, CARRIZO-WILCOX, SABINE)	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	100	100	100	100	100	100	$1540	$1540
CASH SUD	C	CONSERVATION - CASH SUD	DEMAND REDUCTION	0	1	2	3	5	7	N/A	$0
CASH SUD	C	CONSERVATION, WATER LOSS CONTROL - CASH SUD	DEMAND REDUCTION	1	1	0	0	0	0	$161	N/A
CASH SUD	C	NTMWD - ADDITIONAL LAKE LAVON	C | LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	26	49	67	80	56	39	$225	$84
CASH SUD	C	NTMWD - LOWER BOIS D'ARC CREEK RESERVOIR	C | LOWER BOIS D ARC LAKE/RESERVOIR	19	279	402	504	366	270	$506	$71
CASH SUD	C	NTMWD - MAIN STEM PUMP STATION	C | TRINITY INDIRECT REUSE	61	88	85	56	2	0	$153	N/A
CASH SUD	C	NTMWD - OKLAHOMA	OK | OKLAHOMA RUN-OF-RIVER	0	0	0	0	0	119	N/A	$509
CASH SUD	C	NTMWD - TEXOMA BLENDING	C | TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	0	0	132	168	214	159	N/A	$1315
CASH SUD	C	NTMWD - TOLEDO BEND PHASE I	I | TOLEDO BEND LAKE/RESERVOIR	0	0	0	0	276	237	N/A	$955

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

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
CASH SUD	C	REMOVAL OF CHAPMAN SILT BARRIER	D | CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	4	8	12	14	10	8	$19	$0
CELESTE	D	DRILL NEW WELLS (CELESTE, WOODBINE, SABINE)	D | WOODBINE AQUIFER | HUNT COUNTY	0	0	0	102	102	204	N/A	$1706
CENTRAL BOWIE COUNTY WSC	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	535	529	534	534	534	534	$0	$0
CLARKSVILLE	D	CLARKSVILLE TEXARKANA PIPELINE GROUNDWATER MIXING	D | BLOSSOM AQUIFER | RED RIVER COUNTY	0	0	371	371	371	371	N/A	$0
CLARKSVILLE	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	303	303	303	303	N/A	$1115
COUNTY-OTHER, HUNT	C	NTMWD - ADDITIONAL LAKE LAVON	C | LAVON LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	11	20	27	38	34	31	$225	$84
COUNTY-OTHER, HUNT	C	NTMWD - LOWER BOIS D'ARC CREEK RESERVOIR	C | LOWER BOIS D ARC LAKE/RESERVOIR	9	114	160	242	222	212	$506	$71
COUNTY-OTHER, HUNT	C	NTMWD - MAIN STEM PUMP STATION	C | TRINITY INDIRECT REUSE	27	36	34	27	1	0	$153	N/A
COUNTY-OTHER, HUNT	C	NTMWD - OKLAHOMA	OK | OKLAHOMA RUN-OF-RIVER	0	0	0	0	0	93	N/A	$509
COUNTY-OTHER, HUNT	C	NTMWD - TEXOMA BLENDING	C | TEXOMA LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	0	0	53	81	130	125	N/A	$1315
COUNTY-OTHER, HUNT	C	NTMWD - TOLEDO BEND PHASE I	I | TOLEDO BEND LAKE/RESERVOIR	0	0	0	0	167	187	N/A	$955
COUNTY-OTHER, HUNT	C	REMOVAL OF CHAPMAN SILT BARRIER	D | CHAPMAN/COOPER LAKE/RESERVOIR NORTH TEXAS MWD SYSTEM	2	3	5	6	6	4	$19	$0
COUNTY-OTHER, HUNT	D	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE)	D | NACATOCH AQUIFER | HUNT COUNTY	0	600	1,200	1,800	2,385	2,387	N/A	$916
COUNTY-OTHER, HUNT	D	POETRY WSC INCREASE CONTRACT (COUNTY-OTHER HUNT, SABINE)	D | TAWAKONI LAKE/RESERVOIR	0	0	670	670	670	551	N/A	$1716
COUNTY-OTHER, HUNT	D	POETRY WSC INCREASE CONTRACT (COUNTY-OTHER HUNT, SABINE, FORK)	D | FORK LAKE/RESERVOIR	0	0	0	0	1,045	628	N/A	$1717
COUNTY-OTHER, HUNT	D	TOLEDO BEND TIE-IN PIPELINE (GREENVILLE)	I | TOLEDO BEND LAKE/RESERVOIR	0	0	0	0	0	3,990	N/A	$1504
COUNTY-OTHER, LAMAR	D	INCREASE EXISTING CONTRACT (COUNTY-OTHER LAMAR)	D | PAT MAYSE LAKE/RESERVOIR	116	116	116	116	116	116	$1629	$1629
COUNTY-OTHER, RED RIVER	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	94	144	185	230	274	318	$481	$481
COUNTY-OTHER, VAN ZANDT	C	DWU - MAIN STEM REUSE	C | TRINITY INDIRECT REUSE	0	0	0	0	41	0	N/A	N/A
COUNTY-OTHER, VAN ZANDT	C	TRWD - ADDITIONAL CEDAR CREEK AND RICHLAND-CHAMBERS	C | TRWD LAKE/RESERVOIR SYSTEM	0	7	11	10	9	15	N/A	$0
COUNTY-OTHER, VAN ZANDT	C	TRWD - CEDAR CREEK WETLANDS	C | TRINITY INDIRECT REUSE	0	13	26	41	34	30	N/A	$114
COUNTY-OTHER, VAN ZANDT	C	TRWD - TEHUACANA	C | TEHUACANA LAKE/RESERVOIR	0	0	12	22	11	0	N/A	N/A
CRYSTAL SYSTEMS INC	D	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN , SABINE)	D | QUEEN CITY AQUIFER | SMITH COUNTY	644	644	966	1,610	1,610	1,936	$399	$152
CRYSTAL SYSTEMS INC	I	CRYS ENHANCED PUBLIC AND SCHOOL EDUCATION	DEMAND REDUCTION	2	3	4	6	7	10	$865	$325
CRYSTAL SYSTEMS INC	I	CRYS WATER CONSERVATION PRICING	DEMAND REDUCTION	3	7	8	10	11	13	$0	$0
CRYSTAL SYSTEMS INC	I	TYL-PAL-EXISTING SURPLUS FOR TYLER	I | PALESTINE LAKE/RESERVOIR	12	105	219	356	510	642	$896	$896

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

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
CUMBY	D	DRILL NEW WELLS (CUMBY, NACATOCH)	D | NACATOCH AQUIFER | HOPKINS COUNTY	0	80	80	80	80	80	N/A	$783
DE KALB	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	304	303	299	298	297	297	$243	$243
GILMER	D	DRILL NEW WELLS (GILMER, QUEEN CITY, CYPRESS)	D | QUEEN CITY AQUIFER | UPSHUR COUNTY	0	269	269	269	269	269	N/A	$115
GREENVILLE	D	CHAPMAN RAW WATER PIPELINE AND NEW WTP (GREENVILLE)	D | CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	0	0	0	10,223	9,891	9,333	N/A	$2619
GREENVILLE	D	TOLEDO BEND TIE-IN PIPELINE (GREENVILLE)	I | TOLEDO BEND LAKE/RESERVOIR	0	0	0	0	0	5,100	N/A	$1014
GREENVILLE	D	VOLUNTARY REALLOCATION OF HUNT MANUFACTURING SURPLUS (GREENVILLE, TAWAKONI)	D | TAWAKONI LAKE/RESERVOIR	484	546	613	677	721	825	$0	$0
GREENVILLE	D	WTP EXPANSION (GREENVILLE)	D | TAWAKONI LAKE/RESERVOIR	3,224	6,351	6,550	4,650	3,046	2,942	$795	$795
HICKORY CREEK SUD	C	CONSERVATION - HICKORY CREEK SUD	DEMAND REDUCTION	2	5	9	14	18	22	$0	$0
HICKORY CREEK SUD	C	CONSERVATION, WATER LOSS CONTROL - HICKORY CREEK SUD	DEMAND REDUCTION	0	0	0	0	0	0	N/A	N/A
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, TRINITY, TRINITY)	D | TRINITY AQUIFER | HUNT COUNTY	0	0	0	189	378	463	N/A	$1446
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, WOODBINE, SABINE)	D | WOODBINE AQUIFER | HUNT COUNTY	0	0	189	378	567	1,138	N/A	$1147
HIDEAWAY	D	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN , SABINE)	D | QUEEN CITY AQUIFER | SMITH COUNTY	0	0	0	0	0	117	N/A	$1303
HOOKS	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	265	258	249	244	243	243	$242	$242
IRRIGATION, BOWIE	D	DRILL NEW WELLS (IRRIGATION BOWIE, CARRIZO-WILCOX, SULPHUR)	D | CARRIZO-WILCOX AQUIFER | BOWIE COUNTY	3,700	3,700	3,638	3,483	3,338	3,276	$555	$509
IRRIGATION, BOWIE	D	DRILL NEW WELLS (IRRIGATION BOWIE, NACATOCH, RED)	D | NACATOCH AQUIFER | BOWIE COUNTY	1,540	1,525	1,441	1,193	1,000	1,000	$599	$520
IRRIGATION, BOWIE	D	VOLUNTARY REALLOCATION BOWIE COUNTY OTHER TO IRRIGATION	D | NACATOCH AQUIFER | BOWIE COUNTY	0	15	0	0	0	0	N/A	N/A
IRRIGATION, HARRISON	D	DRILL NEW WELLS (IRRIGATION HARRISON, CARRIZO-WILCOX , SABINE)	D | CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	54	54	54	54	54	54	$685	$93
IRRIGATION, HARRISON	D	DRILL NEW WELLS (IRRIGATION HARRISON, CARRIZO-WILCOX, CYPRESS)	D | CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	236	236	236	236	236	236	$430	$46
IRRIGATION, HOPKINS	D	DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, CYPRESS)	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	210	210	210	210	210	210	$667	$543
IRRIGATION, HOPKINS	D	DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, SABINE)	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	610	610	610	610	610	610	$613	$519
IRRIGATION, HOPKINS	D	SULPHUR SPRINGS RAW WATER PIPELINE (IRRIGATION HOPKINS, SULPHUR)	D | SULPHUR SPRINGS LAKE/RESERVOIR	1,306	1,306	1,306	1,306	1,306	1,306	$1632	$1327
IRRIGATION, HUNT	D	DRILL NEW WELLS (IRRIGATION HUNT, NACATOCH, SABINE)	D | NACATOCH AQUIFER | HUNT COUNTY	150	150	150	150	146	146	$720	$559
IRRIGATION, LAMAR	D	PAT MAYSE RAW WATER PIPELINE (IRRIGATION LAMAR)	D | PAT MAYSE LAKE/RESERVOIR	18,312	18,308	18,305	18,302	18,299	18,302	$257	$240
IRRIGATION, VAN ZANDT	D	DRILL NEW WELLS (IRRIGATION VAN ZANDT, QUEEN CITY, NECHES)	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	330	330	330	330	330	330	$570	$570
LINDALE	D	DRILL NEW WELLS (LINDALE, QUEEN CITY, SABINE)	D | QUEEN CITY AQUIFER | SMITH COUNTY	966	1,288	1,610	1,932	2,576	2,898	$386	$135

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

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
LINDALE	I	LIND ENHANCED PUBLIC AND SCHOOL EDUCATION	DEMAND REDUCTION	3	5	7	10	14	18	$489	$454
LINDALE	I	LIND WATER CONSERVATION PRICING	DEMAND REDUCTION	5	12	15	18	20	23	$0	$0
LINDALE	I	TYL-PAL-EXISTING SURPLUS FOR TYLER	I | PALESTINE LAKE/RESERVOIR	52	180	323	490	662	826	$896	$896
LONE OAK	D	INCREASE EXISTING CONTRACT (LONE OAK, SABINE)	D | TAWAKONI LAKE/RESERVOIR	0	0	0	0	0	56	N/A	$1717
MACBEE SUD	C	CONSERVATION - MACBEE SUD	DEMAND REDUCTION	0	0	0	0	1	1	N/A	$0
MACBEE SUD	C	CONSERVATION, WATER LOSS CONTROL - MACBEE SUD	DEMAND REDUCTION	0	0	0	0	0	0	N/A	N/A
MACEDONIA-EYLAU MUD #1	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	565	574	577	577	577	577	$482	$482
MANUFACTURING, BOWIE	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	1,544	1,679	1,810	1,922	2,080	2,251	$0	$0
MANUFACTURING, CASS	D	ADVANCED WATER CONSERVATION (MANUFACTURING CASS, CARRIZO-WILCOX)	DEMAND REDUCTION	11,508	12,123	12,711	13,219	14,116	15,073	$0	$0
MANUFACTURING, CASS	D	DREDGE WRIGHT PATMAN (TEXARKANA, SULPHUR)	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	16,000	47,990	N/A	$957
MANUFACTURING, CASS	D	DRILL NEW WELLS (MANUFACTURING CASS, CARRIZO-WILCOX, CYPRESS)	D | CARRIZO-WILCOX AQUIFER | CASS COUNTY	151	151	151	151	151	151	$1086	$587
MANUFACTURING, HARRISON	D	ADVANCED WATER CONSERVATION (MANUFACTURING HARRISON, SABINE)	DEMAND REDUCTION	9,501	10,408	11,316	12,108	13,038	14,039	$0	$0
MANUFACTURING, HARRISON	D	TOLEDO BEND INTAKE AND RAW WATER PIPELINE (HARRISON)	I | TOLEDO BEND LAKE/RESERVOIR	50,000	55,000	65,000	70,000	80,000	0	$354	N/A
MANUFACTURING, LAMAR	D	ADVANCED WATER CONSERVATION (MANUFACTURING LAMAR, RED)	DEMAND REDUCTION	565	592	620	642	685	834	$0	$0
MANUFACTURING, LAMAR	D	DRILL NEW WELLS (MANUFACTURING LAMAR, BLOSSOM, RED)	D | BLOSSOM AQUIFER | LAMAR COUNTY	0	0	0	0	0	120	N/A	$567
MANUFACTURING, MORRIS	D	ADVANCED WATER CONSERVATION (MANUFACTURING MORRIS)	DEMAND REDUCTION	9,593	10,210	10,780	11,242	12,129	13,087	$0	$0
MANUFACTURING, RED RIVER	D	DRILL NEW WELLS (MANUFACTURING RED RIVER, TRINITY, SULPHUR)	D | TRINITY AQUIFER | RED RIVER COUNTY	0	0	20	20	20	20	N/A	$551
MANUFACTURING, TITUS	D	ADVANCED WATER CONSERVATION (MANUFACTURING TITUS, CYPRESS)	DEMAND REDUCTION	900	932	962	986	1,054	1,126	$0	$0
MANUFACTURING, TITUS	D	DRILL NEW WELLS (MANUFACTURING TITUS, QUEEN, CYPRESS)	D | QUEEN CITY AQUIFER | TITUS COUNTY	45	45	45	45	45	45	$822	$585
MANUFACTURING, TITUS	D	INCREASE EXISTING CONTRACT (MANUFACTURING TITUS FROM MT PLEASANT SURPLUS)	D | BOB SANDLIN LAKE/RESERVOIR	2,658	2,742	2,826	3,027	3,634	4,269	$782	$782
MANUFACTURING, UPSHUR	D	DRILL NEW WELLS (MANUFACTURING UPSHUR, QUEEN, CYPRESS)	D | QUEEN CITY AQUIFER | UPSHUR COUNTY	324	324	324	324	430	430	$614	$195
MANUFACTURING, VAN ZANDT	D	DRILL NEW WELLS (MANUFACTURING VAN ZANDT, CARRIZO-WILCOX, NECHES)	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	194	194	194	290	290	290	$773	$583
MARSHALL	D	INCREASE EXISTING CONTRACT (MARSHALL, CYPRESS)	D | O' THE PINES LAKE/RESERVOIR	0	0	0	0	41	701	N/A	$1552
MARTIN SPRINGS WSC	D	DRILL NEW WELLS (MARTIN SPRINGS WSC, CARRIZO-WILCOX, SABINE)	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	0	0	0	0	60	120	N/A	$1533

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

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
MAUD	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	170	169	167	165	164	164	$241	$241
MINING, GREGG	D	DRILL NEW WELLS (MINING GREGG, CARRIZO-WILCOX, CYPRESS)	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	54	54	54	54	54	54	$685	$93
MINING, GREGG	D	DRILL NEW WELLS (MINING GREGG, CARRIZO-WILCOX, SABINE)	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	226	339	339	339	339	339	$425	$44
MINING, HARRISON	D	DRILL NEW WELLS (MINING HARRISON, CARRIZO-WILCOX, CYPRESS)	D | CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	324	324	324	324	108	0	$481	N/A
MINING, HARRISON	D	DRILL NEW WELLS (MINING HARRISON, CARRIZO-WILCOX, SABINE)	D | CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	1,398	1,398	1,398	1,398	1,398	1,398	$413	$54
MINING, HUNT	D	DRILL NEW WELLS (MINING HUNT, NACATOCH , SABINE)	D | NACATOCH AQUIFER | HUNT COUNTY	75	75	75	75	7	0	$907	N/A
MINING, MARION	D	DRILL NEW WELLS (MINING MARION, QUEEN CITY, CYPRESS)	D | QUEEN CITY AQUIFER | MARION COUNTY	432	648	648	648	648	648	$245	$54
MINING, SMITH	D	DRILL NEW WELLS (MINING SMITH, QUEEN CITY, SABINE)	D | QUEEN CITY AQUIFER | SMITH COUNTY	0	0	0	0	108	108	N/A	$528
MINING, SMITH	I	TYL-PAL-EXISTING SURPLUS FOR TYLER	I | PALESTINE LAKE/RESERVOIR	108	113	114	83	54	32	$896	$896
MINING, UPSHUR	D	DRILL NEW WELLS (MINING UPSHUR, QUEEN, CYPRESS/SABINE)	D | QUEEN CITY AQUIFER | UPSHUR COUNTY	430	860	860	860	860	860	$600	$58
NASH	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	206	212	214	214	214	214	$243	$243
NEW BOSTON	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	1,098	1,104	1,094	1,091	1,089	1,089	$243	$243
NORTH HUNT SUD	C	CONSERVATION - NORTH HUNT SUD	DEMAND REDUCTION	0	0	0	1	1	1	N/A	$0
NORTH HUNT SUD	C	CONSERVATION, WATER LOSS CONTROL - NORTH HUNT SUD	DEMAND REDUCTION	0	0	0	0	0	0	N/A	N/A
NORTH HUNT SUD	D	DELTA COUNTY PIPELINE (NORTH HUNT SUD, SULPHUR)	D | BIG CREEK LAKE/RESERVOIR	0	0	0	0	122	350	N/A	$1414
NORTH HUNT SUD	D	VOLUNTARY REALLOCATION OF HUNT MANUFACTURING SUPPLY (COMMERCE WD, TAWAKONI)	D | TAWAKONI LAKE/RESERVOIR	0	36	134	268	338	388	N/A	$0
RED LICK	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	119	117	117	117	N/A	$0
REDWATER	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	82	82	79	77	77	77	$244	$244
R-P-M WSC	D	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES)	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	75	150	150	225	285	285	$1907	$1103
R-P-M WSC	I	RPMW-ENHANCED PUBLIC AND SCHOOL EDUCATION	DEMAND REDUCTION	1	6	10	15	19	23	$489	$454
STEAM ELECTRIC POWER, HARRISON	D	TOLEDO BEND INTAKE AND RAW WATER PIPELINE (HARRISON)	I | TOLEDO BEND LAKE/RESERVOIR	2,000	6,000	10,000	15,000	21,000	47,000	$354	$75
STEAM ELECTRIC POWER, HUNT	D	ADVANCED WATER CONSERVATION (STEAM ELECTRIC POWER HUNT)	DEMAND REDUCTION	7,448	7,398	9,141	8,988	9,038	12,061	$0	$0
STEAM ELECTRIC POWER, LAMAR	D	INCREASE EXISTING CONTRACT (STEAM ELECTRIC LAMAR, EXISTING AVAILABILITY)	D | PAT MAYSE LAKE/RESERVOIR	0	1,415	2,733	4,870	7,474	8,209	N/A	$163
STEAM ELECTRIC POWER, LAMAR	D	INCREASE EXISTING CONTRACT (STEAM ELECTRIC LAMAR, WUG REALLOCATION)	D | PAT MAYSE LAKE/RESERVOIR	0	0	0	0	0	2,359	N/A	$163
STEAM ELECTRIC POWER, TITUS	D	INCREASE EXISTING CONTRACT (STEAM ELECTRIC POWER TITUS, 2020)	D | BOB SANDLIN LAKE/RESERVOIR	24,942	24,826	24,712	24,487	23,812	22,592	$100	$100
STEAM ELECTRIC POWER, TITUS	D	INCREASE EXISTING CONTRACT (STEAM ELECTRIC POWER TITUS, 2030)	D | BOB SANDLIN LAKE/RESERVOIR	0	9,849	9,890	9,846	9,698	9,802	N/A	$100

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

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
STEAM ELECTRIC POWER, TITUS	D	INCREASE EXISTING CONTRACT (STEAM ELECTRIC POWER TITUS, 2040)	D | O' THE PINES LAKE/RESERVOIR	0	0	41,069	40,569	40,028	38,868	N/A	$100
STEAM ELECTRIC POWER, TITUS	D	INCREASE EXISTING CONTRACT (STEAM ELECTRIC POWER TITUS, 2070 MARION REALLOCATION)	D | O' THE PINES LAKE/RESERVOIR	0	0	0	0	0	2,293	N/A	$100
STEAM ELECTRIC POWER, TITUS	D	INCREASE EXISTING CONTRACT (STEAM ELECTRIC POWER TITUS, 2070)	D | O' THE PINES LAKE/RESERVOIR	0	0	0	0	0	18,000	N/A	$100
TEXAMERICAS CENTER	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	514	527	530	530	530	530	$483	$483
TEXARKANA	D	ADVANCED WATER CONSERVATION (TEXARKANA)	DEMAND REDUCTION	6,403	6,664	6,815	6,742	6,729	6,728	$600	$600
TEXARKANA	D	DREDGE WRIGHT PATMAN (TEXARKANA, SULPHUR)	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	2,000	18,000	N/A	$957
TEXARKANA	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	6,368	6,296	6,123	6,123	6,123	6,123	$731	$294
TRI SUD	D	RENEW AND INCREASE EXISTING CONTRACT (TRI SUD FROM MOUNT PLEASANT)	D | BOB SANDLIN LAKE/RESERVOIR	1,560	1,681	1,819	1,991	2,187	2,399	$782	$782
WAKE VILLAGE	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	677	669	654	644	642	642	$242	$242
WASKOM	D	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS)	D | CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	46	46	46	92	138	184	$1065	$641
WINONA	D	DRILL NEW WELLS (WINONA, QUEEN CITY, SABINE)	D | QUEEN CITY AQUIFER | SMITH COUNTY	0	0	0	108	108	108	N/A	$194
WOLFE CITY	D	DRILL NEW WELLS (WOLFE CITY, WOODBINE, SULPHUR)	D | TRINITY AQUIFER | HUNT COUNTY	0	0	0	0	0	81	N/A	$1889
WOLFE CITY	D	DRILL NEW WELLS (WOLFE CITY, WOODBINE, SULPHUR)	D | WOODBINE AQUIFER | HUNT COUNTY	0	0	0	81	192	192	N/A	$1334
Region D Total RecommendedWMS Supplies				176,080	205,413	270,131	295,193	336,711	370,942		

REGION D
EVALUATIONS OF WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

BOWIE COUNTY

WUGs:

The City of DeKalb
The City of Hooks
Bowie County Irrigation
Macedonia-Eylau MUD #1
The City of Maud
The City of Nash
The City of New Boston
The City of Redwater
TexAmericas Center
The City of Texarkana, Texas
The City of Wake Village

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EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF DE KALB

Description of Water User Group:

The City of De Kalb provides water service in Bowie County. The City population is projected to be 1,757 in 2020 and 1,822 in the year 2070. The City has a contract for water supply with the City of Texarkana from Lake Wright Patman. The City is projected to have a shortage in 2020 due to aging of Texarkana's Water Treatment Plant.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	1,757	1,807	1,822	1,822	1,822	1,822
Projected Water Demand	304	303	299	298	297	297
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	0	0	0	0	0	0
Projected Supply Surplus (+) / Deficit (-)	**-304**	**-303**	**-299**	**-298**	**-297**	**-297**

Evaluation of Potentially Feasible Water Management Strategies:

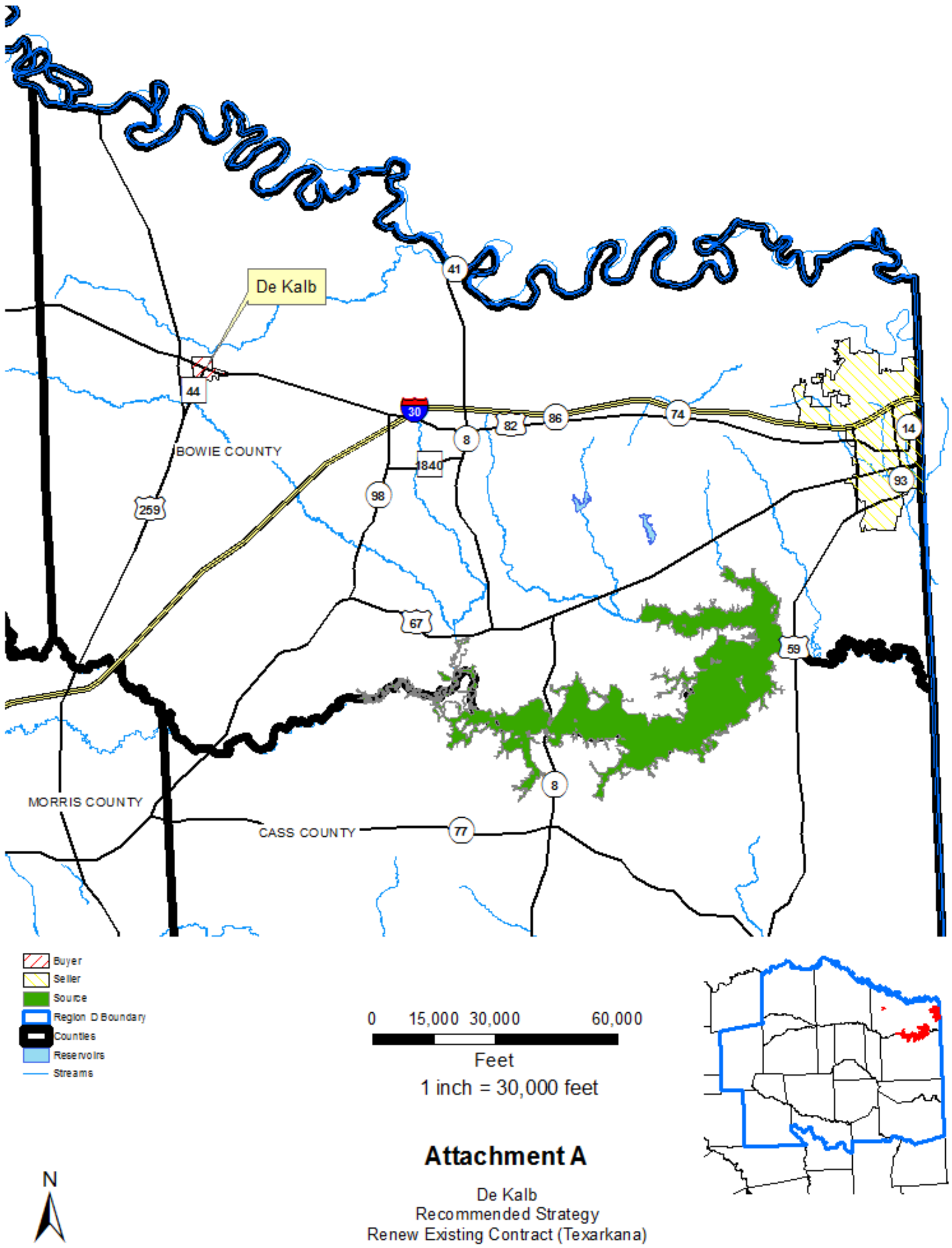
There were four alternative strategies considered to meet the City's water supply shortages as summarized in the Table below. Advanced conservation was not considered because De Kalb's supply is not projected to meet TCEQ regulatory minimums. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the City is planning on continuing to purchase surface water from the City of Texarkana. A request was submitted by Riverbend Water Resources District to consider a new Water Treatment Plant, pipeline, and intake to Wright Patman Reservoir. Thus, a renewal contract with Texarkana/Riverbend has been considered herein.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Ground Water					
Renew Existing Contract	**304**		**$74,000**	**$243**	**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
Renew Existing Contract (ac-ft/yr)	304	303	299	298	297	297

It is recommended that the City of DeKalb continue its surface water purchase from Texarkana contingent upon Texarkana/Riverbend strategies.



Attachment A

De Kalb
Recommended Strategy
Renew Existing Contract (Texarkana)

Cost Estimate Summary
Water Supply Project Option
41518 Prices
DeKalb - Water Purchase Contract with City of Texarkana

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (304 acft/yr @ 242.68 $/acft)	$74,000
TOTAL ANNUAL COST	**$74,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	304
Annual Cost of Water ($ per acft)	$243
Annual Cost of Water ($ per 1,000 gallons)	$0.75
JMP	*3/31/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF HOOKS

Description of Water User Group:

The City of Hooks provides water service in Bowie County. The City population is projected to be 2,863 in 2020 and 2,970 in the year 2070. The City has a contract for water supply with the City of Texarkana from Lake Wright Patman. The City is projected to have a shortage in 2020 due to aging of Texarkana's Water Treatment Plant.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	2,863	2,944	2,970	2,970	2,970	2,970
Projected Water Demand	265	258	249	244	243	243
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	0	0	0	0	0	0
Projected Supply Surplus (+) / Deficit (-)	**-265**	**-258**	**-249**	**-244**	**-243**	**-243**

Evaluation of Potentially Feasible Water Management Strategies:

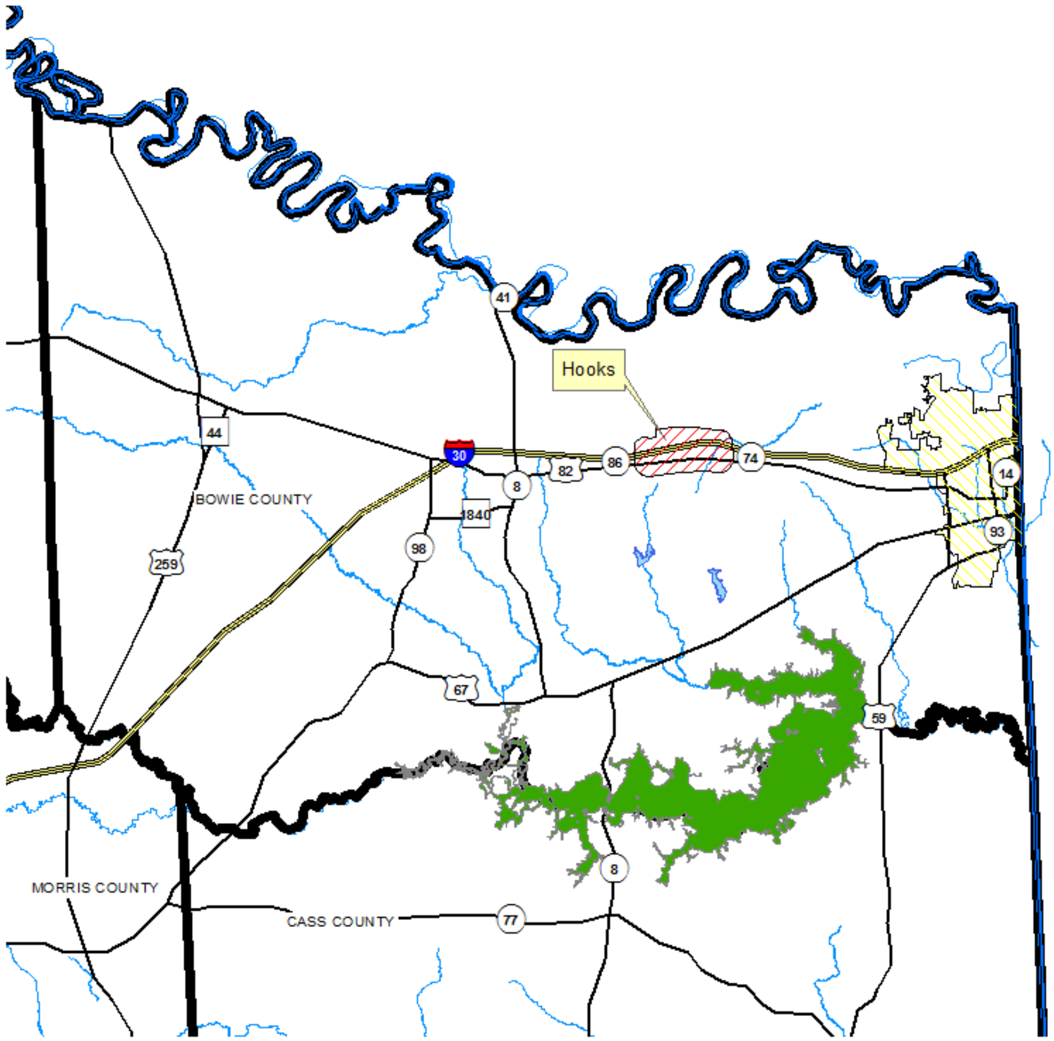
There were four alternative strategies considered to meet the City's water supply shortages as summarized in the Table below. Advanced conservation was not considered because the per capita use per day was less than the 140 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the City is planning on continuing to purchase surface water from the City of Texarkana. A request was submitted by Riverbend Water Resources District to consider a new Water Treatment Plant, pipeline, and intake to Wright Patman Reservoir. Thus, a renewal contract with Texarkana/Riverbend has been considered herein.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Ground Water					
Renew Existing Contract	**265**		**$64,000**	**$242**	**1**

Recommendations:

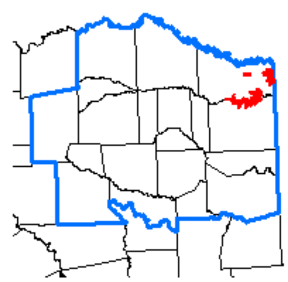
	2020	2030	2040	2050	2060	2070
Renew Existing Contract (ac-ft/yr)	**265**	**258**	**249**	**244**	**243**	**243**

It is recommended that the City of Hooks continue its surface water purchase from Texarkana contingent upon Texarkana/Riverbend strategies.



Buyer
Seller
Source
Region D Boundary
Counties
Reservoirs
Streams

0 15,000 30,000 60,000
Feet
1 inch = 30,000 feet



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Attachment A

Hooks
Recommended Strategy
Renew Existing Contract (Texarkana)

Cost Estimate Summary Water Supply Project Option 41518 Prices Hooks - Renew Existing Contract	
Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518	
Item	***Estimated Costs for Facilities***
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (265 acft/yr @ 242.68 $/acft)	$64,000
TOTAL ANNUAL COST	**$64,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	265
Annual Cost of Water ($ per acft)	$242
Annual Cost of Water ($ per 1,000 gallons)	$0.74
JMP	*3/31/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF IRRIGATION IN BOWIE COUNTY

Description of Water User Group:

The Irrigation WUG in Bowie County has a demand that is projected to decrease from 6,221 ac-ft/yr in 2020 to 5,121 ac-ft/yr in 2070. The Irrigation WUG in Bowie County is projected to be supplied by surface water supplies from run-of-river diversions from the Red and Sulphur Rivers. The current round of planning has identified a deficit of 5,240 ac-ft/yr, projected to occur in 2020 and decrease to 4,140 ac-ft/yr by 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Projected Water Demand	6,221	6,221	6,060	5,657	5,281	5,121
Current Water Supply	981	981	981	981	981	981
Projected Supply Surplus (+)/Deficit(-)	**-5,240**	**-5,240**	**-5,079**	**-4,676**	**-4,300**	**-4,140**

Projected Supply Surplus (+)/Deficit(-) by Basin	2020	2030	2040	2050	2060	2070
Red River Basin	-2,935	-2,935	-2,836	-2,588	-2,357	-2,259
Sulphur Basin	-2,305	-2,305	-2,243	-2,088	-1,943	-1,881
Total	**-5,240**	**-5,240**	**-5,079**	**-4,676**	**-4,300**	**-4,140**

Evaluation of Potentially Feasible Water Management Strategies:

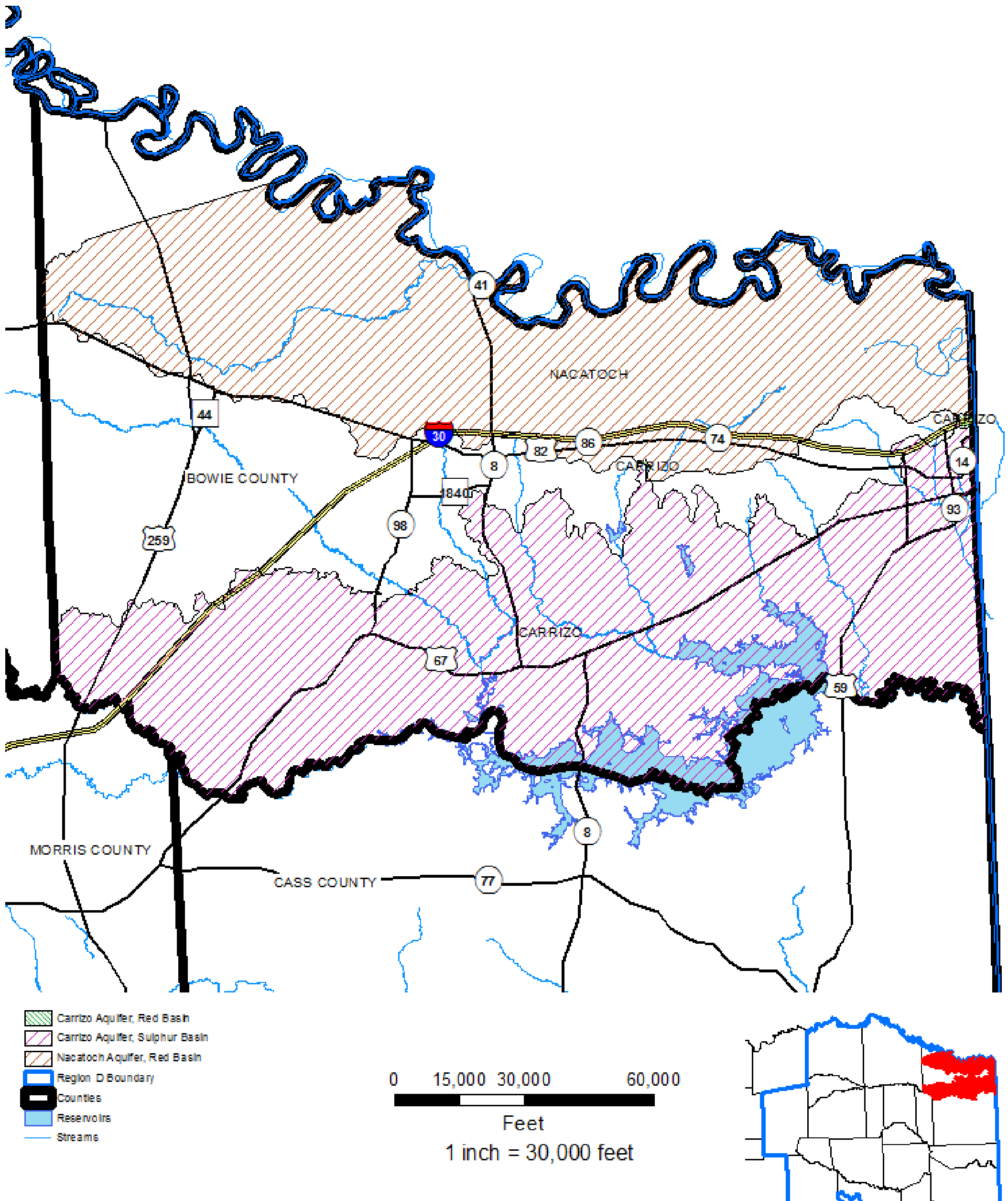
Six alternative strategies were considered to meet the Bowie County Irrigation WUG's projected water supply shortages. Advanced water conservation for irrigation practices were not considered in this planning effort, as present irrigation practices likely already incorporate many BMPs to extend water supplies, thus no additional conservation would be feasible. The use of reuse water from nearby municipalities is not considered feasible as it would not be effective to deliver reuse water to rural farm irrigation systems. Groundwater from the Carrizo-Wilcox and Nacatoch aquifers has been identified as a potential source of water for irrigation in Bowie County. Surface water was not considered as a viable alternative to meet projected demands due to this option would be considered cost prohibitive.

Strategy	Strategy Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Carrizo-Wilcox, Sulphur River Basin)	**3,700**	**$2,021,000**	**$2,053,000**	**$555**	**1**
Drill New Wells (Nacatoch, Red Basin)	**1,540**	**$1,466,000**	**$923,000**	**$599**	**1**
Surface Water					

Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Carrizo-Wilcox, Sulphur River Basin; ac-ft/yr)	**3,700**	**3,700**	**3,700**	**3,700**	**3,700**	**3,700**
Drill New Wells (Nacatoch, Red Basin; ac-ft/yr)	**1,540**	**1,540**	**1,441**	**1,193**	**600**	**440**

The recommended strategy for the Bowie County Irrigation WUG to meet projected demands during the planning period is to drill new ground water wells in the Carrizo-Wilcox and Nacatoch Aquifers in Bowie County.



Attachment A

Bowie County Irrigation
Recommended Strategy
Drill New Wells

Cost Estimate Summary
Water Supply Project Option
41518 Prices

Irrigation - Bowie_Sulphur_Carrizo-Wilcox

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$1,446,000
TOTAL COST OF FACILITIES	**$1,446,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$506,000
Interest During Construction (4% for 1 years with a 1% ROI)	$69,000
TOTAL COST OF PROJECT	**$2,021,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$169,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$14,000
Pumping Energy Costs (222284 kW-hr @ 0.09 $/kW-hr)	$20,000
Purchase of Water (3700 acft/yr @ 500 $/acft)	$1,850,000
TOTAL ANNUAL COST	**$2,053,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	3,700
Annual Cost of Water ($ per acft)	$555
Annual Cost of Water ($ per 1,000 gallons)	$1.70

KVA *10/14/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Irrigation - Bowie_Red_Nacatoch

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
Well Fields (Wells, Pumps, and Piping)	$1,049,000
TOTAL COST OF FACILITIES	**$1,049,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$367,000
Interest During Construction (4% for 1 years with a 1% ROI)	$50,000
TOTAL COST OF PROJECT	**$1,466,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$123,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$10,000
Pumping Energy Costs (218594 kW-hr @ 0.09 $/kW-hr)	$20,000
Purchase of Water (1540 acft/yr @ 500 $/acft)	$770,000
TOTAL ANNUAL COST	**$923,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	1,540
Annual Cost of Water ($ per acft)	$599
Annual Cost of Water ($ per 1,000 gallons)	$1.84
KVA	*3/31/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF MACEDONIA-EYLAU MUD#1

Description of Water User Group:

Macedonia-Eylau MUD #1 provides water service in Bowie County. The MUD's population is projected to be 8,397 in 2020 and 8,572 in the year 2070. The MUD has a contract for water supply with the City of Texarkana for 552 ac-ft/yr that expires in 2019. The MUD is projected to have a deficit of 565 ac-ft in 2020 and increasing to a deficit of 577 ac-ft by 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	8,397	8,530	8,572	8,572	8,572	8,572
Projected Water Demand	565	574	577	577	577	577
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	0	0	0	0	0	0
Projected Supply Surplus (+) / Deficit (-)	**-565**	**-574**	**-577**	**-577**	**-577**	**-577**

Evaluation of Potentially Feasible Water Management Strategies:

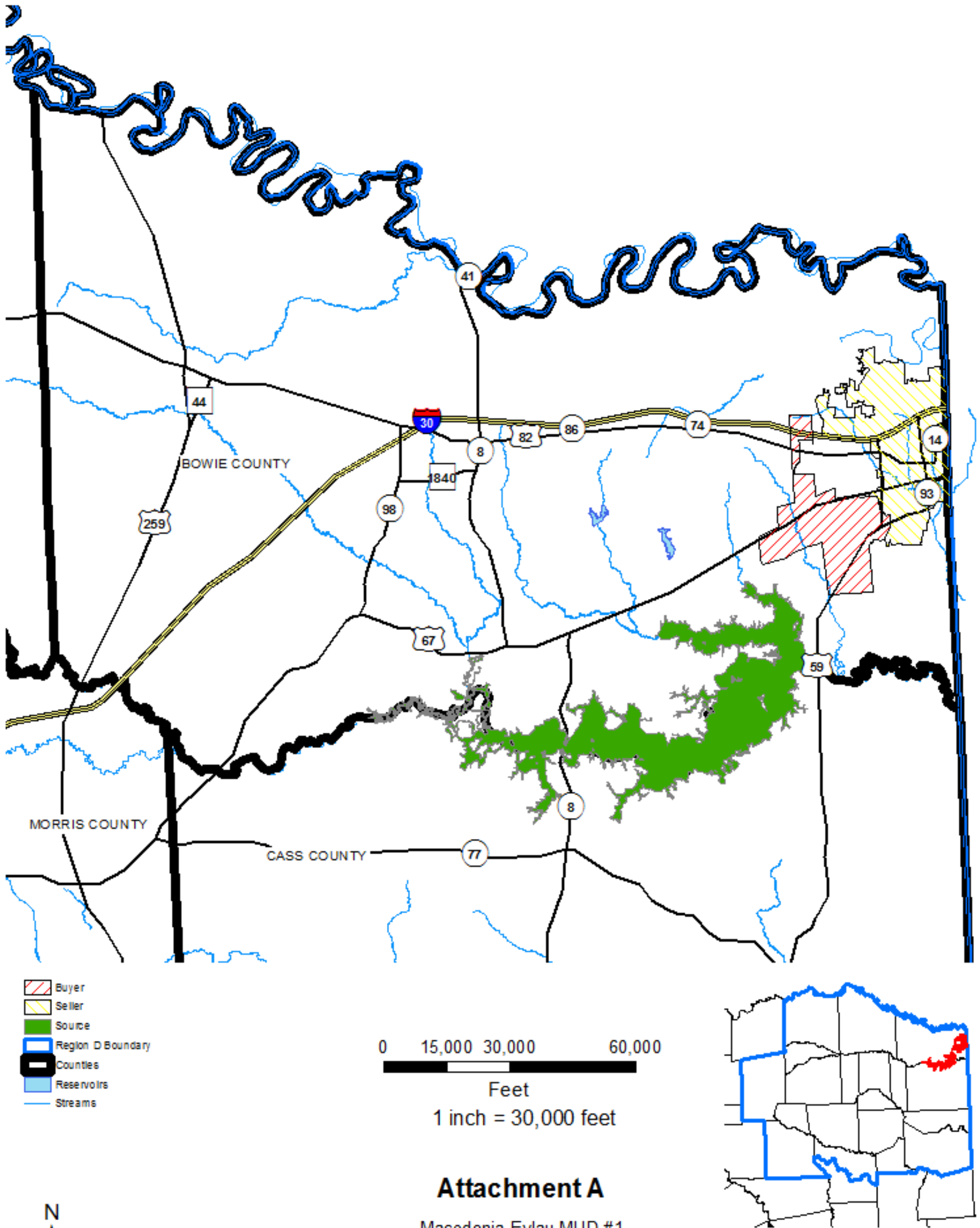
There were four alternative strategies considered to meet the MUD's water supply shortages as summarized in the table below. Advanced conservation was not considered because the per capita use per day was less than the 140 gpcd threshold established by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the MUD is planning on continuing to purchase surface water from the City of Texarkana.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Ground Water					
Renew Existing Contract	**577**		**$278,000**	**$482**	**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
Renew Existing Contract (ac-ft/yr)	**565**	**574**	**577**	**577**	**577**	**577**

Surface water purchase from City of Texarkana is the recommended strategy to meet Macedonia-Eylau MUD's needs contingent on Texarkana/Riverbend recommended strategies.



Attachment A

Macedonia-Eylau MUD #1
Recommended Strategy
Renew and Increase Existing Contract (Texarkana)

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Macedonia-Eylau MUD #1 - Surface Water Contract with Texarkana

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (577 acft/yr @ 482.23 $/acft)	$278,000
TOTAL ANNUAL COST	**$278,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	577
Annual Cost of Water ($ per acft)	$482
Annual Cost of Water ($ per 1,000 gallons)	$1.48
TLS	*3/31/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF MAUD

Description of Water User Group:

The City of Maud provides water service in Bowie County. The City population is projected to be 1,092 in 2020 and 1,133 in the year 2070. The City has a contract for water supply with the City of Texarkana from Lake Wright Patman. The City is projected to have a shortage in 2020 due to aging of Texarkana's Water Treatment Plant.

Water Supply and Demand Analysis:

	2020	**2030**	**2040**	**2050**	**2060**	**2070**
Population	1,092	1,123	1,133	1,133	1,133	1,133
Projected Water Demand	170	169	167	165	164	164
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	0	0	0	0	0	0
Projected Supply Surplus (+) / Deficit (-)	**-170**	**-169**	**-167**	**-165**	**-164**	**-164**

Evaluation of Potentially Feasible Water Management Strategies:

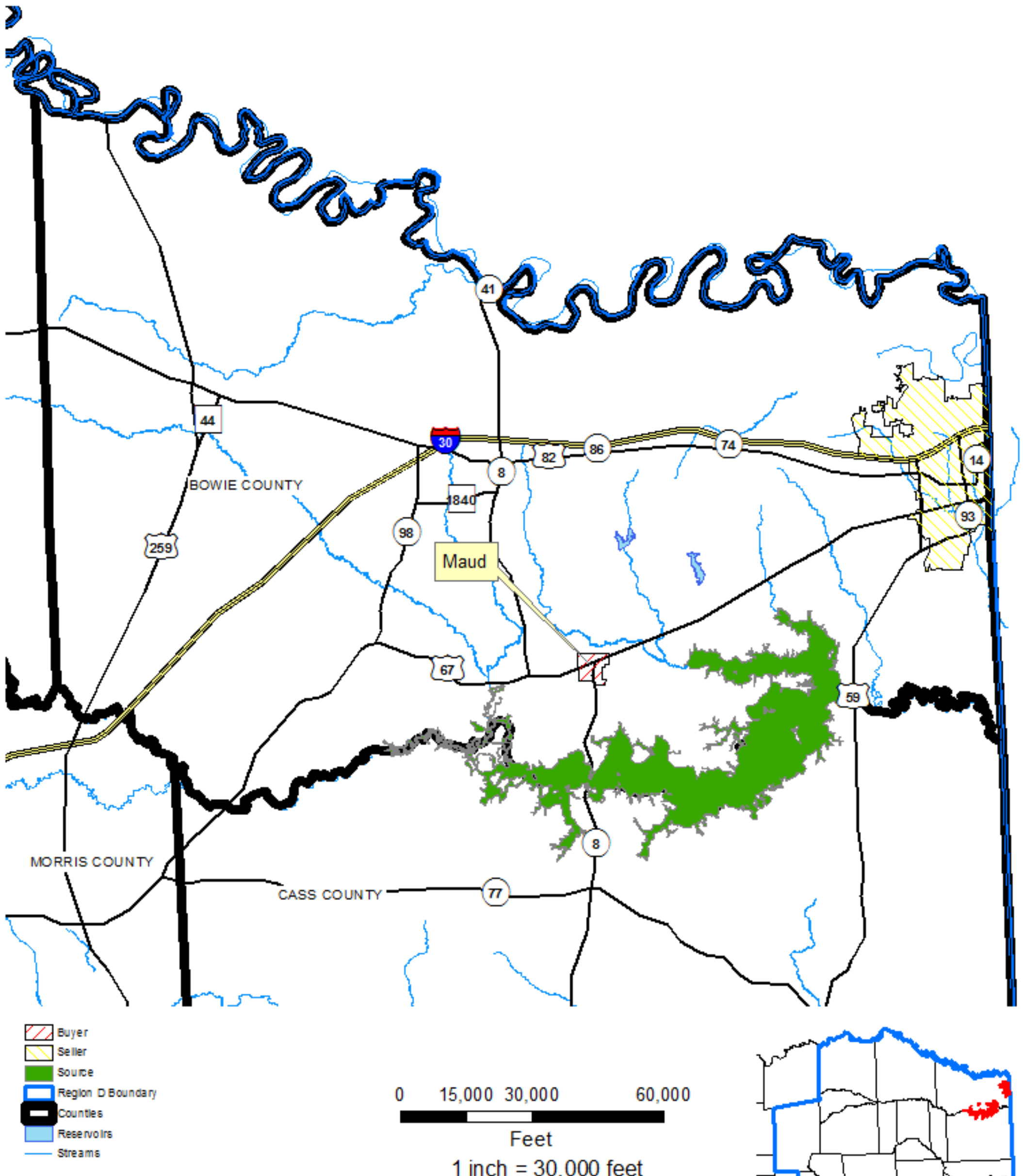
There were four alternative strategies considered to meet the City's water supply shortages as summarized in the Table below. Advanced conservation was not considered because Maud's supply is not projected to meet TCEQ regulatory minimums. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the City is planning on continuing to purchase surface water from the City of Texarkana. A request was submitted by Riverbend Water Resources District to consider a new Water Treatment Plant, pipeline, and intake to Wright Patman Reservoir. Thus, a renewal contract with Texarkana/Riverbend has been considered herein.

Strategy	**Firm Yield (ac-ft)**	**Total Capital Cost**	**Total Annualized Cost**	**Unit Cost**	**Env. Impact**
Advanced Water Conservation					
Water Reuse					
Ground Water					
Renew Existing Contract (ac-ft/yr)	**170**		**$41,000**	**$241**	**1**

Recommendations:

	2020	**2030**	**2040**	**2050**	**2060**	**2070**
Renew Existing Contract (ac-ft/yr)	170	169	167	165	164	164

It is recommended that the City of Maud continue its surface water purchase from Texarkana contingent upon Texarkana/Riverbend strategies.



Attachment A

Maud
Recommended Strategy
Renew Existing Contract (Texarkana)

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Maud - Renew Existing Contract

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (170 acft/yr @ 242.68 $/acft)	$41,000
TOTAL ANNUAL COST	**$41,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	170
Annual Cost of Water ($ per acft)	$241
Annual Cost of Water ($ per 1,000 gallons)	$0.74

JMP *3/31/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF NASH

Description of Water User Group:

The City of Nash provides water service in Bowie County. The City population is projected to be 3,061 in 2020 and 3,175 in the year 2070. The City has a contract for water supply with the City of Texarkana from Lake Wright Patman. The City is projected to have a shortage in 2020 due to aging of Texarkana's Water Treatment Plant.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	3,061	3,148	3,175	3,175	3,175	3,175
Projected Water Demand	206	212	214	214	214	214
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	0	0	0	0	0	0
Projected Supply Surplus (+) / Deficit (-)	**-206**	**-212**	**-214**	**-214**	**-214**	**-214**

Evaluation of Potentially Feasible Water Management Strategies:

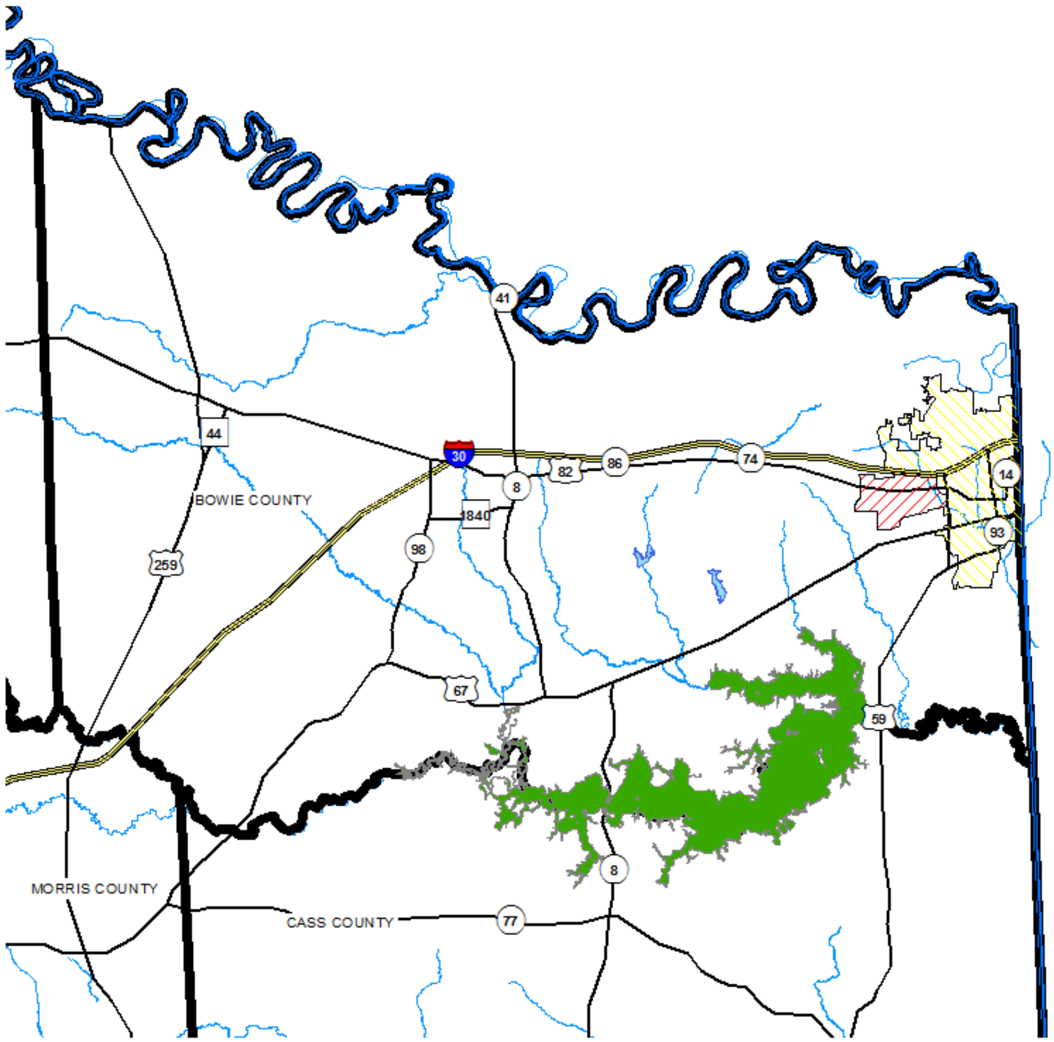
There were four alternative strategies considered to meet the City's water supply shortages as summarized in the Table below. Advanced conservation was not considered because Nash's supply is not projected to meet TCEQ regulatory minimums. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the City is planning on continuing to purchase surface water from the City of Texarkana. A request was submitted by Riverbend Water Resources District to consider a new Water Treatment Plant, pipeline, and intake to Wright Patman Reservoir. Thus, a renewal contract with Texarkana/Riverbend has been considered herein.

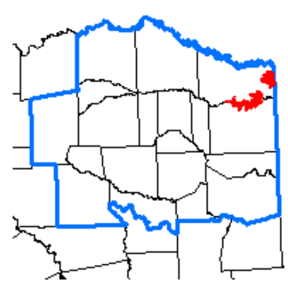
Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Env. Impact
Advanced Water Conservation					
Water Reuse					
Ground Water					
Renew Existing Contract (ac-ft/yr)	**214**		**$52,000**	**$243**	**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
Renew Existing Contract (ac-ft/yr)	206	212	214	214	214	214

It is recommended that the City of Nash continue its surface water purchase from Texarkana contingent upon Texarkana/Riverbend strategies.





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Attachment A

Nash
Recommended Strategy
Renew Existing Contract (Texarkana)

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Nash - Renew Existing Contract

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (214 acft/yr @ 242.68 $/acft)	$52,000
TOTAL ANNUAL COST	**$52,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	214
Annual Cost of Water ($ per acft)	$243
Annual Cost of Water ($ per 1,000 gallons)	$0.75
JMP	*4/3/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF CITY OF NEW BOSTON IN BOWIE COUNTY

Description of Water User Group:

The City of New Boston provides water service in Bowie County. The WUG population is projected to be 4,705 in 2020 and 4,880 in the year 2070. The city has a contract for water supply with the City of Texarkana for 1,090 ac-ft/yr that expires in 2016, with a one year auto renewal. New Boston also has a water right permit for run-of-river diversions from the Sulphur River. The City is projected to have a shortage in 2020 due to aging of Texarkana's Water Treatment Plant.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	4,705	4,838	4,880	4,880	4,880	4,880
Projected Water Demand	1,098	1,104	1,094	1,091	1,089	1,089
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	0	0	0	0	0	0
Projected Supply Surplus (+) / Deficit (-)	**-1,098**	**-1,104**	**-1,094**	**-1,091**	**-1,089**	**-1,089**

Evaluation of Potentially Feasible Water Management Strategies:

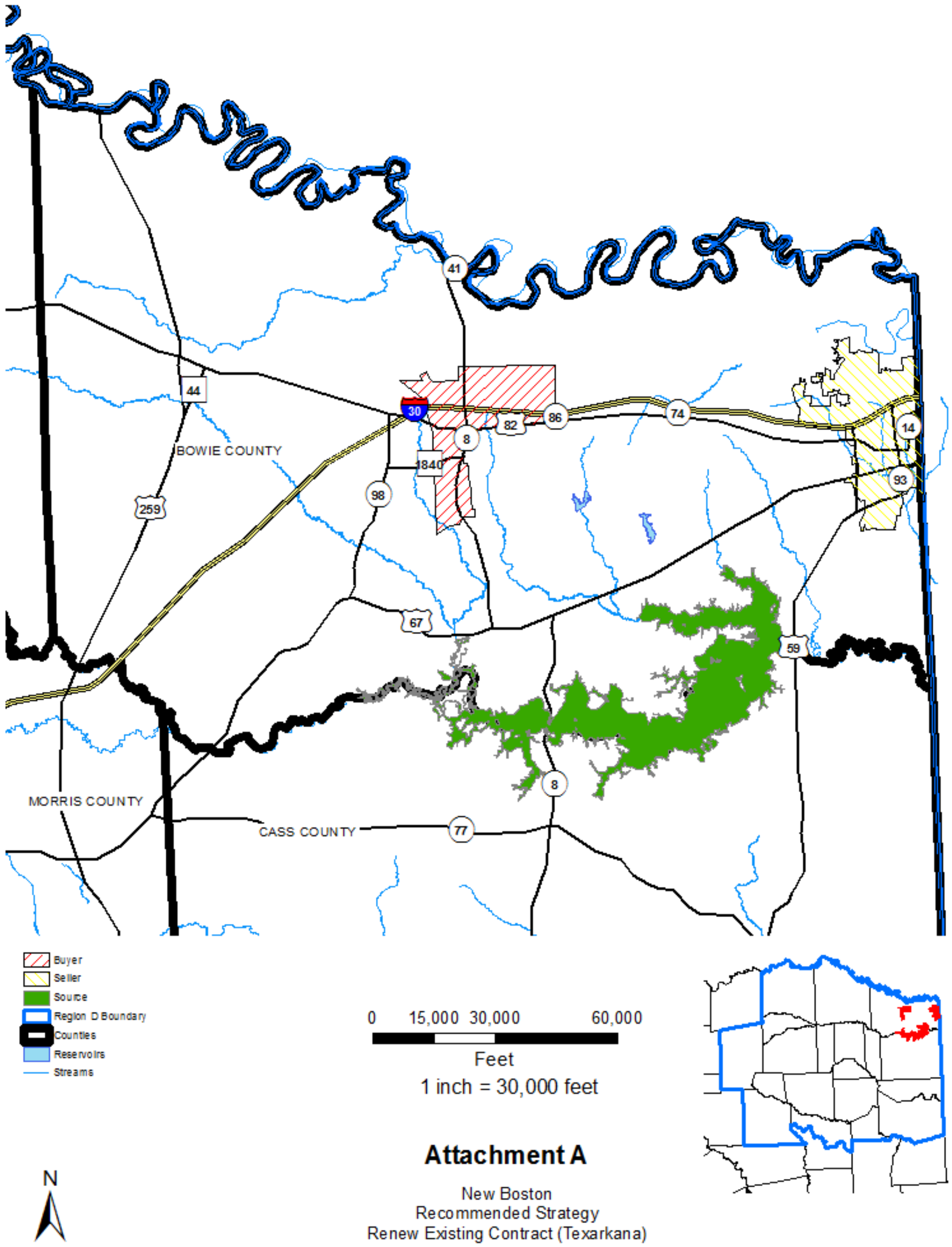
There were four alternative strategies considered to meet New Boston's water supply shortages as summarized in the Table below. Advanced conservation was not considered because New Boston's supply is not projected to meet TCEQ regulatory minimums. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the city has historically utilized surface water supplies and, at present, is planning on continuing to purchase surface water from the City of Texarkana. A request was submitted by Riverbend Water Resources District to consider a new Water Treatment Plant, pipeline, and intake to Wright Patman Reservoir. Thus, a renewal contract with Texarkana/Riverbend has been considered herein.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Ground Water					
Renew Existing Contract	**1,104**		**$268,000**	**$243**	**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
Renew Existing Contract (ac-ft/yr)	1,098	1,104	1,094	1,091	1,089	1,089

It is recommended that the City of New Boston continue its surface water purchase from Texarkana contingent upon Texarkana/Riverbend strategies.



Attachment A

New Boston
Recommended Strategy
Renew Existing Contract (Texarkana)

Cost Estimate Summary
Water Supply Project Option
41518 Prices
New Boston - Renew Existing Contract

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (1104 acft/yr @ 242.68 $/acft)	$268,000
TOTAL ANNUAL COST	**$268,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	1,104
Annual Cost of Water ($ per acft)	$243
Annual Cost of Water ($ per 1,000 gallons)	$0.74

JMP *3/31/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF REDWATER

Description of Water User Group:

The City of Redwater provides water service in Bowie County. The City population is projected to be 1,093 in 2020 and 1,134 in the year 2070. The City has a contract for water supply with the City of Texarkana from Lake Wright Patman, and groundwater supply from the Carrizo-Wilcox Aquifer. The City is projected to have a shortage in 2020 due to aging of the Texarkana's Water Treatment Plant.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	1,093	1,124	1,134	1,134	1,134	1,134
Projected Water Demand	148	148	145	143	143	143
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	66	66	66	66	66	66
Projected Supply Surplus (+) / Deficit (-)	**-82**	**-82**	**-79**	**-77**	**-77**	**-77**

Evaluation of Potentially Feasible Water Management Strategies:

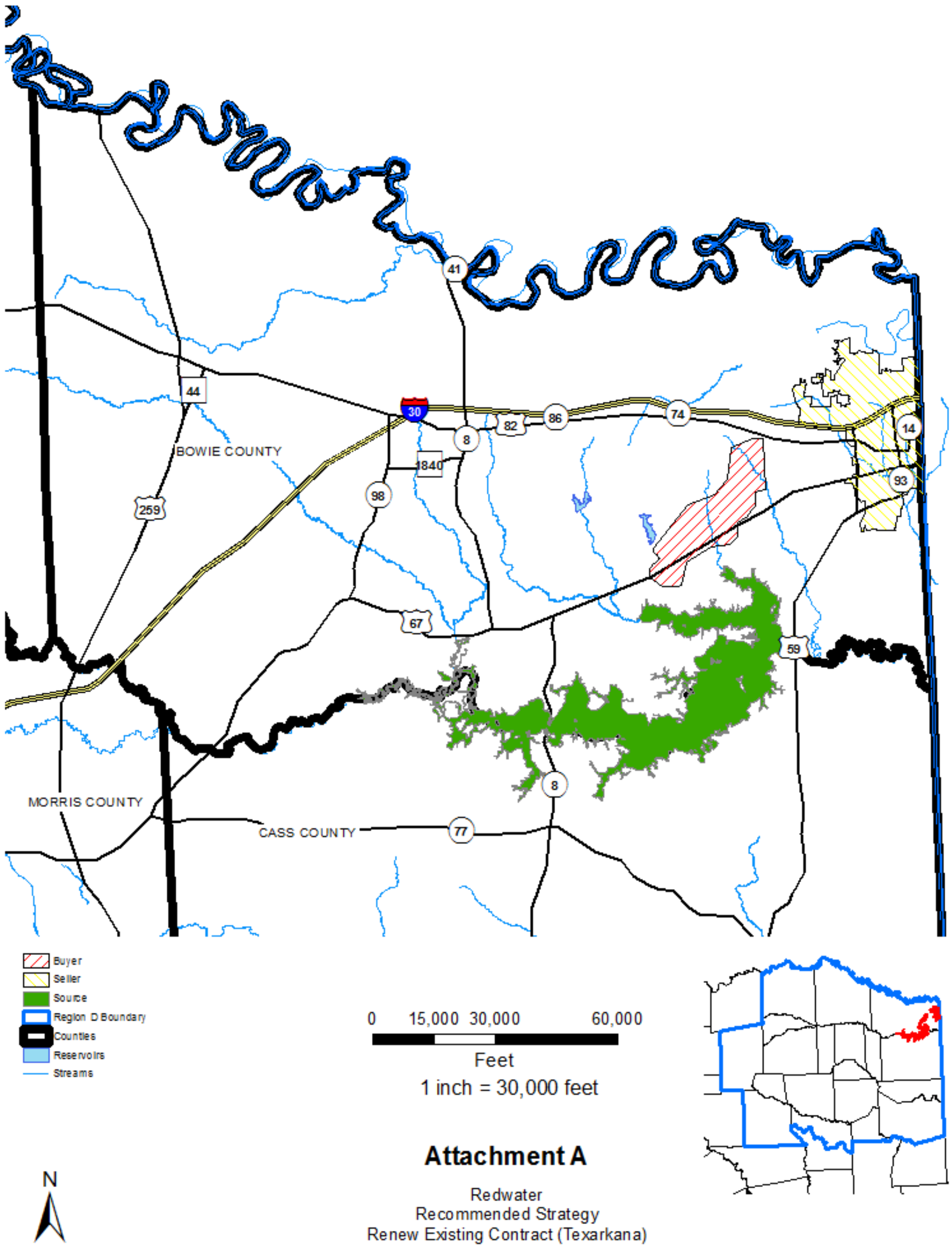
There were four alternative strategies considered to meet the City's water supply shortages as summarized in the Table below. Advanced conservation was not considered because Redwater's supply is not projected to meet TCEQ regulatory minimums. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the City is planning on continuing to purchase surface water from the City of Texarkana. A request was submitted by Riverbend Water Resources District to consider a new Water Treatment Plant, pipeline, and intake to Wright Patman Reservoir. Thus, a renewal contract with Texarkana/Riverbend has been considered herein.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Env. Impact
Advanced Water Conservation					
Water Reuse					
Ground Water					
Renew Existing Contract (ac-ft/yr)	**82**		**$20,000**	**$244**	**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
Renew Existing Contract (ac-ft/yr)	82	82	79	77	77	77

It is recommended that the City of Redwater continue its surface water purchase from Texarkana contingent upon Texarkana/Riverbend strategies. Development of infrastructure necessary to provide water to the City's customers is to be considered consistent with this recommended strategy.



Attachment A

Redwater
Recommended Strategy
Renew Existing Contract (Texarkana)

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Redwater - Renew Existing Contract

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (82 acft/yr @ 242.68 $/acft)	$20,000
TOTAL ANNUAL COST	**$20,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	82
Annual Cost of Water ($ per acft)	$244
Annual Cost of Water ($ per 1,000 gallons)	$0.75

JMP *4/5/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF TEXAMERICAS CENTER

Description of Water User Group:

TexAmericas Center provides water service in Bowie County. The WUG population is projected to be 533 by 2020 and increasing to 553 by 2070. TexAmericas has a contract for water supply with the City of Texarkana for surface water from Wright Patman. TexAmericas is not projected to have a shortage in the current planning period; however, as a member of Riverbend Water Resources District, a request was received from Riverbend to include a strategy within the 2016 Plan.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	533	548	553	553	553	553
Projected Water Demand	514	527	529	528	528	528
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	0	0	0	0	0	0
Projected Supply Surplus (+) / Deficit (-)	**-514**	**-527**	**-529**	**-528**	**-528**	**-528**

Evaluation of Potentially Feasible Water Management Strategies:

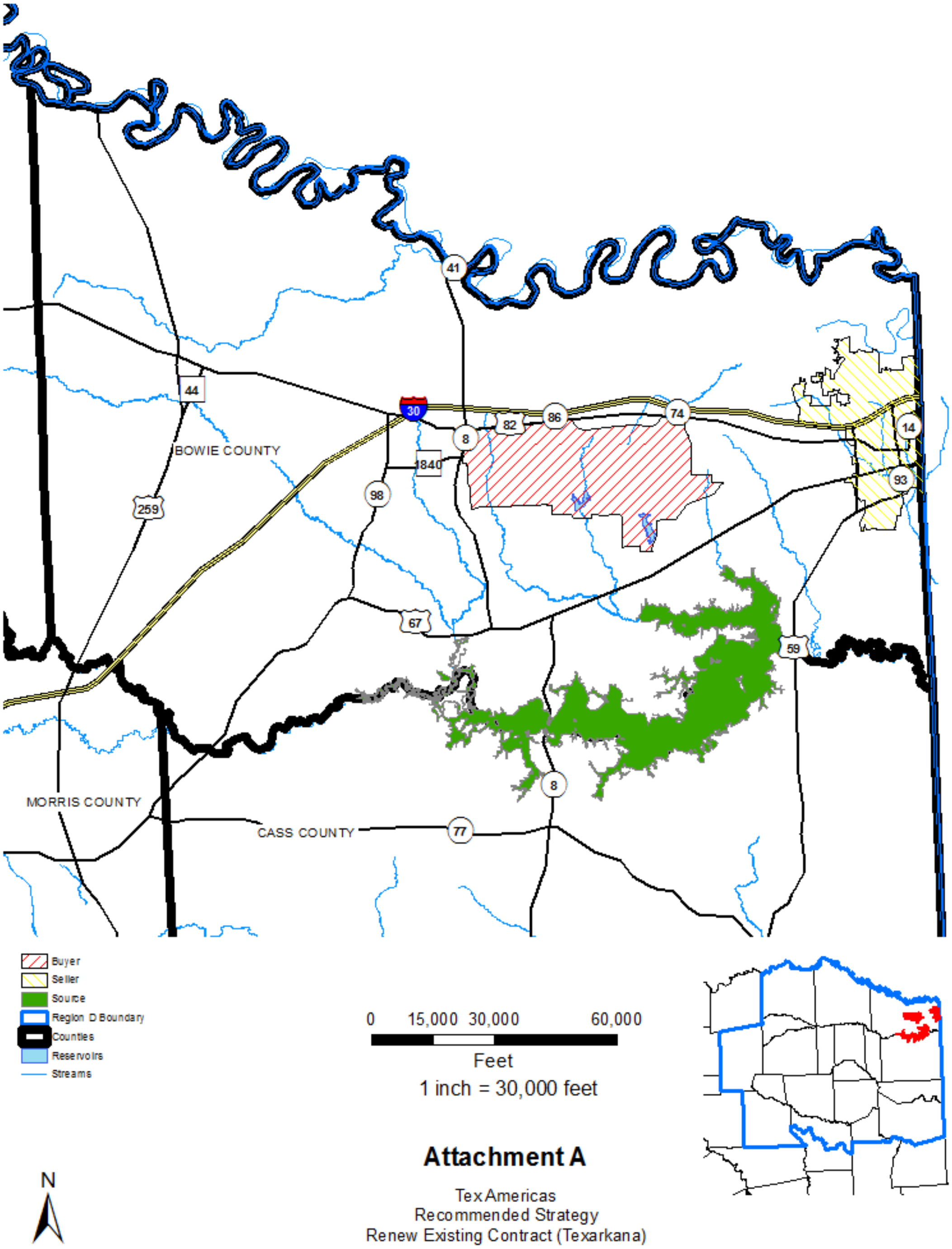
There were four alternative strategies considered to meet the TexAmericas' water supply shortages as summarized in the Table below. Advanced conservation is not considered as the entity has no existing shortages. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because TexAmericas has historically utilized surface water supplies and, at present, is planning on continuing to purchase surface water from the City of Texarkana. A request was submitted by Riverbend Water Resources District to consider a new pipeline and intake to Wright Patman Reservoir as an explicit strategy for consideration in the 2016 Plan. Surface water infrastructure was thus considered to increase available supplies for potential future industrial development, based upon analyses provided by Riverbend. Another strategy is considered whereby a renewal contract with Texarkana/Riverbend is implemented, contingent upon the development of Riverbend's recommended strategy for the development of a new Water Treatment Plant, pipeline, and intake, connecting Wright Patman reservoir to a new facility at TexAmericas Center, for subsequent connection to the member cities' system.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Groundwater					
New Intake and Raw Water Pipeline from Wright Patman	**22,403**	**$42,178,000**	**$8,145,000**	**$364**	**3**
Renew Existing Contract	**530**		**$256,000**	**$483**	**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
Renew Existing Contract (ac-ft/yr)	514	527	530	530	530	530

Renewal of the existing surface water purchase from the City of Texarkana/Riverbend is the recommended strategy to meet TexAmericas' needs, contingent upon Texarkana/Riverbend strategies.



Attachment A

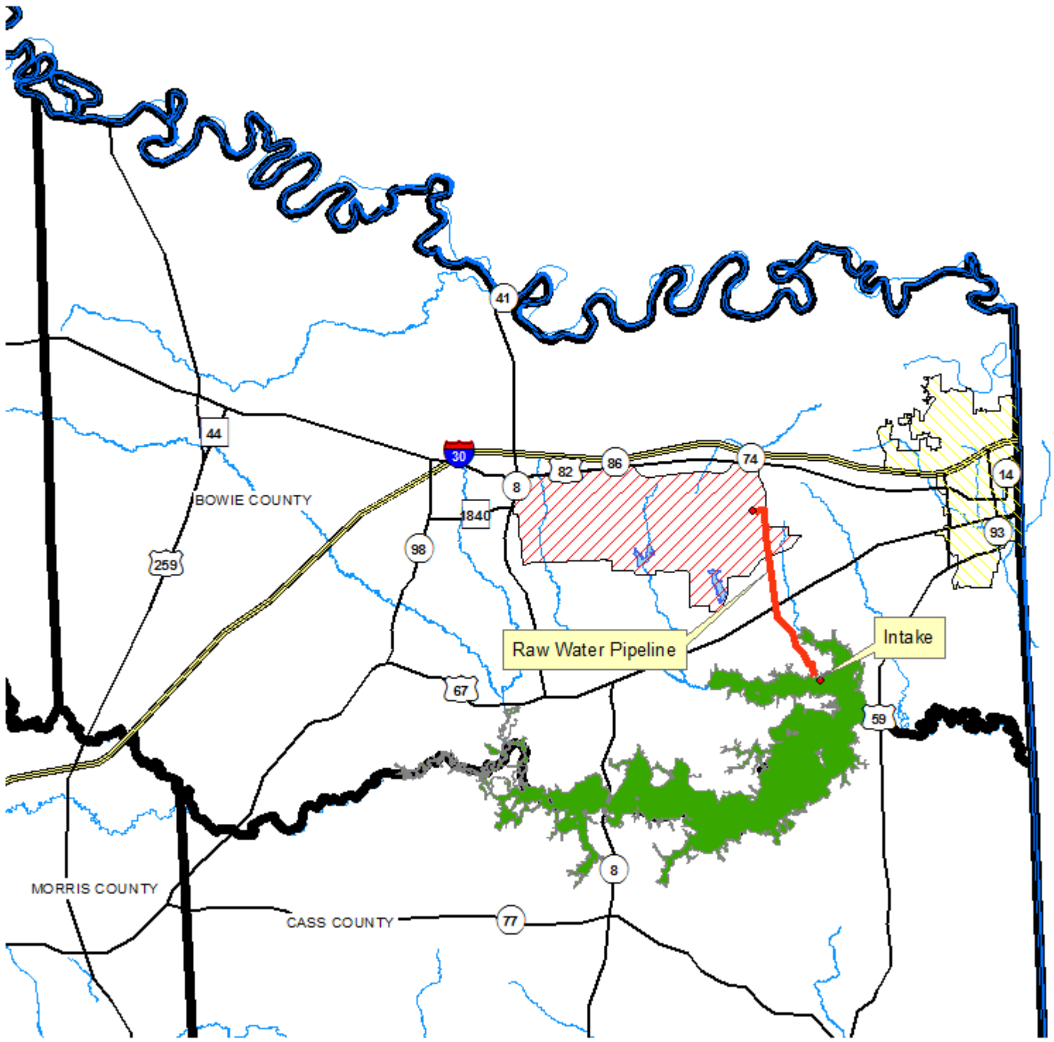
TexAmericas
Recommended Strategy
Renew Existing Contract (Texarkana)

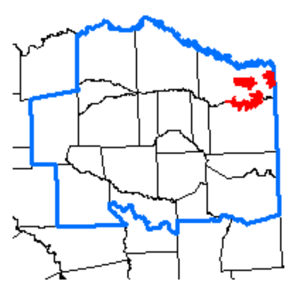
Cost Estimate Summary *Water Supply Project Option* *41518 Prices* *TexAmericas - Renew Existing Contract*	
Cost based on ENR CCI 9552 for 41518 and ***a PPI of 187 for 41518***	
Item	***Estimated Costs for Facilities***
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (530 acft/yr @ 482.23 $/acft)	$256,000
TOTAL ANNUAL COST	**$256,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	530
Annual Cost of Water ($ per acft)	$483
Annual Cost of Water ($ per 1,000 gallons)	$1.48
JMP	*3/31/2015*

Alternate Strategy:

	2020	2030	2040	2050	2060	2070
New Intake and Raw Water Pipeline from Wright Patman (ac-ft/yr)	22,403	22,403	22,403	22,403	22,403	22,403

The recommended alternative strategy is the construction of a new raw water pipeline and intake structure to transport raw water from Wright Patman purchased from Texarkana.





Attachment A

TexAmericas
Alternative Strategy
New Intake and Raw Water Pipeline from Wright Patman

Cost Estimate Summary
Water Supply Project Option
41518 Prices

TexAmericas - New Intake and Raw Water Pipeline from Wright Patman

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Intake Pump Stations (0 MGD)	$13,968,000
Transmission Pipeline (0 in dia., 0 miles)	$20,962,000
TOTAL COST OF FACILITIES	**$34,930,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$5,315,000
Land Acquisition and Surveying (0 acres)	$506,000
Interest During Construction (4% for 1 years with a 1% ROI)	$1,427,000
TOTAL COST OF PROJECT	**$42,178,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$3,529,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$559,000
Pumping Energy Costs (465889 kW-hr @ 0.09 $/kW-hr)	$42,000
Purchase of Water (22403 acft/yr @ 179.21 $/acft)	$4,015,000
TOTAL ANNUAL COST	**$8,145,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	22,403
Annual Cost of Water ($ per acft)	$364
Annual Cost of Water ($ per 1,000 gallons)	$1.12

Note: One or more cost element has been calculated externally

JMP *3/31/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF THE CITY OF TEXARKANA

Description of Water User Group:

The City of Texarkana, Texas, is a municipality located in Bowie County, Texas. Although the City of Texarkana, Texas, is a separate and distinct entity from the City of Texarkana, Arkansas, both entities are served by the same system (operated by Texarkana Water Utility). For the purposes of the 2016 Region D Water Plan, it has been assumed that water supplied from Arkansas (i.e., Millwood Reservoir) serves the population of Texarkana, Arkansas, while water supplied from Texas serves Texarkana, Texas.

For the City of Texarkana, Texas, the system is projected to serve 37,646 people in 2020, increasing to 39,046 by 2070. The current sources of supply based in Texas are surface water from Lake Wright Patman and a run of river diversion permit from the Red River (although no infrastructure is currently in place for the latter). The City provides water to area municipal and industrial customers and is projected to have a water supply deficit of 19,904 ac-ft/yr in 2070, due to the age and functionality of the existing New Boston Water Treatment Plant.

In 1969 Texarkana, Texas, entered into separate water supply contracts with surrounding communities. The contracts provided that Texarkana, Texas, and member cities would participate in paying debt service on bonds to be issued by Lake Texarkana Water Supply Corporation (LTWSC, today known as Riverbend Water Resources District, referred to hereafter as Riverbend). These member cities would all make payments for water supplied through facilities. In exchange Texarkana, Texas, and member cities were guaranteed ownership interest in LTWSC facilities and specified amounts of water in Wright Patman. Each city was guaranteed a maximum amount of water sufficient to meet the needs of the member cities, but also agreed to pay a minimum amount to ensure adequate funding for LTWSC facilities. Member cities historically relied on Texarkana, Texas, to manage and administer the water, the LTWSC facilities and water rates fairly for the benefits of all parties. When debt was paid off member cities would own an undivided interest in LTWSC facilities equal to that percentage that was paid by each member city to discharge debt.

In 2010, Texarkana, Texas executes water supply contract extensions, an interlocal cooperation agreement with Riverbend, and the formation of an advisory committee regarding the creation of water facilities and new cooperative agreements. The City of Texarkana sells and/or supplies surface water to: City of Atlanta, Central Bowie County WSC, City of De Kalb, City of Hooks, Macedonia-Eylau MUD#1, City of Maud, City of Nash, City of New Boston, City of Queen City, Red River County WSC, City of Redwater, TexAmericas Center, City of Wake Village, County-Other portions of Bowie, Cass and Red River Counties, and Manufacturing in Bowie and Cass Counties. Texarkana, along with the Cities of DeKalb, Hooks, Maud, Nash, New Boston, Redwater, Wake Village, TexAmericas Center, and sub-WUG entities comprising Bowie County-Other and Red River County-Other, comprise Riverbend Water Resources District (Riverbend). The system does have a water conservation and drought management plan in place.

This 2016 Plan recognizes that Riverbend may become the contracting entity between its members and Texarkana, Tx. The strategies shown herein for entities with shortages in Bowie and Red River Counties rely on continued use of water from Lake Wright Patman. Presently, the strategies related to Riverbend are presented with the City of Texarkana's water management strategies. However, the strategies should be considered consistent with the plan for this planning cycle if Riverbend is the contracting party rather than Texarkana, as long as the water source remains Lake Wright Patman.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	37,646	38,712	39,046	39,046	39,046	39,046
Projected Water Demand	12,771	12,960	12,938	12,865	12,852	12,851
Water Demand from other entities	6,054	6,250	6,511	6,643	6,838	7,053
Current Water Supply	0	0	0	0	0	0

Projected Supply Surplus (+) / Deficit (-)	-18,825	-19,210	-19,449	-19,508	-19,690	-19,904

Evaluation of Potentially Feasible Water Management Strategies:

Seven alternative strategies have been considered to meet Texarkana's water supply shortages, as listed in the table below.

Advanced conservation is a probable strategy for the City of Texarkana, as identified in the City's Water Conservation Plan. There are no significant current water needs in Texarkana that could be met by water reuse.

Groundwater was not considered as an alternative for this entity as conservation can meet future needs and the City relies upon its surface water supplies.

Texarkana is supplied by water in Lake Wright Patman. Riverbend has requested consideration of the strategy to decommission the existing New Boston Rd WTP and construct a new WTP by 2020 (referred to hereafter as the Riverbend Strategy), although the timing of this action is still under consideration by Texarkana, Riverbend, and the remaining member cities. As the City of Texarkana has indicated a desire to remain flexible, the City has not ruled out any alternatives at present.

Significant growth is projected for customer demands in Cass County, specifically Manufacturing. These demands represent the dominant need in the latter part of the 2020 – 2070 period. Thus, sedimentation issues play a significant role in the availability of supply from Wright Patman. Implementation of best management practices (BMPs) in the contributing watersheds upstream of Lake Wright Patman have the potential to reduce the total sediment inflow to the lake, thus slowing the loss of conservation storage to sedimentation and slowing the resultant loss of firm yield. Another alternative is to dredge sediment from Wright Patman in an attempt to restore conservation storage that has been lost due to sedimentation.

Each alternative is summarized in the following table.

Strategy	Firm Yield (ac-ft)	Start Year	Total Capital Cost	Total Annual Cost	Unit Cost	Env. Impact
Advanced Water Conservation	6,815	2020	N/A	$4,037,000	$600	1
Water Reuse						
Ground Water						
Riverbend Strategy	22,403	2020	$117,116,000	$16,386,000	$731	2
TexAmericas Raw Water Pipeline						
Sediment Reduction BMPs	15,000	2060	$123,545,000	$31,513,000	$2,101	4
Dredge Wright Patman	18,000	2060	$205,862,000	$17,226,000	$957	4

Detailed Description of evaluated projects

Advanced Water Conservation – The City has identified conservation targets for near term reductions in demand. These targets have been projected to the year 2070, with a minimum threshold of 140 gpcpd, resulting in a maximum savings of 6,815 ac-ft/yr. The rate of conservation was developed from conservation targets identified by the City of Texarkana in its Water Conservation and Drought Contingency Plan. The Unified Costing Model (UCM) was then employed to develop cost estimates for the implementation of this strategy.

TexAmericas Raw Water Pipeline **–** Although no immediate need has been identified in the RWP process, Riverbend Water Resources District has requested the consideration of a strategy to construct a new intake at Wright Patman Reservoir and construct a raw water pipeline to TexAmericas Center, a member of Riverbend This strategy differs from the below described strategies related to the timing of construction of a new water treatment plant. Surface water infrastructure has been considered to increase available supplies for potential future industrial development, based upon analyses provided by Riverbend. This strategy is contemplated within the strategy evaluation for TexAmericas Center. However, the 2016 Plan recognizes that Riverbend or Texarkana, Tx, may become the sponsoring entity for this strategy. The strategy presented within the TexAmericas Center section of this plan as an Alternate Strategy should be considered consistent with the plan for this planning cycle if Texarkana, Tx, or Riverbend are the sponsor rather than TexAmericas, as long as the water source remains Lake Wright Patman.

Riverbend Strategy (2020) –Riverbend Water Resources District has requested for inclusion a water management strategy entailing the construction of a new WTP, pipeline, and intake to meet member cities' needs by 2020. This strategy, hereafter referred to as the Riverbend Strategy, has been identified specifically to provide the infrastructure necessary to meet the remaining member cities' needs in the year 2020. The CH2M-Hill (2009) study performed for Riverbend in 2009 was utilized to evaluate and identify the specifics of the project, including costs. The total, annual, and unit costs of water from the project have been based upon costs originally estimated by CH2M Hill (2009). Those costs have been adjusted to September 2013 costs using the ENR Construction Cost Index (CCI) and entered into the UCM. UCM default assumptions were utilized to estimate annual operation and maintenance costs. This strategy entails the construction of a new intake location with a deeper invert elevation allowing access to additional storage in Wright Patman, a raw water pipeline, a new 20 MGD WTP, and the decommission of the existing New Boston WTP to meet member cities' and wholesale customer needs. The supply necessary to meet the needs identified in the 2016 planning process for the member cities of Riverbend is a maximum firm supply of 22,403 ac-ft/yr. The total project cost is $117.1 million, with an annual cost of $16.4 million and a unit cost of $731 per ac-ft. during debt service ($2.24/1,000 gal.) and $294 per ac-ft after debt service. Supply adequate to meet the identified needs, when considered in conjunction with the City of Texarkana's and its customers' needs, do not over allocate the existing firm supply available from Wright Patman Reservoir, if other recommended Water Management Strategies are also employed.

Sediment Reduction BMPs **–** The firm yield of Wright Patman decreases over time due to sedimentation in the reservoir, reducing the total volume of conservation capacity. As part of the Sulphur River Basin Feasibility Study, a report to the USACE from Freese and Nichols Inc. entitled *Watershed Overview Sulphur River Basin from January 2014* identified and discussed the benefit of establishing sediment reduction best management practices (BMPs) in the Sulphur River Basin. This report presents model results demonstrating a reduction to the sediment load of Wright Patman from application of a SWAT model to the Sulphur River Basin. A potential water management strategy is to implement and construct the BMPs described in the feasible BMP scenario within the SRBA Report, wherein an annual average reduction of sediment load to Wright Patman was estimated to be 28%. This project implements and constructs, where feasible, BMP's including vegetative filter strips, conversion of crop land to pasture, construction of channel grade control structures to reduce the hydraulic grade line of the channel, and construction of riparian buffer strips along the stream channel. Although the SRBA study identified a potentially feasible approach, no potential costs were developed as a part of that study. Thus, potential unit costs of the BMPs were developed for consideration herein from the following sources:

- San Antonio River Basin Low Impact Design Report,
- Estimated Cost of Pasture and Hay Production from Iowa State University,
- Urban Stream Repair Practices from the Center for Watershed Protection,
- And from the project budget for a Riparian Restoration Project in New Braunfels.

The overall project cost of this strategy was calculated using identified units of each BMP (as specified in SRBA, 2014) and unit costs developed from the above sources. Annual costs have also been calculated for conversion of crop land to pasture. Note, however, that this BMP is based upon an assumed 100% adoption rate developed in the SRBA 2014 study. Project costs have been input into the UCM to determine debt service costs. Water supply yield from the project has been modeled using the modified WAM utilizing sedimentation rates reduced by the proposed BMPs and identifying the additional firm yield of Wright Patman from the base sedimentation WAM. The project is estimated to yield 15,000 ac-ft of additional firm supply in the year 2060 by reducing the sediment load to Wright Patman, for a total project cost of $123.5 million, an annual cost of $31.5 million and a unit cost for the additional supply of $2,101 per ac-ft. during debt service and $1,412 per ac-ft after debt service.

Concerns with this strategy include the efficacy of the application of the BMP's, and the assumed implementation of conversion of crop land to pasture. There exists substantial uncertainty in this approach, and as such, should be further evaluated in future regional and local planning efforts. Particular attention in future efforts should be given to the conversion of crop land to pasture, as the extent of implementation and cost of this particular BMP may exhibit a significant impact to the overall, annual, and unit costs of this strategy.

Dredge Wright Patman – As described above, the firm yield of Wright Patman decreases over time due to sedimentation in the reservoir reducing the total volume of conservation capacity. This strategy would dredge sediment from Wright Patman to restore storage capacity within the reservoir which has been lost due to sedimentation. This project utilizes a 24" dredge to remove an estimated 3,000 ac-ft per year of sediment from the reservoir for an operational period of 20 years. The unit cost of reservoir dredging in units of dollars per ac-ft of sediment removed has been calculated based upon a formula from the World Bank, identified in the TWDB Report *Dredging vs. New Reservoirs (December 2005).* The cost determined by this methodology was subsequently entered into the UCM to determine debt service cost. The project is estimated to yield a maximum of 18,000 ac-ft of additional firm supply by dredging a total of 60,000 ac-ft of sediment from Wright Patman over a 20 year period for a total project cost of $205.9 million, with an annual cost of $17.2 million, and a unit cost for the additional supply of $957 per ac-ft. during debt service ($2.94/1,000 gal.) and $0 per ac-ft after debt service.

Concerns with this strategy include the location and impacts from disposition of dredged material, the efficiency of removal of the dredged material, and the potential need to repeat the effort in the future since dredging does not remove the source of sedimentation issues in the contributing watershed. As noted in TWDB (2005), issues with regard to dredging fall into four general categories: removal of the sediment, transportation, disposal, and re-use.

For the removal of sediment, dredging reservoirs, particularly at the shallow headwaters and reservoir margins can destroy habitats and affect wetland birds, etc. If the water sustains flora or fauna of particular value, or if fish issues are important, then issues exist regarding lowering the water level. Dredging may also result in a temporary loss of reservoir water quality, through removal of organic material, although there may be long-term improvements in the reservoir water quality through removal of such organic material. Downstream water quality may also be temporarily impacted due to dredging. There may also be a loss of land for containment areas to drain/treat the sediment.

Regarding transportation, reservoirs are often in remote areas. The impact of additional transportation during dredging can place pressure on local communities (e.g., noise/air pollution and physical damage to roads), although these impacts may be reduced if the sediment can be effectively dewatered at or near the reservoir site using, for example, a hydrocyclone and/or a filter bed press. The viability of disposal to land depends on the level of contaminants, whereby there may be risks to groundwater supplies from contamination by leaching.

Opportunities for the re-use of dredged material include sand/gravel/bricks for the construction industry, fertilizer, usage for filling abandoned quarry areas or mines, and usage for capping landfill sites.

Recommendations:

	2020	2030	2040	2050	2060	2070
Advanced Water Conservation (ac-ft/yr)	**6,403**	**6,664**	**6,815**	**6,742**	**6,729**	**6,728**
Dredge Wright Patman (ac-ft/yr)					**2,000**	**18,000**
Riverbend Strategy (ac-ft/yr)	**22,403**	**22,403**	**22,403**	**22,403**	**22,403**	**17,920**

To meet the City of Texarkana's and Riverbend's projected needs and the requested approach for the 2016 RWP, it is recommended that advanced water conservation practices as specified in the City's Water Conservation Plan be adopted to reduce demands. It is further recommended that a new intake, pipeline, and water treatment facility be constructed by 2020 to meet these WUGs' needs. Dredging of Wright Patman beginning in 2050 (with observable effects by 2060) has been identified as the more likely, and cost effective, strategy necessary to continue to meet customers' future needs in 2070, specifically projected Cass County Manufacturing demands.

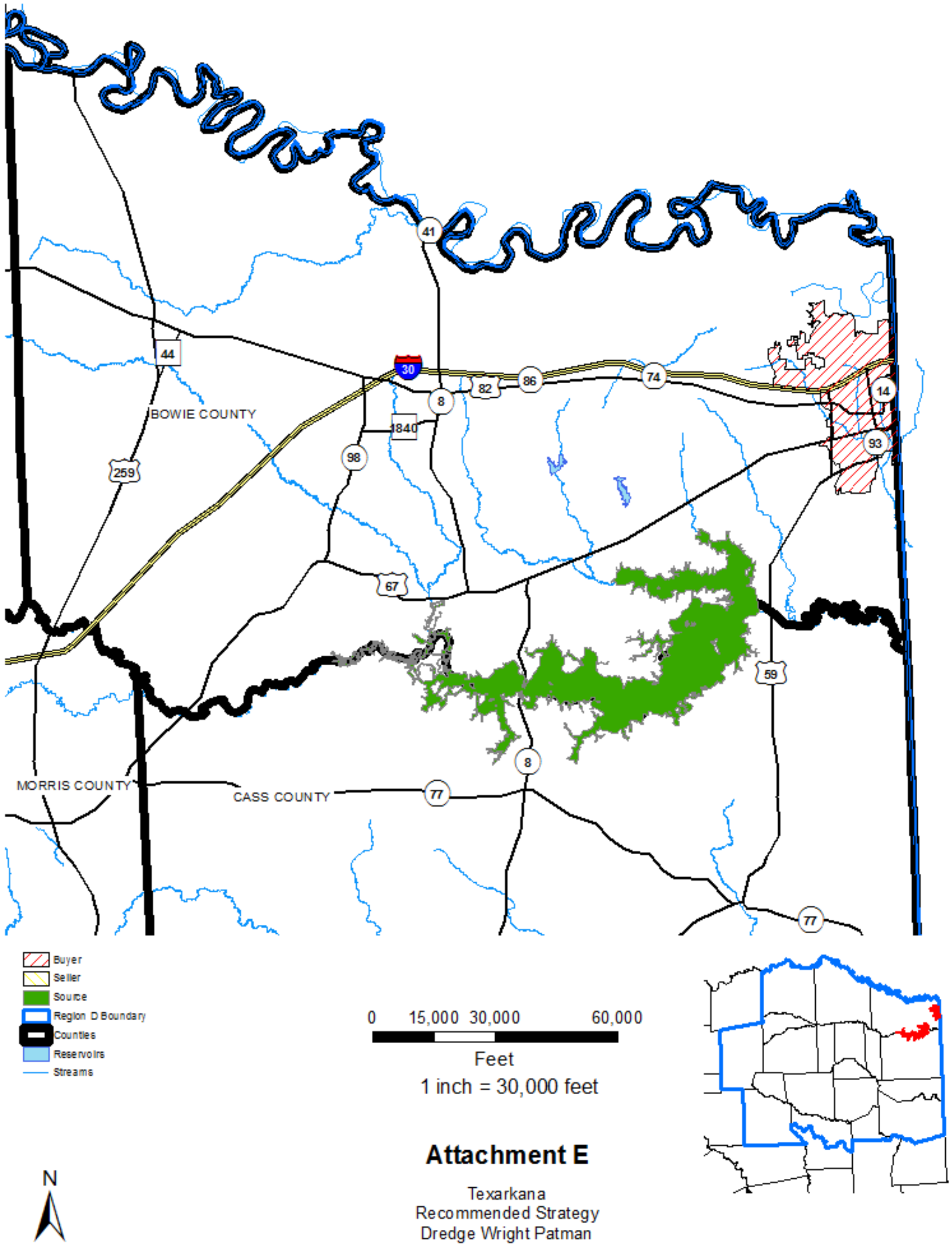
At present, considerable discussions are underway between all of the member cities of Riverbend Water Resources District. As noted previously and reiterated here, this 2016 Plan recognizes that Riverbend may become the contracting entity between its members and Texarkana, Tx. The strategies shown herein for entities with shortages in Bowie and Red River Counties rely on continued use of water from Lake Wright Patman. Presently, the strategies related to Riverbend are presented with the City of Texarkana's water management strategies. However, the strategies should be considered consistent with the plan for this planning cycle if Riverbend is the contracting party rather than Texarkana, as long as the water source remains Lake Wright Patman.

Conservation Costing Analysis

Municipal Water Conservation

Conservation Goal (gpcd):	140	***Urban Unit Cost ($/acft/yr):***	$600
Rate to Achieve Goal (%/yr):	2.0%	***Suburban Unit Cost ($/acft/yr):***	$681
Rate Once Goal Is Achieved (%/yr):	0.00%	***Rural Unit Cost ($/acft/yr):***	$770
Location:	Urban		

WUG/WWP:	**Texarkana**						
Planning Year:	**2011**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Population:		37,646	38,712	39,046	39,046	39,046	39,046
Water Demand (acft/yr):		12,771	12,960	12,938	12,865	12,852	12,851
Per Capita Water Use (gpcd):	171	303	299	296	294	294	294
Base Per Capita Goal (gpcd):		151	145	140	140	140	140
Advanced Water Conservation (acft/yr):		6,403	6,664	6,815	6,742	6,729	6,728
Adv. Water Conservation Cost ($/yr):		$3,842,094	$3,998,215	$4,088,880	$4,045,080	$4,037,280	$4,036,680



Attachment E

Texarkana
Recommended Strategy
Dredge Wright Patman

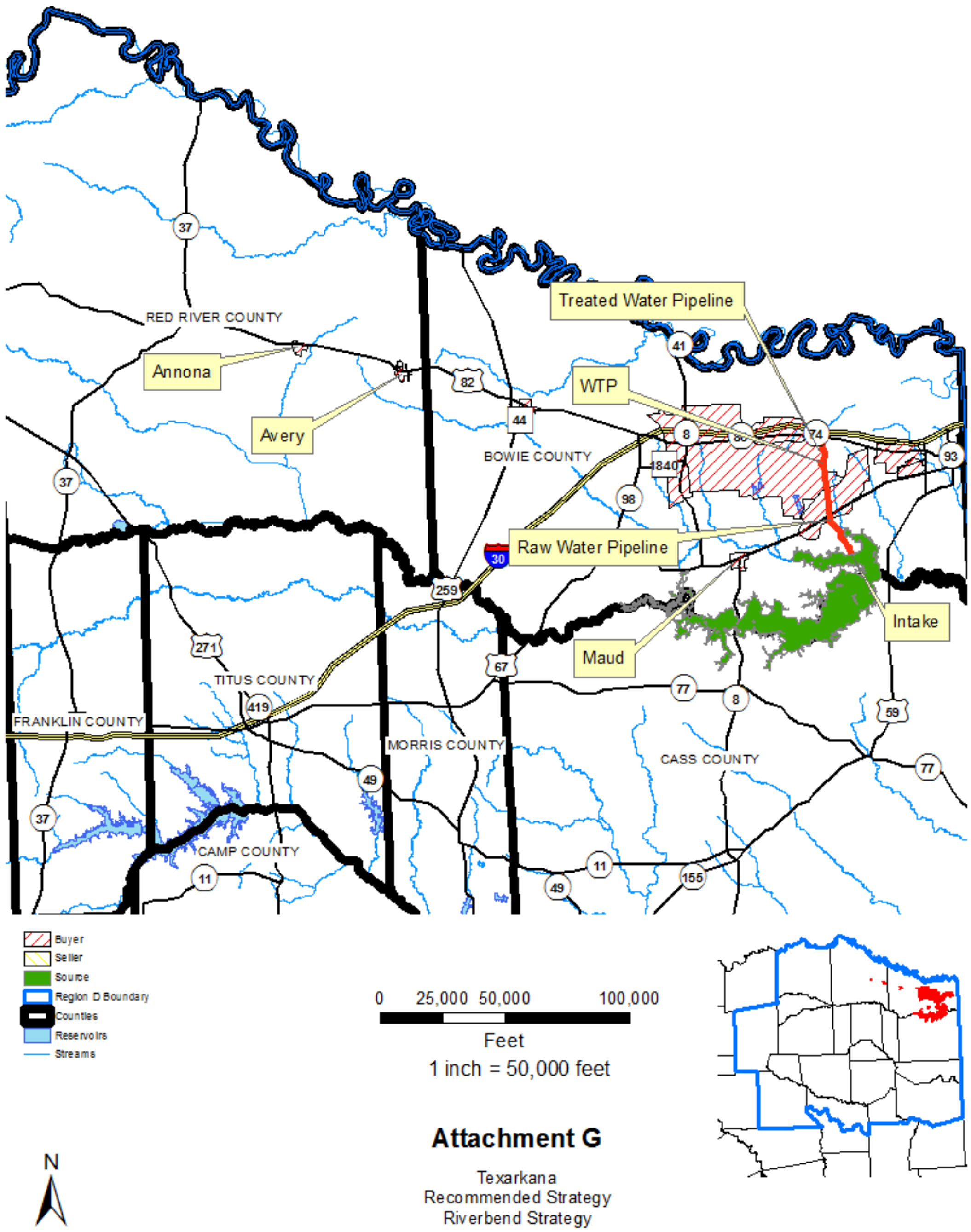
Cost Estimate Summary
Water Supply Project Option
41518 Prices

Texarkana - Dredge Wright Patman

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Integration, Relocations, & Other	$89,700,000
TOTAL COST OF FACILITIES	**$89,700,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$31,395,000
Interest During Construction (4% for 20 years with a 1% ROI)	$84,767,000
TOTAL COST OF PROJECT	**$205,862,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$17,226,000
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$17,226,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	18,000
Annual Cost of Water ($ per acft)	$957
Annual Cost of Water ($ per 1,000 gallons)	$2.94

JMP *3/31/2015*



Attachment G

Texarkana
Recommended Strategy
Riverbend Strategy

Cost Estimate Summary
Water Supply Project Option
41518 Prices

Texarkana - Riverbend Strategy

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Intake Pump Stations (0 MGD)	$15,221,000
Transmission Pipeline (0 in dia., 0 miles)	$29,902,000
Water Treatment Plant (20 MGD)	$57,245,000
TOTAL COST OF FACILITIES	**$102,368,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$10,236,000
Land Acquisition and Surveying (10 acres)	$551,000
Interest During Construction (4% for 1 years with a 1% ROI)	$3,961,000
TOTAL COST OF PROJECT	**$117,116,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$9,800,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$680,000
Water Treatment Plant (2.5% of Cost of Facilities)	$5,864,000
Pumping Energy Costs (465889 kW-hr @ 0.09 $/kW-hr)	$42,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$16,386,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	22,403
Annual Cost of Water ($ per acft)	$731
Annual Cost of Water ($ per 1,000 gallons)	$2.24

Note: One or more cost element has been calculated externally

TLS *10/28/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF WAKE VILLAGE

Description of Water User Group:

The City of Wake Village provides water service in Bowie County. The City's population is projected to be 5,949 in 2020 and 6,160 in the year 2070. The City has a contract for water supply with the City of Texarkana from Lake Wright Patman. The City is projected to have a shortage in 2020 due to aging of Texarkana's Water Treatment Plant.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	5,949	6,109	6,160	6,160	6,160	6,160
Projected Water Demand	677	669	654	644	642	642
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	0	0	0	0	0	0
Projected Supply Surplus (+) / Deficit (-)	**-677**	**-669**	**-654**	**-644**	**-642**	**-642**

Evaluation of Potentially Feasible Water Management Strategies:

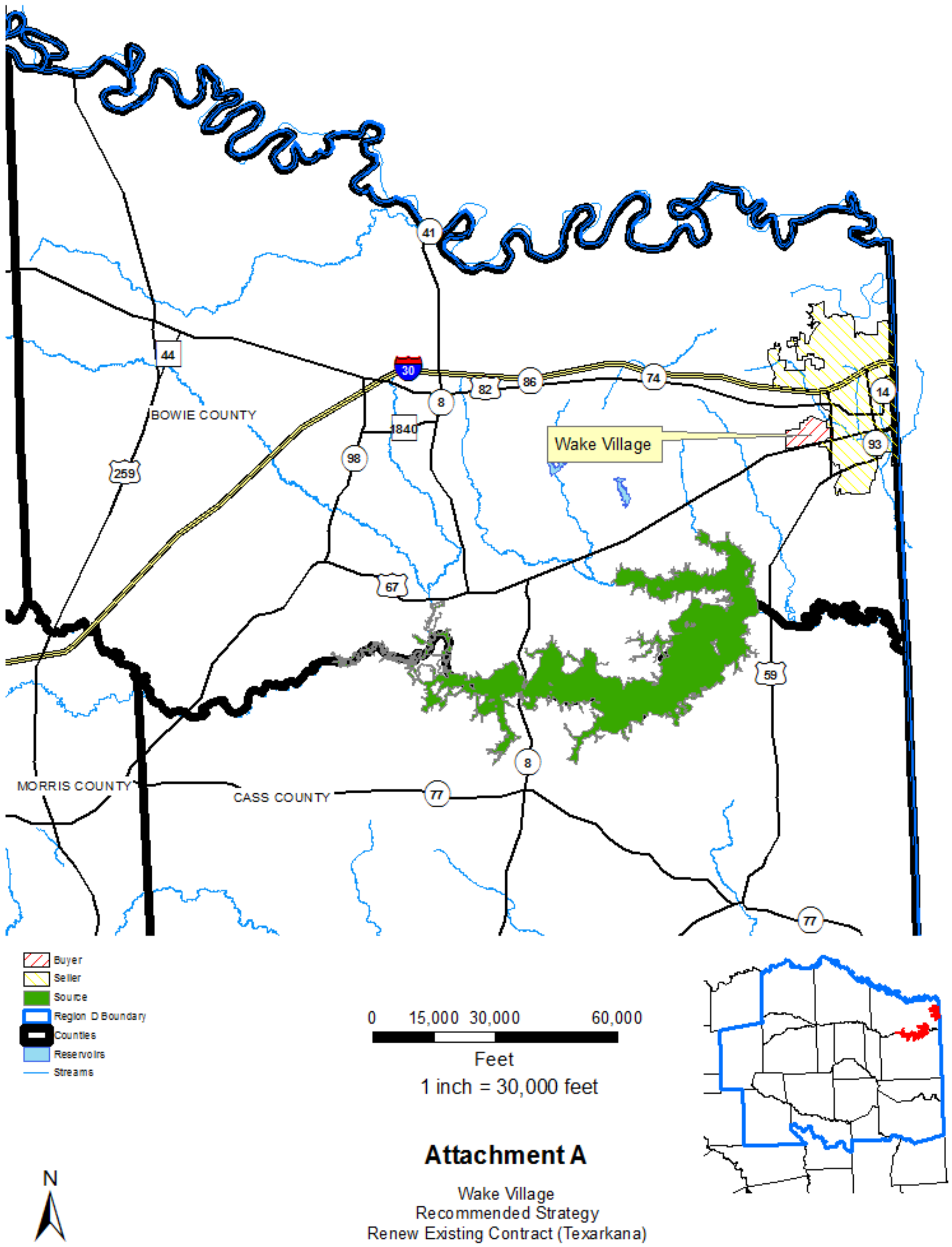
There were four alternative strategies considered to meet the City's water supply shortages as summarized in the Table below. Advanced conservation was not considered because the per capita use per day was less than the 140 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the City is planning on continuing to purchase surface water from the City of Texarkana. A request was submitted by Riverbend Water Resources District to consider a new Water Treatment Plant, pipeline, and intake to Wright Patman Reservoir. Thus, a renewal contract with Texarkana/Riverbend has been considered herein.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Ground Water					
Renew Existing Contract	**677**		**$164,000**	**$242**	**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
Renew Existing Contract (ac-ft/yr)	677	669	654	644	642	642

It is recommended that the City of Wake Village continue its surface water purchase from Texarkana contingent upon Texarkana/Riverbend strategies.



Attachment A

Wake Village
Recommended Strategy
Renew Existing Contract (Texarkana)

Cost Estimate Summary
Water Supply Project Option
41518 Prices

Wake Village - Renew Existing Contract

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (677 acft/yr @ 242.68 $/acft)	$164,000
TOTAL ANNUAL COST	**$164,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	677
Annual Cost of Water ($ per acft)	$242
Annual Cost of Water ($ per 1,000 gallons)	$0.74
JMP	*3/31/2015*

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REGION D
EVALUATIONS OF WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

CAMP COUNTY

WUGs:

Bi-County WSC

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EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF BI COUNTY WSC

Description of Water User Group:

The Bi County WSC system is located in Upshur, Camp, Morris, and Titus Counties and serves the un-incorporated areas of each of the Counties. The population is projected to increase from 12,352 persons in 2020 to 20,208 persons in 2070. The WSC is included as a W.U.G. in Upshur, Camp, Morris, and Titus Counties. The system's current water supply consists of 29 water wells with 26 operational from the Carrizo-Wilcox Aquifer. The total rated capacity of the 26 operational wells is approximately 3,200 GPM, or 1,723 ac-ft/yr. The System does have a water conservation plan. The System is projected to have a water supply surplus of 277 ac-ft/yr in 2020 decreasing to a deficit of 226 ac-ft/yr in 2070. A location map is included as Attachment A.

Water Supply and Demand Analysis:

Camp County

	2020	2030	2040	2050	2060	2070
Population	6,842	8,224	9,305	10,587	11,779	12,941
Projected Water Demand	708	820	907	1,019	1,131	1,241
Current Water Supply	985	985	985	1,019	1,018	1,015
Projected Supply Surplus (+)/Deficit(-)	**277**	**165**	**78**	**0**	**-113**	**-226**

Morris County

	2020	2030	2040	2050	2060	2070
Population	1,276	1,299	1,325	1,364	1,395	1,426
Projected Water Demand	132	130	130	132	134	137
Current Water Supply	167	167	167	133	134	137
Projected Supply Surplus (+)/Deficit(-)	**35**	**37**	**37**	**1**	**0**	**0**

Titus County

	2020	2030	2040	2050	2060	2070
Population	362	409	457	510	566	625
Projected Water Demand	38	41	45	50	55	60
Current Water Supply	143	143	132	111	96	89
Projected Supply Surplus (+)/Deficit(-)	**105**	**102**	**87**	**61**	**41**	**29**

Upshur County

	2020	2030	2040	2050	2060	2070
Population	3,872	4,183	4,451	4,727	4,979	5,216
Projected Water Demand	401	417	434	455	478	500
Current Water Supply	423	423	434	455	455	455
Projected Supply Surplus (+)/Deficit(-)	**22**	**6**	**0**	**0**	**-23**	**-45**

Evaluation of Potentially Feasible Water Management Strategies:

Four alternative strategies were considered to meet the 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 gpcpd threshold set by the planning group. Water reuse was not considered because the system 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 system and surface water treatment is not economically feasible for a system of this size. A groundwater worksheet is included as Attachment B.

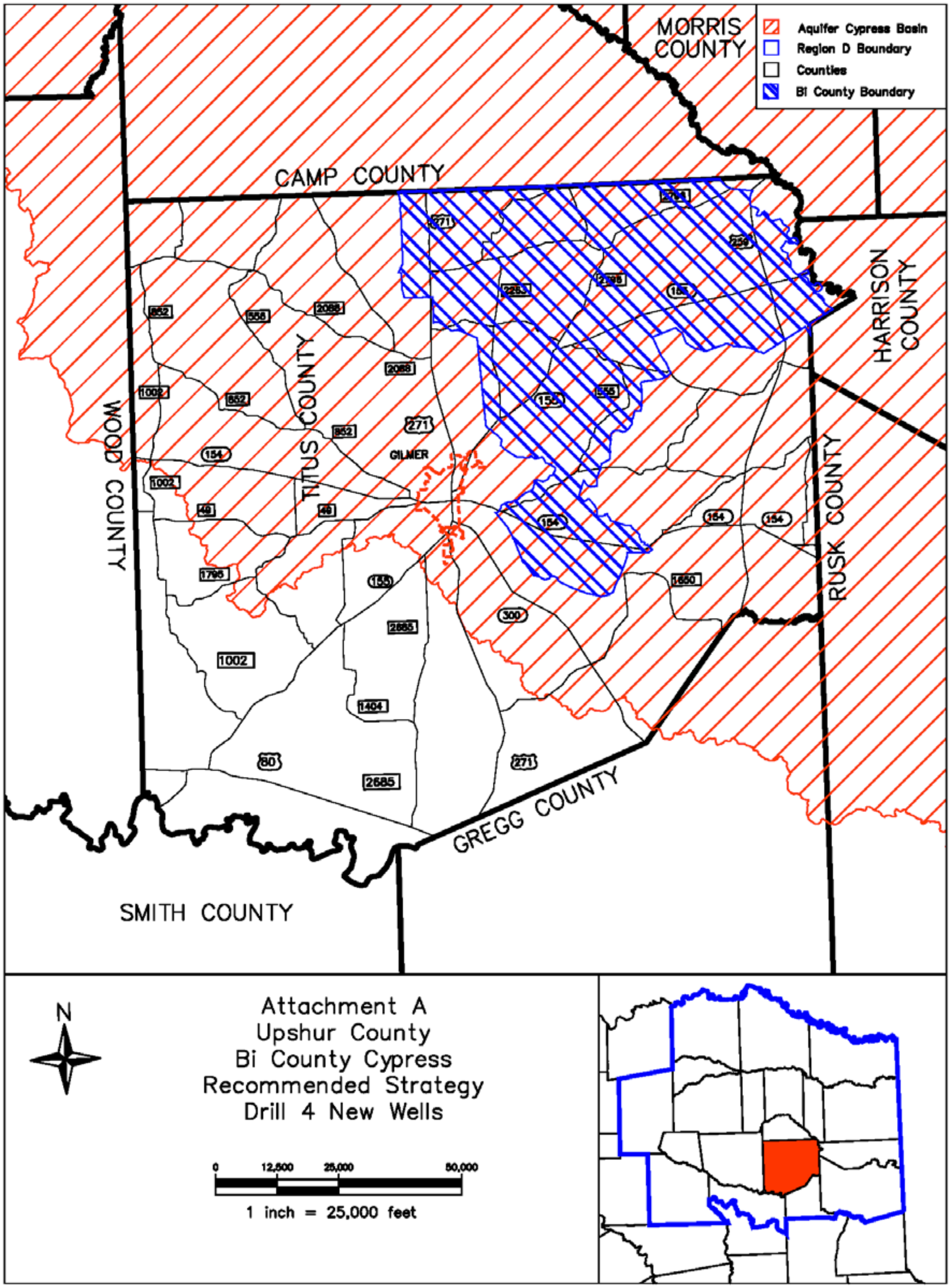
Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Groundwater	**322**	**$ 2,742,000**	**$ 286,000**	**$ 885**	**1**
Surface Water					

Recommendations:

	2020	2030	2040	2050	2060	2070
Groundwater (ac-ft/yr)	0	0	0	0	215	322

The recommended strategy for the System to meet their projected deficit of 113 ac-ft/yr in 2020 and 226 ac-ft/yr in 2070 would be to construct six additional water wells similar to other wells within their system. Three wells in Camp County and one well in Upshur County are recommended in 2060 and two additional wells are recommended in Camp County in 2070. The recommended supply source will be the Queen City Aquifer in Camp and Upshur Counties. One well with rated capacity of 100 gpm each would provide approximately 54 acre-feet each. The Queen City Aquifer in Upshur and Camp Counties are projected to have a more than ample supply availability to meet the needs of Bi County WSC for the planning period. Note that one Queen City Upshur County and five Queen City Camp County wells would be drilled.

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.



Attachment A
Upshur County
Bi County Cypress
Recommended Strategy
Drill 4 New Wells

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Bi County - Drill New Wells (Bi County - Cypress – Queen City - Camp)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
Well Fields (Wells, Pumps, and Piping)	$1,392,000
Water Treatment Plant (2.3 MGD)	$53,000
TOTAL COST OF FACILITIES	**$1,445,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$506,000
Environmental & Archaeology Studies and Mitigation	$51,000
Land Acquisition and Surveying (8 acres)	$44,000
Interest During Construction (4% for 1 years with a 1% ROI)	$72,000
TOTAL COST OF PROJECT	**$2,118,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$177,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$14,000
Water Treatment Plant (2.5% of Cost of Facilities)	$32,000
Pumping Energy Costs (136394 kW-hr @ 0.09 $/kW-hr)	$3,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$226,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	269
Annual Cost of Water ($ per acft)	$840
Annual Cost of Water ($ per 1,000 gallons)	$2.58

Note: One or more cost element has been calculated externally

JTS *7/23/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Bi County - Drill New Wells (Bi County - Cypress – Queen City - Upshur)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
Well Fields (Wells, Pumps, and Piping)	$278,000
Water Treatment Plant (2.3 MGD)	$21,000
TOTAL COST OF FACILITIES	**$299,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$105,000
Environmental & Archaeology Studies and Mitigation	$44,000
Land Acquisition and Surveying (8 acres)	$44,000
Interest During Construction (4% for 1 years with a 1% ROI)	$18,000
TOTAL COST OF PROJECT	**$510,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$43,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$3,000
Water Treatment Plant (2.5% of Cost of Facilities)	$12,000
Pumping Energy Costs (136394 kW-hr @ 0.09 $/kW-hr)	$2,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$60,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	54
Annual Cost of Water ($ per acft)	$1,111
Annual Cost of Water ($ per 1,000 gallons)	$3.41

Note: One or more cost element has been calculated externally

JTS *7/23/2015*

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REGION D
EVALUATIONS OF WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

CASS COUNTY

WUGs:

Cass County Manufacturing

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EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF MANUFACTURING IN CASS COUNTY

Description of Water User Group:

The Manufacturing WUG in Cass County has a demand that is projected to increase from 115,199 ac-ft/yr in 2020 to 150,883 ac-ft/yr in 2070. Manufacturing in Cass County is currently supplied by groundwater from the Carrizo-Wilcox Aquifer and surface water from Wright Patman Reservoir purchased from the City of Texarkana. A deficit of 1,305 ac-ft/yr is projected to occur in 2030 and increase to 62,827 ac-ft/yr by 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Projected Water Demand	115,199	121,355	127,237	132,324	141,299	150,883
Current Water Supply	120,051	120,050	120,048	120,047	120,047	88,056
Projected Supply Surplus (+)/Deficit(-)	**4,825**	**-1,305**	**-7,189**	**-12,277**	**-21,252**	**-62,827**

Projected Supply Surplus (+) / Deficit (-) by Basin	2020	2030	2040	2050	2060	2070
Cypress Cass County	-115	-121	-127	-132	-141	-151
Sulphur Cass County	4,967	-1,184	-7,062	-12,145	-21,111	-62,676
Total	**4,852**	**-1,305**	**-7,189**	**-12,277**	**-21,252**	**-62,827**

Evaluation of Potentially Feasible Water Management Strategies:

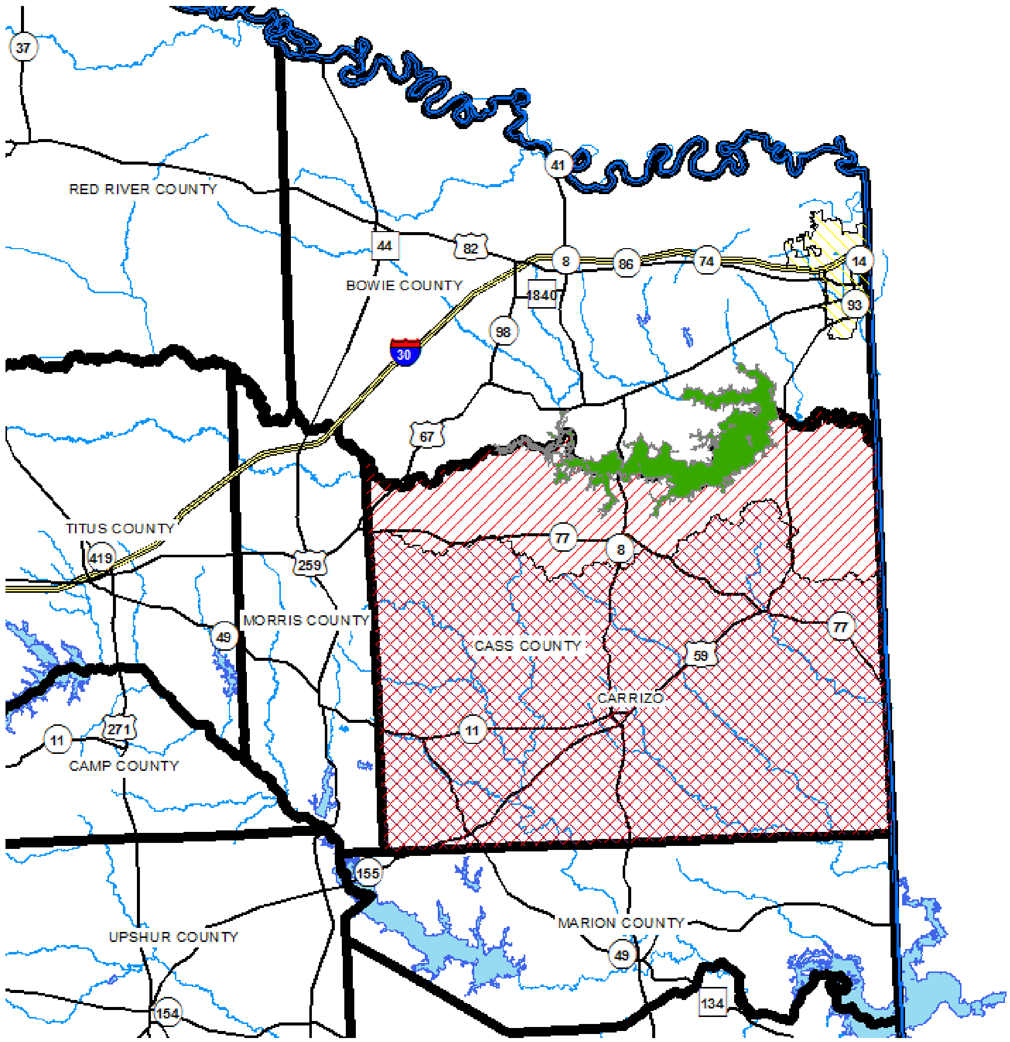
Three alternative strategies were considered to meet the Cass County Manufacturing WUG's water supply shortages. Advanced water conservation for manufacturing was considered in this planning effort to reduce overall demands; however, it does not resolve all identified needs. The use of reuse water from nearby municipalities was not considered in this planning period beyond those amounts currently reported by manufacturing entities in the county. Groundwater has been identified as a potential source of water for manufacturing in Cass County. Surface water was considered as a potential alternative to meet projected demands.

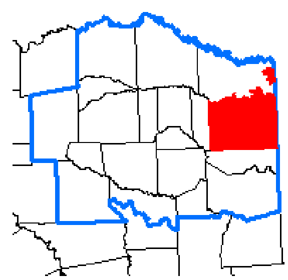
Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Env. Impact
Advanced Water Conservation	**15,073**	**$0**	**$0**	**$0**	**1**
Water Reuse					
Drill New Wells (Carrizo-Wilcox Aquifer, Cypress Basin)	**151**	**$894,000**	**$164,000**	**$1,086**	**1**
Increase Existing Contract	**16,000**	**$0**	**$2,867,000**	**$179**	**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
Advanced Water Conservation (ac-ft/yr)	**0**	**1,184**	**7,062**	**13,219**	**14,116**	**15,073**
Drill New Wells (Carrizo-Wilcox Aquifer, Cypress Basin) (ac-ft/yr)	**151**	**151**	**151**	**151**	**151**	**151**
Increase Existing Contract (ac-ft/yr)	**0**	**0**	**0**	**0**	**16,000**	**16,000**

The recommended strategies for the Cass County Manufacturing WUG to meet projected demands during the planning period is to implement advanced conservation measures (such as industrial water auditing), develop groundwater supplies in the Carrizo-Wilcox Aquifer, and purchase additional raw water from Wright Patman Reservoir from the City of Texarkana (necessitating an amendment to the City's current water right permit reflecting additional industrial use), contingent upon the recommended strategy for the City of Texarkana to dredge Wright Patman Reservoir. Dredging of the reservoir allows for diversion up to and beyond the presently contracted supply of 120,000 ac-ft/yr, such that adequate supply would be available to allow for a contractual increase of up to 16,000 ac-ft/yr.





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Attachment A

Cass County Manufacturing
Recommended Strategy
Conservation, Increase Existing Contract (Texarkana), and Drill New Wells

Cost Estimate Summary
Water Supply Project Option
41518 Prices

Manufacturing - Drill New Wells, Cass - Cypress - Carrizo Wilcox

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$625,000
TOTAL COST OF FACILITIES	**$625,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$219,000
Interest During Construction (4% for 1 years with a 1% ROI)	$31,000
TOTAL COST OF PROJECT	**$894,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$75,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$6,000
Pumping Energy Costs (76309 kW-hr @ 0.09 $/kW-hr)	$7,000
Purchase of Water (151 acft/yr @ 500 $/acft)	$76,000
TOTAL ANNUAL COST	**$164,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 3	151
Annual Cost of Water ($ per acft)	$1,086
Annual Cost of Water ($ per 1,000 gallons)	$3.33
JNS	*4/6/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices

Manufacturing Cass County - Increase Existing Contract

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (16000 acft/yr @ 179.21 $/acft)	$2,867,000
TOTAL ANNUAL COST	**$2,867,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	16,000
Annual Cost of Water ($ per acft)	$179
Annual Cost of Water ($ per 1,000 gallons)	$0.55
JMP	*3/31/2015*

REGION D
EVALUATIONS OF WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

DELTA COUNTY

WUGs:

None

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REGION D
EVALUATIONS OF WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

FRANKLIN COUNTY

WUGs:

None

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REGION D
EVALUATIONS OF WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

GREGG COUNTY

WUGs:

Gregg County Mining

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EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS MINING IN GREGG COUNTY CYPRESS

Description of Water User Group:

The Mining WUG in Gregg County is a split entity and has a demand that is projected to be decreasing from 14 ac-ft/yr in 2020 to 9 ac-ft/yr in 2070. Mining in Gregg County does not have a current water supply. The total rated available supply is 0 ac-ft/yr. Mining in Gregg County is projected to have a water supply deficit of 14 ac-ft/yr in 2020 increasing to 22 ac-ft/yr in 2030 then decreasing to a deficit of 9 ac-ft/yr in 2070 for the Gregg Cypress split.

Water Supply and Demand Analysis:

Mining Gregg Cypress	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Projected Water Demand	14	22	21	17	12	9
Current Water Supply	0	0	0	0	0	0
Projected Supply Surplus (+)/Deficit(-)	-14	-22	-21	-17	-12	-9

Evaluation of Potentially Feasible Water Management Strategies:

Three alternative strategies were considered to meet the Gregg County Mining water supply shortages as summarized in the following table. Advanced conservation and water reuse was not considered because there are no existing mines. Surface water alternatives were omitted since there is not a supply source within close proximity to the county with available supply. A groundwater worksheet is included as Attachment B.

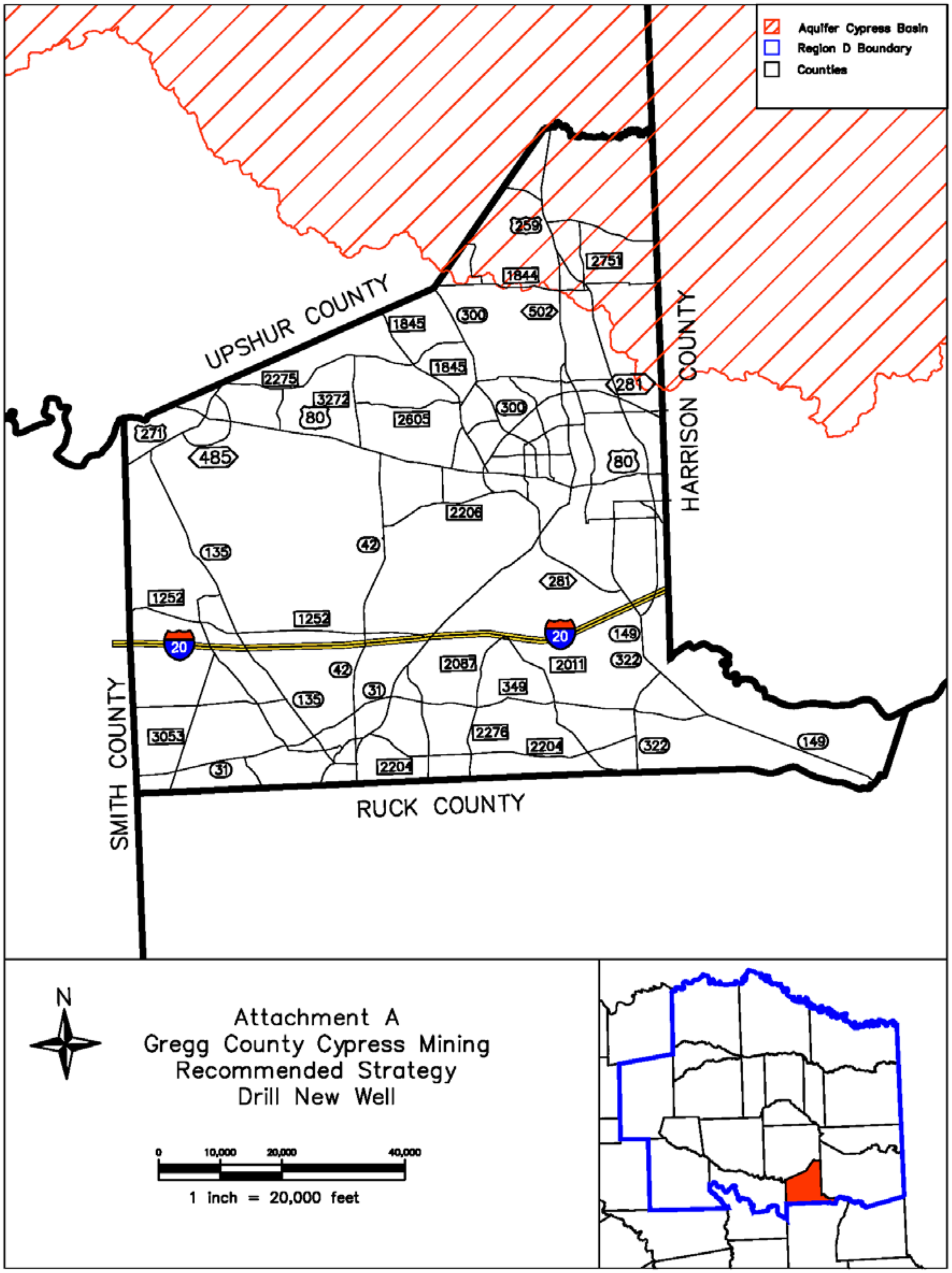
Strategy	**Firm Yield (AF)**	**Total Capital Cost**	**Total Annualized Cost**	**Unit Cost**	**Environmental Impact**
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Carrizo-Wilcox, Cypress, Gregg)	**54**	**$377,000**	**$37,000**	**$685**	**1**
Surface Water					

Recommendations:

	2020	**2030**	**2040**	**2050**	**2060**	**2070**
Drill New Wells (Carrizo-Wilcox, Cypress, Gregg; ac-ft/yr)	54	54	54	54	54	54

The recommended strategy for the Gregg County Mining to meet their projected deficit of 14 ac-ft/yr in 2020 and 22 ac-ft/yr in 2030 would be to construct one water well by 2020. The recommended supply source will be the Carrizo-Wilcox Aquifer in Gregg County. One well with rated capacity of 100 gpm each would provide approximately 54 ac-ft/yr. The Carrizo-Wilcox Aquifer in Gregg County is projected to have a more than ample supply availability to meet the needs of the Mining in Gregg County 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.



Attachment A
Gregg County Cypress Mining
Recommended Strategy
Drill New Well

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Mining Gregg Cypress - Drill New Wells (Gregg - Cypress - Carrizo Wilcox)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
Well Fields (Wells, Pumps, and Piping)	$256,000
TOTAL COST OF FACILITIES	**$256,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$89,000
Environmental & Archaeology Studies and Mitigation	$19,000
Interest During Construction (4% for 1 years with a 1% ROI)	$13,000
TOTAL COST OF PROJECT	**$377,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$32,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$3,000
Pumping Energy Costs (21280 kW-hr @ 0.09 $/kW-hr)	$2,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$37,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	54
Annual Cost of Water ($ per acft)	$685
Annual Cost of Water ($ per 1,000 gallons)	$2.10
SRH	*4/8/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS MINING IN GREGG COUNTY SABINE

Description of Water User Group:

The Mining WUG in Gregg County is a split entity and has a demand that is projected to be decreasing from 260 ac-ft/yr in 2020 to 171 ac-ft/yr in 2070. Mining in Gregg County has a current water supply consisting of water wells from the Carrizo-Wilcox Aquifer. The total rated available supply from these sources is 70 ac-ft/yr. Mining in Gregg County is projected to have a water supply deficit of 190 ac-ft/yr in 2020 increasing to 332 ac-ft/yr in 2030 then decreasing to a deficit of 55 ac-ft/yr in 2070 for the Gregg Sabine split.

Water Supply and Demand Analysis:

Mining Gregg Sabine	2020	2030	2040	2050	2060	2070
Projected Water Demand	260	411	408	320	234	171
Current Water Supply	70	79	88	98	107	116
Projected Supply Surplus (+)/Deficit(-)	-190	-332	-320	-222	-127	-55

Evaluation of Potentially Feasible Water Management Strategies:

Three alternative strategies were considered to meet the Gregg County Mining water supply shortages as summarized in the following table. Advanced conservation and water reuse was not considered because operational procedures for the existing mines are not available. Surface water alternatives were omitted since there is not a supply source within close proximity to the county with available supply. A groundwater worksheet is included as Attachment B.

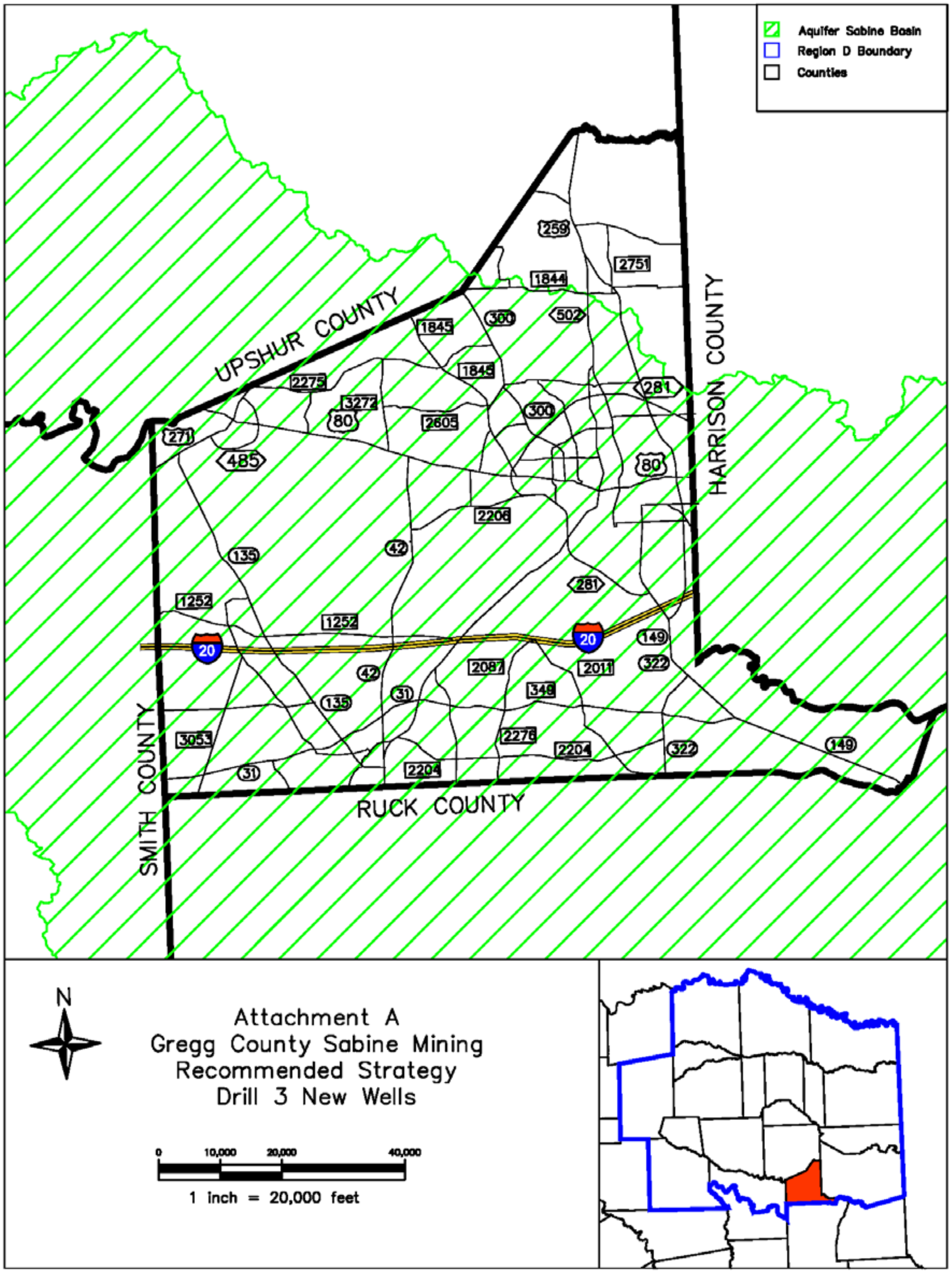
Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Carrizo-Wilcox, Sabine, Gregg)	**339**	**$1,569,000**	**$144,000**	**$425**	**1**
Surface Water					

Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Carrizo-Wilcox, Sabine, Gregg; ac-ft/yr)	226	339	339	339	339	339

The recommended strategy for the Gregg County Mining to meet their projected deficit of 190 ac-ft/yr in 2020 and 332 ac-ft/yr in 2030 would be to construct one additional water well 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 Gregg County. Three wells with rated capacity of 210 gpm each would provide approximately 113 acre-feet each or 339 ac-ft/yr. The Carrizo-Wilcox Aquifer in Gregg County is projected to have a more than ample supply availability to meet the needs of the Mining in Gregg County 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.


Aquifer Sabine Basin
Region D Boundary
Counties
UPSHUR COUNTY
HARRISON COUNTY
SMITH COUNTY
RUCK COUNTY
N
Attachment A
Gregg County Sabine Mining
Recommended Strategy
Drill 3 New Wells
0 10,000 20,000 40,000
1 inch = 20,000 feet

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Mining Gregg Sabine - Drill New Wells (Gregg - Sabine - Carrizo Wilcox)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$1,115,000
TOTAL COST OF FACILITIES	**$1,115,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$390,000
Environmental & Archaeology Studies and Mitigation	$8,000
Interest During Construction (4% for 1 years with a 1% ROI)	$53,000
TOTAL COST OF PROJECT	**$1,566,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$131,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$11,000
Pumping Energy Costs (25139 kW-hr @ 0.09 $/kW-hr)	$2,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$144,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	339
Annual Cost of Water ($ per acft)	$425
Annual Cost of Water ($ per 1,000 gallons)	$1.30
SRH	*4/8/2015*

REGION D
EVALUATIONS OF WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

HARRISON COUNTY

WUGs:

Harrison County Irrigation
Harrison County Manufacturing
The City of Marshall
Harrison County Mining
Harrison County Steam Electric
The City of Waskom

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EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS IRRIGATION IN HARRISON COUNTY – CYPRESS

Description of Water User Group:

The Irrigation WUG in Harrison County is a split entity and has a demand that is projected to be a constant 267 ac-ft/yr from 2020 to 2070. Irrigation in Harrison County has a current water supply consisting of water wells from the Carrizo-Wilcox Aquifer surface water from Cypress Run-of-River permit, and Sabine Run-of-River permit. The total rated available supply from these sources is 88 ac-ft/yr. Irrigation in Harrison County is projected to have a water supply deficit of 193 ac-ft/yr in 2020 and staying even to a deficit of 193 ac-ft/yr in 2070 for the Cypress split.

Water Supply and Demand Analysis:

Mining Harrison Cypress	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Projected Water Demand	267	267	267	267	267	267
Current Water Supply	35	35	35	35	35	35
Projected Supply Surplus (+)/Deficit(-)	-232	-232	-232	-232	-232	-232

Evaluation of Potentially Feasible Water Management Strategies:

Three alternative strategies were considered to meet the Harrison County Irrigation water supply shortages as summarized in the following table. Advanced conservation and water reuse was not considered because operational procedures for the existing irrigation is not available. Surface water alternatives were omitted since there is not a supply source within close proximity to the county with available supply. A groundwater worksheet is included as Attachment B.

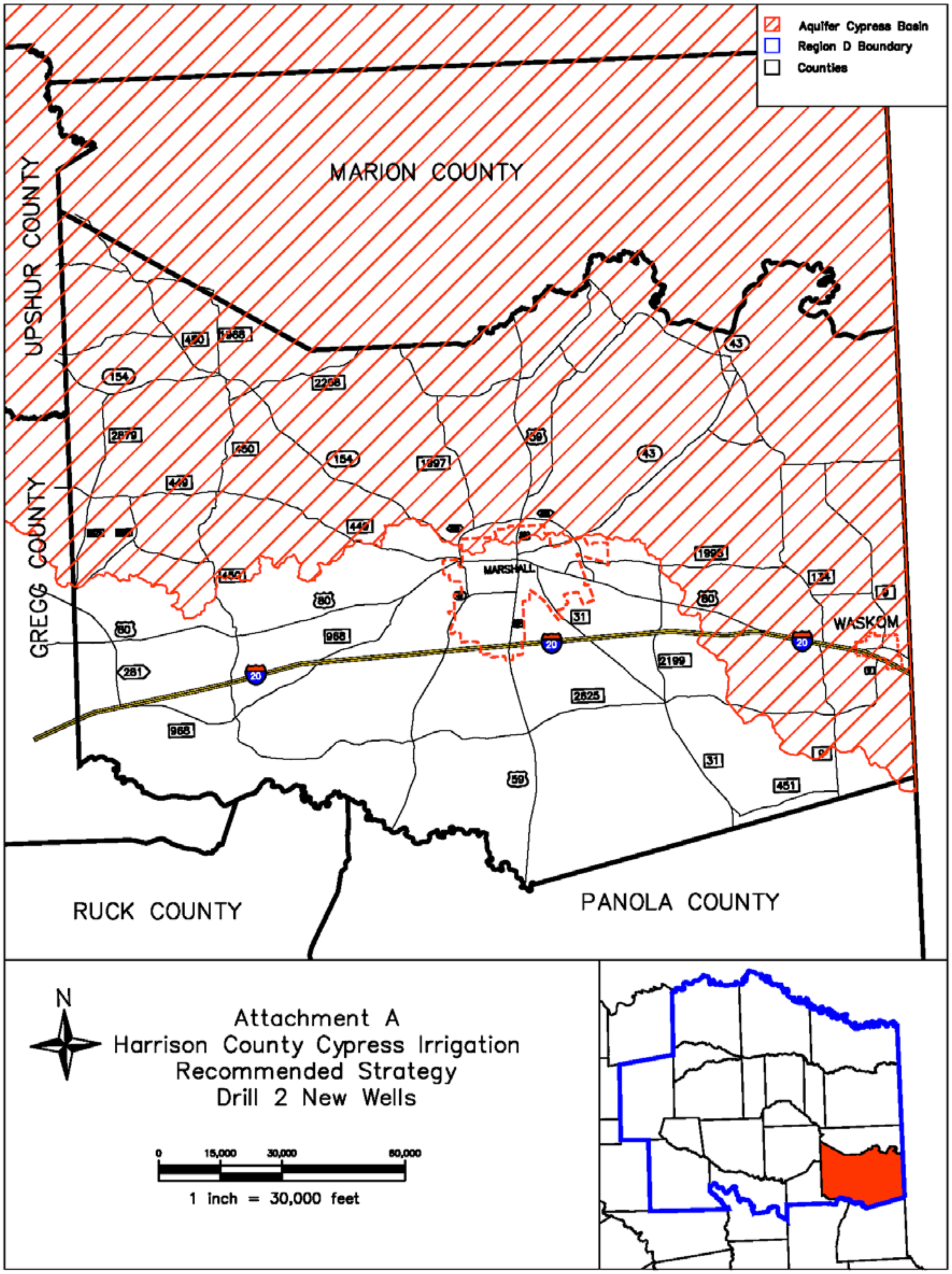
Strategy	**Firm Yield (AF)**	**Total Capital Cost**	**Total Annualized Cost**	**Unit Cost**	**Environmental Impact**
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Carrizo-Wilcox, Cypress, Harrison County)	236	$ 1,092,000	$ 102,000	$ 430	1
Surface Water					

Recommendations:

	2020	**2030**	**2040**	**2050**	**2060**	**2070**
Drill New Wells (Carrizo-Wilcox, Cypress, Harrison County; ac-ft/yr)	**236**	**236**	**236**	**236**	**236**	**236**

The recommended strategy for the Harrison County Irrigation to meet their projected deficit of 232 ac-ft/yr in 2020 through 2070 would be to construct two water wells prior to 2020 as the deficits occur. The recommended supply source will be the Carrizo-Wilcox Aquifer in Harrison County. Two wells with rated capacity of 220 gpm each would provide approximately 118 acre-feet each or 236 ac-ft/yr. The Carrizo-Wilcox Aquifer in Harrison County is projected to have a more than ample supply availability to meet the needs of the Irrigation in Harrison County 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.



Attachment A
Harrison County Cypress Irrigation
Recommended Strategy
Drill 2 New Wells

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Irrigation Harrison Cypress - Drill New Wells (Harrison - Cypress - Carrizo Wilcox)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$761,000
TOTAL COST OF FACILITIES	**$761,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$266,000
Environmental & Archaeology Studies and Mitigation	$28,000
Interest During Construction (4% for 1 years with a 1% ROI)	$37,000
TOTAL COST OF PROJECT	**$1,092,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$91,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$8,000
Pumping Energy Costs (34327 kW-hr @ 0.09 $/kW-hr)	$3,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$102,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	237
Annual Cost of Water ($ per acft)	$430
Annual Cost of Water ($ per 1,000 gallons)	$1.32
JTS	*4/9/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS IRRIGATION IN HARRISON COUNTY – SABINE

Description of Water User Group:

The Irrigation WUG in Harrison County is a split entity and has a demand that is projected to be decreasing from 178 ac-ft/yr in 2020 to 178 ac-ft/yr in 2070. Irrigation in Harrison County has a current water supply consisting of water wells from the Carrizo-Wilcox Aquifer and surface water from Sabine Run-of-River permit, and Cypress Run-of-River permit. The total rated available supply from these sources is 88 ac-ft/yr. Irrigation in Harrison County is projected to have a water supply deficit of 164 ac-ft/yr in 2020 and staying even to a deficit of 164 ac-ft/yr in 2070 for the Sabine split.

Water Supply and Demand Analysis:

Mining Harrison Sabine	2020	2030	2040	2050	2060	2070
Projected Water Demand	178	178	178	178	178	178
Current Water Supply	177	177	177	177	177	177
Projected Supply Surplus (+)/Deficit(-)	-1	-1	-1	-1	-1	-1

Evaluation of Potentially Feasible Water Management Strategies:

Three alternative strategies were considered to meet the Harrison County Irrigation water supply shortages as summarized in the following table. Advanced conservation and water reuse was not considered because operational procedures for the existing irrigation is not available. Surface water alternatives were omitted since there is not a supply source within close proximity to the county with available supply. A groundwater worksheet is included as Attachment B.

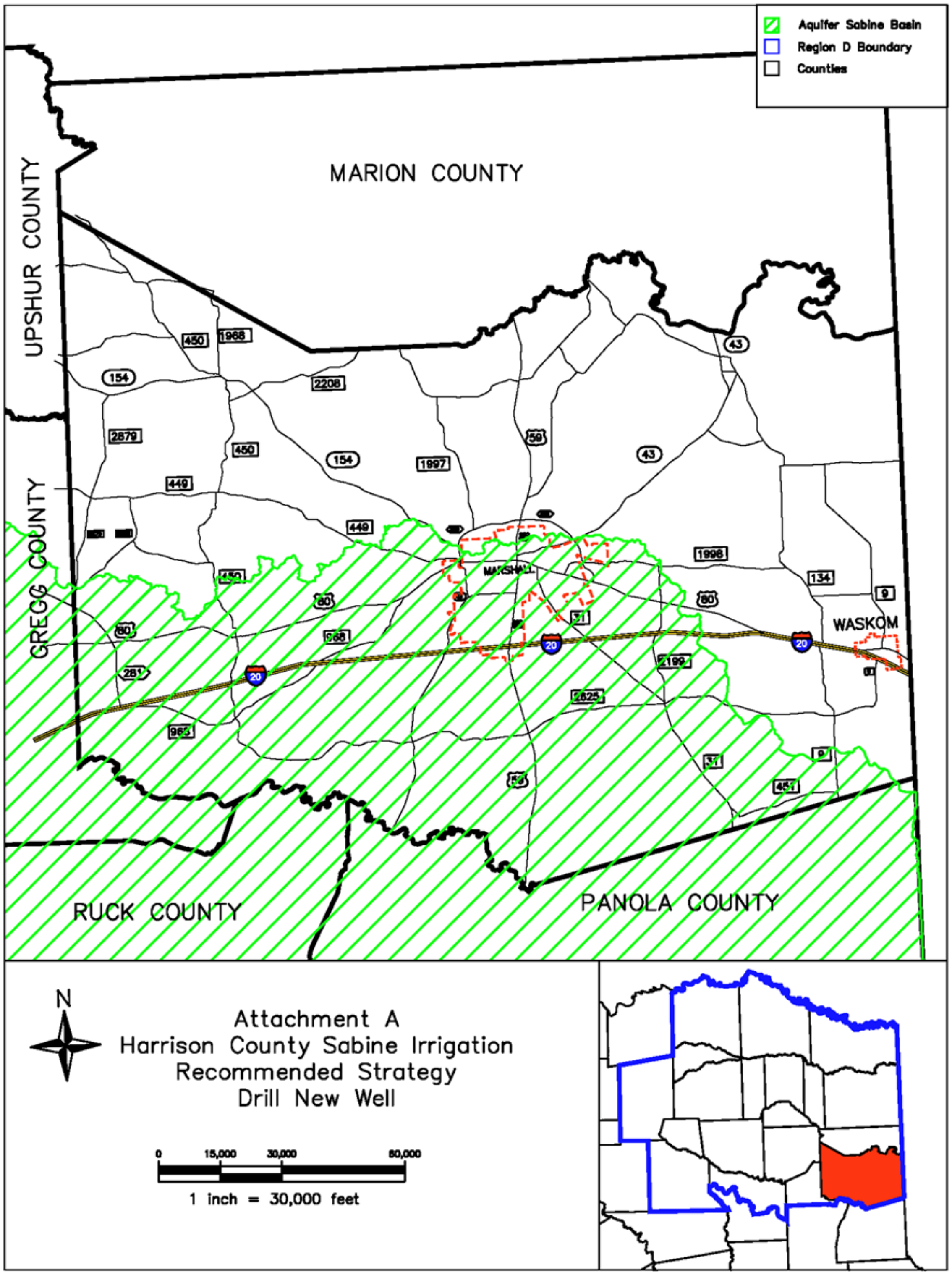
Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Groundwater	54	$ 377,000	$ 37,000	$ 685	1
Surface Water					

Recommendations:

	2020	2030	2040	2050	2060	2070
Groundwater (ac-ft/yr)	**54**	**54**	**54**	**54**	**54**	**54**

The recommended strategy for the Harrison County Irrigation to meet their projected deficit of 1 ac-ft/yr in 2020 from 2070 would be to construct one water well prior to 2020. The recommended supply source will be the Carrizo-Wilcox Aquifer in Harrison County. One well with rated capacity of 100 gpm each would provide approximately 54 ac-ft/yr. The Carrizo-Wilcox Aquifer in Harrison County is projected to have a more than ample supply availability to meet the needs of the Irrigation in Harrison County 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.


Aquifer Sabine Basin
Region D Boundary
Counties
MARION COUNTY
UPSHUR COUNTY
GREGG COUNTY
RUCK COUNTY
PANOLA COUNTY
MARSHALL
WASKOM
N
Attachment A
Harrison County Sabine Irrigation
Recommended Strategy
Drill New Well
0
15,000
30,000
60,000
1 inch = 30,000 feet

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Irrigation Harrison Sabine - Drill New Wells (Harrison - Sabine - Carrizo Wilcox)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$256,000
TOTAL COST OF FACILITIES	**$256,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$89,000
Environmental & Archaeology Studies and Mitigation	$19,000
Interest During Construction (4% for 1 years with a 1% ROI)	$13,000
TOTAL COST OF PROJECT	**$377,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$32,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$3,000
Pumping Energy Costs (21280 kW-hr @ 0.09 $/kW-hr)	$2,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$37,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	54
Annual Cost of Water ($ per acft)	$685
Annual Cost of Water ($ per 1,000 gallons)	$2.10
JTS	*4/9/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS MANUFACTURING IN HARRISON COUNTY – SABINE

Description of Water User Group:

The Manufacturing WUG in Harrison County is a split entity and has a demand that is projected to be increasing from 95,100 ac-ft/yr in 2020 to 140,534 ac-ft/yr in 2070. Manufacturing in Harrison County has a current water supply consisting of water wells from the Carrizo-Wilcox Aquifer, surface water from Cypress Run-of-River permit, Gray's Creek Run-of-River permit, Sabine Run-of-River permit and contracts with Sabine River Authority for surface water from Lake Fork, Northeast Texas MWD for surface water from Lake O' the Pines, and Cherokee Water Company for surface water from lake Cherokee. The total rated available supply from these sources is 40,956 ac-ft/yr. Manufacturing in Harrison County is projected to have a water supply deficit of 55,006 ac-ft/yr in 2020 increasing to a deficit of 100,394 ac-ft/yr in 2070 for the Sabine split.

Water Supply and Demand Analysis:

Mining Harrison Sabine	2020	2030	2040	2050	2060	2070
Projected Water Demand	95,005	104,083	113,155	121,082	130,380	140,393
Current Water Supply	39,999	39,999	39,999	39,999	39,999	39,999
Projected Supply Surplus (+)/Deficit(-)	-55,006	-64,084	-73,156	-81,083	-90,381	-100,394

Evaluation of Potentially Feasible Water Management Strategies:

Three alternative strategies were considered to meet the Harrison County Manufacturing water supply shortages as summarized in the following table. Advanced conservation was considered through implementation of industrial water audits. Water reuse was not considered because operational procedures for the existing facilities are not available. Groundwater alternatives were omitted since there is not a source within the county with the available supply. A surface water worksheet is included as Attachment B. This strategy is combined with the strategy for Harrison Steam Electric Power with a need of 46,625 ac-ft/yr. The combined project will supply 150,000 ac-ft/yr to Harrison County entities.

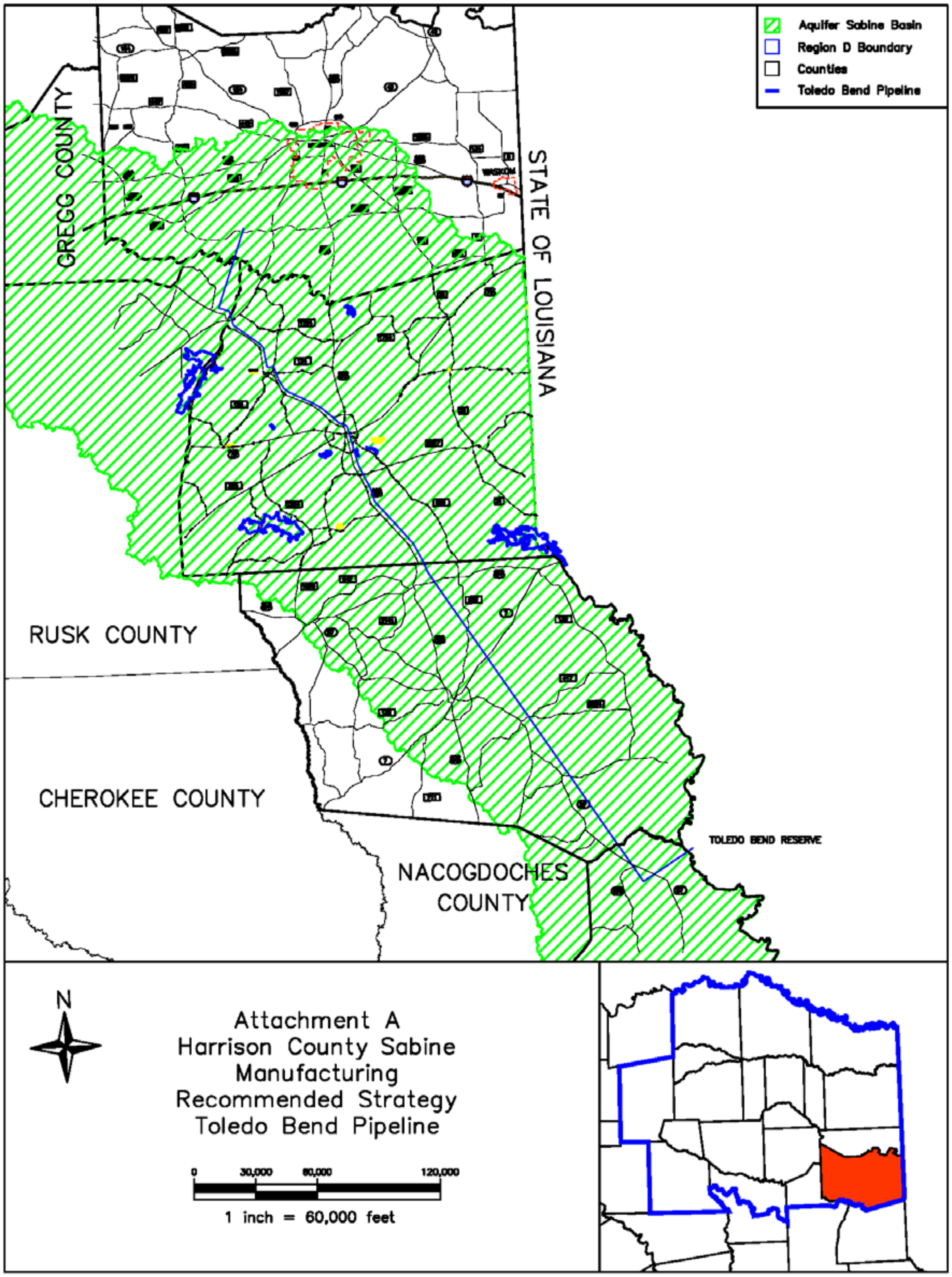
Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation	**14,039**	**$0**	**$0**	**$0**	**1**
Water Reuse					
Groundwater					
Toledo Bend Intake and Raw Water Pipeline	**150,000**	**$498,773,000**	**$53,051,000**	**$354**	**3**

Recommendations:

	2020	2030	2040	2050	2060	2070
Advanced Water Conservation (ac-ft/yr)	**9,501**	**10,408**	**11,316**	**12,108**	**13,038**	**14,039**
Toledo Bend Intake and Raw Water Pipeline (ac-ft/yr)	**50,000**	**55,000**	**65,000**	**70,000**	**80,000**	**0**
Unmet Need	**0**	**0**	**0**	**0**	**0**	**86,355**

The recommended strategy for the Harrison County Manufacturing to meet their projected deficit of 55,006 ac-ft/yr in 2020 and 90,381 ac-ft/yr in 2060 would be to first implement advanced water conservation measures (such as industrial water auditing), and to construct an intake and raw water pipeline from Toledo Bend Reservoir and contract with the Sabine River Authority to purchase raw water. The recommended contract for water for manufacturing uses with the Sabine River Authority would expire by 2070, and would not be renewed as such a renewal would result in a projected overallocation of supply from Toledo Bend Reservoir when considered in conjunction with all regions' strategies related to this supply. (Note that contracted supply for steam electric use in Harrison County is recommended to continue through 2070, as this would not result in a projected overallocation of Toledo Bend supply.) With advanced water conservation in place, in 2070 with no water contracted from the Sabine River Authority for supply from Toledo Bend Reservoir, the remaining projected need for Harrison County Manufacturing is 86,355 ac-ft/yr. This remaining amount is left as an unmet need for the purposes of this 2016 Plan.

The recommended supply source will be the Toledo Bend Reservoir in Shelby County. The Toledo Bend Reservoir in Shelby County is projected to have sufficient supply availability to meet the needs of Manufacturing in Harrison County through 2060.



Attachment A
Harrison County Sabine
Manufacturing
Recommended Strategy
Toledo Bend Pipeline

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Manufacturing Harrison County - Toledo Bend Pipeline (Manufacturing Harrison - SRA - Toledo Bend Reservoir)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Intake Pump Stations (0 MGD)	$5,000,000
Transmission Pipeline (0 in dia., 82 miles)	$363,839,000
TOTAL COST OF FACILITIES	**$368,839,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$110,902,000
Environmental & Archaeology Studies and Mitigation	$2,110,000
Land Acquisition and Surveying (5 acres)	$55,000
Interest During Construction (4% for 1 years with a 1% ROI)	$16,867,000
TOTAL COST OF PROJECT	**$498,773,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$41,737,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$3,763,000
Pumping Energy Costs (83900127 kW-hr @ 0.09 $/kW-hr)	$7,551,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$53,051,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	150,000
Annual Cost of Water ($ per acft)	$354
Annual Cost of Water ($ per 1,000 gallons)	$1.09

Note: One or more cost element has been calculated externally

SRH *4/8/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF THE CITY OF MARSHALL

Description of Water User Group:

The City of Marshall is located in central Harrison County and serves the incorporated city limits and an area immediately north of the City of Marshall. The population is projected to increase from 25,210 persons in 2020 to 38,140 persons in 2070. The City is included as a W.U.G. in Harrison County. The system's current water supply consists of a Run-of-the-River water rights permit for 16,000 AF/yr from Big Cypress Bayou and a water purchase contract for 9,000 AF/yr from Northeast Texas Municipal Water District from Lake O' the Pines.. The Big Cypress ROR is not available during drought conditions according to water availability models. Therefore, the total rated supply capacity is 9,000 ac-ft/yr. The system is bounded on the east and North by Leigh WSC, on the south by Gill WSC, and on the west by Talley WSC. The City has a water conservation plan. The City of Marshall is projected to have a water supply deficit of 41 ac-ft/yr in 2060 increasing to a deficit of 701 ac-ft/yr in 2070. A location map is included as Attachment A.

Water Supply and Demand Analysis:

	2020	**2030**	**2040**	**2050**	**2060**	**2070**
Population	25,210	27,074	29,004	31,711	34,661	38,140
Projected Water Demand	5,085	5,326	5,599	6,067	6,618	7,278
Current Water Supply	6,577	6,577	6,577	6,577	6,577	6,577
Projected Supply Surplus (+)/Deficit(-)	**1,492**	**1,251**	**978**	**510**	**-41**	**-701**

Evaluation of Potentially Feasible Water Management Strategies:

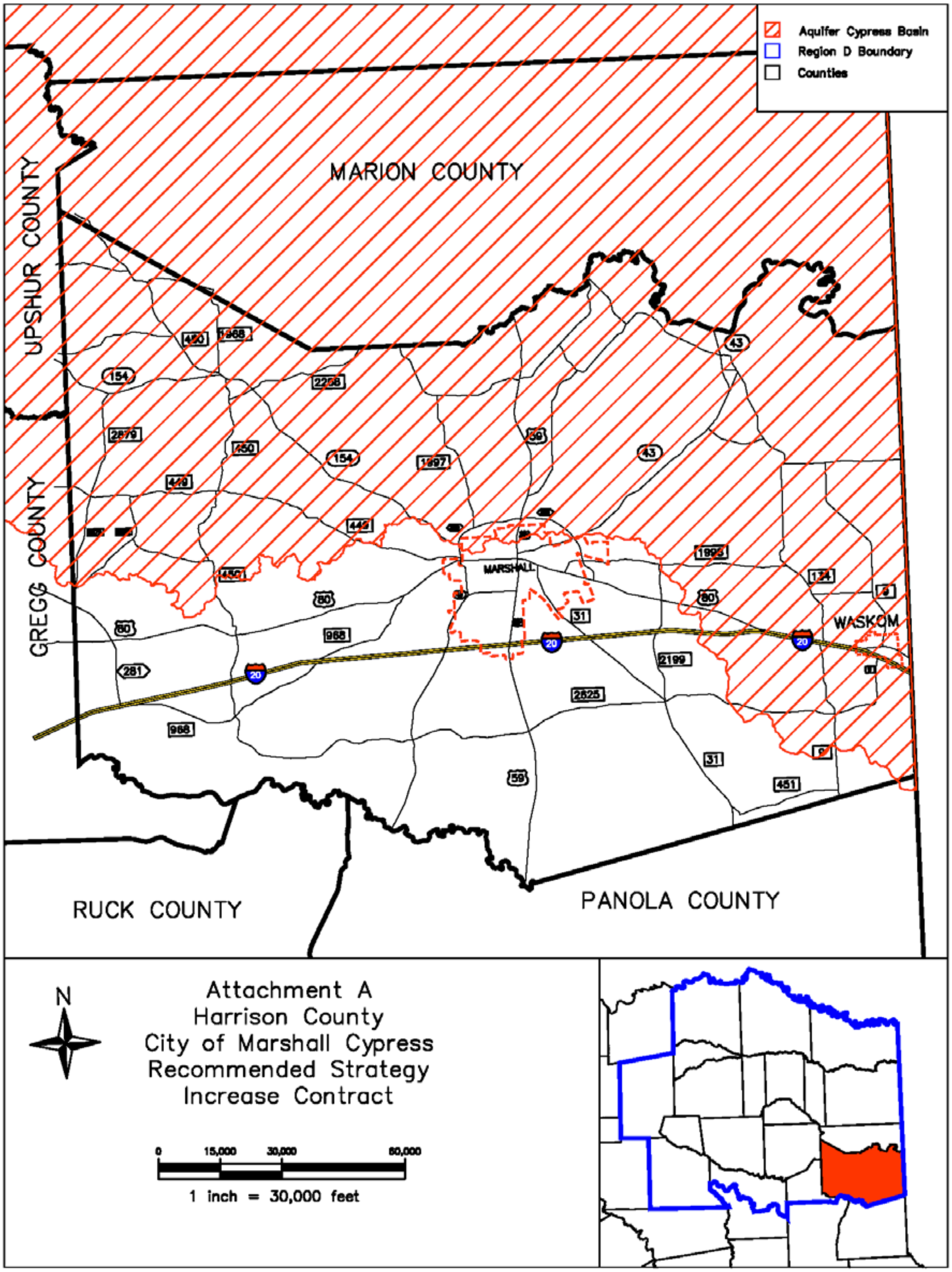
Four alternative strategies were considered to meet the City of Marshall water supply shortages as summarized in the following table. Advanced conservation was not considered because the per capita use per day was below the 140 gpcpd threshold set by the planning group. Water reuse was not considered because the City does not have a demand for non-potable water. Surface water alternatives are limited to an increase in contract amount from NETMWD from Lake O the Pines. Groundwater is limited in capacity in this area and therefore was not considered feasible. A surface water worksheet is included as Attachment B.

Strategy	**Firm Yield (AF)**	**Total Capital Cost**	**Total Annualized Cost**	**Unit Cost**	**Environmental Impact**
Advanced Water Conservation					
Water Reuse					
Groundwater					
Increase Existing Contract	**701**	**$4,738,000**	**$1,088,000**	**$1,552**	**1**

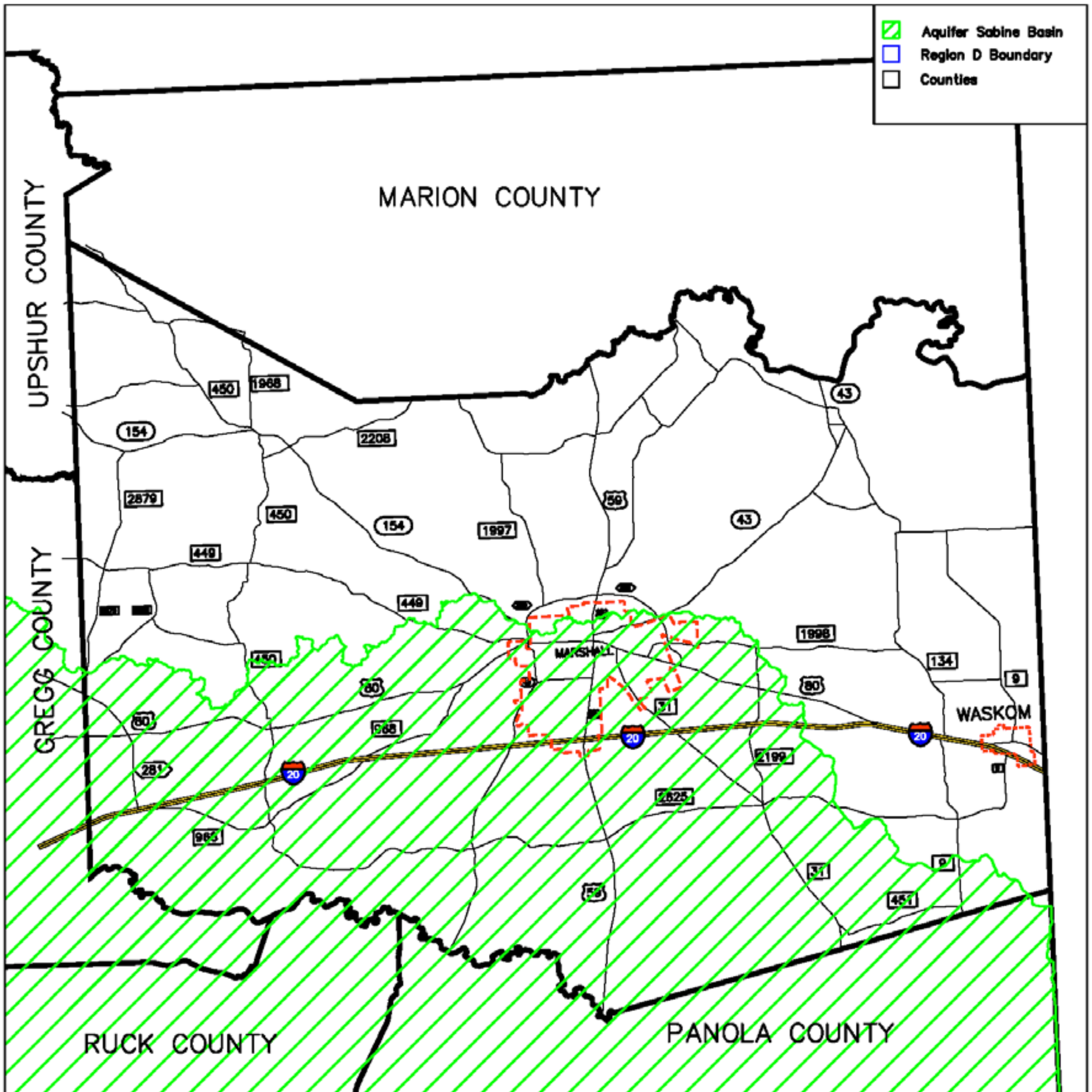
Recommendations:

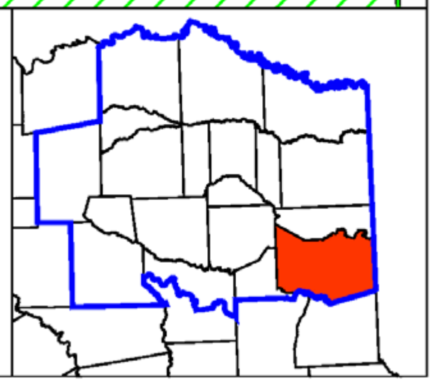
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
Increase Existing Contract (ac-ft/yr)					50	701

The recommended strategy for the City of Marshall to meet their projected deficit of 41 ac-ft/yr in 2060 and 701 ac-ft/yr in 2070 would be to increase their contract amount with NETMWD and expand their water treatment capacity by an additional 0.6 MGD. The recommended supply source will be the Lake O the Pines in Marion County. Lake O the Pines is projected to have a more than ample supply availability to meet the needs of the City of Marshall for the planning period.



Attachment A
Harrison County
City of Marshall Cypress
Recommended Strategy
Increase Contract





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0 15,000 30,000 60,000

1 inch = 30,000 feet

Attachment A
Harrison County
City of Marshall Sabine
Recommended Strategy
Increase Contract

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Marshall - Increase Contract (Marshall - NETMWD - Lake O' the Pines)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
Water Treatment Plant (0.6 MGD)	$3,390,000
TOTAL COST OF FACILITIES	**$3,390,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,187,000
Interest During Construction (4% for 1 years with a 1% ROI)	$161,000
TOTAL COST OF PROJECT	**$4,738,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$396,000
Operation and Maintenance	
Water Treatment Plant (2.5% of Cost of Facilities)	$339,000
Pumping Energy Costs (17885 kW-hr @ 0.09 $/kW-hr)	$2,000
Purchase of Water (701 acft/yr @ 500 $/acft)	$351,000
TOTAL ANNUAL COST	**$1,088,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	701
Annual Cost of Water ($ per acft)	$1,552
Annual Cost of Water ($ per 1,000 gallons)	$4.76

SRH *4/8/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS MINING IN HARRISON COUNTY – CYPRESS

Description of Water User Group:

The Mining WUG in Harrison County is a split entity and has a demand that is projected to be decreasing from 525 ac-ft/yr in 2020 to 180 ac-ft/yr in 2070. Mining in Harrison County has a current water supply consisting of water wells from the Carrizo-Wilcox Aquifer and Queen City Aquifer, and contract with Sabine River Authority for surface water from Lake Fork. The total rated available supply from these sources is 253 ac-ft/yr in 2020. Mining in Harrison County is projected to have a water supply deficit of 272 ac-ft/yr in 2020 and increasing to a surplus of 116 ac-ft/yr in 2070 for the Harrison Cypress split.

Water Supply and Demand Analysis:

Mining Harrison Cypress	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Projected Water Demand	525	436	365	297	228	180
Current Water Supply	253	262	270	279	286	296
Projected Supply Surplus (+)/Deficit(-)	-272	-174	-95	-18	58	116

Evaluation of Potentially Feasible Water Management Strategies:

Three alternative strategies were considered to meet the Harrison County Mining water supply shortages as summarized in the following table. Advanced conservation and water reuse was not considered because operational procedures for the existing mines is not available. Surface water alternatives were omitted since there is not a supply source within close proximity to the county with available supply. A groundwater worksheet is included as Attachment B.

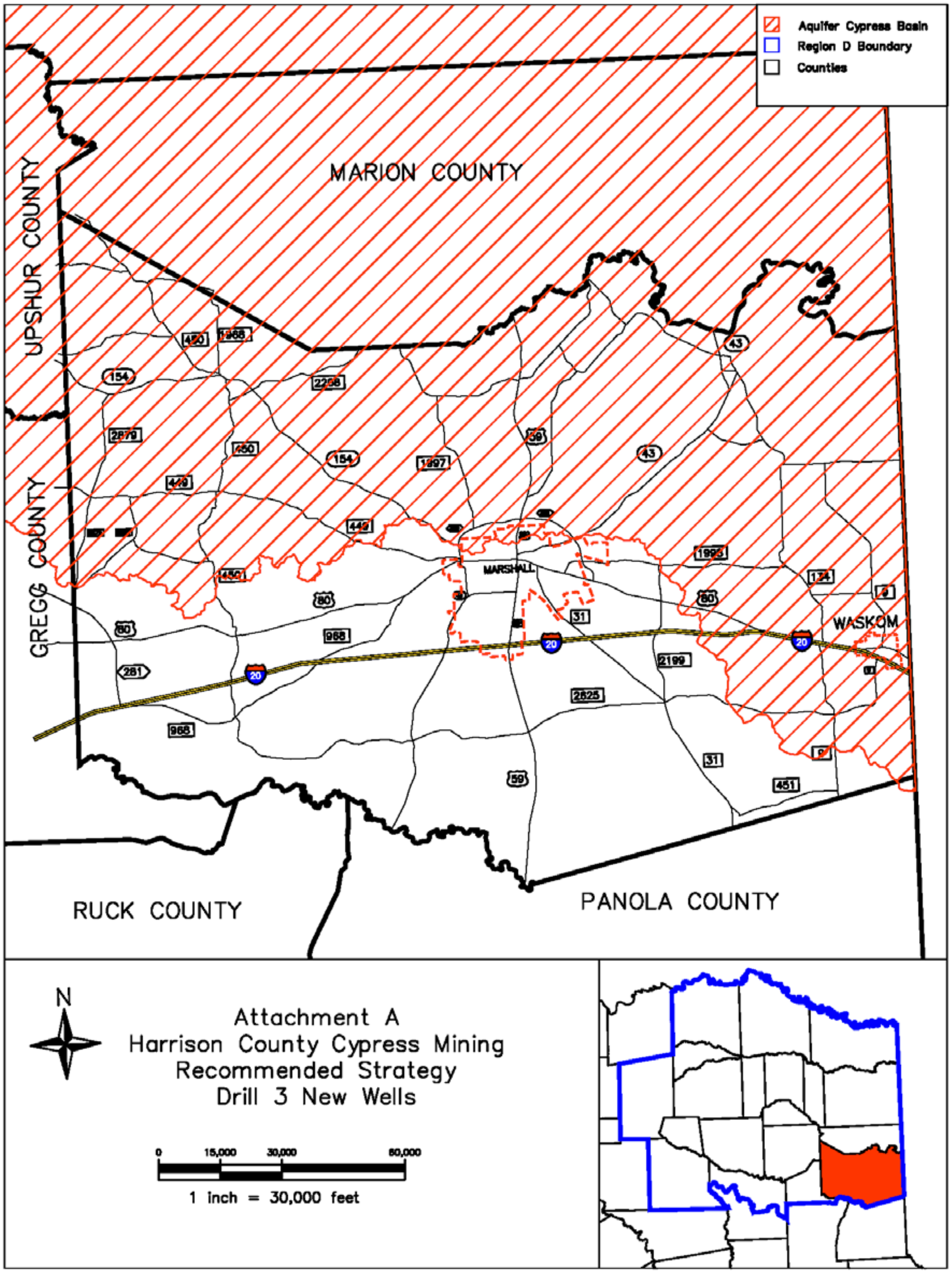
Strategy	**Firm Yield (AF)**	**Total Capital Cost**	**Total Annualized Cost**	**Unit Cost**	**Environmental Impact**
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Carrizo-Wilcox, Cypress, Harrison County)	**323**	**$ 1,438,000**	**$ 134,000**	**$ 415**	**1**
Surface Water					

Recommendations:

	2020	**2030**	**2040**	**2050**	**2060**	**2070**
Drill New Wells (Carrizo-Wilcox, Cypress, Harrison County; ac-ft/yr)	**324**	**324**	**324**	**324**	**108**	**0**

The recommended strategy for the Harrison County Mining to meet their projected deficit of 272 ac-ft/yr in 2020 and 18 ac-ft/yr in 2050 would be to construct three additional water wells similar to their existing wells just prior to each decade as the deficits occur to 2040. The recommended supply source will be the Carrizo-Wilcox Aquifer in Harrison County. Three wells with rated capacity of 200 gpm each would provide approximately 108 acre-feet each or 323 ac-ft/yr. The Carrizo-Wilcox Aquifer in Harrison County is projected to have a more than ample supply availability to meet the needs of the Mining in Harrison County 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.



Cost Estimate Summary
Water Supply Project Option
41518 Prices
Mining Harrison Cypress - Drill New Wells (Harrison - Cypress - Carrizo Wilcox)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$1,015,000
TOTAL COST OF FACILITIES	**$1,015,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$355,000
Environmental & Archaeology Studies and Mitigation	$19,000
Interest During Construction (4% for 1 years with a 1% ROI)	$49,000
TOTAL COST OF PROJECT	**$1,438,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$120,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$10,000
Pumping Energy Costs (42027 kW-hr @ 0.09 $/kW-hr)	$4,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$134,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	323
Annual Cost of Water ($ per acft)	$415
Annual Cost of Water ($ per 1,000 gallons)	$1.27
JTS	*4/9/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS MINING IN HARRISON COUNTY – SABINE

Description of Water User Group:

The Mining WUG in Harrison County is a split entity and has a demand that is projected to be decreasing from 525 ac-ft/yr in 2020 to 180 ac-ft/yr in 2070. Mining in Harrison County has a current water supply consisting of water wells from the Carrizo-Wilcox Aquifer, surface water from Sabine Run-of-River permit, and contract with Sabine River Authority for surface water from Lake Fork. The total rated available supply from these sources is 612 ac-ft/yr in 2020. Mining in Harrison County is projected to have a water supply deficit of 1,361 ac-ft/yr in 2020 decreasing to a deficit of 18 ac-ft/yr in 2070 for the Sabine split.

Water Supply and Demand Analysis:

Mining Harrison Sabine	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Projected Water Demand	1,973	1,641	1,375	1,115	860	675
Current Water Supply	612	621	631	640	648	657
Projected Supply Surplus (+)/Deficit(-)	-1,361	-1,020	-744	-475	-212	-18

Evaluation of Potentially Feasible Water Management Strategies:

Three alternative strategies were considered to meet the Harrison County Mining water supply shortages as summarized in the following table. Advanced conservation and water reuse was not considered because operational procedures for the existing mines is not available. Surface water alternatives were omitted since there is not a supply source within close proximity to the county with available supply. A groundwater worksheet is included as Attachment B.

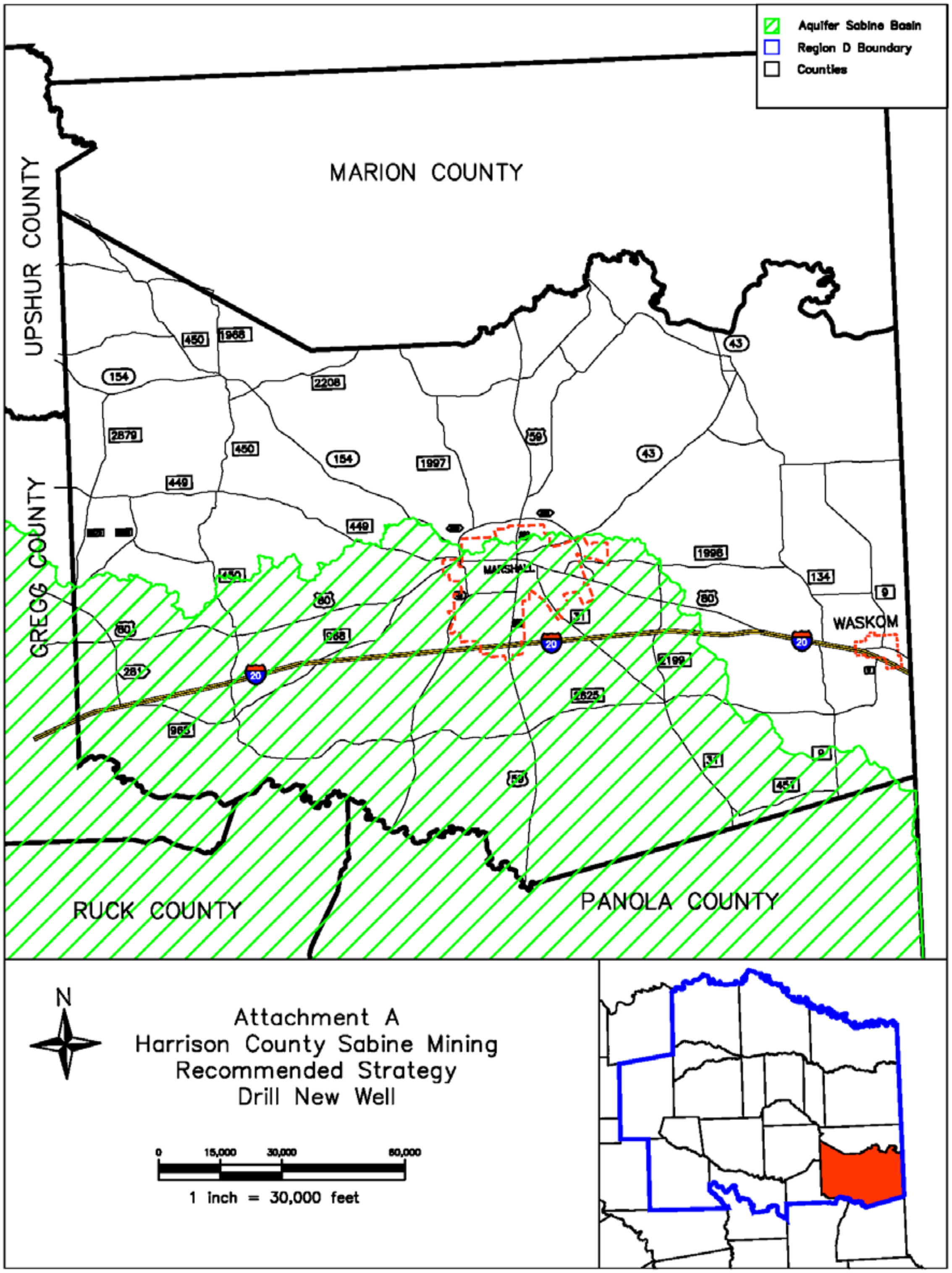
Strategy	**Firm Yield (AF)**	**Total Capital Cost**	**Total Annualized Cost**	**Unit Cost**	**Environmental Impact**
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Carrizo-Wilcox, Sabine, Harrison County)	**1,398**	**$5,994,000**	**$ 578,000**	**$ 413**	**1**
Surface Water					

Recommendations:

	2020	**2030**	**2040**	**2050**	**2060**	**2070**
Drill New Wells (Carrizo-Wilcox, Sabine, Harrison County; ac-ft/yr)	1,398	1,398	1,398	1,398	1,398	1,398

The recommended strategy for the Harrison County Mining to meet their projected deficit of 1,361 ac-ft/yr in 2020 would be to construct one additional water well 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 Harrison County. Thirteen wells with rated capacity of 200 gpm each would provide approximately 108 acre-feet each or 1,398 ac-ft/yr. The Carrizo-Wilcox Aquifer in Harrison County is projected to have a more than ample supply availability to meet the needs of the Mining in Harrison County 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.


Aquifer Sabine Basin
Region D Boundary
Counties
MARION COUNTY
UPSHUR COUNTY
GREGG COUNTY
RUCK COUNTY
PANOLA COUNTY
MARSHALL
WASKOM
Attachment A
Harrison County Sabine Mining
Recommended Strategy
Drill New Well
N
0
15,000
30,000
60,000
1 inch = 30,000 feet

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Mining Harrison Sabine - Drill New Wells (Harrison - Sabine - Carrizo Wilcox)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$4,276,000
TOTAL COST OF FACILITIES	**$4,276,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,496,000
Environmental & Archaeology Studies and Mitigation	$19,000
Interest During Construction (4% for 1 years with a 1% ROI)	$203,000
TOTAL COST OF PROJECT	**$5,994,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$502,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$43,000
Pumping Energy Costs (364030 kW-hr @ 0.09 $/kW-hr)	$33,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$578,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	1,398
Annual Cost of Water ($ per acft)	$413
Annual Cost of Water ($ per 1,000 gallons)	$1.27
JTS	*4/9/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS STEAM ELECTRIC POWER IN HARRISON COUNTY

Description of Water User Group:

The Steam Electric Power WUG in Harrison County has a demand that is projected to be increasing from 19,838 ac-ft/yr in 2020 to 46,625 ac-ft/yr in 2070. Steam Electric Power in Harrison County has a current water supply consisting of contracts with Northeast Texas MWD for surface water from Lake O' the Pines. The total rated available supply from this source is 18,000 ac-ft/yr. Steam Electric Power in Harrison County is projected to have a water supply deficit of 1,838 ac-ft/yr in 2020 increasing to a deficit of 28,625 ac-ft/yr in 2070.

Water Supply and Demand Analysis:

Mining Harrison Sabine	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Projected Water Demand	19,838	23,193	27,283	32,268	38,345	46,625
Current Water Supply	18,000	18,000	18,000	18,000	18,000	18,000
Projected Supply Surplus (+)/Deficit(-)	-1,838	-5,193	-9,283	-14,268	-20,345	-28,625

Evaluation of Potentially Feasible Water Management Strategies:

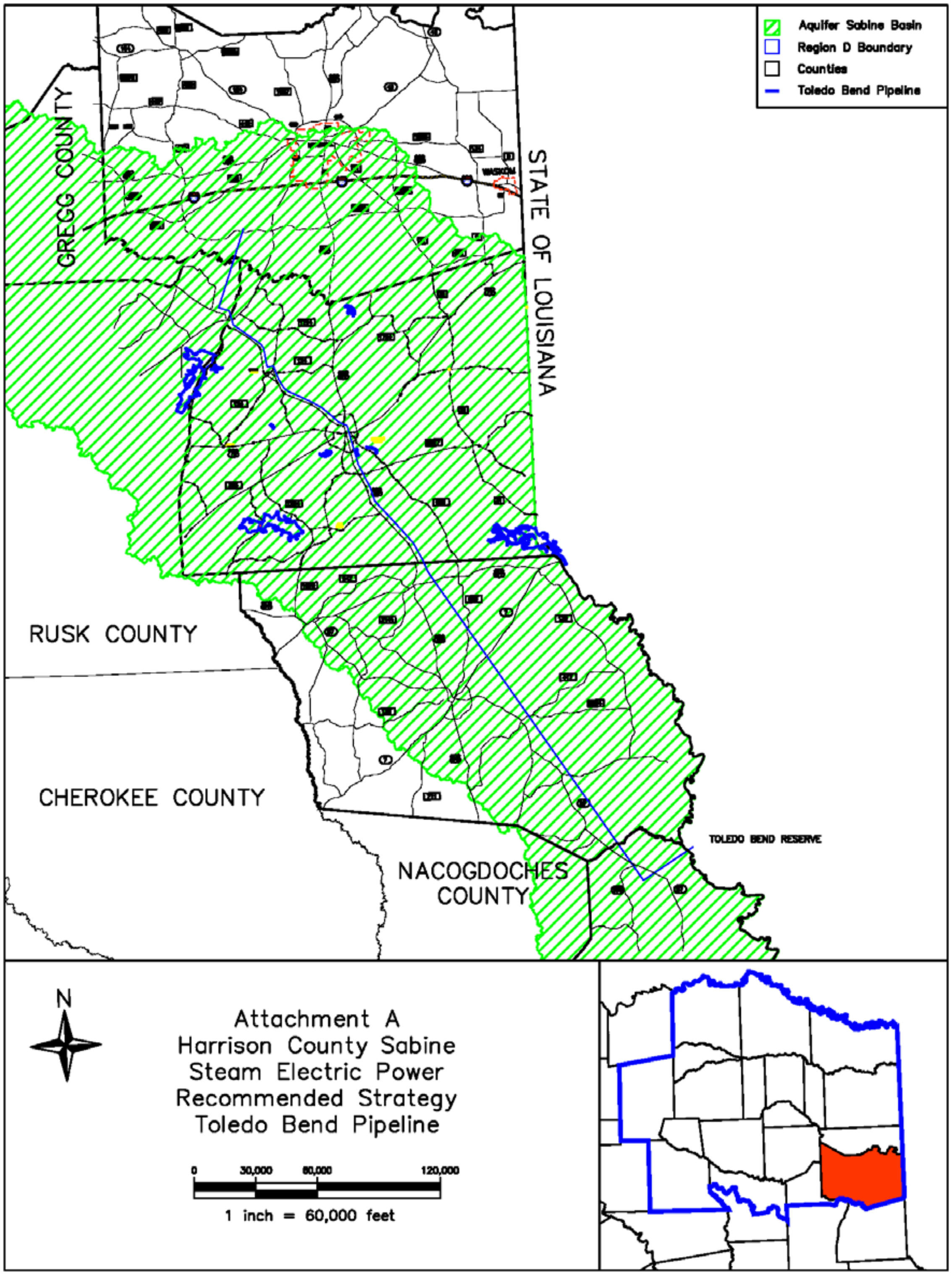
Three alternative strategies were considered to meet the Harrison County Steam Electric Power water supply shortages as summarized in the following table. Advanced conservation and water reuse were not considered because operational procedures for the existing facilities are not available. Groundwater alternatives were omitted since there is not a source within the county with the available supply. A surface water worksheet is included as Attachment B. This strategy is combined with the strategy for Harrison Manufacturing with a need of 100,394 ac-ft/yr. The combined project will supply 150,000 ac-ft/yr to Harrison County entities. The current supply of 18,000 af-ft/yr is recommended as a strategy for Titus County Steam Electric to be voluntarily reallocated in 2070 to meet those identified needs from Lake O' the Pines.

Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Groundwater					
Toledo Bend Intake and Raw Water Pipeline	**49,000**	**$498,773,000**	**$53,051,000**	**$354**	**3**

Recommendations:

	2020	**2030**	**2040**	**2050**	**2060**	**2070**
Toledo Bend Intake and Raw Water Pipeline (ac-ft/yr)	2,000	6,000	10,000	15,000	21,000	49,000

The recommended strategy for the Harrison County Steam Electric Power to meet their projected deficit of 1,838 ac-ft/yr in 2020 and 28,625 ac-ft/yr in 2070 would be to construct an intake and raw water pipeline from Toledo Bend Reservoir and contract with the Sabine River Authority to purchase raw water. The recommended supply source will be the Toledo Bend Reservoir in Shelby County. The Toledo Bend Reservoir in Shelby County is projected to have a more than ample supply availability to meet the needs of Steam Electric Power in Harrison County for the planning period. The existing supply from Lake O' the Pines will be voluntarily reallocated in 2070 to other Steam Electric Power needs in the region.


Aquifer Sabine Basin
Region D Boundary
Counties
Toledo Bend Pipeline
GREGG COUNTY
STATE OF LOUISIANA
WASKOM
RUSK COUNTY
CHEROKEE COUNTY
NACOGDOCHES COUNTY
TOLEDO BEND RESERVE
N
Attachment A
Harrison County Sabine
Steam Electric Power
Recommended Strategy
Toledo Bend Pipeline
0
30,000
60,000
120,000
1 inch = 60,000 feet

Cost Estimate Summary
Water Supply Project Option
41518 Prices
SteamElectric Harrison County - Toledo Bend Pipeline (Steam Electric - SRA - Toledo Bend Reservoir)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Intake Pump Stations (0 MGD)	$5,000,000
Transmission Pipeline (0 in dia., 82 miles)	$363,839,000
TOTAL COST OF FACILITIES	**$368,839,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$110,902,000
Environmental & Archaeology Studies and Mitigation	$2,110,000
Land Acquisition and Surveying (5 acres)	$55,000
Interest During Construction (4% for 1 years with a 1% ROI)	$16,867,000
TOTAL COST OF PROJECT	**$498,773,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$41,737,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$3,763,000
Pumping Energy Costs (83900127 kW-hr @ 0.09 $/kW-hr)	$7,551,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$53,051,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	150,000
Annual Cost of Water ($ per acft)	$354
Annual Cost of Water ($ per 1,000 gallons)	$1.09

Note: One or more cost element has been calculated externally

SRH *4/8/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF THE CITY OF WASKOM

Description of Water User Group:

The City of Waskom is located in southeastern Harrison County and serves the incorporated city limits and an area immediately north, east, and south of the City of Waskom. In 2003, the system had 957 residential connections. The population is projected to increase from 2,315 persons in 2020 to 3,503 persons in 2070. The City is included as a WUG in Harrison County. The system's current water supply consists of nine water wells from the Carrizo-Wilcox Aquifer. The total rated capacity of these wells is 631 GPM, or 339 ac-ft/yr. The system is bounded on the east, south, and west by the Waskom Rural Water WSC #1. The City does not have a water conservation plan. The City of Waskom is projected to have a water supply deficit of 6 ac-ft/yr in 2020 increasing to a deficit of 148 ac-ft/yr in 2070. A location map is included as Attachment A.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	2,315	2,487	2,664	2,912	3,183	3,503
Projected Water Demand	345	359	376	406	443	487
Current Water Supply	339	339	339	339	339	339
Projected Supply Surplus (+)/Deficit(-)	**-6**	**-20**	**-37**	**-67**	**-104**	**-148**

Evaluation of Potentially Feasible Water Management Strategies:

Four alternative strategies were considered to meet the City of Waskom 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 gpcpd 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. A groundwater worksheet is included as Attachment B.

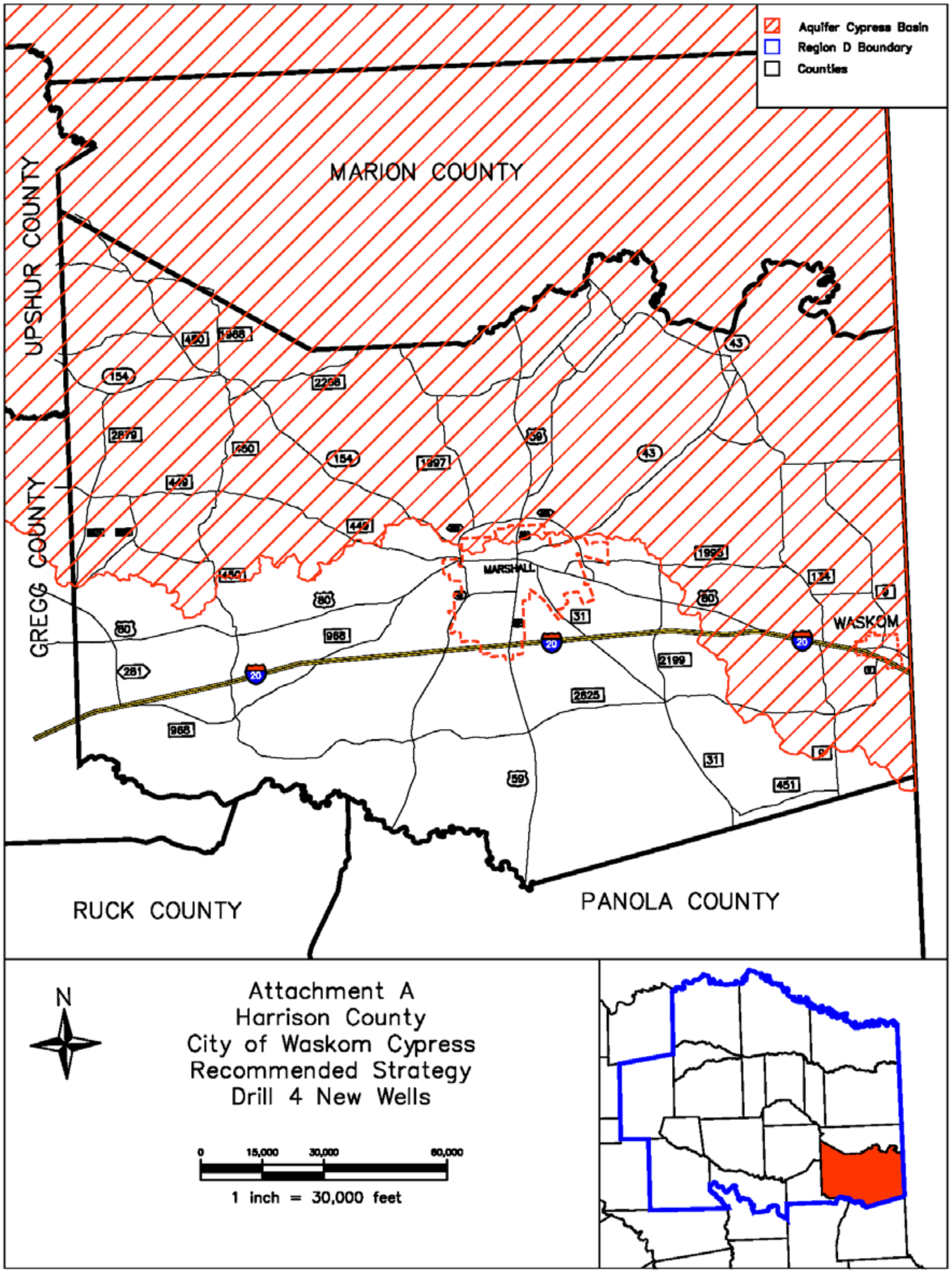
Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Drill New Well (Carrizo-Wilcox, Cypress, Harrison County)	**184**	**$ 1,780,000**	**$ 161,000**	**$ 870**	**1**
Surface Water					

Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Well (Carrizo-Wilcox, Cypress, Harrison County; ac-ft/yr)	46	46	46	92	138	184

The recommended strategy for the City of Waskom to meet their projected deficit of 6 ac-ft/yr in 2020 and 148 ac-ft/yr in 2070 would be to construct one additional water well 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 Harrison County, Cypress River Basin. Four wells with rated capacity of 86 gpm each would provide approximately 46 acre-feet each or 184 ac-ft/yr. The Carrizo-Wilcox Aquifer in Harrison County, Cypress River Basin, is projected to have a more than ample supply availability to meet the needs of the City of Waskom 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.



Attachment A
Harrison County
City of Waskom Cypress
Recommended Strategy
Drill 4 New Wells

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Waskom - Drill New Wells (Waskom - Cypress - Carrizo Wilcox)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
Well Fields (Wells, Pumps, and Piping)	$960,000
Water Treatment Plant (0.5 MGD)	$41,000
TOTAL COST OF FACILITIES	**$1,001,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$350,000
Environmental & Archaeology Studies and Mitigation	$49,000
Land Acquisition and Surveying (7 acres)	$44,000
Interest During Construction (4% for 1 years with a 1% ROI)	$51,000
TOTAL COST OF PROJECT	**$1,495,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$125,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$10,000
Water Treatment Plant (2.5% of Cost of Facilities)	$24,000
Pumping Energy Costs (20772 kW-hr @ 0.09 $/kW-hr)	$2,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$161,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	185
Annual Cost of Water ($ per acft)	$870
Annual Cost of Water ($ per 1,000 gallons)	$2.67

Note: One or more cost element has been calculated externally

SRH *4/8/2015*

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REGION D
EVALUATIONS OF WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

HOPKINS COUNTY

WUGs:

Brinker WSC

The City of Cumby

Hopkins County Irrigation

Martin Springs WSC

Hopkins County Mining

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EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF BRINKER WATER SUPPLY CORPORATION IN HOPKINS COUNTY

Description of Water User Group:

Brinker WSC provides water service in Hopkins County. It is projected that the users in the WUG will have a shortage in 2060. The WUG population is projected to be 2,252 by 2020 and increases to 3,990 by 2070. The WSC utilizes groundwater from the Carrizo-Wilcox aquifer and has a contract for water supply with City of Sulphur Springs for 77 ac-ft/yr. Brinker WSC is projected to have a deficit of 29 ac-ft in 2060 and increasing to a deficit of 63 ac-ft by 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	2,252	2,601	2,919	3,284	3,636	3,990
Projected Water Demand	241	268	293	325	359	393
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	329	328	328	329	330	330
Projected Supply Surplus (+) / Deficit (-)	**88**	**60**	**35**	**4**	**-29**	**-63**

Evaluation of Potentially Feasible Water Management Strategies:

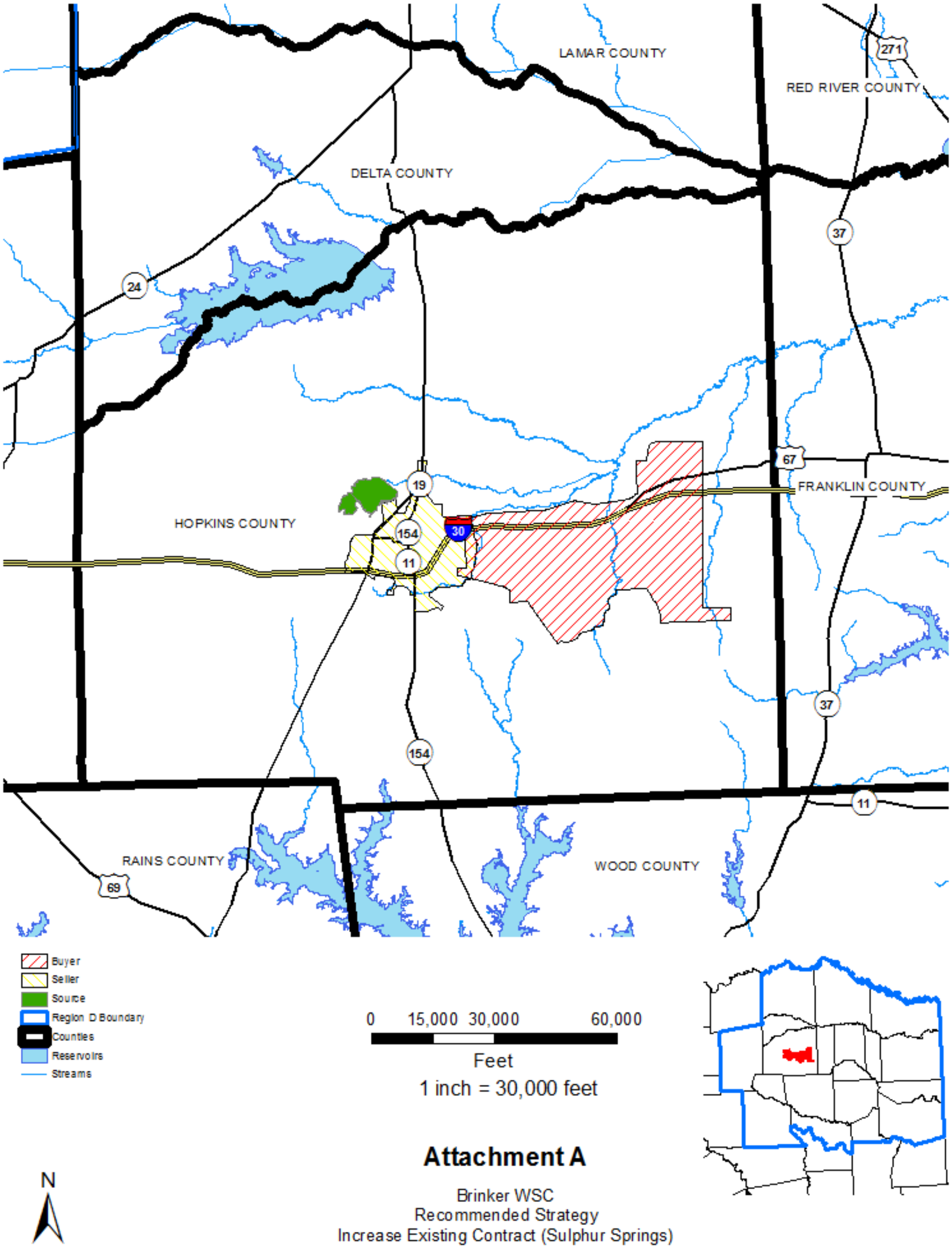
Four alternative strategies considered to meet the WSC's water supply shortages as summarized in the table below. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. Additional use of groundwater has been identified as a likely source of water for Brinker WSC in Hopkins County; however, projected needs exceed the availability of groundwater in the basin based on the modeled available groundwater (MAG) estimates. Brinker WSC has indicated that the likely future strategy would be the additional use of groundwater. However, due to current TWDB guidelines for the Regional Water Planning process, this strategy is considered an alternate strategy for the 2016 Plan. Purchase of additional surface water from Sulphur Springs Lake under contract from the City of Sulphur Springs was also considered.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Carrizo-Wilcox, Sulphur Basin)	**63**	**$343,384**	**$78,993**	**$1,215**	**1**
Increase Existing Contract	**63**	**$0**	**$74,100**	**$1,176**	**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
Increase Existing Contract (ac-ft/yr)	0	0	0	0	29	63

To meet the identified needs for Brinker WSC, the recommended strategy is to increase the existing surface water contract from the City of Sulphur Springs prior to 2060.



Attachment A

Brinker WSC
Recommended Strategy
Increase Existing Contract (Sulphur Springs)

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Brinker WSC - Increase Existing Contract

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (63 acft/yr @ 1176 $/acft)	$74,000
TOTAL ANNUAL COST	**$74,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	63
Annual Cost of Water ($ per acft)	$1,175
Annual Cost of Water ($ per 1,000 gallons)	$3.60

JNS *3/31/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF CITY OF CUMBY

Description of Water User Group:

The City of Cumby provides water service in Hopkins County. It is projected that the users in the WUG will have a shortage in 2030. The WUG population is projected to be 919 by 2020 and increases to 1,652 by 2070. The City of Cumby utilizes groundwater from the Nacatoch aquifer through 4 wells with a combined production capacity of 223 gpm. The City of Cumby is projected to have a deficit of 12 ac-ft in 2030 and increasing to a deficit of 77 ac-ft by 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	919	1,066	1,200	1,354	1,503	1,652
Projected Water Demand	117	132	145	162	179	197
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	120	120	120	120	120	120
Projected Supply Surplus (+) / Deficit (-)	**3**	**-12**	**-25**	**-42**	**-59**	**-77**

Projected Supply Surplus (+) / Deficit (-) by Basin	2020	2030	2040	2050	2060	2070
Sabine	3	-11	-23	-38	-54	-70
Sulphur	0	-1	-2	-4	-5	-7
Total	**3**	**-12**	**-25**	**-42**	**-59**	**-77**

Evaluation of Potentially Feasible Water Management Strategies:

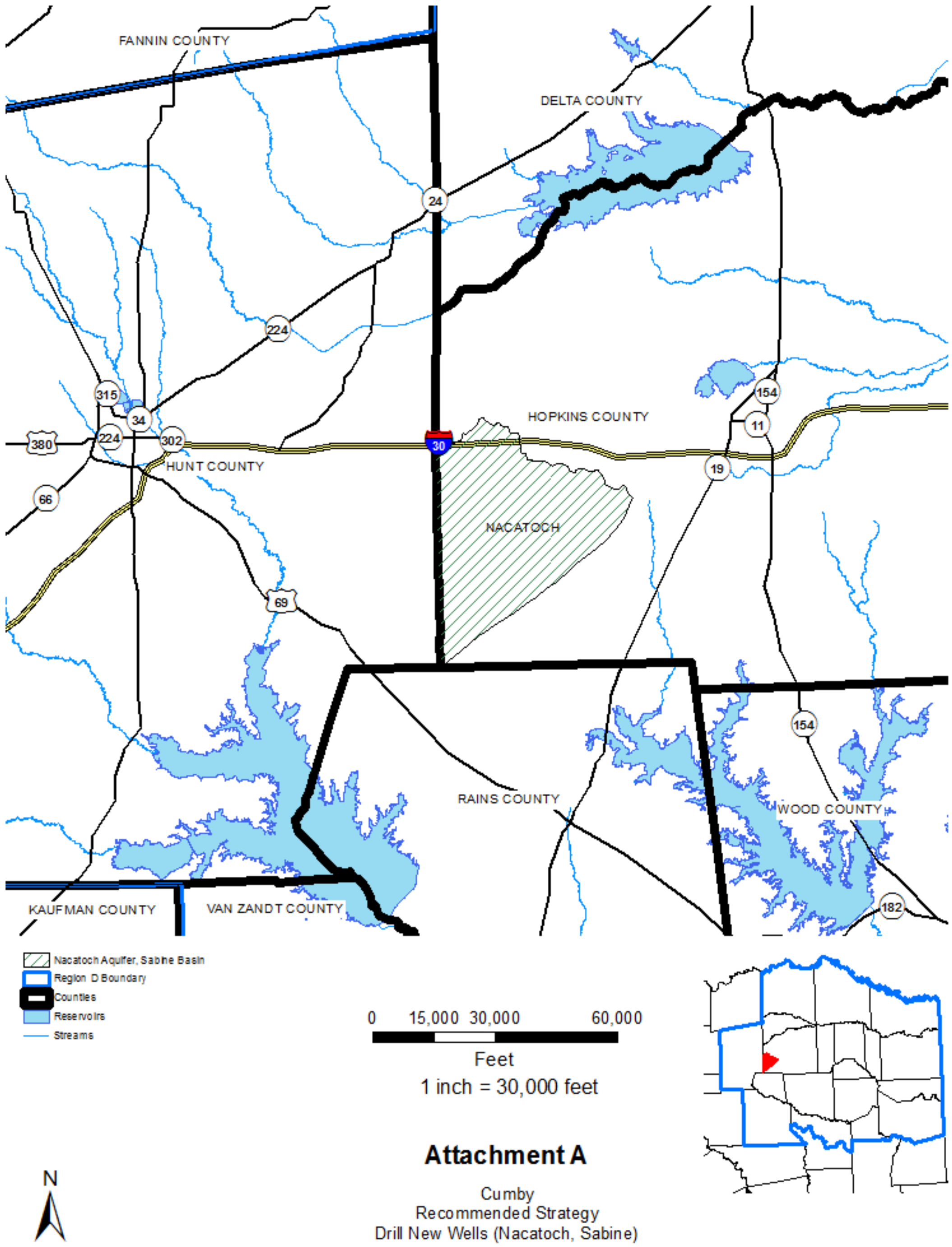
There were four alternative strategies considered to meet the WSC's water supply shortages as summarized in the Table below. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. The system is not large enough to treat surface water in a cost-effective manner. Additional groundwater from the Nacatoch aquifer has been considered as a potential water management strategy.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Nacatoch Aquifer, Sabine Basin, Hopkins County)	**80**	**$772,000**	**$128,000**	**$1,600**	**1**
Surface Water					

Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Nacatoch Aquifer, Sabine Basin, Hopkins County; ac-ft/yr)		80	80	80	80	80

The recommended strategy for the City of Cumby to meet their projected deficit of 12 ac-ft/yr in 2030 and 77 ac-ft/yr in 2070 would be to construct two additional water wells similar to their existing wells just prior to the decade as the deficits occur. The recommended supply source will be the Nacatoch Aquifer in Hopkins County, Sabine River Basin. Two wells with rated capacity of 75 gpm each would provide sufficient supply to meet the projected demands. The Nacatoch Aquifer in Hopkins County, Sabine River Basin, is projected to have sufficient supply availability to meet the needs of the City of Cumby for the planning period.



Cost Estimate Summary
Water Supply Project Option
41518 Prices
City of Cumby - Drill New Wells (Hopkins - Sabine - Nacatoch)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$529,000
Water Treatment Plant (0.1 MGD)	$18,000
TOTAL COST OF FACILITIES	**$547,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$191,000
Environmental & Archaeology Studies and Mitigation	$7,000
Interest During Construction (4% for 1 years with a 1% ROI)	$27,000
TOTAL COST OF PROJECT	**$772,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$65,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$5,000
Water Treatment Plant (2.5% of Cost of Facilities)	$11,000
Pumping Energy Costs (73130 kW-hr @ 0.09 $/kW-hr)	$7,000
Purchase of Water (80 acft/yr @ 500 $/acft)	$40,000
TOTAL ANNUAL COST	**$128,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	80
Annual Cost of Water ($ per acft)	$1,600
Annual Cost of Water ($ per 1,000 gallons)	$4.91

KVA *3/31/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF IRRIGATION IN HOPKINS COUNTY

Description of Water User Group:

The Irrigation WUG in Hopkins County has a demand that is projected to remain constant at 2,269 ac-ft/yr for the planning period. The Irrigation WUG in Hopkins County is supplied by groundwater from the Carrizo-Wilcox Aquifer and run-of-river diversions from the Sabine and Sulphur Rivers. A deficit of 2,126 ac-ft/yr is projected to occur in throughout the planning period.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Projected Water Demand	2,269	2,269	2,269	2,269	2,269	2,269
Current Water Supply	143	143	143	143	143	143
Projected Supply Surplus (+)/Deficit(-)	**-2,126**	**-2,126**	**-2,126**	**-2,126**	**-2,126**	**-2,126**

Evaluation of Potentially Feasible Water Management Strategies:

Three alternative strategies were considered to meet the projected shortages for Hopkins County Irrigation. Advanced water conservation for irrigation practices was not considered, as present irrigation practices likely already incorporate many BMPs to extend water supplies, thus no additional conservation would be feasible. The use of reuse water from nearby municipalities is not considered feasible as it would not be effective to deliver reuse water to farm irrigation systems. Groundwater from the Carrizo-Wilcox and Nacatoch aquifers has been identified as a potential source of water for irrigation in Hopkins County; however, the total irrigation needs exceed the availability of groundwater in these aquifers based on the managed available groundwater (MAG) estimates. The construction of a pipeline to convey raw surface water from Sulphur Springs Lake purchased via the City of Sulphur Springs was also considered as a potential alternative to meet projected demands.

Strategy	Strategy Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Carrizo-Wilcox, Cypress Basin)	**210**	**$313,000**	**$140,000**	**$667**	**1**
Drill New Wells (Carrizo-Wilcox, Sabine Basin)	**610**	**$681,000**	**$374,000**	**$613**	**1**
Drill New Wells (Carrizo-Wilcox, Sulphur Basin)	**415**	**$447,000**	**$253,000**	**$610**	**1**
Drill New Wells (Nacatoch, Sulphur Basin)	**415**	**$884,000**	**$323,000**	**$778**	**1**
Sulphur Springs Raw Water Pipeline	**1,306**	**$4,758,000**	**$2,132,000**	**$1,632**	**3**

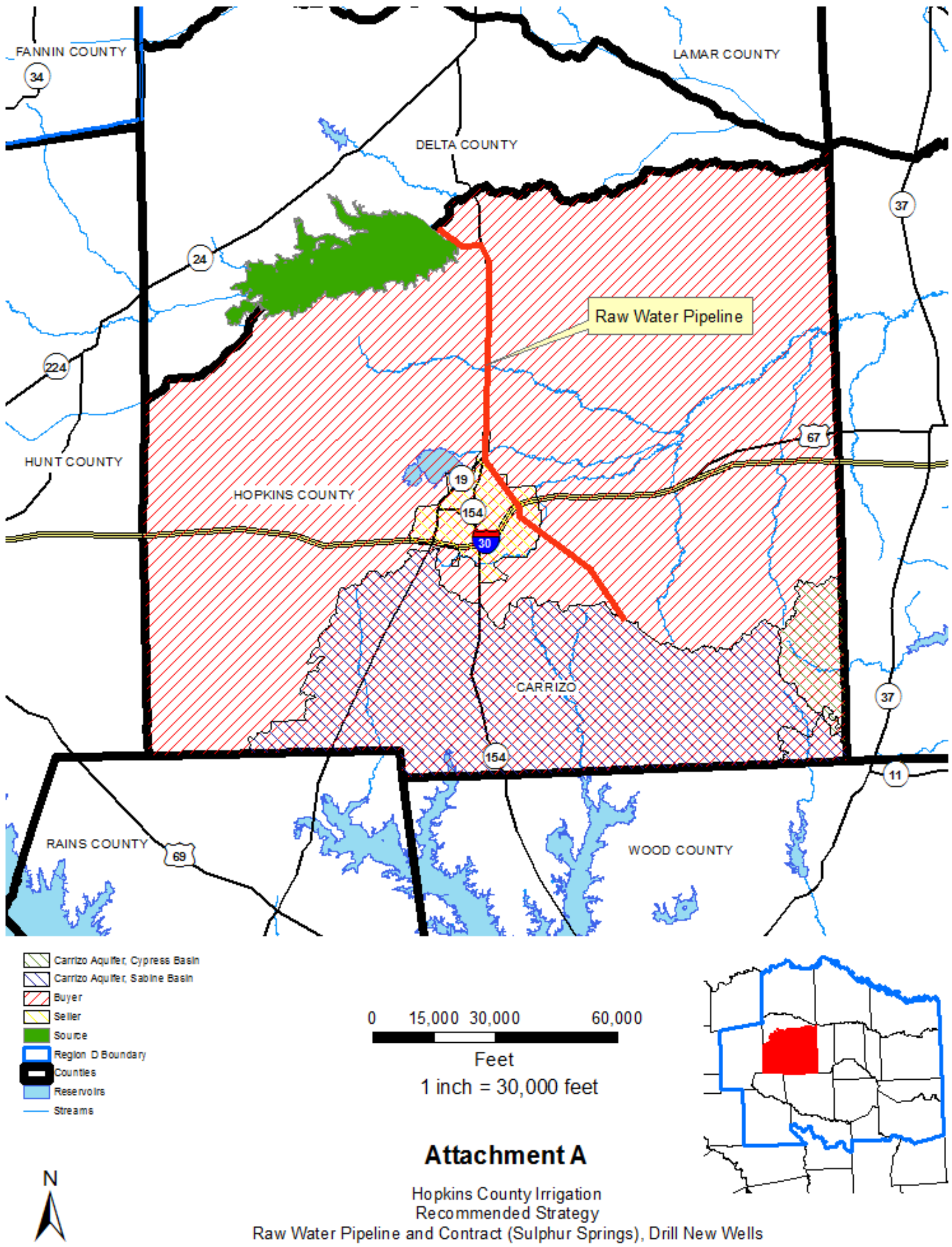
Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Carrizo-Wilcox, Cypress Basin; ac-ft/yr)	**210**	**210**	**210**	**210**	**210**	**210**
Drill New Wells (Carrizo-Wilcox, Sabine Basin; ac-ft/yr)	**610**	**610**	**610**	**610**	**610**	**610**
Sulphur Springs Raw Water Pipeline (ac-ft/yr)	**1,306**	**1,306**	**1,306**	**1,306**	**1,306**	**1,306**

The recommended strategies for the Hopkins County Irrigation to meet their projected deficit of 2,126 ac-ft/yr would be to construct three additional water wells with a rated capacity of 50 gpm in the Carrizo-Wilcox/Cypress/Hopkins aquifer, and five additional water wells with a rated capacity of 80 gpm in the Carrizo-Wilcox/Sabine/Hopkins aquifer. The recommended supply source will be the Carrizo-Wilcox Aquifer in Hopkins County, Cypress and Sabine River basins. The Carrizo-Wilcox Aquifer in Hopkins

County, both in the Cypress and Sabine River basins, is projected to have sufficient supply availability to only meet a portion needs of Hopkins County Irrigation over the planning period (approximately 820 ac-ft/yr).

To meet the remaining needs, it is recommended that a 10" diameter pipeline to Lake Sulphur Springs be developed for the purchase of raw water from the City of Sulphur Springs. For planning purposes, the raw water pipeline was estimated to be 120,000 feet long, following existing right-of-way for roads.



Attachment A

Hopkins County Irrigation
Recommended Strategy
Raw Water Pipeline and Contract (Sulphur Springs), Drill New Wells

Cost Estimate Summary
Water Supply Project Option
41518 Prices

Irrigation - Drill New Wells (Hopkins - Cypress - Carrizo Wilcox)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$224,000
TOTAL COST OF FACILITIES	**$224,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$78,000
Interest During Construction (4% for 1 years with a 1% ROI)	$11,000
TOTAL COST OF PROJECT	**$313,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$26,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$2,000
Pumping Energy Costs (76309 kW-hr @ 0.09 $/kW-hr)	$7,000
Purchase of Water (210 acft/yr @ 500 $/acft)	$105,000
TOTAL ANNUAL COST	**$140,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	210
Annual Cost of Water ($ per acft)	$667
Annual Cost of Water ($ per 1,000 gallons)	$2.05

KVA *3/31/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Irrigation - Drill New Wells (Hopkins - Sabine - Carrizo Wilcox)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
Well Fields (Wells, Pumps, and Piping)	$487,000
TOTAL COST OF FACILITIES	**$487,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$170,000
Interest During Construction (4% for 1 years with a 1% ROI)	$24,000
TOTAL COST OF PROJECT	**$681,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$57,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$5,000
Pumping Energy Costs (76309 kW-hr @ 0.09 $/kW-hr)	$7,000
Purchase of Water (610 acft/yr @ 500 $/acft)	$305,000
TOTAL ANNUAL COST	**$374,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	610
Annual Cost of Water ($ per acft)	$613
Annual Cost of Water ($ per 1,000 gallons)	$1.88
KVA	*3/31/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Hopkins County Irrigation - Raw Water Pipeline and Contract (Sulphur Springs)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Intake Pump Stations (0 MGD)	$1,706,000
Transmission Pump Station(s) & Storage Tank(s)	$1,282,000
TOTAL COST OF FACILITIES	**$2,988,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,046,000
Environmental & Archaeology Studies and Mitigation	$563,000
Interest During Construction (4% for 1 years with a 1% ROI)	$161,000
TOTAL COST OF PROJECT	**$4,758,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$398,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$72,000
Pumping Energy Costs (1397618 kW-hr @ 0.09 $/kW-hr)	$126,000
Purchase of Water (1306 acft/yr @ 1176 $/acft)	$1,536,000
TOTAL ANNUAL COST	**$2,132,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	1,306
Annual Cost of Water ($ per acft)	$1,632
Annual Cost of Water ($ per 1,000 gallons)	$5.01

JMP *4/1/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF MARTIN SPRINGS WATER SUPPLY CORPORATION

Description of Water User Group:

Martin Springs WSC provides water service in Hopkins County. It is projected that the users in the WUG will have a shortage in 2060. The WUG population is projected to be 3,779 by 2020 and increases to 6,979 by 2070. Martin Springs WSC utilizes groundwater from the Carrizo-Wilcox aquifer. Martin Springs WSC is projected to have a deficit of 43 ac-ft in 2060 and increasing to a deficit of 115 ac-ft by 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	3,779	4,421	5,007	5,679	6,327	6,979
Projected Water Demand	458	517	571	641	712	784
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	668	667	666	668	669	669
Projected Supply Surplus (+) / Deficit (-)	**210**	**150**	**95**	**27**	**-43**	**-115**

Projected Supply Surplus (+) / Deficit (-) by Basin	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Sabine	177	126	80	23	-36	-97
Sulphur	33	24	15	4	-7	-18
Total	**210**	**150**	**95**	**27**	**-43**	**-115**

Evaluation of Potentially Feasible Water Management Strategies:

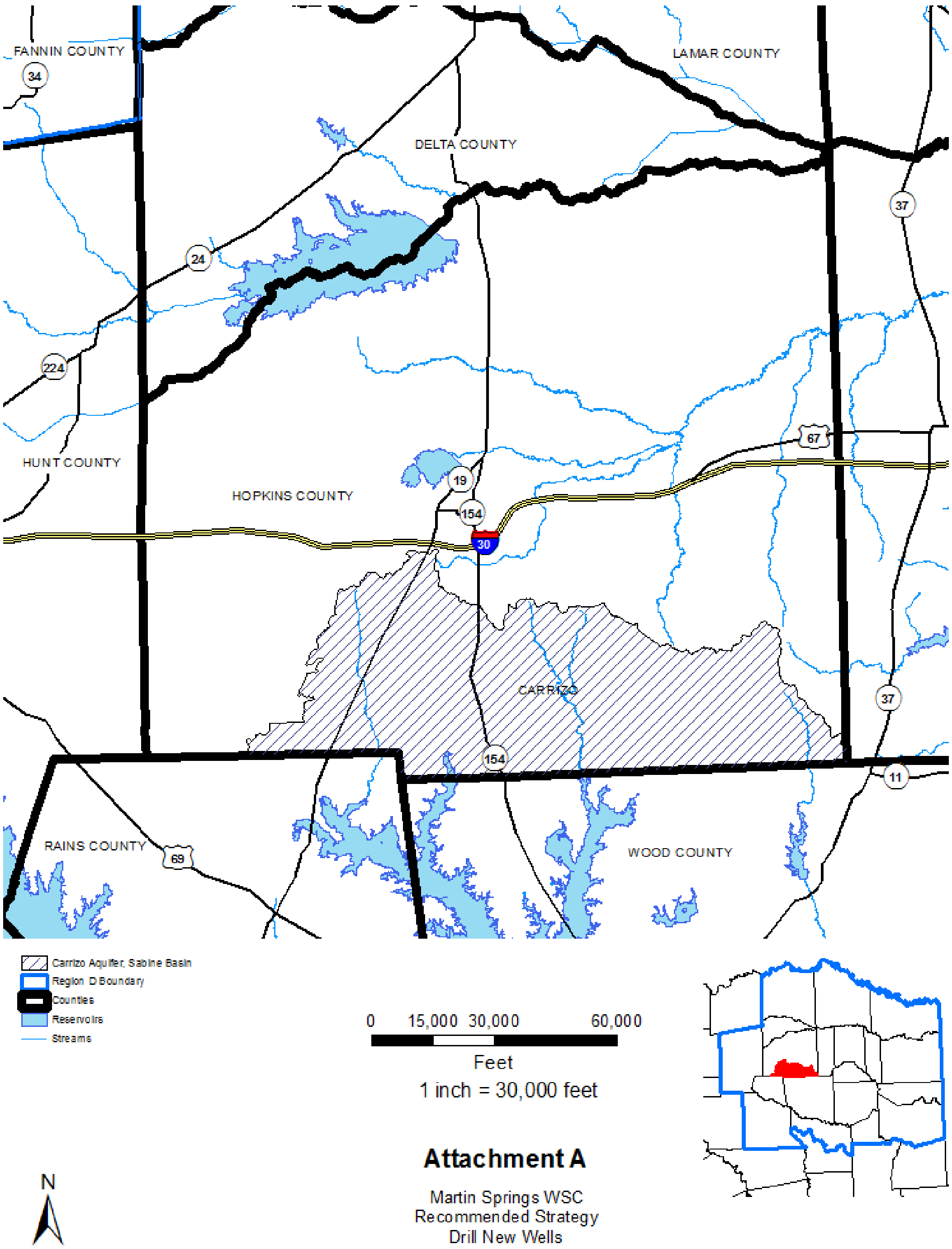
Four alternative strategies were considered to meet the WSC's water supply shortages as summarized in the table below. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. Additional use of groundwater has been identified as a potential source of water for Martin Springs WSC in Hopkins County. Purchase of surface water from Chapman Lake under contract from the Sulphur River Municipal Water District was also considered. However, Martin Springs WSC does not currently use water from Sulphur River Municipal Water District.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Env. Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Carrizo-Wilcox Aquifer, Sabine Basin)	**120**	**$1,844,000**	**$184,000**	**$1,533**	**1**
New Contract (Chapman, Sulphur River MWD)	**115**	**$0**	**$126,500**	**$1,100**	**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Carrizo-Wilcox Aquifer, Sabine; ac-ft/yr)	**0**	**0**	**0**	**0**	**60**	**120**

The recommended strategy for Martin Springs WSC to meet their projected deficit of 43 ac-ft/yr in 2060 and 115 ac-ft/yr in 2070 would be to construct two additional water wells with a rated capacity of 80 gpm each in the Carrizo-Wilcox/Sabine/Hopkins aquifer. The recommended supply source will be the Carrizo-Wilcox Aquifer in Hopkins County, Sabine River Basin. Construction of these wells in the year preceding the decade of need would allow for sufficient provision of supply to meet the projected demands. The Carrizo-Wilcox Aquifer in Hopkins County, in the Sabine River Basin, is projected to have sufficient supply available to meet the projected needs of Hopkins County Mining over the planning period.



Attachment A

Martin Springs WSC
Recommended Strategy
Drill New Wells

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Martin Springs WSC - Drill New Wells (Hopkins - Sabine - Carrizo Wilcox)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$749,000
Water Treatment Plant (0.2 MGD)	$24,000
TOTAL COST OF FACILITIES	**$773,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$270,000
Environmental & Archaeology Studies and Mitigation	$100,000
Interest During Construction (4% for 1 years with a 1% ROI)	$41,000
TOTAL COST OF PROJECT	**$1,184,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$99,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$7,000
Water Treatment Plant (2.5% of Cost of Facilities)	$14,000
Pumping Energy Costs (48034 kW-hr @ 0.09 $/kW-hr)	$4,000
Purchase of Water (120 acft/yr @ 500 $/acft)	$60,000
TOTAL ANNUAL COST	**$184,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	120
Annual Cost of Water ($ per acft)	$1,533
Annual Cost of Water ($ per 1,000 gallons)	$4.70
KVA	*3/31/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF MINING IN HOPKINS COUNTY

Description of Water User Group:

Mining in Hopkins County has a demand that is projected to increase from 1,031 ac-ft/yr in 2020 to 1,577 ac-ft/yr in 2070. This WUG is projected to be supplied by groundwater from Nacatoch Aquifer and a nominal amount of surface water purchased from Sulphur Springs for potable use. A deficit of 227 ac-ft/yr is projected to occur in 2020 and increase to 639 ac-ft/yr by 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Projected Water Demand	1,031	1,124	1,222	1,329	1,446	1,577
Current Water Supply	804	841	862	885	913	938
Projected Supply Surplus (+)/Deficit(-)	**-227**	**-283**	**-360**	**-444**	**-533**	**-639**

Projected Supply Surplus (+)/Deficit(-) by Basin	2020	2030	2040	2050	2060	2070
Sulphur	-149	-187	-237	-293	-352	-422
Sabine	-71	-88	-112	-138	-165	-198
Cypress	-7	-8	-11	-13	-16	-19
Total	**-227**	**-283**	**-360**	**-444**	**-533**	**-639**

Evaluation of Potentially Feasible Water Management Strategies:

Advanced water conservation for mining practices was not considered, as present operations of the facilities are not available. The use of reuse water from nearby municipalities was not considered feasible as it would not be effective to deliver reuse water to the mining locations. Since the projected demands for mining in Hopkins County are primarily due to overburden dewatering, it was assumed that projected needs would likely be met by additional groundwater pumping.

Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Nacatoch Aquifer, Sulphur Basin; ac-ft/yr)	**320**	**320**	**440**	**540**	**540**	**640**

Since the projected demands for mining in Hopkins County are primarily due to overburden dewatering, it was assumed that projected needs would likely be met by additional groundwater pumping, and no additional supply would be sought by this WUG. Thus, this demand has been left as an unmet need.

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REGION D
EVALUATIONS OF WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

HUNT COUNTY

WUGs:

Ables Springs WSC
Blackland WSC
Caddo Basin SUD
Caddo Mills
Cash SUD
The City of Celeste
Commerce WD
Hunt County-Other
The City of Greenville
Hickory Creek SUD
Hunt County Irrigation
The City of Josephine
The City of Lone Oak
Hunt County Mining
North Hunt SUD
The City of Royse City
Sabine River Authority
Hunt County Steam Electric
The City of Wolfe City

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EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF ABLE SPRINGS WATER SUPPLY CORPORATION IN HUNT COUNTY

Description of Water User Group:

Able Springs Water Supply Corporation is located primarily in Kaufman County within the Region C Texas Regional Water Planning Area, but serves a relatively smaller portion of population within the North East Texas Region (Region D). Thus, Region C is the RWPG with the primary responsibility for the evaluation and recommendation of water management strategies for this WUG. For completeness, the consultants have coordinated to include information on that Region's preliminary recommendations for the 2016 Region C IPP herein, as they relate to the demand and identified needs within the North East Texas Region (Region D). At the time of publication of the Region D IPP, cost information for the Region C recommendation(s) for this WUG was not available. Once available from the primary region, this information will be incorporated into the Final 2016 Region D Plan for adoption.

Ables Springs Water Supply Corporation supplies about 5,200 people in northeastern Kaufman County and southern Hunt County. The water supply for this WSC is treated water from North Texas Municipal Water District (NTMWD). Water management strategies for Ables Springs WSC are conservation and purchasing additional water from NTMWD.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	5,662	7,336	9,354	11,824	14,931	18,873
Projected Water Demand	383	494	630	796	1,006	1,271
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	294	306	347	397	450	498
Projected Supply Surplus (+) / Deficit (-)	**-89**	**-188**	**-283**	**-399**	**-556**	**-773**

Evaluation of Potentially Feasible Water Management Strategies:

The four alternative strategies considered to meet Able Springs WSC's water supply shortages are listed in the table below. Advanced conservation was identified a feasible strategy. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the WSC is planning on meeting its future needs from water purchase from NTMWD.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annual Cost	Unit Cost	Environmental Impact
Advanced Water Conservation	**17**				**1**
Water Reuse					
Ground Water					
Increase Contract (NTMWD)	**756**				**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
Advanced Water Conservation (ac-ft/yr)	3	4	5	8	12	17
Increase Contract (NTMWD) (ac-ft/yr)	86	184	278	391	544	756

The North East Texas Regional Water Planning Group supports the recommendation from Region C for Advanced water conservation and an increased contract with NTMWD to meet projected future needs of Able Springs WSC.

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF BLACKLAND WATER SUPPLY CORPORATION IN HUNT COUNTY

Description of Water User Group:

Blackland WSC is located primarily in Rockwall County within the Region C Texas Regional Water Planning Area, but serves a relatively smaller portion of population within the North East Texas Region (Region D). Thus, Region C is the RWPG with the primary responsibility for the evaluation and recommendation of water management strategies for this WUG. For completeness, the consultants have coordinated to include information on that Region's preliminary recommendations for the 2016 Region C IPP herein, as they relate to the demand and identified needs within the North East Texas Region (Region D). At the time of publication of the Region D IPP, cost information for the Region C recommendation(s) for this WUG was not available. Once available from the primary region, this information will be incorporated into the Final 2016 Region D Plan for adoption.

Blackland WSC is located in eastern Rockwall County, with a small area in Hunt County, and serves about 3,300 people primarily in Region C. The WSC gets its water supply from the North Texas Municipal Water District (NTMWD) through Rockwall. Water management strategies for Blackland WSC include conservation, establishing a direct connection with NTMWD, and additional water from NTMWD.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	3,350	3,584	3,850	4,119	4,419	4,737
Projected Water Demand	678	712	754	800	857	918
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	618	540	528	528	530	526
Projected Supply Surplus (+) / Deficit (-)	**-60**	**-172**	**-226**	**-272**	**-327**	**-392**

Evaluation of Potentially Feasible Water Management Strategies:

There were four alternative strategies considered by Region C to meet the WSC's water supply shortages as summarized in the Table below. Advanced conservation was identified a feasible strategy. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the WSC is planning on meeting its future needs from water purchase from NTMWD.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation	**36**				**1**
Water Reuse					
Ground Water					
Direct Connection and Increase Contract (NTMWD)	**356**				**2**

Recommendations:

	2020	2030	2040	2050	2060	2070
Advanced Water Conservation (ac-ft/yr)	12	19	22	26	31	36
Direct Connection and Increase Contract (NTMWD) (ac-ft/yr)	48	153	204	246	296	356

The North East Texas Regional Water Planning Group supports the recommendation from Region C for Advanced water conservation and a direct connection to NTMWD to meet projected future needs of Blackland WSC.

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF CADDO BASIN SUD IN HUNT COUNTY

Description of Water User Group:

Caddo Basin SUD provides water service in western Hunt County and eastern Collin County. The WUG population is projected to be 8,837 in 2020 and 35,581 by the year 2070. The SUD purchases treated water from North Texas MWD and is projected to have a shortage beginning in 2030 based on the availability of current supplies from North Texas MWD. The SUD is projected to have a deficit of 184 ac-ft in 2030 increasing to a deficit of 1,379 ac-ft by 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	8,837	11,401	15,201	20,067	26,576	35,581
Projected Water Demand	986	1,219	1,586	2,071	2,736	3,659
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	909	934	1,120	1,379	1,707	2,113
Projected Supply Surplus (+) / Deficit (-)	**-77**	**-285**	**-466**	**-692**	**-1,029**	**-1,546**

Evaluation of Potentially Feasible Water Management Strategies:

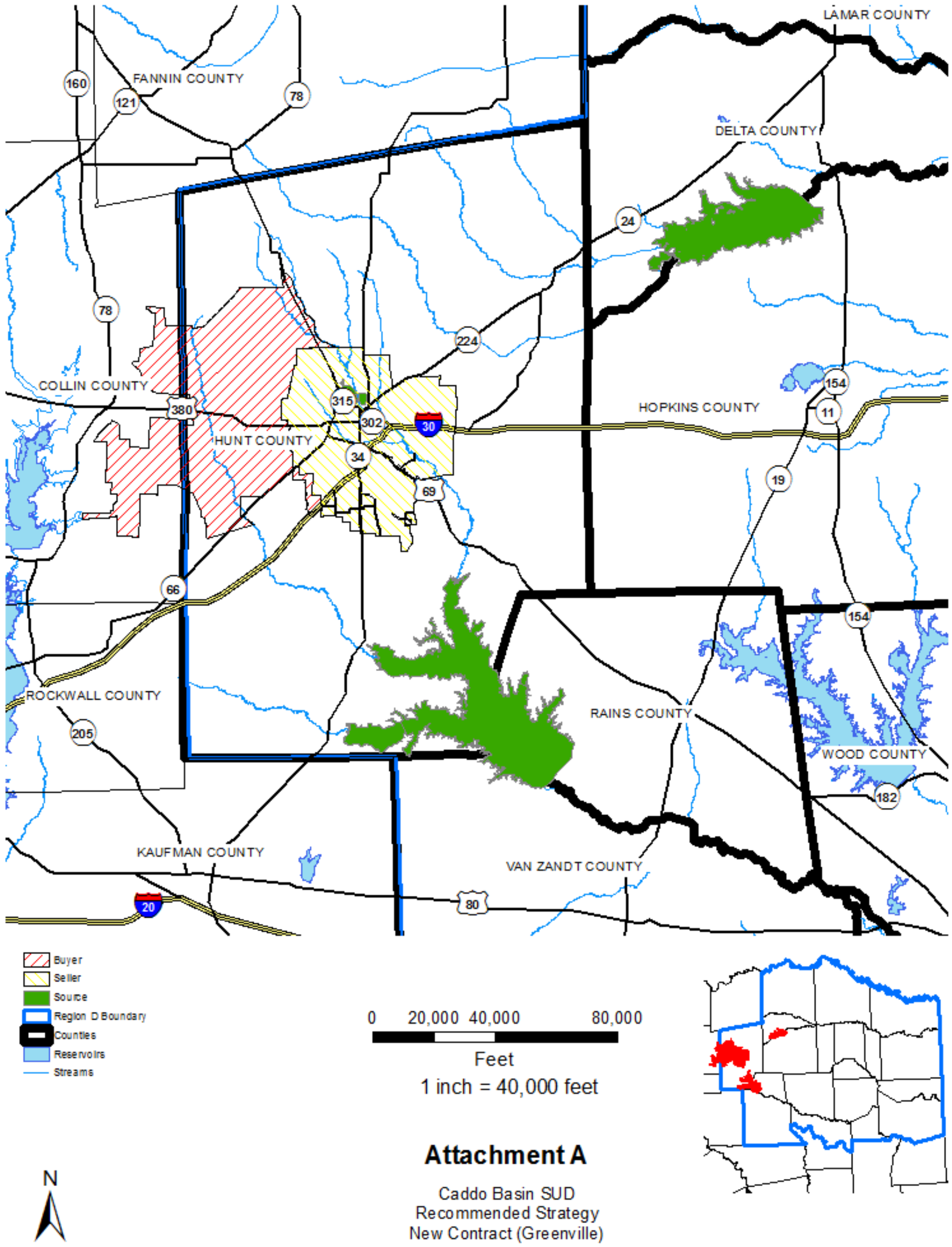
Four alternative strategies were considered to meet the SUD's water supply shortages as summarized in the following table. Advanced conservation was not considered by Region D because the per capita use per day was below the 140 gpcpd threshold set by the planning group, However Region C has evaluated Advanced Water Conservation. Water reuse was not considered because the SUD does not have a demand for non-potable water. Groundwater was not considered because the SUD currently purchases treated water from North Texas MWD and is planning to meet its future needs from water purchase. The SUD also has an existing emergency interconnect with the City of Greenville, thus, a contract with the City of Greenville was considered.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation	**14**				**1**
Water Reuse					
Ground Water					
New Contract	**1,537**	**$0**	**$1,357,000**	**$883**	**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
New Contract (ac-ft/yr)	72	280	460	686	1,022	1,537

Based on discussions with Region C, North Texas MWD does not have additional surface water supplies available to sell over the 2020 – 2070 planning period for purposes of the 2016 Regional Plan. Therefore, the recommended strategy for Caddo Basin SUD to meet their projected deficit of 72 ac-ft/yr in 2020 and 1,537 ac-ft/yr in 2070 is to purchase treated surface water from the City of Greenville, contingent upon the recommended strategies for the City of Greenville for the voluntary reallocation of Hunt Manufacturing supplies and the Chapman Raw Water Pipeline.



Attachment A

Caddo Basin SUD
Recommended Strategy
New Contract (Greenville)

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Caddo Basin SUD - New Contract (Greenville)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (1537 acft/yr @ 883 $/acft)	$1,357,000
TOTAL ANNUAL COST	**$1,357,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	1,537
Annual Cost of Water ($ per acft)	$883
Annual Cost of Water ($ per 1,000 gallons)	$2.71
JNS	*4/3/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF CADDO MILLS IN HUNT COUNTY

Description of Water User Group:

The City of Caddo Mills provides water service in Hunt County. This City's population was 1,338 in 2010 and is projected to increase to 1,710 by 2020 and 7,147 by 2070. The City purchases treated water from the City of Greenville and is projected to have a shortage beginning in 2030 based on the availability of current supplies to Greenville. Caddo Mills is projected to have a deficit of 1 ac-ft in 2030 increasing to a deficit of 255 ac-ft by 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	1,710	2,214	2,898	3,843	5,190	7,147
Projected Water Demand	153	187	237	310	417	574
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	178	186	201	242	309	319
Projected Supply Surplus (+) / Deficit (-)	**25**	**-1**	**-36**	**-68**	**-108**	**-255**

Evaluation of Potentially Feasible Water Management Strategies:

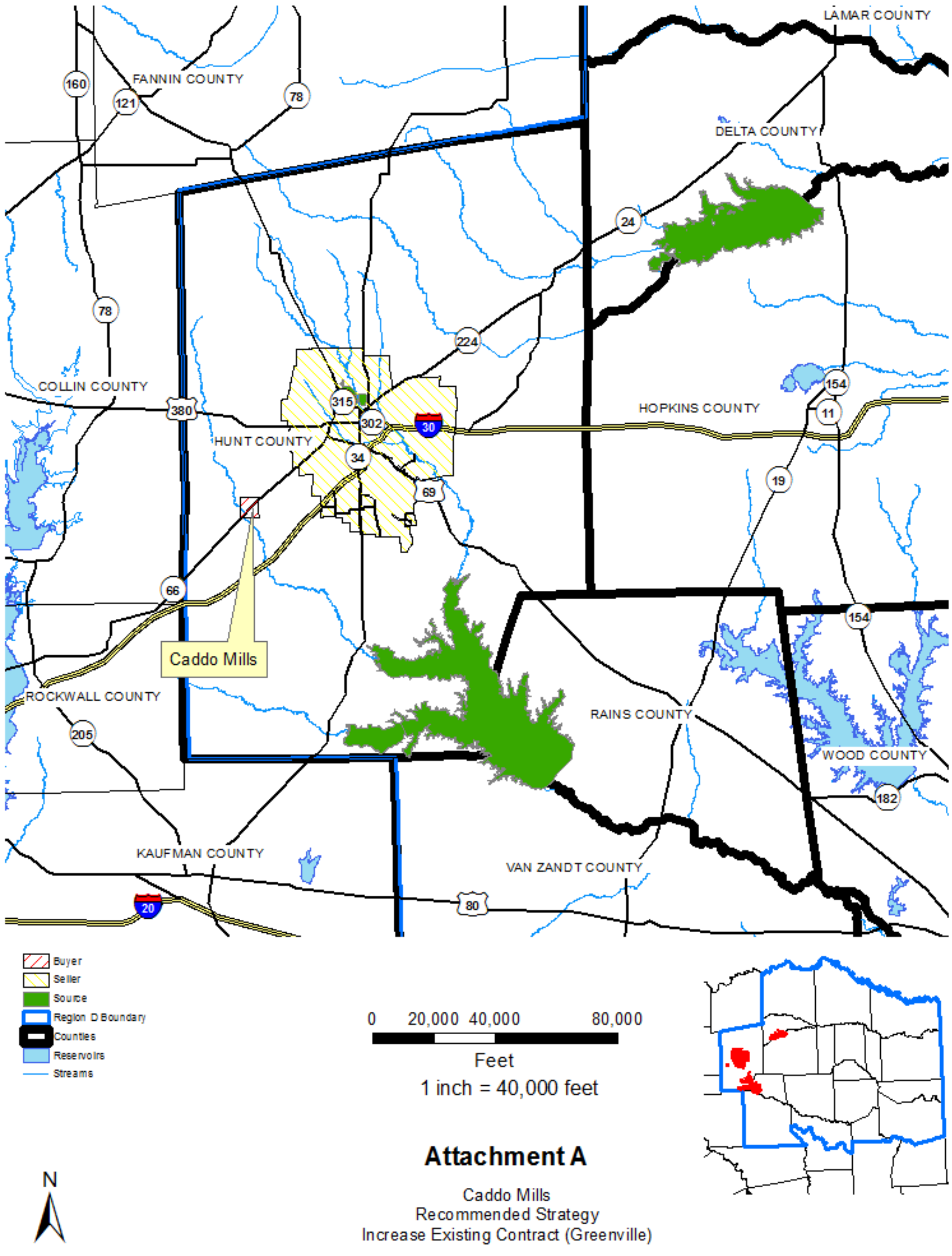
Four alternative strategies were considered to meet the City of Caddo Mills water supply shortages as summarized in the following table. Advanced conservation was not considered because the per capita use per day was below the 140 gpcpd threshold set by the planning group. Water reuse was not considered because the City does not have a demand for non-potable water. Groundwater was not considered because the City currently purchases treated water from Greenville and is planning to meet its future needs from water purchase from the City of Greenville.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Ground Water					
Increase Existing Contract	**255**	**$0**	**$225,000**	**$882**	**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
Increase Existing Contract (ac-ft/yr)	0	1	36	68	108	255

The recommended strategy for the City of Caddo Mills to meet their projected deficit of 1 ac-ft/yr in 2020 and 255 ac-ft/yr in 2070 is to increase the volume of treated surface water purchased from the City of Greenville, contingent upon Greenville strategies.



0 20,000 40,000 80,000

Feet

1 inch = 40,000 feet

Attachment A

Caddo Mills
Recommended Strategy
Increase Existing Contract (Greenville)

Cost Estimate Summary
Water Supply Project Option
41518 Prices
City of Caddo Mills - Increase Existing Contract (Greenville)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (255 acft/yr @ 883 $/acft)	$225,000
TOTAL ANNUAL COST	**$225,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	255
Annual Cost of Water ($ per acft)	$882
Annual Cost of Water ($ per 1,000 gallons)	$2.71
JNS	*4/1/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF CASH SUD IN HUNT COUNTY

Description of Water User Group:

Cash SUD provides water in the south-central portion of Hunt County and small areas of western Rains County from purchased surface water supplies from the North Texas Municipal Water District (NTMWD) and the Sabine River Authority for supplies out of Lake Fork and Lake Tawakoni. Over 90% of the SUD's demand is located in Region D (Hunt County), with less than 10% in Region C (Rockwall County). In both regions, the system is projected to serve a total of 19,973 people in 2020 and 48,933 people by the year 2070. Cash SUD is not projected to have a need over the 2020 – 2070 planning period. However, Cash SUD submitted a request to the Region C Water Planning Group for consideration of a near-term strategy to increase its delivery infrastructure from NTMWD.

Water Supply and Demand Analysis:

In coordination with Cash SUD and Region C, the below summarization of Cash SUD supplies and demands has been developed.

Cash Special Utility District (Region C & D)

(Values in Ac-Ft/Yr)	**Projected Population and Demand**					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
Projected Region Population (C&D)	**19,973**	**23,972**	**28,708**	**34,308**	**40,986**	**48,933**
Projected Region Population (D)	18,784	22,432	26,769	31,966	38,194	45,664
Projected Region Population (C)	1,189	1,540	1,939	2,342	2,792	3,269
Projected Water Demand						
Municipal Demand (Region D)	2,159	2,497	2,924	3,460	4,123	4,923
Municipal Demand (Region C)	137	172	212	254	302	353
Total Projected Total Demand	***2,296***	***2,669***	***3,136***	***3,714***	***4,425***	***5,276***
Currently Available Water Supplies						
North Texas Municipal Water District	1,301	1,392	1,684	1,642	1,539	1,424
Sabine River Authority (current and future)	1,651	4,705	4,705	4,705	4,704	4,679
Total Current Supplies	***2,952***	***6,097***	***6,389***	***6,347***	***6,243***	***6,103***
Need (Demand - Current Supply)	***0***	***0***	***0***	***0***	***0***	***0***
Water Management Strategies						
Water Conservation	1	2	2	3	5	7
Additional Water from NTMWD	1,165	1,074	782	824	927	1,042
Increase delivery infrastructure from NTWMD	*1,165*	*1,074*	*782*	*824*	*927*	*1,042*
Total Water Management Strategies	***1,166***	***1,076***	***784***	***827***	***932***	***1,049***
Reserve (Shortage)	**1,822**	**4,504**	**4,037**	**3,460**	**2,750**	**1,876**

Evaluation of Potentially Feasible Water Management Strategies:

Within its contract with the Sabine River Authority, Cash SUD has identified a potential water management strategy with SRA for the use of available supply from Toledo Bend Reservoir, contingent upon the development of the Toledo Bend Transfer water management strategy for SRA under consideration by Region C.

As mentioned above, Cash SUD also submitted to Region C a proposed project for a new 16" transmission line from Fate to Union Valley, for an approximate cost of \$6 million. The purpose of this project would be to deliver the full contractual capacity from NTMWD. Due to the size and distance of the existing line, Cash SUD cannot receive the full capacity of its existing contract with NTMWD.

Recommendations:

The North East Texas Regional Water Planning group supports the recommendation (as preliminarily indicated by Region C for the purposes of this IPP) for construction of a new 16" transmission line from Fate to Union Valley, for an approximate cost of \$6 million.

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF CITY OF CELESTE

Description of Water User Group:

The City of Celeste is a small public water supply located in northwest Hunt County. The system is projected to serve 991 people in 2020 and 3,584 people by the year 2070. The current sources of supply are two wells into the Woodbine Aquifer with production capacities of 150 gpm and 200 gpm. The City provides water to its own customers in the Sabine River Basin and is projected to have a water supply deficit of 28 ac-ft/yr in 2050 increasing to 204 ac-ft/yr by 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	991	1,231	1,558	2,009	2,651	3,584
Projected Water Demand	122	145	178	227	299	403
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	199	199	199	199	199	199
Projected Supply Surplus (+) / Deficit (-)	**77**	**54**	**21**	**-28**	**-100**	**-204**

Evaluation of Potentially Feasible Water Management Strategies:

The four alternative strategies considered to meet Celeste's water supply shortages are listed in the table below. Advanced conservation was not selected since per capita use is less than 140 gpcpd. There are no significant current water needs in Celeste that could be met by water reuse. The system is not large enough to treat surface water in a cost-effective manner; however a surface water alternative using purchased water from the City of Greenville was considered. Groundwater from the Woodbine Aquifer was also considered as an alternative for this entity.

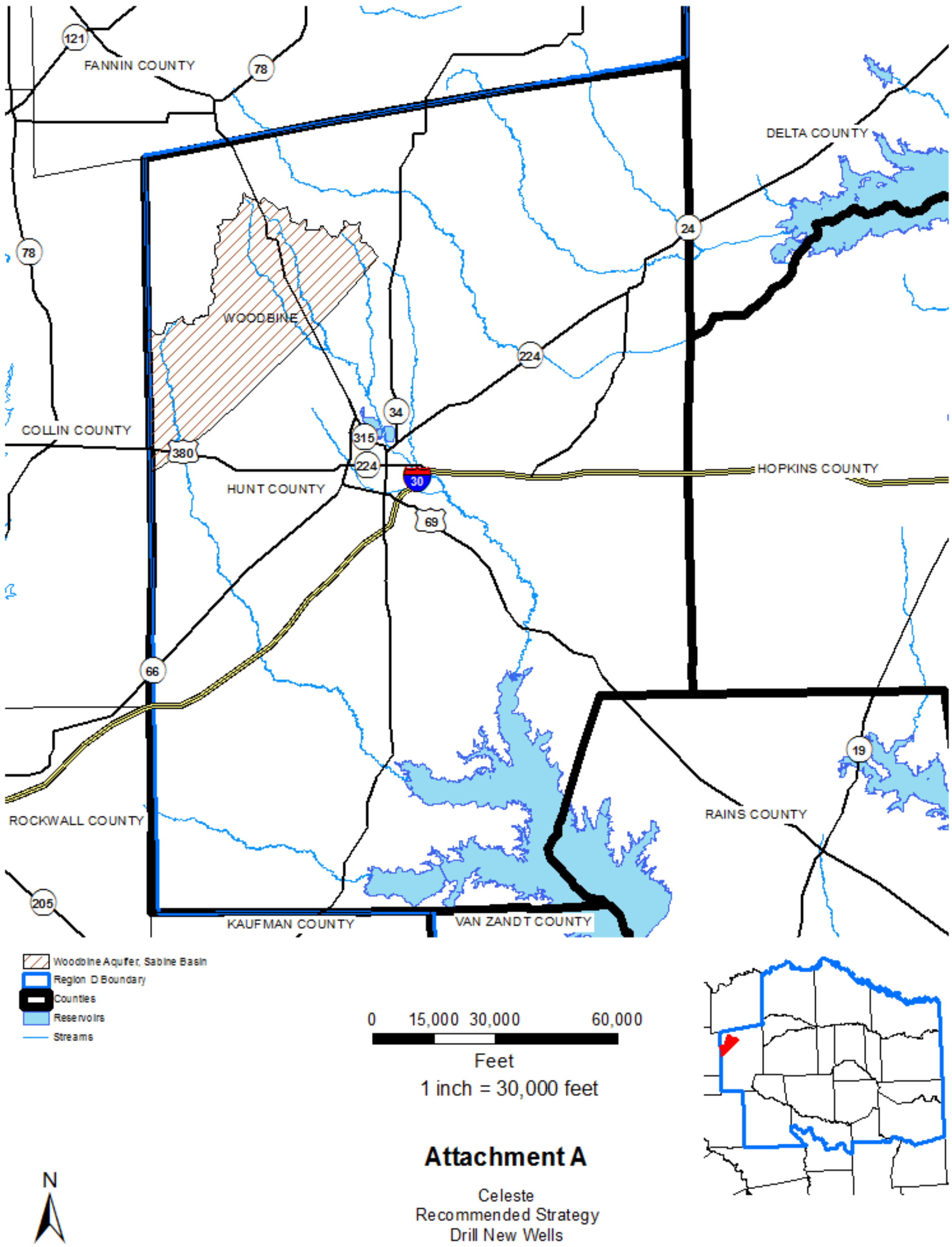
Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annual Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Woodbine, Sabine Basin)	**204**	**$2,550,000**	**$324,000**	**$1,588**	**1**
New Contract	**204**	**$1,741,204**	**$74,223**	**$7,069**	**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Woodbine, Sabine Basin; ac-ft/yr)	0	0	0	102	102	204

The recommended strategy for the City of Celeste to meet their projected deficit of 28 ac-ft/yr in 2050 and 204 ac-ft/yr in 2070 would be to construct two additional water wells similar to their existing wells just prior to each decade as the deficits occur. The recommended supply source will be the Woodbine Aquifer in Hunt County. Two wells with rated capacity of 190 gpm each would provide approximately 102 acre-feet each. The Woodbine Aquifer in Hunt County is projected to have a more than ample supply availability to meet the needs of the City of Celeste 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.



Cost Estimate Summary
Water Supply Project Option
41518 Prices
Celeste - Hunt - Sabine - Woodbine

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$1,673,000
TOTAL COST OF FACILITIES	**$1,673,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$586,000
Interest During Construction (4% for 1 years with a 1% ROI)	$81,000
TOTAL COST OF PROJECT	**$2,368,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$198,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$17,000
Pumping Energy Costs (76309 kW-hr @ 0.09 $/kW-hr)	$7,000
Purchase of Water (204 acft/yr @ 500 $/acft)	$102,000
TOTAL ANNUAL COST	**$324,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 3	204
Annual Cost of Water ($ per acft)	$1,588
Annual Cost of Water ($ per 1,000 gallons)	$4.87

JNS *4/1/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF COMMERCE WD IN HUNT COUNTY

Description of Water User Group:

Commerce WD is a wholesale water provider in Hunt County selling groundwater and purchased surface water supplies from the Sabine River Authority for supplies out of Lake Tawakoni. Commerce WD is projected to maintain a supply surplus throughout the planning period, but is listed herein for the purpose of recommending seller water management strategies to utilize the District's available surplus supplies to meet projected demands for the District's customer WUGs.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Water Demand from other entities	2,750	3,089	3,572	5,143	5,840	6,960
Current Water Supply	2,750	8,498	8,311	8,568	7,199	7,411
Projected Supply Surplus (+) / Deficit (-)	0	5,409	4,739	3,425	1,359	451

Evaluation of Potentially Feasible Water Management Strategies:

Commerce WD is projected to have a supply surplus over the 2020 – 2070 planning period.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annual Cost	Unit Cost	Environmental Impact
Advanced Water Conservation			-		
Water Reuse					
Voluntary Reallocation of Hunt County Manufacturing (Tawakoni, Sabine)	**388**	**$0**	**$0**	**$0**	**1**
Surface Water					

Recommendations:

	2020	2030	2040	2050	2060	2070
Voluntary Reallocation of Hunt County Manufacturing (Tawakoni, Sabine)	**0**	**36**	**134**	**268**	**338**	**388**

It is recommended that Commerce WD voluntarily reallocate the available surplus water supplies presently contracted with Hunt County Manufacturing. Demand projections for Hunt County Manufacturing indicate sufficient supply to meet the manufacturing projected demands over the 2020-2070 planning period, even with the voluntary removal of this supply. to increase supplies for other customer contracts. A voluntary reallocation in 2030 of 388 ac-ft/yr from Hunt County Manufacturing's surplus contracted supply from Tawakoni Reservoir is projected to be adequate to allow for the purchase of said supply by North Hunt SUD, to meet that WUG's demands starting in 2030.

As noted within the 2016 Plan, these recommendations are for the voluntary reallocation of supply. No entity should be required to participate.

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF COUNTY-OTHER IN HUNT COUNTY

Description of Water User Group:

The County-Other WUG in Hunt County comprises all or portions of Jacobia WSC, Little Creek Acres WSC, Maloy WSC, Poetry WSC, Shady Grove WSC, and West Leonard WSC within Hunt County. The WUG population is projected to be 18,328 in 2020 and 109,728 by the year 2070. The WUG is supplied by groundwater from the Nacatoch, Trinity, and Woodbine Aquifers and purchases surface water from Commerce WD, City of Cooper, City of Greenville, City of Terrell, and North Texas MWD. In Hunt County, the County-Other WUG is projected to have a deficit of 433 ac-ft in 2030 increasing to 7,554 ac-ft by 2070. Only the entities within the Sabine Basin are projected to incur a deficit in supply.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	16,719	23,249	32,662	46,427	67,453	99,563
Projected Water Demand	2,081	2,803	3,875	5,471	7,933	11,698
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	2,312	2,370	2,561	3,712	3,833	4,144
Projected Supply Surplus (+) / Deficit (-)	**231**	**-433**	**-1,314**	**-1,759**	**-4,100**	**-7,554**

Evaluation of Potentially Feasible Water Management Strategies:

Four alternative strategies were considered to meet the WUG'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 gpcpd threshold set by the planning group. Water reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was identified as a potential source of water for Hunt County-Other, but the Nacatoch aquifer does not have sufficient availability to cover all shortages. Various sources of treated surface water are available to the entities in the County-Other WUG based on proximity and availability. Potential sources for contracted surface water include the City of Greenville, City of Commerce, Combined Consumers SUD, and City of West Tawakoni. Because of limited availability of additional supplies in Region C, additional surface water above current contract amounts is not expected to be available for Region D entities for purposes of the 2016 Plan that are currently purchasing from North Texas MWD or the City of Terrell.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Nacatoch Aquifer, Sabine Basin)	**2,400**	**$9,584,000**	**$2,203,000**	**$918**	**1**
Poetry WSC Increase Existing Contract contingent upon Voluntary Reallocation West Tawakoni Surplus purchase from SRA Lake Tawakoni to Poetry WSC	**670**		**$1,150,000**	**$1,716**	**1**
Poetry WSC Increase Existing Contract contingent upon Voluntary Reallocation Combined Consumers SUD Surplus purchase from SRA Lake	**1,045**		**$1,794,000**	**$1,717**	**1**

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Fork to Poetry WSC					
Greenville Tie-In Pipeline	**3,990**	**$25,670,000**	**$6,000,000**	**$1,504**	**3**

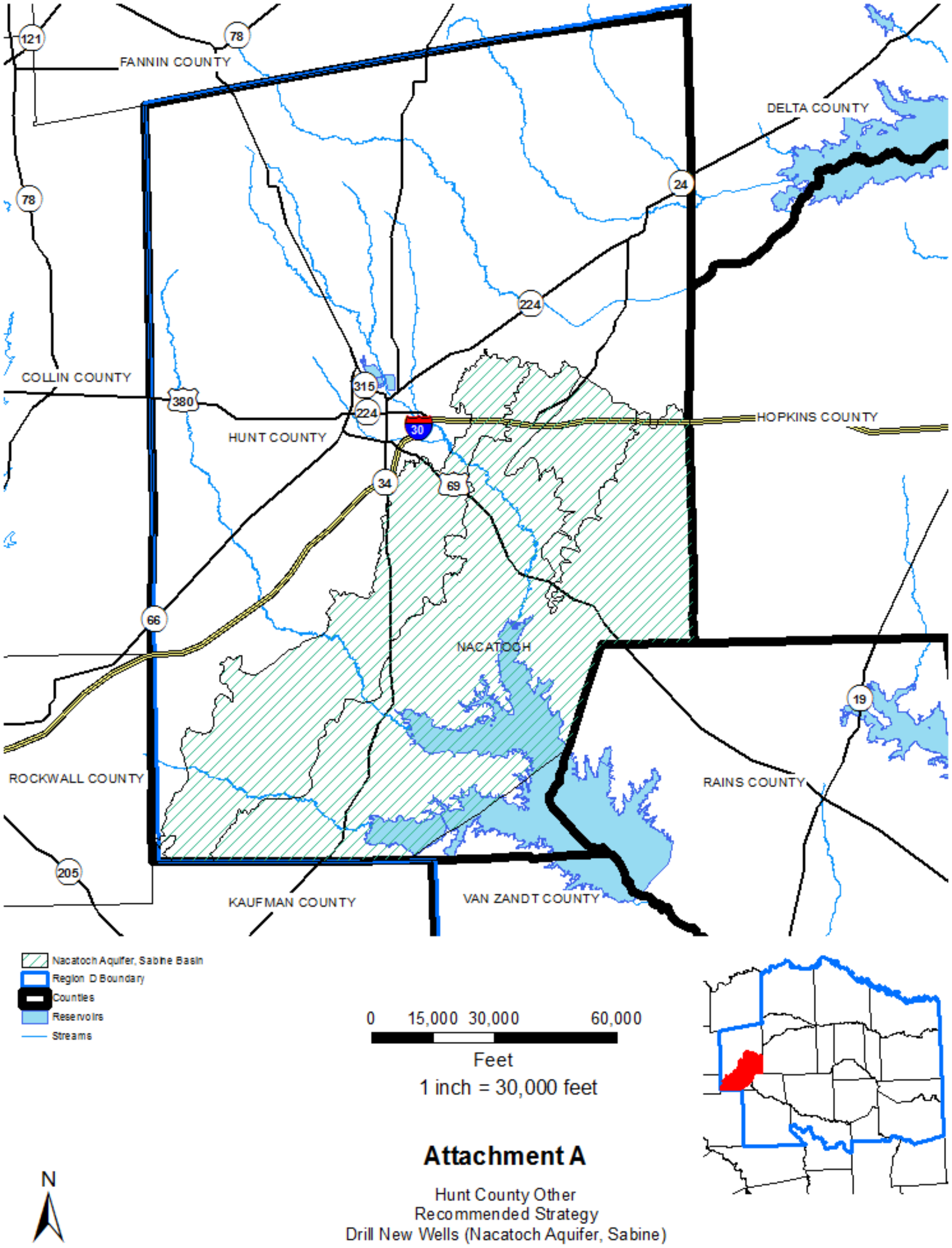
Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Nacatoch Aquifer, Sabine Basin; ac-ft/yr)		600	1,200	1,800	2,400	2,400
Poetry WSC Increase Existing Contract contingent upon Voluntary Reallocation West Tawakoni Surplus purchase from SRA Lake Tawakoni to Poetry WSC (ac-ft/yr)			670	670	670	551
Poetry WSC Increase Existing Contract contingent upon Voluntary Reallocation Combined Consumers SUD Surplus purchase from SRA Lake Fork to Poetry WSC (ac-ft/yr)					1,045	628
Greenville Tie-In Pipeline (ac-ft/yr)						3,990

A combination of developing additional groundwater, reallocations of existing supplies, and development of a pipeline to purchase treated surface water can provide sufficient supply to meet the demands of the County-Other WUG through 2070. A recommended strategy for Hunt County-Other would be to initially construct up to 40 additional water wells in sufficient quantity to meet demands just prior to each decade as the deficits occur. The recommended supply source will be the Nacatoch Aquifer in Hunt County, Sabine River Basin. Forty wells with rated capacity of 75 gpm each would provide approximately 60 acre-feet each. The Nacatoch Aquifer in Hunt County is projected to have sufficient supply availability to meet a portion of the needs of Hunt County-Other for the planning period.

To meet additional projected needs for Hunt County-Other, voluntary reallocations of surplus surface supplies purchased from the Sabine River Authority are recommended for Hunt County-Other. Reallocation of Combined Consumers SUD's surplus from their purchase of Lake Fork supply from the Sabine River Authority to Hunt County-Other has been recommended for the Sabine River Authority to allow more utilization of existing supplies that would be adequate, when in combination with more groundwater wells, to meet projected demands for Hunt County-Other starting in 2040. Reallocation of the City of West Tawakoni's surplus from their purchase of Lake Tawakoni supply from the Sabine River Authority to Hunt County-Other has been recommended for the Sabine River Authority as a seller strategy to meet projected demands starting in 2060. Note that as demands increase for these original purchasers of the supply for which voluntary reallocations are recommended, the surplus available to Hunt County-Other diminishes over time.

By 2070, the recommended strategy is to construct a 23-mile, 24" pipeline for the purchase of 3,990 ac-ft/yr of surface water from the City of Greenville. This strategy is contingent upon the City of Greenville's recommended strategy for a pipeline tying into the proposed Toledo Bend Transfer, a preliminarily identified strategy under consideration for the 2016 Region C Plan. Thus, this strategy is contingent upon the Toledo Bend Transfer strategy as well.



Attachment A

Hunt County Other
Recommended Strategy
Drill New Wells (Nacatoch Aquifer, Sabine)

Cost Estimate Summary
Water Supply Project Option
41518 Prices
County Other - Drill New Wells (Hunt - Sabine - Nacatoch)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$6,857,000
TOTAL COST OF FACILITIES	**$6,857,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$2,400,000
Interest During Construction (4% for 1 years with a 1% ROI)	$325,000
TOTAL COST OF PROJECT	**$9,582,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$802,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$69,000
Pumping Energy Costs (1466173 kW-hr @ 0.09 $/kW-hr)	$132,000
Purchase of Water (2400 acft/yr @ 500 $/acft)	$1,200,000
TOTAL ANNUAL COST	**$2,203,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	2,400
Annual Cost of Water ($ per acft)	$918
Annual Cost of Water ($ per 1,000 gallons)	$2.82

KVA *3/31/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Hunt County-Other (Poetry WSC) - Voluntary Reallocation - Tawakoni

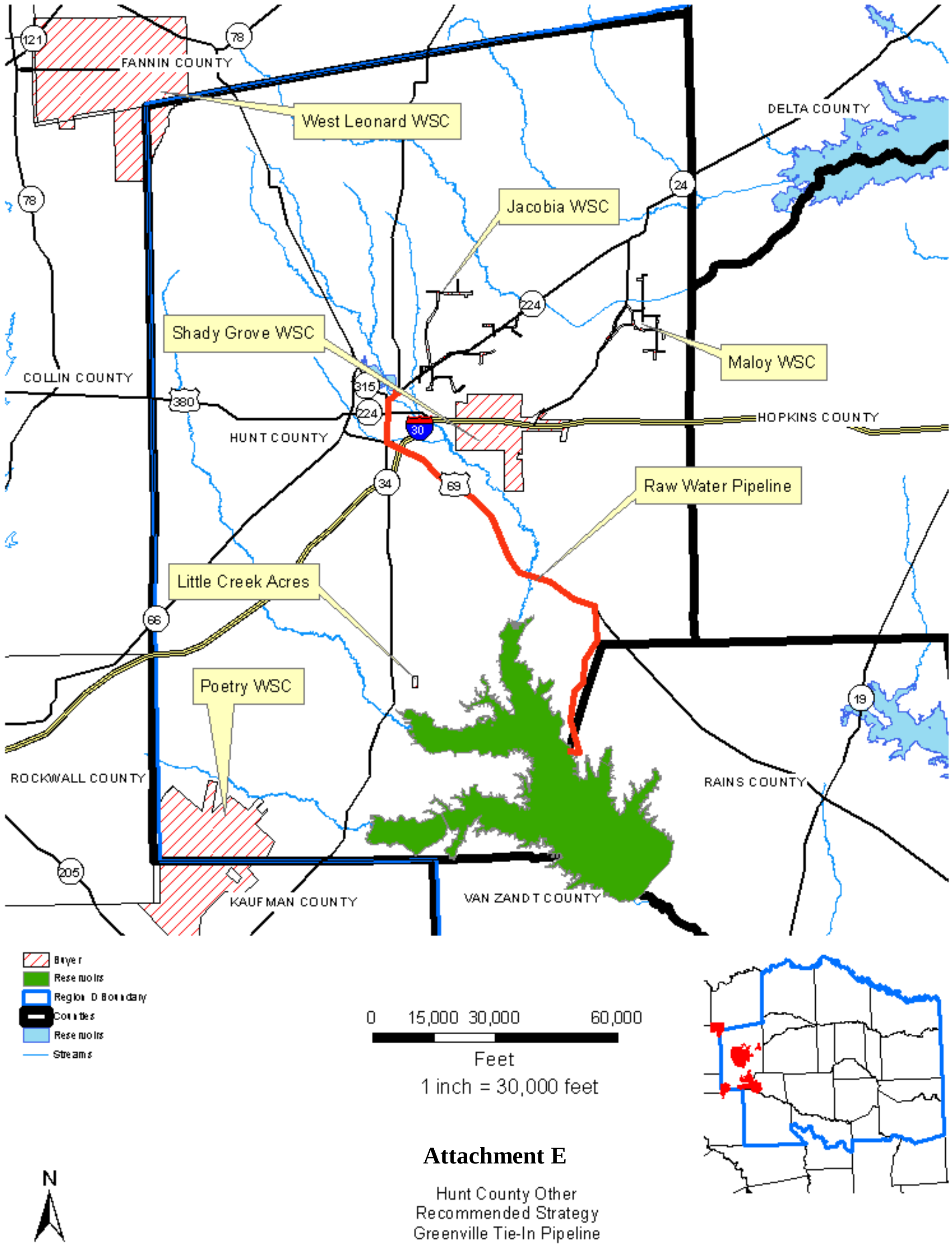
Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (1045 acft/yr @ 1717 $/acft)	$1,794,000
TOTAL ANNUAL COST	**$1,794,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	1,045
Annual Cost of Water ($ per acft)	$1,717
Annual Cost of Water ($ per 1,000 gallons)	$5.27
JNS	*4/2/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Hunt County-Other (Poetry WSC) - Voluntary Reallocation - Fork

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (670 acft/yr @ 1717 $/acft)	$1,150,000
TOTAL ANNUAL COST	**$1,150,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	670
Annual Cost of Water ($ per acft)	$1,716
Annual Cost of Water ($ per 1,000 gallons)	$5.27
JNS	*4/5/2015*



Attachment E

Hunt County Other
Recommended Strategy
Greenville Tie-In Pipeline

Cost Estimate Summary
Water Supply Project Option
41518 Prices
County Other - Greenville Tie-In Pipeline

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Intake Pump Stations (0 MGD)	$3,671,000
Transmission Pipeline (0 in dia., 23 miles)	$14,814,000
TOTAL COST OF FACILITIES	**$18,485,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$5,729,000
Environmental & Archaeology Studies and Mitigation	$587,000
Interest During Construction (4% for 1 years with a 1% ROI)	$869,000
TOTAL COST OF PROJECT	**$25,670,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$2,148,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$240,000
Pumping Energy Costs (984917 kW-hr @ 0.09 $/kW-hr)	$89,000
Purchase of Water (3990 acft/yr @ 883 $/acft)	$3,523,000
TOTAL ANNUAL COST	**$6,000,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1.8	3,990
Annual Cost of Water ($ per acft)	$1,504
Annual Cost of Water ($ per 1,000 gallons)	$4.61

JMP	*4/4/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF CITY OF GREENVILLE

Description of Water User Group:

The City of Greenville provides water service in Hunt County. The WUG population is projected to be 28,700 in 2020 increasing to 74,659 by the year 2070. The City of Greenville uses surface water from Greenville's city lake and purchases surface water out of Lake Tawakoni from the Sabine River Authority. The City of Greenville sells water to the City of Caddo Mills, entities within Hunt County-Other, Manufacturing, Mining and Steam Electric WUGs in Hunt County. The City of Greenville is projected to have a deficit of -3,299 ac-ft in 2050 increasing to -14,315 ac-ft by 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	28,700	32,964	38,749	46,738	58,120	74,659
Projected Water Demand	8,908	10,070	11,709	14,051	17,451	22,405
Water Demand from other entities	2,409	2,586	2,785	3,000	3,191	3,388
Current Water Supply	5,609	5,223	4,809	6,530	8,090	8,090
Projected Supply Surplus (+) / Deficit (-)	**-3,299**	**-4,847**	**-6,900**	**-7,521**	**-9,361**	**-14,315**

Evaluation of Potentially Feasible Water Management Strategies:

Several alternative strategies were considered to meet the City of Greenville's water supply shortages as summarized in the below table. Advanced conservation was not considered because the per capita use per day was below the 140 gpcpd 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 strategies considered included the purchase of water out of Chapman Lake from the City of Sulphur Springs and purchase of raw water from the Sabine River Authority's proposed Toledo Bend Transfer. The Chapman Lake surface water strategy would require the City to construct an intake structure, pump station, pipeline, and new Water Treatment Plant (WTP) to bring water from Chapman Lake to the City. According to preliminary discussions with Region C, the Toledo Bend Transfer is currently not being considered until 2070, so was not considered a feasible alternative for Greenville until 2070.

Because the City of Greenville currently provides wholesale water to a number of entities in the surrounding area, unmet needs for Caddo Mills, Caddo Basin SUD, and County-Other were included in the analysis of needed supply for Greenville under the assumption that Greenville would sell treated and untreated water, as needed, to these other entities. The City of Sulphur Springs has up to 11,260 acre-feet available from Chapman Lake. To meet projected demands for the city along with the other entities, the City of Greenville would need to implement a contract and develop infrastructure in place by 2050 to convey 10,750 acre-feet per year from Chapman Lake. It has been assumed for the purposes of the 2016 Plan that the conveyance of this supply would not require an amendment for interbasin transfer, as the retail service area for the City of Sulphur Springs is contiguous the City of Greenville's retail service area, and would thus be exempt per TAC §297.18(k)(5). Even with this supply in place, the City of Greenville would still require an additional 5,100 acre-feet of supply by 2070 to meet projected demands. This demand could be met by purchasing water from the Sabine River Authority through the Toledo Bend Transfer.

The City's existing water treatment plant was expanded in 1993-1994 to a capacity of 13 MGD. Based on TWDB projections, the City will need to expand the WTP by 2020 to accommodate projected demand. Expanding the WTP to include an additional 16 MGD of capacity will ensure adequate capacity through 2050, when additional raw water is made available from the Chapman Lake pipeline. In 2050, the City will need to construct a new WTP with a capacity of at least 30 MGD to ensure adequate capacity for projected demands through 2070.

Projected demands for Steam Electric power generation are associated with a proposed 1,750 MW combined cycle generation facility at Greenville. This facility was announced in 2002, but has not yet been constructed. The facility has been estimated to require approximately 4,000 acre-feet per year of supply, while the projections for Steam Electric water demand in Hunt County range from 12,400 ac-ft in 2020 to 28,500 ac-ft in 2070. Because of the uncertainty in demand and when this facility will be constructed, for the purposes of the 2016 Plan, Steam Electric demands have not been included in the strategy for the City of Greenville. Depending on the actual demand, the City may need to construct a pipeline to Chapman Lake earlier than 2050 and the Toledo Bend Transfer pipeline may be necessary earlier than 2070.

Strategy	Firm Yield (ac-ft)	Start Year	Total Capital Cost	Total Annualized Cost	Unit Cost	Env. Impact
Advanced Water Conservation						
Water Reuse						
Ground Water						
Voluntary Reallocation of Hunt Manufacturing Surplus purchased from Greenville (purchased from SRA Tawakoni)	825	2020	$0	$0	$0	1
WTP Expansion	7,048	2020	$36,074,000	$5,601,000	$795	2
Chapman Raw Water Pipeline and New WTP	10,750	2050	$193,438,000	$28,159,000	$2,619	3
Toledo Bend Tie-In Pipeline	5,100	2070	$42,470,000	$5,171,000	$1,014	3
Chapman Raw Water Pipeline	10,750	2020	$193,438,000	$28,159,000	$2,619	3
Toledo Bend Tie-In Pipeline	21,230	2050	$78,477,000	$12,550,000	$591	3

Recommendations:

	2020	2030	2040	2050	2060	2070
Voluntary Reallocation of Hunt Manufacturing Surplus purchased from Greenville (purchased from SRA Tawakoni; ac-ft/yr)	**484**	**546**	**613**	**677**	**721**	**825**
WTP Expansion	**3,299**	**6,634**	**7,048**	**5,327**	**3,767**	**3,767**
Chapman Raw Water Pipeline and New WTP (ac-ft/yr)	**0**	**0**	**0**	**10,750**	**10,750**	**10,750**
Toledo Bend Tie-In Pipeline	**0**	**0**	**0**	**0**	**0**	**5,100**

The recommended strategies to meet the projected demands of the City of Greenville and its wholesale customers (both existing and future) first includes the voluntary reallocation in 2020 of surplus supply for Hunt County Manufacturing of 484 ac-ft in 2020, up to 825 ac-ft in 2070. Also in 2020, the existing 13 MGD water treatment plant should be expanded by 16 MGD. This will allow the provision of up to 7,048 ac-ft/yr through 2040. By 2050, it is recommended the City contract with the City of Sulphur Springs for all available supply from Chapman Lake, and to construct an intake, pump station, and pipeline along with a new 30 MGD water treatment plant. By 2070, the recommended strategy is for the City to construct a tie-in pipeline to additional supply available through the Toledo Bend Transfer from the Sabine River Authority, which has been preliminarily discussed to be a Region C strategy in the 2016 Plan. This strategy would be in combination with a recommended strategy for construction of a tie-in pipeline to the City of Greenville for the purchase and use of a portion of this Toledo Bend supply water for the Hunt County-Other WUG.

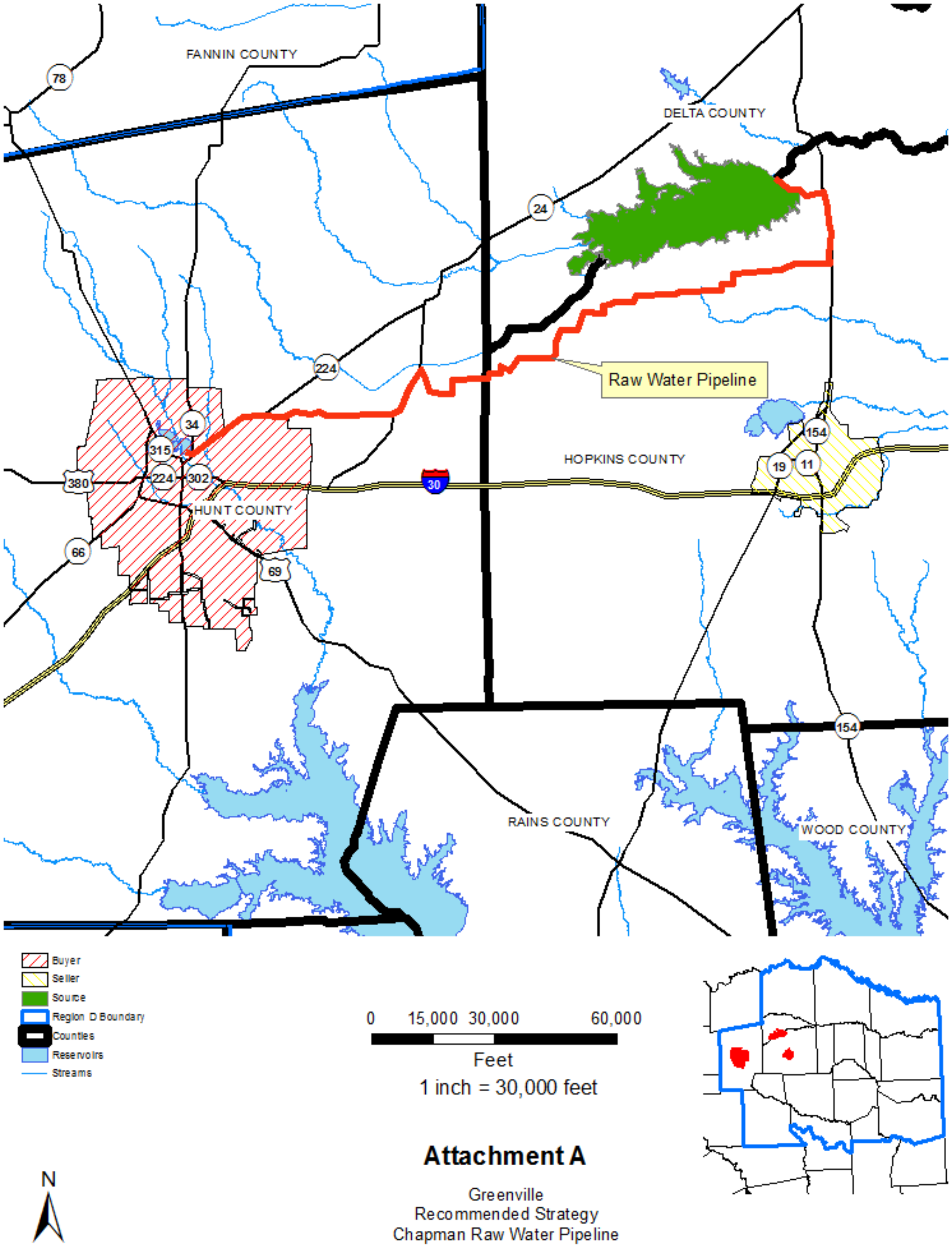
Cost Estimate Summary
Water Supply Project Option
September 2013 Prices

Greenville - 16 MGD WTP Expansion

Cost based on ENR CCI 9552 for September 2013 and

a PPI of 187 for September 2013

Item	***Estimated Costs for Facilities***
Water Treatment Plant (16 MGD)	$25,818,000
TOTAL COST OF FACILITIES	**$25,818,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$9,036,000
Interest During Construction (4% for 1 years with a 1% ROI)	$1,220,000
TOTAL COST OF PROJECT	**$36,074,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$3,019,000
Operation and Maintenance	
Water Treatment Plant (2.5% of Cost of Facilities)	$2,582,000
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$5,601,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1.8	7,048
Annual Cost of Water ($ per acft)	$795
Annual Cost of Water ($ per 1,000 gallons)	$2.44
TLS	*4/6/2015*



Attachment A

Greenville
Recommended Strategy
Chapman Raw Water Pipeline

Cost Estimate Summary
Water Supply Project Option
September 2013 Prices

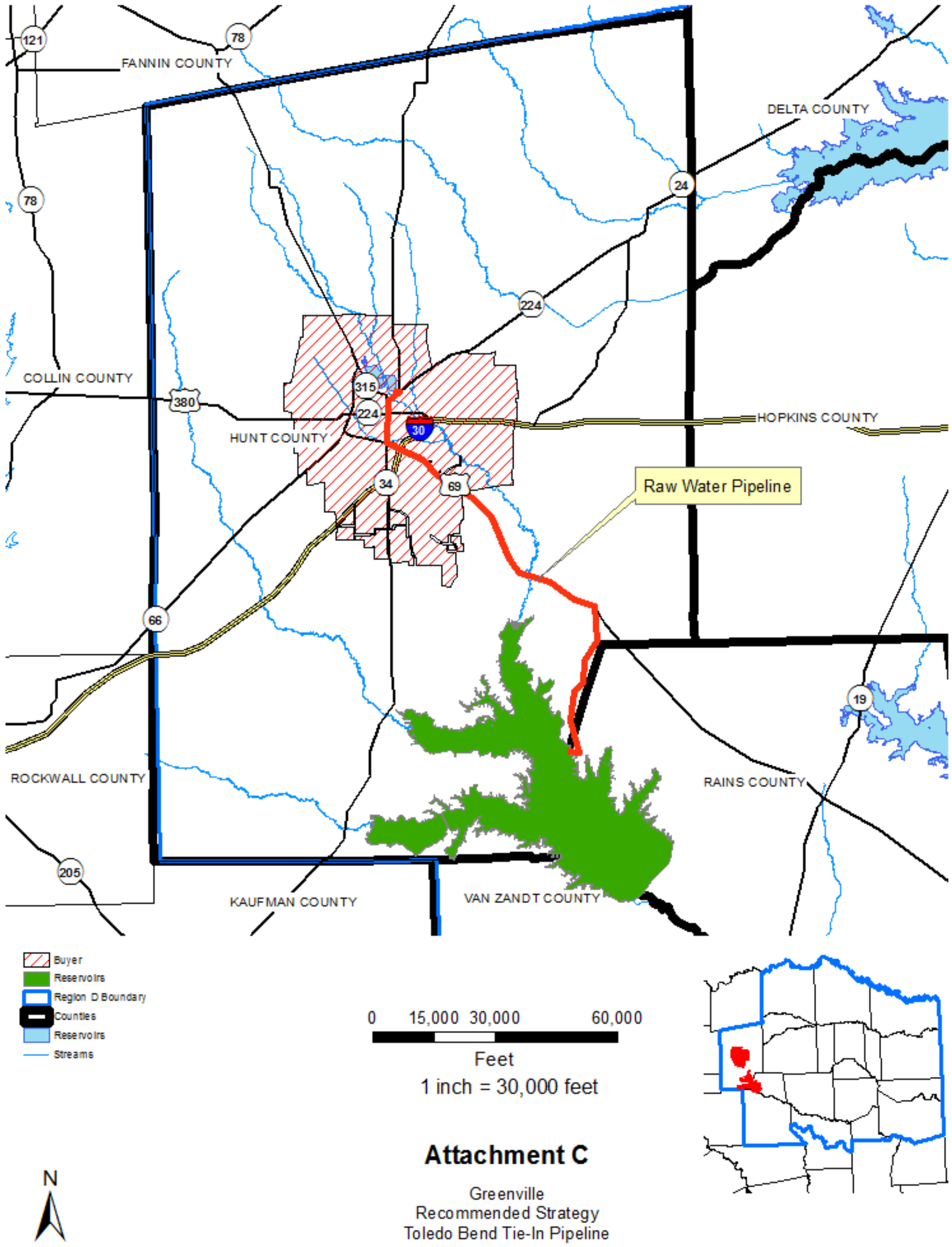
Greenville - Chapman Raw Water Pipeline and New WTP

Cost based on ENR CCI 9552 for September 2013 and

a PPI of 187 for September 2013

Item	***Estimated Costs for Facilities***
Intake Pump Stations (0 MGD)	$10,060,000
Transmission Pipeline (0 in dia., 43 miles)	$44,957,000
Water Treatment Plant (30 MGD)	$84,293,000
TOTAL COST OF FACILITIES	**$139,310,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$46,511,000
Environmental & Archaeology Studies and Mitigation	$1,075,000
Interest During Construction (4% for 1 years with a 1% ROI)	$6,542,000
TOTAL COST OF PROJECT	**$193,438,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$16,187,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$701,000
Water Treatment Plant (2.5% of Cost of Facilities)	$8,429,000
Pumping Energy Costs (4349786 kW-hr @ 0.09 $/kW-hr)	$391,000
Purchase of Water (10750 acft/yr @ 228 $/acft)	$2,451,000
TOTAL ANNUAL COST	**$28,159,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1.8	10,750
Annual Cost of Water ($ per acft)	$2,619
Annual Cost of Water ($ per 1,000 gallons)	$8.04

TLS *4/6/2015*



Attachment C

Greenville
Recommended Strategy
Toledo Bend Tie-In Pipeline

Cost Estimate Summary
Water Supply Project Option
September 2013 Prices
Greenville - Toledo Bend Tie-In Pipeline

Cost based on ENR CCI 9552 for September 2013 and

a PPI of 187 for September 2013

Item	***Estimated Costs for Facilities***
Intake Pump Stations (0 MGD)	$3,387,000
Transmission Pipeline (0 in dia., 23 miles)	$27,595,000
TOTAL COST OF FACILITIES	**$30,982,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$9,464,000
Environmental & Archaeology Studies and Mitigation	$587,000
Interest During Construction (4% for 1 years with a 1% ROI)	$1,437,000
TOTAL COST OF PROJECT	**$42,470,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$3,554,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$361,000
Pumping Energy Costs (1035504 kW-hr @ 0.09 $/kW-hr)	$93,000
Purchase of Water (5100 acft/yr @ 228 $/acft)	$1,163,000
TOTAL ANNUAL COST	**$5,171,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1.8	5,100
Annual Cost of Water ($ per acft)	$1,014
Annual Cost of Water ($ per 1,000 gallons)	$3.11
JMP	*4/4/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF HICKORY CREEK SUD IN HUNT COUNTY

Description of Water User Group:

Hickory Creek SUD provides water in northwestern Hunt County and small areas of eastern Collin and southern Fannin counties from four wells in the Woodbine Aquifer in Hunt County, having a total rated capacity of 1402 gpm, or 754 ac-ft/yr. Over 90% of the SUD's demand is located in Region D (Hunt County), with less than 10% in Region C (Collin and Fannin Counties). In both regions, the system is projected to serve a total of 4,517 people in 2020 and 25,413 people by the year 2070. The population and demand projections for the system are shown in the table below. In Hunt County, Hickory Creek SUD is projected to have a water supply deficit of 183 ac-ft/yr by 2040 increasing to 1,774 ac-ft/yr by 2070. The system does not have either a water conservation plan or a drought management plan.

Water Supply and Demand Analysis:

	2020	**2030**	**2040**	**2050**	**2060**	**2070**
Population	4,517	6,474	9,112	12,741	17,913	25,413
Projected Water Demand	451	619	8,55	1,185	1,662	2,355
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	754	754	754	754	754	754
Projected Supply Surplus (+) / Deficit (-)	**303**	**135**	**-101**	**-431**	**-908**	**-1,601**

Projected Supply Surplus (+) / Deficit (-) by Basin	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Sabine	137	62	-47	-204	-432	-769
Sulphur	113	50	-36	-153	-320	-560
Trinity	53	23	-18	-74	-156	-272
Total	**303**	**135**	**-101**	**-431**	**-908**	**-1,601**

Evaluation of Potentially Feasible Water Management Strategies:

The four alternative strategies considered to meet Hickory Creek SUD's water supply shortages are listed in the table below. Advanced conservation was not selected since per capita use is less than 140 gpcpd. There are no significant current water needs that could be met by water reuse. No surface water alternatives were evaluated because the SUD advised that it would continue adding wells to meet future demands. Groundwater from the Woodbine Aquifer was considered because the SUD is currently using this aquifer as the source of supply for the system. However, due to the limited availability of this groundwater source, this aquifer is not projected to have sufficient supply to meet all of Hickory Creek SUD's shortage. Additional supplies are available from the Trinity Aquifer in Hunt County to satisfy the remainder of Hickory Creek SUD's needs.

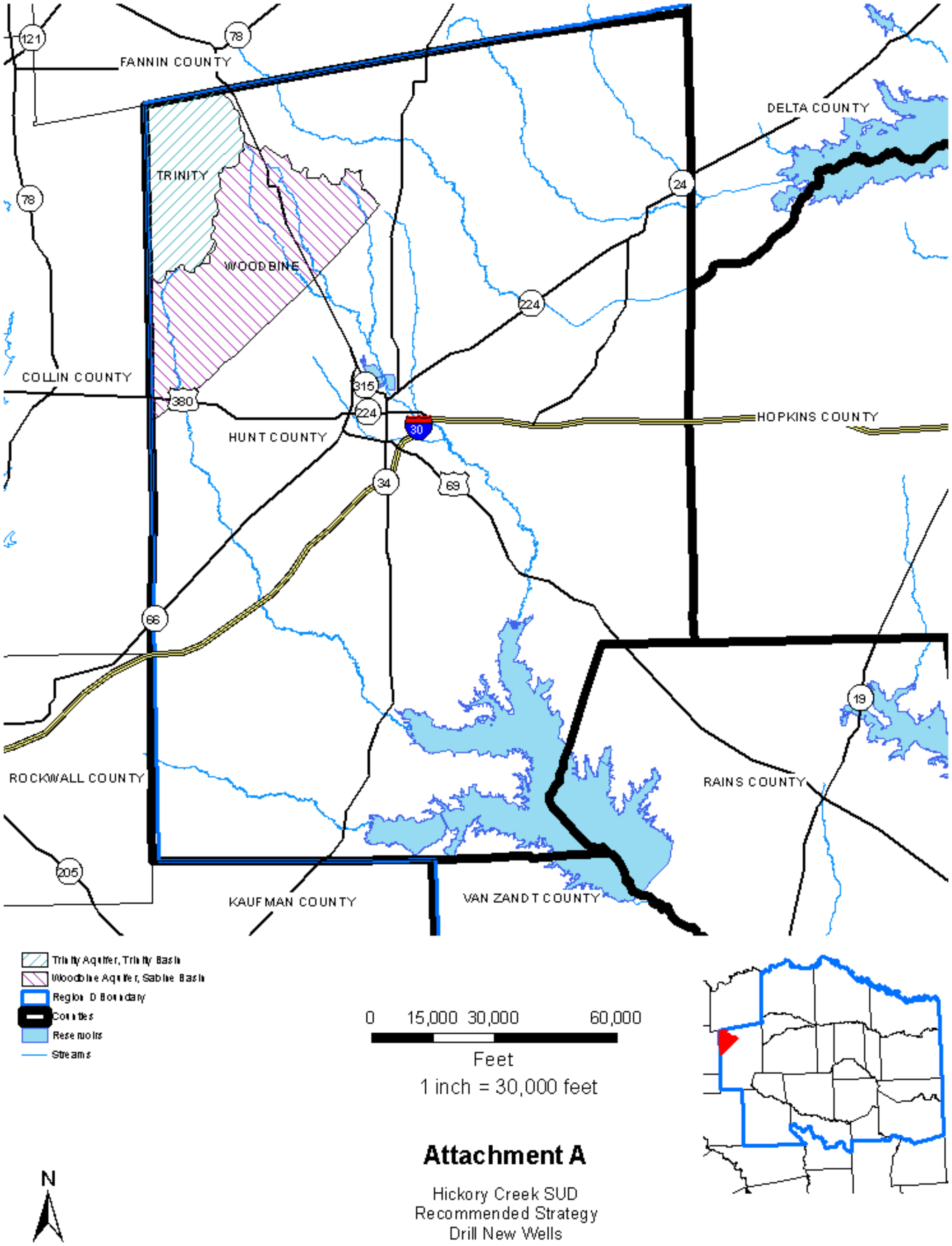
Strategy	**Firm Yield (ac-ft)**	**Total Capital Cost**	**Total Annual Cost**	**Unit Cost**	**Environmental Impact**
Advanced Water Conservation			**-**		
Water Reuse					
Drill New Wells (Trinity Aquifer, Trinity Basin)	**463**	**$4,821,000**	**$702,000**	**$1,516**	**1**
Drill New Wells (Woodbine Aquifer, Sabine Basin)	**1,138**	**$8,325,000**	**$1,500,000**	**$1,318**	**1**
Surface Water					

Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Trinity Aquifer, Sabine Basin)			**0**	**189**	**378**	**463**
Drill New Wells (Woodbine Aquifer, Sabine Basin)			**189**	**378**	**567**	**1,138**

The recommended strategy for Hickory Creek SUD to meet their projected deficit of 101 ac-ft/yr in 2040 and 1,601 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 Woodbine and Trinity aquifers in Hunt County. Wells with rated capacity of 350 gpm each would provide approximately 189 acre-feet each. The Woodbine and Trinity aquifers in Hunt County are projected to have a more than ample supply availability to meet the needs of Hickory Creek SUD 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.



Attachment A

Hickory Creek SUD
Recommended Strategy
Drill New Wells

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Hickory Creek SUD - Drill New Wells (Hunt - Trinity - Trinity)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$3,202,000
TOTAL COST OF FACILITIES	**$3,279,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,148,000
Interest During Construction (4% for 1 years with a 1% ROI)	$156,000
TOTAL COST OF PROJECT	**$4,597,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$385,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$32,000
Pumping Energy Costs (76309 kW-hr @ 0.09 $/kW-hr)	$7,000
Purchase of Water (463 acft/yr @ 500 $/acft)	$232,000
TOTAL ANNUAL COST	**$702,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 3	463
Annual Cost of Water ($ per acft)	$1,516
Annual Cost of Water ($ per 1,000 gallons)	$4.65

JNS *4/5/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Hickory Creek SUD - Drill New Wells (Hunt - Woodbine - Sabine)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$6,404,000
TOTAL COST OF FACILITIES	**$6,556,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$2,295,000
Interest During Construction (4% for 1 years with a 1% ROI)	$311,000
TOTAL COST OF PROJECT	**$9,190,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$769,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$64,000
Pumping Energy Costs (76309 kW-hr @ 0.09 $/kW-hr)	$7,000
Purchase of Water (1138 acft/yr @ 500 $/acft)	$569,000
TOTAL ANNUAL COST	**$1,500,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 3	1,138
Annual Cost of Water ($ per acft)	$1,318
Annual Cost of Water ($ per 1,000 gallons)	$4.04

JNS *4/5/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF IRRIGATION IN HUNT COUNTY

Description of Water User Group:

Irrigation in Hunt County has a demand that is projected to remain constant at 254 ac-ft/yr for the planning period. The Irrigation WUG in Hunt County is supplied by groundwater from the Nacatoch Aquifer and run-of-river diversions from the Sabine and Sulphur Rivers. A deficit of 146 ac-ft/yr is projected to occur throughout the planning period.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Projected Water Demand	254	254	254	254	254	254
Current Water Supply	108	108	108	108	108	108
Projected Supply Surplus (+)/Deficit(-)	**-146**	**-146**	**-146**	**-146**	**-146**	**-146**

Projected Supply Surplus (+)/Deficit(-) by Basin	2020	2030	2040	2050	2060	2070
Sabine	-108	-108	-108	-108	-108	-108
Sulphur	-33	-33	-33	-33	-33	-33
Trinity	-5	-5	-5	-5	-5	-5
Total	**-146**	**-146**	**-146**	**-146**	**-146**	**-146**

Evaluation of Potentially Feasible Water Management Strategies:

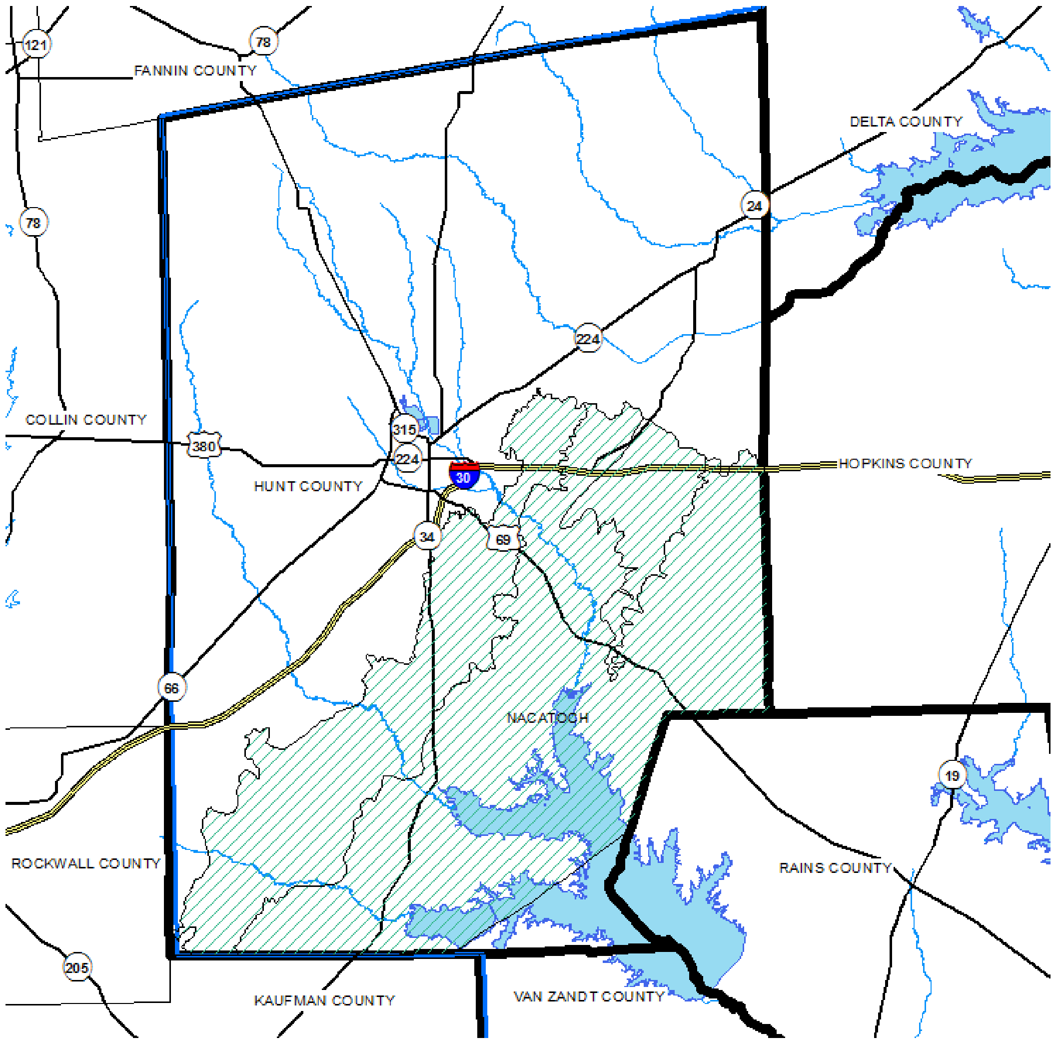
Three alternative strategies were considered to meet the Hunt County Irrigation WUG's water supply shortages. Advanced water conservation for irrigation practices were not considered in this planning effort, as present irrigation practices likely already incorporate many BMPs to extend water supplies, thus no additional conservation would be feasible. The use of reuse water from nearby municipalities is not considered feasible as it would not be effective to deliver reuse water to farm irrigation systems. Groundwater has been identified as a potential source of water for irrigation in Hunt County.

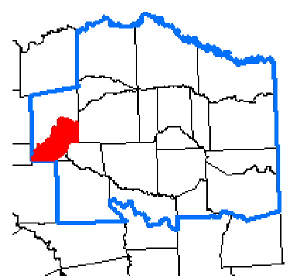
Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Env. Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Nacatoch, Sabine)	**150**	**$282,000**	**$108,000**	**$720**	**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Nacatoch, Sabine; ac-ft/yr)	**150**	**150**	**150**	**150**	**150**	**150**

The recommended strategy for the Hunt County Irrigation to meet their projected deficit of 146 ac-ft/yr from 2020 to 2070 would be to construct two water wells prior to 2020. The recommended supply source will be the Nacatoch Aquifer in Hunt County. One well with rated capacity of 140 gpm would provide approximately 75 ac-ft/yr, each. The Nacatoch Aquifer in Hunt County, in the Sabine River Basin, is projected to have a more than ample supply availability to meet the needs of the Irrigation in Hunt County for the planning period.





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Attachment A

Hunt County Irrigation
Recommended Strategy
Drill New Wells (Nacatoch Aquifer, Sabine)

Cost Estimate Summary
Water Supply Project Option
41518 Prices

Irrigation - Drill New Wells (Hunt - Sabine - Nacatoch)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$198,000
TOTAL COST OF FACILITIES	**$198,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$69,000
Interest During Construction (4% for 1 years with a 1% ROI)	$10,000
TOTAL COST OF PROJECT	**$282,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$24,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$2,000
Pumping Energy Costs (76309 kW-hr @ 0.09 $/kW-hr)	$7,000
Purchase of Water (150 acft/yr @ 500 $/acft)	$75,000
TOTAL ANNUAL COST	**$108,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 3	150
Annual Cost of Water ($ per acft)	$720
Annual Cost of Water ($ per 1,000 gallons)	$2.21

JNS *4/7/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF CITY OF JOSEPHINE IN HUNT COUNTY

Description of Water User Group:

City of Josephine is located primarily in Collin County within the Region C Texas Regional Water Planning Area, but serves a relatively smaller portion of population within the North East Texas Region (Region D). Thus, Region C is the RWPG with the primary responsibility for the evaluation and recommendation of water management strategies for this WUG. For completeness, the consultants have coordinated to include information on that Region's preliminary recommendations for the 2016 Region C IPP herein, as they relate to the demand and identified needs within the North East Texas Region (Region D). At the time of publication of the Region D IPP, cost information for the Region C recommendation(s) for this WUG was not available. Once available from the primary region, this information will be incorporated into the Final 2016 Region D Plan for adoption.

The City of Josephine is located in southeastern Collin County, with a small part of the city in Hunt County in the North East Texas Region (Region D). Josephine has a population of about 1,000 and receives its water supply from NTMWD. Water management strategies for Josephine are conservation and additional water from NTMWD.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	1,859	2,906	3,953	5,000	5,000	5,000
Projected Water Demand	278	424	573	722	722	722
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	238	299	367	427	400	370
Projected Supply Surplus (+) / Deficit (-)	**-40**	**-125**	**-206**	**-295**	**-322**	**-352**

Evaluation of Potentially Feasible Water Management Strategies:

The four alternative strategies considered to meet the City of Josephine's water supply shortages are listed in the table below. Advanced conservation was identified a feasible strategy. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the City is planning on meeting its future needs from water purchase from NTMWD.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annual Cost	Unit Cost	Environmental Impact
Advanced Water Conservation	**13**				**1**
Water Reuse					
Ground Water					
Surface Water	**339**				**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
Advanced Water Conservation (ac-ft/yr)	2	4	5	9	11	13
Increase Contract (NTMWD) (ac-ft/yr)	38	121	201	286	311	339

The North East Texas Regional Water Planning Group supports the recommendation from Region C for Advanced water conservation and an increased contract with NTMWD to meet projected future needs of the City of Josephine.

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF CITY OF LONE OAK

Description of Water User Group:

City of Lone Oak is a public water supply located in Hunt County. The system is projected to serve 749 people in 2020 and 2,962 people by the year 2070. The current sources of supply is surface water from Tawakoni Reservoir purchased from Cash SUD. The City provides water to its own customers in the Sabine River Basin and is projected to have a water supply deficit of 56 ac-ft/yr in 2070. The system does have a water conservation and drought management plan in place.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	749	954	1,232	1,617	2,165	2,962
Projected Water Demand	63	76	94	121	161	220
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	164	164	164	164	164	164
Projected Supply Surplus (+) / Deficit (-)	**101**	**88**	**70**	**43**	**3**	**-56**

Evaluation of Potentially Feasible Water Management Strategies:

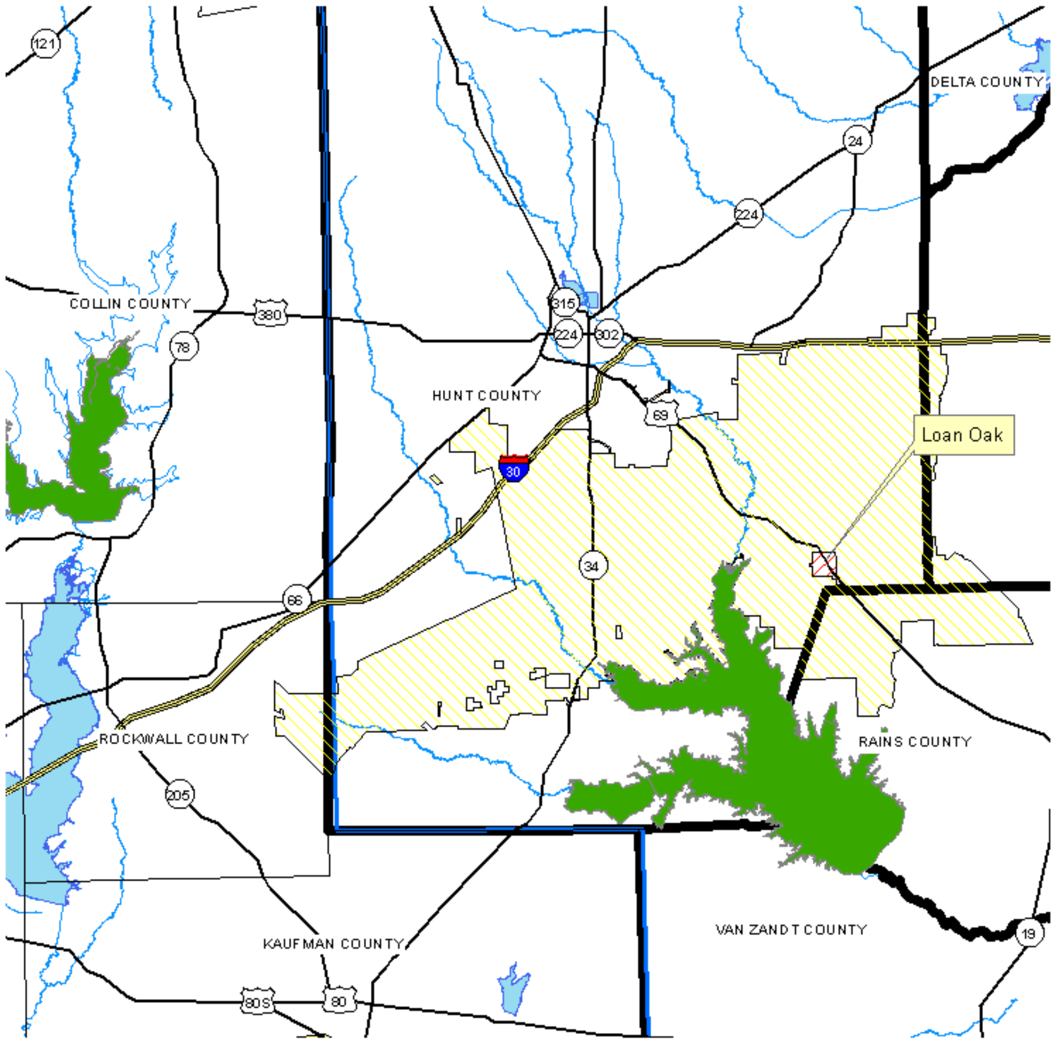
The four alternative strategies considered to meet Lone Oak's water supply shortages are listed in the table below. Advanced conservation was not selected since per capita use is less than 140 gpcpd. There are no significant current water needs in Lone Oak that could be met by water reuse. The purchase of additional surface water from Cash SUD was evaluated. Cash SUD is projected to have supply available in 2070. Groundwater was not considered because of limited local availability by 2070.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annual Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Ground Water					
Increase Existing Contract	**56**	**$0**	**$96,000**	**$1,717**	**1**

Recommendations:

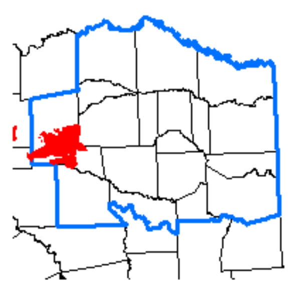
	2020	2030	2040	2050	2060	2070
Surface Water (ac-ft/yr)					0	56

The recommended strategy to meet projected demands for Lone Oak is to purchase additional water from Cash SUD by 2070.



Buyer
Seller
Source
Region D Boundary
Counties
Reservoirs
Streams

0 15,000 30,000 60,000
Feet
1 inch = 30,000 feet



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Attachment A

Lone Oak
Recommended Strategy
Voluntary Reallocation of Quinlan Surplus purchased from Cash SUD

Cost Estimate Summary
Water Supply Project Option
41518 Prices
City of Lone Oak - Increase Existing Contract

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (56 acft/yr @ 1717 $/acft)	$96,000
TOTAL ANNUAL COST	**$96,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	56
Annual Cost of Water ($ per acft)	$1,714
Annual Cost of Water ($ per 1,000 gallons)	$5.26
JNS	*4/2/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF MINING IN HUNT COUNTY

Description of Water User Group:

Mining in Hunt County has a demand that is projected to decrease from 128 ac-ft/yr in 2020 to 47 ac-ft/yr in 2070. Mining in Hunt County is currently supplied by groundwater from the Nacatoch Aquifer, Sabine River Basin, and water purchased from the City of Greenville from Lake Tawakoni.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Projected Water Demand	128	118	88	71	58	47
Current Water Supply	55	54	53	52	51	50
Projected Supply Surplus (+)/Deficit(-)	**-73**	**-64**	**-35**	**-19**	**-7**	**3**

Projected Supply Surplus (+)/Deficit(-) by Basin	2020	2030	2040	2050	2060	2070
Sabine	-41	-35	-16	-5	2	8
Sulphur	-30	-27	-18	-13	-9	-5
Trinity	-2	-2	-1	-1	0	0
Total	**-73**	**-64**	**-35**	**-19**	**-7**	**3**

Evaluation of Potentially Feasible Water Management Strategies:

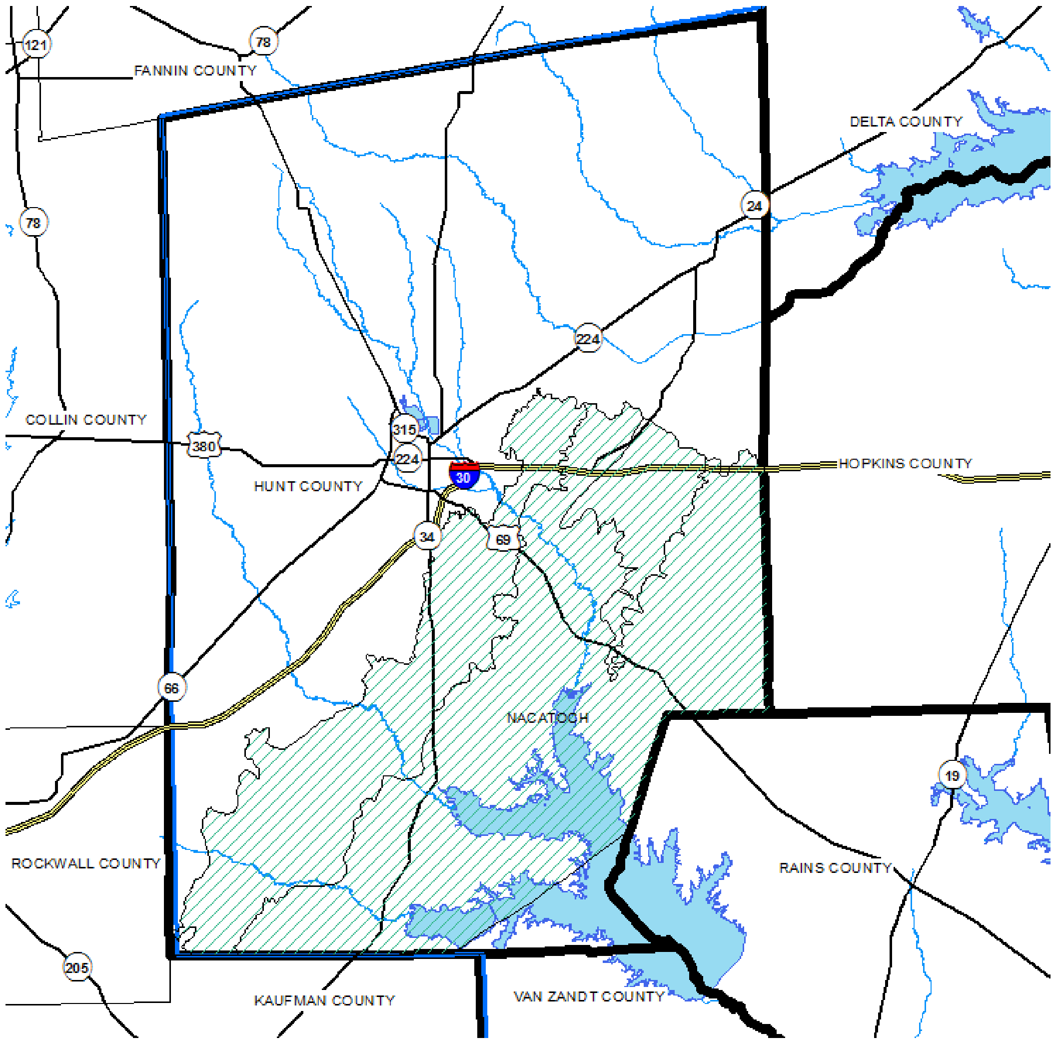
Three alternative strategies were considered to meet the Hunt County Mining water supply shortages as summarized in the following table. Advanced conservation and water reuse were not considered because operational procedures for the existing mines are not available. Groundwater has been identified as a potential source of water for mining in Hunt County. Surface water was also considered as a viable alternative to meet projected demands.

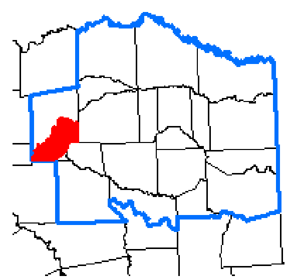
Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Env. Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Nacatoch, Sabine Basin)	**75**	**$254,000**	**$68,000**	**$907**	**1**
Surface Water					

Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Nacatoch, Sabine Basin; (ac-ft/yr)	**75**	**75**	**75**	**75**	**75**	**75**

The recommended strategy for the Hunt County Mining WUG to meet their projected deficit of 73 ac-ft/yr in 2020 is to construct an additional water well similar to their existing wells, with a production capacity of 140 gpm. The recommended supply source is the Nacatoch Aquifer in Hunt County, Sabine River Basin. The Nacatoch Aquifer in Hunt County, Sabine River Basin is projected to have a more than ample supply availability to meet the needs of the Mining in Hunt County for the planning period.





Attachment A

Hunt County Mining
Recommended Strategy
Drill New Wells (Nacatoch Aquifer, Sabine)

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Mining - Drill New Wells (Hunt - Sabine - Nacatoch)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$178,000
TOTAL COST OF FACILITIES	**$178,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$62,000
Interest During Construction (4% for 1 years with a 1% ROI)	$9,000
TOTAL COST OF PROJECT	**$254,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$21,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$2,000
Pumping Energy Costs (76309 kW-hr @ 0.09 $/kW-hr)	$7,000
Purchase of Water (75 acft/yr @ 500 $/acft)	$38,000
TOTAL ANNUAL COST	**$68,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 3	75
Annual Cost of Water ($ per acft)	$907
Annual Cost of Water ($ per 1,000 gallons)	$2.78

JNS *4/7/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF NORTH HUNT SUD IN HUNT COUNTY

Description of Water User Group:

North Hunt SUD provides water service in Hunt, Fannin, and Delta counties. It is projected North Hunt SUD will have a shortage in 2030. The WUG population is projected to be 4,246 in 2020 and 16,003 by the year 2070. The SUD has a contract for water supply with the City of Commerce for 147 ac-ft/yr, a well in Hunt county with a rating of 170 gpm , and a well in Fannin County that is rated at 318 gpm. In Hunt County, the SUD is projected to have a deficit of 36 ac-ft in 2030 increasing to 738 ac-ft by 2070.

Water Supply and Demand Analysis:

North Hunt SUD in Hunt County	2020	2030	2040	2050	2060	2070
Population	3,483	4,551	6,000	8,001	10,851	14,993
Projected Water Demand	235	306	404	538	730	1,008
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	252	270	270	270	270	270
Projected Supply Surplus (+) / Deficit (-)	**17**	**-36**	**-134**	**-268**	**-460**	**-738**

Evaluation of Potentially Feasible Water Management Strategies:

The five alternative strategies considered to meet North Hunt SUD's water supply shortages are listed in the table below. 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. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater from the Woodbine Aquifer was considered because North Hunt SUD is currently using this aquifer as a source of supply for the system. However, due to the limited availability of this groundwater source, this aquifer will not be able to meet all of North Hunt SUD's shortage. Additional supplies are available from the Paluxy Aquifer, another existing source used by the SUD, but no present MAG exists for the aquifer. Additional purchase of water from the City of Commerce is another alternative; however, Commerce has only a limited volume, potentially available only if existing supplies to the Manufacturing WUG can be reallocated. A separate feasible strategy was considered to utilize surplus supply from Delta County-Other, specifically Delta County MUD (an entity within Delta County-Other). The North Hunt SUD service area is contiguous with the service area for Delta County MUD, which purchases Big Creek Lake supply from the City of Cooper. Delta County MUD is projected to have sufficient surplus supplies to have the capability to meet North Hunt SUD needs starting in 2060. This strategy would require a pipeline connecting the two systems of sufficient size to provide up to 350 ac-ft/yr.

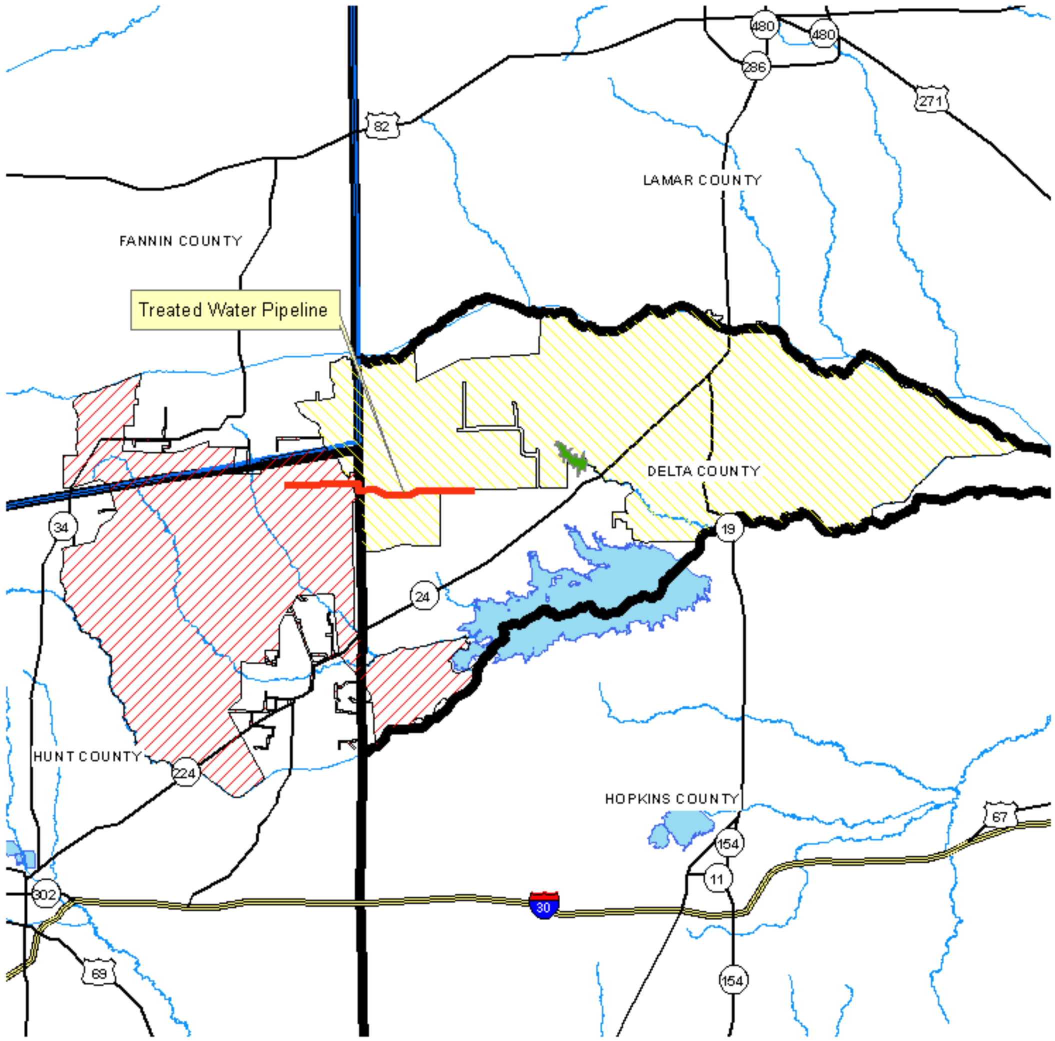
Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Env. Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Woodbine/Paluxy Aquifers, Sulphur Basin)	**394**	**$4,867,000**	**$646,000**	**$1,640**	**1**
Voluntary Reallocation of Hunt County Manufacturing Surplus purchased from Commerce WD	**388**	**$0**	**$421,000**	**$1,085**	**1**
Delta County Pipeline	**350**	**$1,774,000**	**$495,000**	**$1,414**	**3**

Recommendations:

	2020	2030	2040	2050	2060	2070
Voluntary Reallocation of Hunt County Manufacturing Surplus purchased from Commerce WD (ac-ft/yr)	0	36	134	268	338	388
Delta County Pipeline	0	0	0	0	122	350

The recommended strategy to meet North Hunt SUD's needs is to purchase surface water from City of Commerce available via a voluntary reallocation from the existing surplus for the Hunt Manufacturing – Sulphur WUG beginning in 2030. In 2060, it is recommended that North Hunt SUD construct a pipeline to connect with Delta County MUD (a Sub-WUG entity within Delta County Other) for the purchase of surplus supplies by 2060.

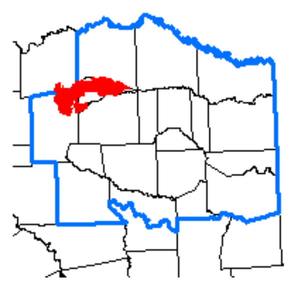
Cost Estimate Summary ***Water Supply Project Option*** ***41518 Prices*** ***North Hunt SUD - Voluntary Realloc of Hunt Man purchased from Commerce WD***	
Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518	
Item	***Estimated Costs for Facilities***
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (388 acft/yr @ 1085 $/acft)	$421,000
TOTAL ANNUAL COST	**$421,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	388
Annual Cost of Water ($ per acft)	$1,085
Annual Cost of Water ($ per 1,000 gallons)	$3.33
TLS	*4/6/2015*



0 15,000 30,000 60,000

Feet

1 inch = 30,000 feet



Attachment A

North Hunt SUD
Recommended Strategy
Delta County Pipeline

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Cost Estimate Summary
Water Supply Project Option
41518 Prices
North Hunt WSC - Delta County Pipeline

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Intake Pump Stations (0 MGD)	$1,115,000
TOTAL COST OF FACILITIES	**$1,115,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$390,000
Environmental & Archaeology Studies and Mitigation	$209,000
Interest During Construction (4% for 1 years with a 1% ROI)	$60,000
TOTAL COST OF PROJECT	**$1,774,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$148,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$28,000
Pumping Energy Costs (107116 kW-hr @ 0.09 $/kW-hr)	$10,000
Purchase of Water (350 acft/yr @ 883 $/acft)	$309,000
TOTAL ANNUAL COST	**$495,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	350
Annual Cost of Water ($ per acft)	$1,414
Annual Cost of Water ($ per 1,000 gallons)	$4.34

JMP *4/6/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF CITY OF ROYSE CITY IN HUNT COUNTY

Description of Water User Group:

The City of Royse City is located primarily in Rockwall and Collin Counties within the Region C Texas Regional Water Planning Area, but serves a relatively smaller portion of population within the North East Texas Region (Region D). Thus, Region C is the RWPG with the primary responsibility for the evaluation and recommendation of water management strategies for this WUG. For completeness, the consultants have coordinated to include information on that Region's preliminary recommendations for the 2016 Region C IPP herein, as they relate to the demand and identified needs within the North East Texas Region (Region D). At the time of publication of the Region D IPP, cost information for the Region C recommendation(s) for this WUG was not available. Once available from the primary region, this information will be incorporated into the Final 2016 Region D Plan for adoption.

Water Supply and Demand Analysis:

Royse City is a city of about 10,000 people located in northeast Rockwall County and southeast Collin County. The North Texas Municipal Water District (NTMWD) supplies most of the water used in Rockwall County and will continue to do so in the future. Water user groups that currently get water from NTMWD will purchase additional water from NTMWD to meet future demands.

Evaluation of Potentially Feasible Water Management Strategies:

The four alternative strategies considered to meet the City of Royse City's water supply shortages are listed in the table below. Advanced conservation was identified a feasible strategy. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the City is planning on meeting its future needs from water purchase from NTMWD.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annual Cost	Unit Cost	Environmental Impact
Advanced Water Conservation	**199**	**$26,500**	**$44,000**	**$222**	**1**
Water Reuse					
Ground Water					
Increase Contract (NTMWD)	**4,148**	**$0**	**$2,298,000**	**$554**	**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
Advanced Water Conservation (ac-ft/yr)	3	4	5	8	12	17
Increase Contract (NTMWD) (ac-ft/yr)	86	184	278	391	544	756

The North East Texas Regional Water Planning Group supports the recommendation from Region C for advanced water conservation and an increased contract with NTMWD to meet projected future needs of the City of Royse City.

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF SABINE RIVER AUTHORITY

Description of Water User Group:

The Sabine River Authority (SRA) holds water rights in Lake Fork (Wood and Rains Counties) and Lake Tawakoni (Hunt, Rains, and Van Zandt Counties). The SRA supplies the cities of Commerce, Edgewood, Emory, Greenville, Quitman, Kilgore, Longview, Point, West Tawakoni, Wills Point, the Ables Springs WSC, Cash SUD, Combined Consumers SUD, MacBee SUD and South Tawakoni, as well as industry. SRA is projected to maintain a supply surplus throughout the planning period, but is listed herein for the purpose of recommending seller water management strategies to utilize the District's available surplus supplies to meet projected demands for the Authorities' customer WUGs.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Water Demand from other Region D entities	42,427	61,641	61,579	61,983	60,745	61,085
Current Water Supply	396,601	392,915	389,231	385,551	381,853	378,172
Projected Supply Surplus (+) / Deficit (-)	354,174	331,274	327,652	323,568	321,108	317,087

Evaluation of Potentially Feasible Water Management Strategies:

SRA is projected to have a supply surplus over the 2020 – 2070 planning period.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Env. Impact
Advanced Water Conservation					
Water Reuse					
Ground Water					
Voluntary Reallocation (West Tawakoni Surplus, from Lake Tawakoni ac-ft/yr)	670	$0	$0	$0	1
Voluntary Reallocation (Combined Consumers SUD surplus, from Lake Fork ac-ft/yr)	1,045	$0	$0	$0	1

Recommendations:

	2020	2030	2040	2050	2060	2070
Voluntary Reallocation of West Tawakoni Surplus, from Lake Tawakoni (ac-ft/yr)	**0**	**0**	**670**	**670**	**670**	**670**
Voluntary Reallocation of Combined Consumers SUD surplus, from Lake Fork (ac-ft/yr)	**0**	**0**	**0**	**0**	**1,045**	**628**

It is recommended that the Sabine River Authority voluntarily reallocate the available surplus water supplies presently contracted with the City of West Tawakoni out of Lake Tawakoni. Demand projections for the City of West Tawakoni indicate sufficient supply to meet West Tawakoni's projected demands over the 2020 – 2070 planning period, even with the voluntary removal of this supply. A voluntary reallocation in 2040 of 670 ac-ft/yr from West Tawakoni's surplus contracted supply from Tawakoni Reservoir is projected to be adequate to allow for the purchase of said supply by Poetry WSC (within the County-Other WUG for Hunt County), to meet that WUG's demands starting in 2040.

Additional supply is projected to be necessary for this WUG by 2060. Thus, starting in 2060, it is recommended that the Sabine River Authority voluntarily reallocate the available surplus water supplies presently contracted with Combined Consumers SUD out of Lake Fork. Demand projections for Combined Consumers SUD indicate sufficient supply to meet the SUD's projected demands over the 2020 – 2070 planning period, even with the voluntary removal of this supply. A voluntary reallocation in 2060 of 1,045 ac-ft/yr from Combined Consumers SUD's surplus contracted supply from Lake Fork is projected to be adequate to allow for the purchase of said supply by Poetry WSC, to meet that WUG's demands starting in 2040.

These voluntary reallocations would provide sufficient supply to meet the projected demands for the Hunt County Other WUG, in combination with a recommendation for that WUG to increase its existing contract to purchase these supplies with the Sabine River Authority. Note, however, that the amount necessary and available for reallocation diminishes as the demand for the original entity, Combined Consumers SUD, increases.

As noted within the 2016 Plan, these recommendations are for the voluntary reallocation of supply. No entity should be required to participate.

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF STEAM ELECTRIC IN HUNT COUNTY

Description of Water User Group:

The Steam Electric WUG in Hunt County has a demand that is projected to grow from 12,436 ac-ft/yr in 2020 to 28,564 ac-ft/yr in 2070. This projected demand is associated with the proposed Cobisa generation facility near Greenville, a proposed 1,750 MW combined cycle plant announced in 2002, but not yet constructed. The facility has been estimated to require about 4,000 acre-feet per year of supply, while the projections for Steam Electric water demand in Hunt County range from 12,436 ac-ft in 2020 to 28,564 ac-ft in 2070. Actual current demand is about 351 ac-ft for the existing Powerline facility at Greenville.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Projected Water Demand	12,436	14,539	17,102	20,228	24,038	28,564
Current Water Supply	351	351	351	351	351	351
Projected Supply Surplus (+)/Deficit(-)	**-12,085**	**-14,188**	**-16,751**	**-19,877**	**-23,687**	**-28,213**

Evaluation of Potentially Feasible Water Management Strategies:

Projected demands for steam electric power generation in 2020 are substantially greater (by a factor of approximately 3) than existing demand plus anticipated demand for the Cobisa facility, if constructed. The differences are attributable to differing estimation methods and assumptions for future steam electric demands. TWDB projections for steam electric demand are conservatively based at the higher end of unit water use for electricity generation. Because the proposed Cobisa facility would be a combined cycle plant, actual water use would potentially be significantly lower than the adopted projections. Other factors, such as water requirements for carbon capture if required in the future, also elevate the projected demands. Uncertainty increases as projections are made further into the future.

Because the proposed Cobisa facility would be a combined cycle generation facility, the implementation of a combined cycle generation facility was considered advanced conservation for the purposes of the 2016 Plan. Projections of estimated savings are based upon projections developed by the University of Texas Bureau of Economic Geology (2008), utilizing a projection of four times Business As Usual (4BUA) as a conservative estimate. This conservation would meet a substantial portion (7,450 ac-ft/yr in 2020 to 12,060 ac-ft/yr in 2070) of the projected demand. No cost was assumed because the facility would be constructed with this level of conservation built in. With advanced conservation, remaining demands range from 4,990 ac-ft/yr in 2020 to 16,500 ac-ft/yr in 2070.

Because the proposed facility would be located at Greenville, it is assumed the demands would be met under contract with the City of Greenville. Groundwater is not feasible due to the limited managed available capacity of aquifers. Greenville currently contracts with the Sabine River Authority for its supply and utilizes the city lake for storage. However, all SRA water from Lake Tawakoni and Lake Fork has been contracted, thus no additional water is available from these lakes to meet the projected steam electric demands. The recommended strategy for Greenville is to supplement existing supplies with water from Chapman Lake by 2050. To meet the projected steam electric demands (after conservation), this water would need to be available as soon as any additional, unspecified facility is constructed, such that the contract and infrastructure for Greenville would be needed as much as 30 years earlier. The available supply from Chapman Lake would not be sufficient to meet projected steam electric demands without conservation.

Conservation and supply from Chapman Lake would be sufficient to meet projected steam electric demands through 2040, but additional supplies would be necessary by 2050. The Sabine River Authority is proposing to transfer water from the Toledo Bend Reservoir to the North Texas region by 2070 to meet anticipated future needs of its customers. Analysis of available supplies in the area suggest no other wholesale water provider in the area can meet projected steam electric demands in Hunt County; thus, SRA water from the Toledo Bend Reservoir would be needed to meet demands by 2050.

Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Env. Impact
Advanced Water Conservation	12,061	$0	$0	$0	1
Water Reuse					
Groundwater					
Increase Existing Contract (Greenville)	16,152		$3,683,000	$228	3

Recommendation:

	2020	2030	2040	2050	2060	2070
Advanced Water Conservation; (ac-ft/yr)	**7,448**	**7,398**	**9,141**	**8,988**	**9,038**	**12,061**

Advanced Water Conservation, reflecting the construction of a combined cycle generation facility, is recommended to address a portion of the identified Steam Electric needs in Hunt County. Depending on the actual demand, as well as the timing of construction of new power generation facilities in Hunt County, the City of Greenville may need to construct a pipeline to Chapman Reservoir by 2020, and the Toledo Bend Transfer pipeline may be necessary by as soon as 2050. However, given the uncertainty in projected demands and the uncertain timing of construction of the proposed Cobisa facility (originally announced in 2002), Hunt County Steam Electric demands above the existing 351 ac-ft/yr that are not met by the recommended Advanced Water Conservation are considered an unmet need for the purposes of the 2016 Plan.

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF THE CITY OF WOLFE CITY

Description of Water User Group:

The City of Wolfe City is located in northern Hunt County and is situated in the Sulphur River Basin. Wolfe City is bound on the west side by the Hickory Creek SUD, and the City of Commerce is located southeast of the City. The system is projected to serve 1,719 people by 2020, and the population is expected to increase to 6,217 by the year 2070. Wolfe City's current source of supply comes from two city lakes located on Turkey Creek in the South Sulphur River Basin. The City also has a 150 gpm well in the Woodbine formation, Sulphur River Basin, which has been brought back for use. Yield from the local lakes is calculated as 200 ac-ft/yr through 2070. Based on these yields, the quantity of water from the lakes will not be sufficient to meet projected demands. Wolfe City is projected to have a deficit of 30 ac-ft/yr in 2050, up to 271 ac-ft/yr in 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	1,719	2,136	2,703	3,484	4,598	6,217
Projected Water Demand	169	199	243	311	409	552
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	281	281	281	281	281	281
Projected Supply Surplus (+) / Deficit (-)	**112**	**82**	**38**	**-30**	**-128**	**-271**

Evaluation of Potentially Feasible Water Management Strategies:

Listed in the table below are the four strategies that were considered to meet water supply needs in Wolfe City. There are no significant current water needs that could be met by water reuse. Advanced conservation was not selected since per capita use is less than 140 gpcpd. While surface water options are available, these options were not investigated due to higher costs for the acquisition of surface supplies relative to the development costs for available groundwater supplies. The system has a number of surface water options, including connection to the City of Commerce, City of Greenville, and the proposed Ralph Hall Reservoir in Region C. Groundwater from the Woodbine Aquifer, Sulphur River Basin, was evaluated as a potentially cost effect approach for this entity.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annual Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Woodbine Aquifer, Sulphur Basin)	**323**	**$4,376,000**	**$465,000**	**$2,279**	**1**
Surface Water	**271**	**$2,910,914**	**$147,984**	**$3,794**	**1**

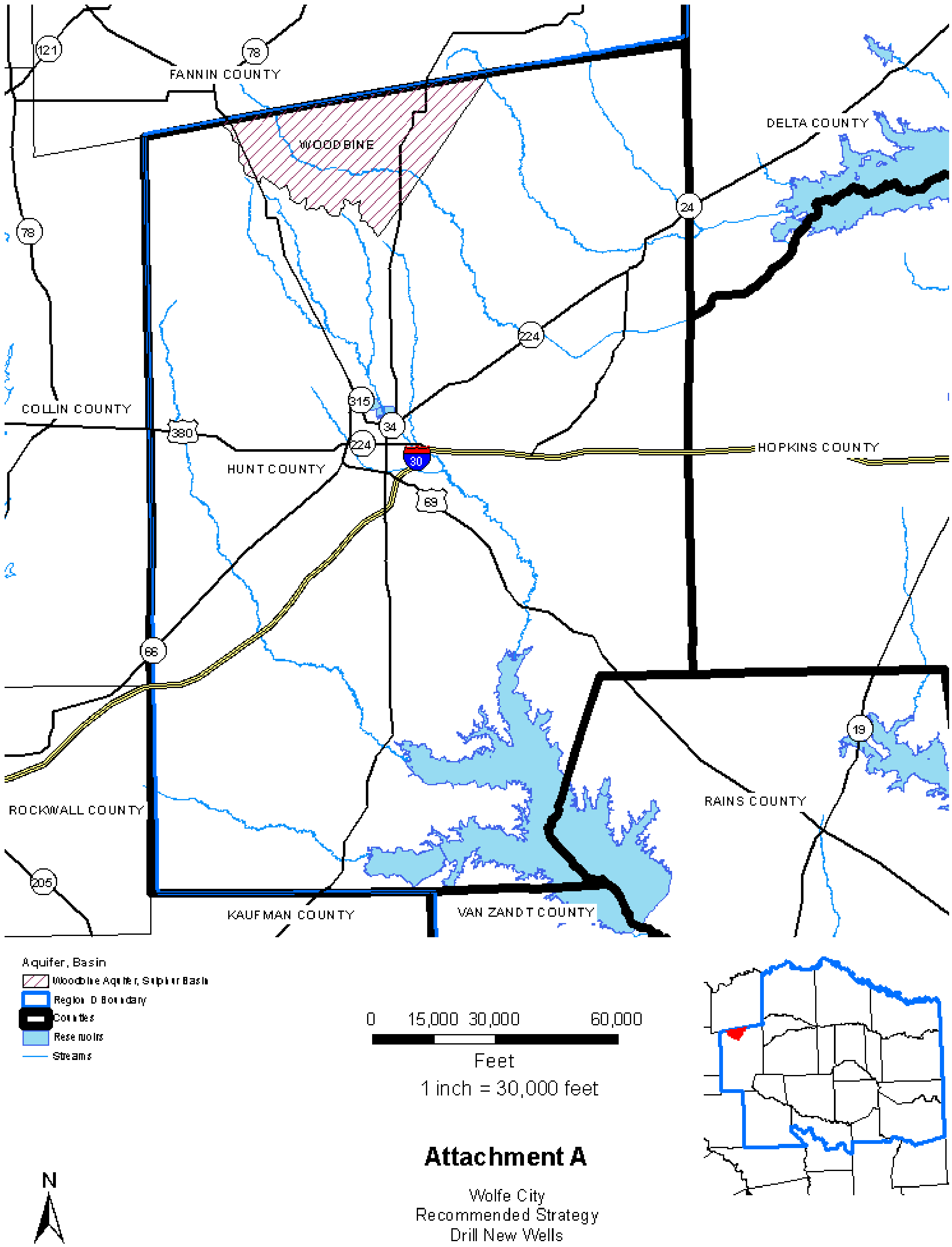
Recommendations:

	2010	2020	2030	2040	2050	2060
Drill New Wells (Woodbine Aquifer, Sulphur Basin; ac-ft/yr)	0	0	0	81	192	323

The recommended strategy for the City of Wolfe City to meet their projected deficit of 30 ac-ft/yr in 2050 and 271 ac-ft/yr in 2070 would be to construct up to 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 Woodbine Aquifer in Hunt County, Sulphur River Basin. Four wells with rated capacity of 150 gpm each would provide approximately 81 acre-feet each. The Woodbine Aquifer in Hunt County is projected to have a more than ample supply availability to meet the needs of the City of Wolfe City for the planning period.

This recommendation is made based on limited knowledge of firm yield of the Wolf City lakes. No in-depth studies were available indicating either the current firm yield of the reservoirs, or whether dredging or similar enhancements to the storage capacity could improve the firm yield. It is recommended that the City pursue such a study. The City currently operates its own surface water treatment to treat water from the existing local lakes. The firm yields were calculated using the approved WAM, Run 3, for the Sulphur River Basin, reflecting full demand from existing water rights and no return flows.

Given the increasing costs to comply with more stringent regulations and decreasing reliability of groundwater as a future supply source due to quality issues in this region, the NETRWPG supports efforts for this WUG evaluating the consideration of purchasing treated surface water from regional water providers in the future. Further study of this system is warranted, and supported by the NETRWPG for the purposes of the 2016 Plan.



Attachment A

Wolfe City
Recommended Strategy
Drill New Wells

Cost Estimate Summary
Water Supply Project Option
41518 Prices

Wolfe City - Drill New Wells (Hunt - Sulphur - Woodbine)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$2,755,000
TOTAL COST OF FACILITIES	**$2,755,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$964,000
Interest During Construction (4% for 1 years with a 1% ROI)	$132,000
TOTAL COST OF PROJECT	**$3,889,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$325,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$28,000
Pumping Energy Costs (76309 kW-hr @ 0.09 $/kW-hr)	$7,000
Purchase of Water (210 acft/yr @ 500 $/acft)	$105,000
TOTAL ANNUAL COST	**$465,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 3	204
Annual Cost of Water ($ per acft)	$2,279
Annual Cost of Water ($ per 1,000 gallons)	$6.99

JNS *3/31/2015*

REGION D
EVALUATIONS OF WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

LAMAR COUNTY

WUGs:

Lamar County-Other
Lamar County Irrigation
Lamar County Manufacturing
Lamar County Steam Electric

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EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF COUNTY-OTHER IN LAMAR COUNTY

Description of Water User Group:

Lamar County-Other is comprised of M-J-C, Pattonville and Petty WSCs. The WUG population is projected to be 2,707 in 2020 and 3,061 by the year 2070. The entities comprising this WUG are supplied by groundwater from the Trinity and Woodbine Aquifers, and purchased surface water from Lamar County WSD. In Lamar County, the County-Other WUG is projected to have a deficit of 67 ac-ft in 2020 and increasing to a deficit of 116 ac-ft by 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	2,707	2,813	2,891	2,962	3,016	3,061
Projected Water Demand	418	424	434	444	451	458
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	351	343	351	348	344	342
Projected Supply Surplus (+) / Deficit (-)	**-67**	**-81**	**-83**	**-96**	**-107**	**-116**

Projected Supply Surplus (+) / Deficit (-) by Basin	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Red	-46	-61	-61	-65	-69	-71
Sulphur	-21	-20	-22	-31	-38	-45
Total	**-67**	**-81**	**-83**	**-96**	**-107**	**-116**

Evaluation of Potentially Feasible Water Management Strategies:

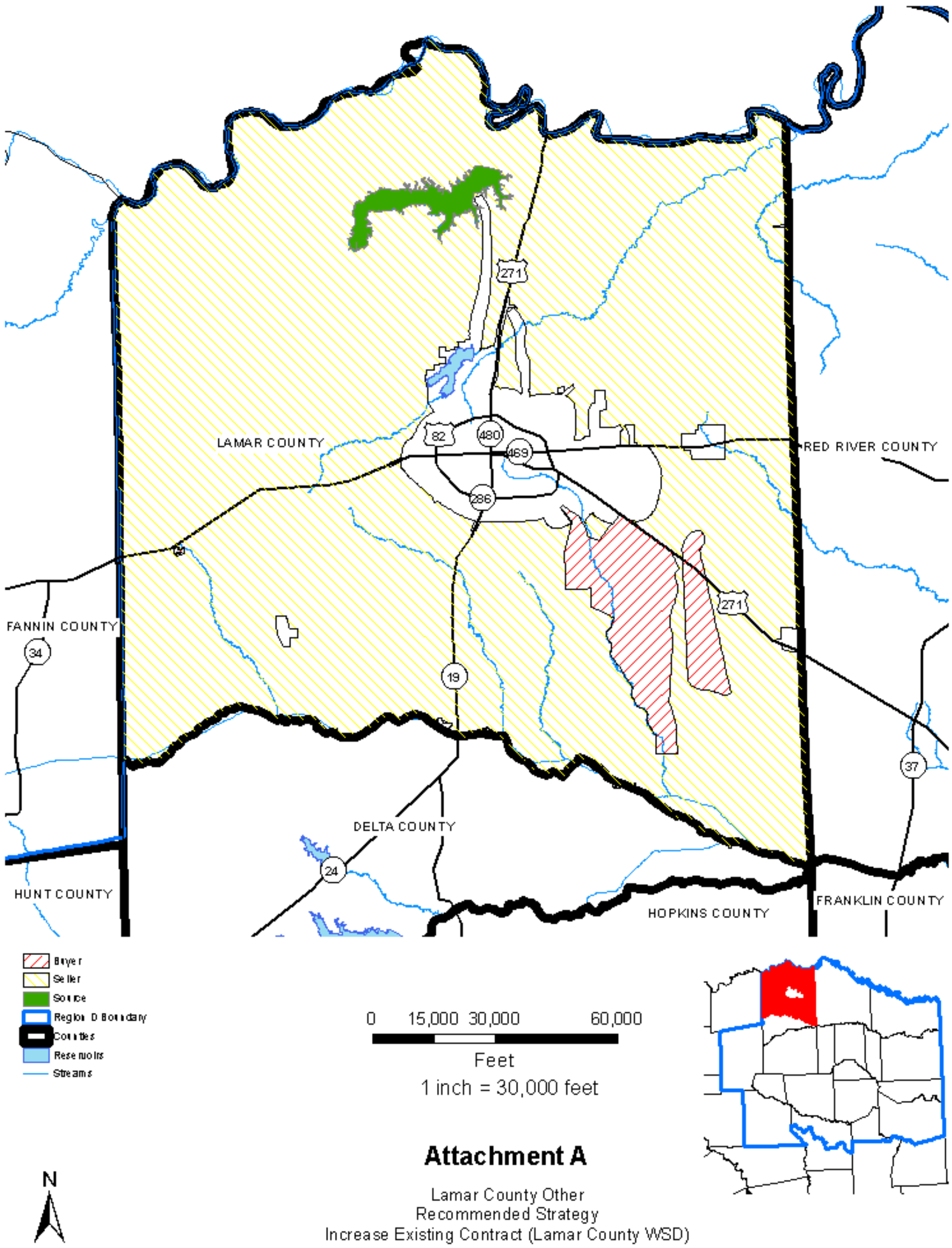
Five alternative strategies were considered to meet the WUG's water supply shortages. Advanced conservation was not selected because the WUG's overall supply is not projected to meet TCEQ regulatory minimums. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater from the Trinity Aquifer has been identified as a potential source of water for Lamar County Other. The purchase of surface water from Pat Mayse from Lamar County WSD has also been identified as a potential water supply source.

Strategy	**Firm Yield (ac-ft)**	**Total Capital Cost**	**Total Annualized Cost**	**Unit Cost**	**Environmental Impact**
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Trinity Aquifer, Red Basin)	**120**	**$1,610,000**	**$211,000**	**$1,758**	**1**
Increase Existing Contract (Lamar County WSD; Sulphur Basin)	**45**		**$73,000**	**$1,629**	**1**
Increase Existing Contract (Lamar County WSD; Red Basin)	**71**		**$116,000**	**$1,629**	**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
Increase Existing Contract (Lamar County WSD; Sulphur Basin; ac-ft/yr)	45	45	45	45	45	45
Increase Existing Contract (Lamar County WSD; Red Basin; ac-ft/yr)	71	71	71	71	71	71

The recommended strategy to meet Lamar County-Other needs is to increase the existing contract amounts with Lamar County WSD is the recommended strategy to meet Lamar County's County-Other needs.



Cost Estimate Summary
Water Supply Project Option
41518 Prices
Lamar County Other - Purchase Surface Water from Lamar Co WSD

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (116 acft/yr @ 1629.14 $/acft)	$189,000
TOTAL ANNUAL COST	**$189,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	116
Annual Cost of Water ($ per acft)	$1,629
Annual Cost of Water ($ per 1,000 gallons)	$5.00
JMP	*3/25/2015*

Cost Estimate Summary *Water Supply Project Option* *41518 Prices* *County Other - Lamar - Red - Trinity*	
Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518	
Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$1,152,000
TOTAL COST OF FACILITIES	**$1,152,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$403,000
Interest During Construction (4% for 1 years with a 1% ROI)	$55,000
TOTAL COST OF PROJECT	**$1,610,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$135,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$12,000
Pumping Energy Costs (45309 kW-hr @ 0.09 $/kW-hr)	$4,000
Purchase of Water (120 acft/yr @ 500 $/acft)	$60,000
TOTAL ANNUAL COST	**$211,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	120
Annual Cost of Water ($ per acft)	$1,758
Annual Cost of Water ($ per 1,000 gallons)	$5.40
KVA	*2/14/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF IRRIGATION IN LAMAR COUNTY

Description of Water User Group:

Irrigation WUG in Lamar County is projected to be supplied by surface water from run-of-river diversions from the Red River and groundwater from wells the Trinity and Woodbine Aquifers. Irrigation in Lamar County has a demand that is projected to decrease from 20,945 ac-ft/yr in 2020 to 20,622 ac-ft/yr in 2070. A deficit of 18,312 ac-ft/yr is projected to occur in 2020 and decrease to 18,302 ac-ft/yr by 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Projected Water Demand	20,945	20,879	20,813	20,748	20,684	20,622
Current Water Supply	2,633	2,571	2,508	2,446	2,385	2,320
Projected Supply Surplus (+)/Deficit(-)	**-18,312**	**-18,308**	**-18,305**	**-18,302**	**-18,299**	**-18,302**

Projected Supply Surplus (+)/Deficit(-) by Basin	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Red	-16,012	-15,941	-15,974	-15,921	-15,974	-15,942
Sulphur	-2,300	-2,367	-2,331	-2,381	-2,325	-2,360
Total	**-18,312**	**-18,308**	**-18,305**	**-18,302**	**-18,299**	**-18,302**

Evaluation of Potentially Feasible Water Management Strategies:

Twelve alternative strategies were considered to meet the Lamar County Irrigation WUG's water supply shortages. Advanced water conservation for irrigation practices were not considered in this planning effort, as present irrigation practices likely already incorporate many BMPs to extend water supplies, thus no additional conservation would be feasible. The use of reuse water from nearby municipalities is not considered feasible as it would not be effective to deliver reuse water to farm irrigation systems. Groundwater was identified as a potential source of water for irrigation in Lamar County. Due to limitations of availability, the Woodbine and Trinity aquifers will not cover all shortages. Surface water purchased from the City of Paris was considered as a viable supplement to groundwater in order to meet projected demands. Another potential alternative is to purchase all needed water from the City of Paris, or Lamar Co WSD via City of Paris.

Current plans are under consideration for the development of a potential new surface water permit for a diversion and two impoundments entirely located on private property. These plans are for the generation of firm supply for agricultural uses in Lamar County. As more information is acquired regarding these plans, this strategy may be further considered for the purposes of the Final 2016 Region D Plan, pending further discussions with the developer.

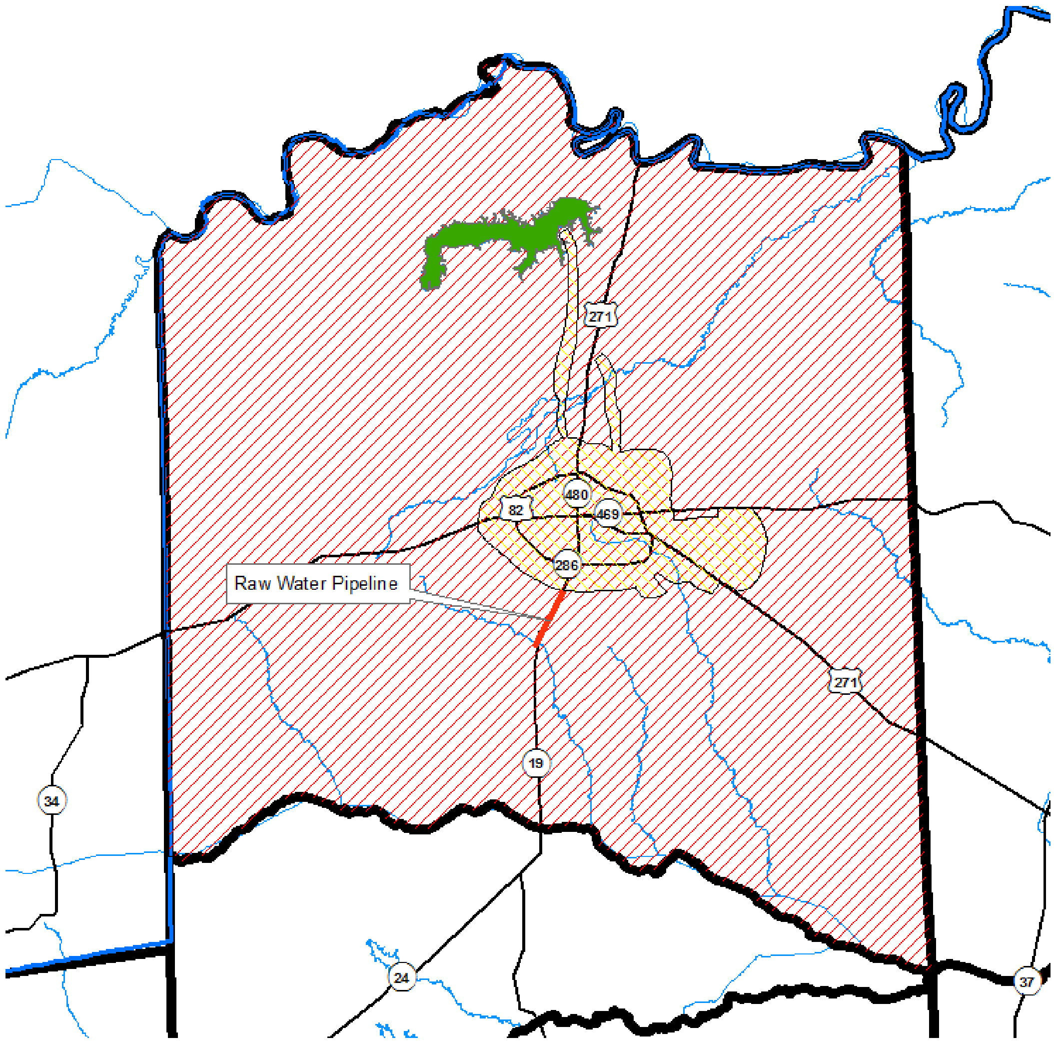
Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Env. Impact
Advanced Water Conservation					
Water Reuse					
Develop Trinity Aquifer (Red Basin)	**340**	**$1,139,000**	**$285,000**	**$838**	**1**
Develop Woodbine Aquifer (Sulphur Basin)	**165**	**$152,000**	**$99,000**	**$600**	**1**
Pat Mayse Raw Water Pipeline from Paris (Red Basin)	**15,672**	**$9,709,000**	**$5,091,000**	**$325**	**3**
Pat Mayse Raw Water Pipeline from Paris (Sulphur Basin)	**2,216**	**$5,432,000**	**$1,205,000**	**$544**	**3**
Pat Mayse Raw Water Pipeline from Paris	**18,312**	**$3,717,000**	**$4,705,000**	**$257**	**3**

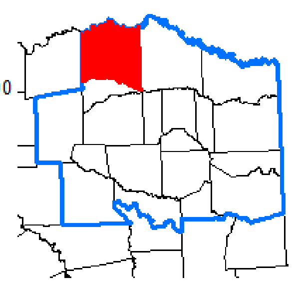
(Red/SulphurBasin)					
Treated Surface Water from Lamar Co WSD (Red Basin)	**15,672**		**$25,532,000**	**$1,629**	**3**
Treated Surface Water from Lamar Co WSD (Sulphur Basin)	**2,216**		**$3,610,000**	**$1,629**	**3**
Treated Surface Water from Lamar Co WSD (Red Basin)	**16,012**		**$26,086,000**	**$1,629**	**3**
Treated Surface Water from Lamar Co WSD (Sulphur Basin)	**2,381**		**$3,879,000**	**$1,629**	**3**

Recommendations:

	2020	**2030**	**2040**	**2050**	**2060**	**2070**
Pat Mayse Raw Water Pipeline from Paris (Red Basin) (ac-ft/yr)	16,012	15,941	15,974	15,921	15,974	15,942
Pat Mayse Raw Water Pipeline from Paris (Sulphur Basin) (ac-ft/yr)	2,300	2,367	2,331	2,381	2,325	2,360

The recommended strategy for the Lamar County Irrigation WUG to meet projected demands during the planning period is to purchase raw water from Pat Mayse and Crook Reservoirs through the City of Paris. The recommended raw water pipeline is a 30 inch pipeline from Pat Mayse. As more information is gained regarding current plans related to the development of a new surface water right for an impoundment (or impoundments) on private property for expansion of firm supplies for agricultural uses in Lamar County, that strategy may be further considered prior to development of the Final 2016 Region D Plan.





Attachment A

Lamar County Irrigation
Recommended Strategy
Pat Mayse Raw Water Pipeline

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Cost Estimate Summary
Water Supply Project Option
41518 Prices
Lamar County Irrigation - Pat Mayse Raw Water Pipeline (Paris)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Intake Pump Stations (0 MGD)	$2,610,000
TOTAL COST OF FACILITIES	**$2,610,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$914,000
Environmental & Archaeology Studies and Mitigation	$67,000
Interest During Construction (4% for 1 years with a 1% ROI)	$126,000
TOTAL COST OF PROJECT	**$3,717,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$311,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$65,000
Pumping Energy Costs (1713155 kW-hr @ 0.09 $/kW-hr)	$154,000
Purchase of Water (18312 acft/yr @ 228 $/acft)	$4,175,000
TOTAL ANNUAL COST	**$4,705,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	18,312
Annual Cost of Water ($ per acft)	$257
Annual Cost of Water ($ per 1,000 gallons)	$0.79
JMP	*4/6/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF MANUFACTURING IN LAMAR COUNTY

Description of Water User Group:

Manufacturing in Lamar County has a demand that is projected to increase from 6,427 ac-ft/yr in 2020 to 8,338 ac-ft/yr in 2070. Manufacturing WUG in Lamar County is projected to be supplied by direct reuse and surface water purchased from the City of Paris and Lamar County WSD. A deficit of 565 ac-ft/yr is projected to occur in 2020, increasing to 951 ac-ft/yr by 2070 in the Sulphur River Basin. No shortages are projected within the Red River Basin.

Water Supply and Demand Analysis:

Red River Basin	2020	2030	2040	2050	2060	2070
Projected Water Demand	771	809	845	877	937	1,001
Current Water Supply	870	912	953	988	1054	1,089
Projected Supply Surplus (+)/Deficit(-)	99	103	108	111	117	88

Sulphur River Basin	2020	2030	2040	2050	2060	2070
Projected Water Demand	5,656	5,932	6,200	6,429	6,868	7,337
Current Water Supply	5,091	5,340	5,580	5,787	6,183	6,386
Projected Supply Surplus (+)/Deficit(-)	-565	-592	-620	-642	-685	-951

Evaluation of Potentially Feasible Water Management Strategies:

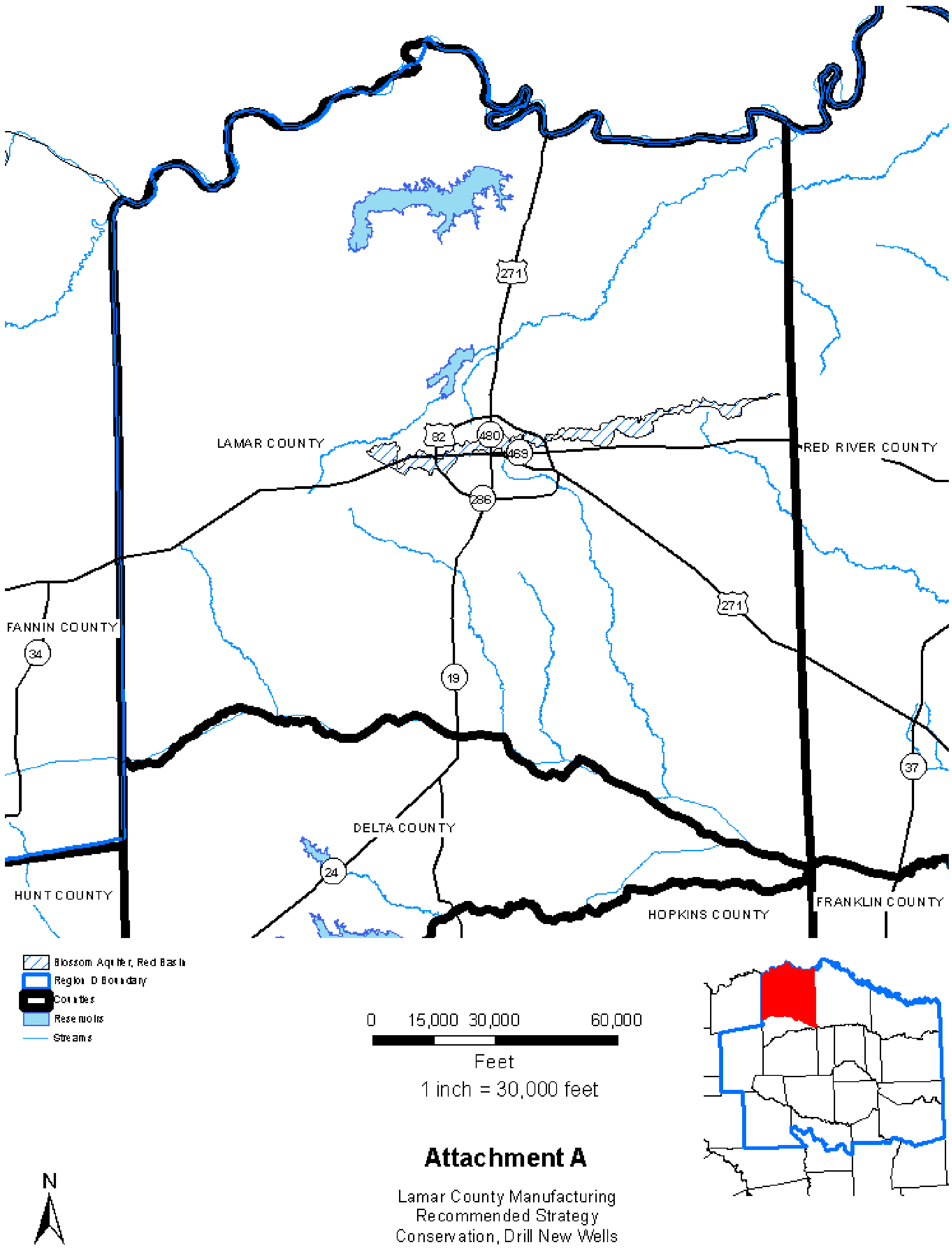
Seven alternative strategies were considered to meet the Lamar County Manufacturing WUG's water supply shortages. Advanced water conservation for manufacturing was considered in this planning effort, to reduce overall demands; however, application of this strategy would not resolve all identified needs. The use of reuse water from nearby municipalities was not considered, and direct reuse of existing manufacturing supplies is already occurring. Groundwater has been identified as a potential source of water for manufacturing in Lamar County. Surface water purchases from the City of Paris and Lamar County WSD were considered as potential strategies as well.

Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation	834	$0	$0	$0	1
Water Reuse					
Drill New Wells (Blossom, Red)	120	$76,000	$68,000	$567	1
Surface Water (City of Paris)	117		$152,900	$1,307	1
Surface Water (Lamar Co WSD)	117		$191,000	$1,629	1
Surface Water (City of Paris)	951		$1,243,000	$1,307	1
Surface Water (Lamar Co WSD)	951		$1,549,000	$1,629	1

Recommendations:

	2020	2030	2040	2050	2060	2070
Advanced Water Conservation (ac-ft/yr)	565	592	620	642	685	834
Drill New Wells (Blossom, Red) (ac-ft/yr)	0	0	0	0	0	120

The recommended strategy for the Lamar County Manufacturing WUG to meet projected demands during the planning period is to implement advanced water conservation through industrial water auditing, where possible, and develop additional groundwater wells in the Blossom Aquifer in the Red River Basin, as this would be the cost-effective solution, and allow surface water supplies to be available for other demands in the region.



Cost Estimate Summary
Water Supply Project Option
41518 Prices
Manufacturing - Lamar - Red - Blossom

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$54,000
TOTAL COST OF FACILITIES	**$54,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$19,000
Interest During Construction (4% for 1 years with a 1% ROI)	$3,000
TOTAL COST OF PROJECT	**$76,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$6,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$1,000
Pumping Energy Costs (6813 kW-hr @ 0.09 $/kW-hr)	$1,000
Purchase of Water (120 acft/yr @ 500 $/acft)	$60,000
TOTAL ANNUAL COST	**$68,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	120
Annual Cost of Water ($ per acft)	$567
Annual Cost of Water ($ per 1,000 gallons)	$1.74

KVA *2/14/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF STEAM ELECTRIC IN LAMAR COUNTY

Description of Water User Group:

The Steam Electric WUG in Lamar County has a demand that is projected to grow from a demand of 8,503 ac-ft/yr in 2020 to 19,529 ac-ft/yr in 2070. Steam electric is projected to have a deficit of 980 ac-ft/yr in 2030 and increasing to a deficit of 10,568 ac-ft/yr in 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Projected Water Demand	8,503	9,941	11,694	13,831	16,435	19,529
Current Water Supply	8,961	8,961	8,961	8,961	8,961	8,961
Projected Supply Surplus (+)/Deficit(-)	**458**	**-980**	**-2,733**	**-4,870**	**-7,474**	**-10,568**

Evaluation of Potentially Feasible Water Management Strategies:

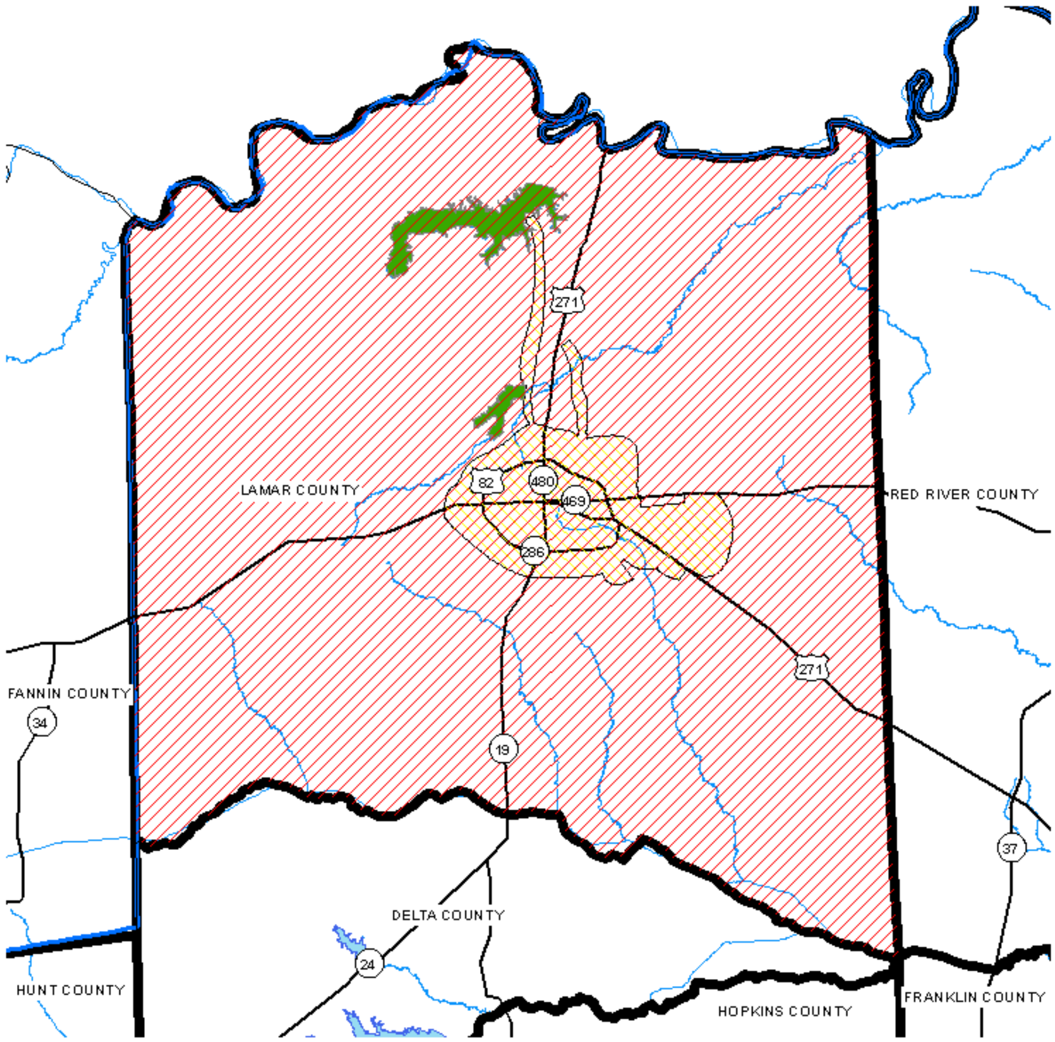
Seven alternative strategies were considered to meet the Hunt County Steam Electric WUG's water supply shortages. In this round of planning, advanced water conservation was not considered as a water management strategy as the majority of steam electric plants and future plants intend to operate with all possible water conservation processes practicable. Groundwater was identified as a potential source of water for steam electric power in Lamar County. However, due to the limited availability of these groundwater sources, these aquifers will not be able to provide sufficient supply to meet the identified shortages. For this reason, groundwater development was not considered a viable strategy. Surface water from Pat Mayse Reservoir purchased from the City of Paris was considered as a viable supplement to the groundwater sources to meet projected demands. Alternatively, surface water from Pat Mayse Reservoir purchased from the City of Paris was considered as a potential strategy to meet all steam electric needs.

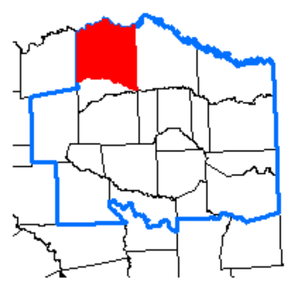
Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Develop Blossom Aquifer (Red Basin)	**200**	**$304,000**	**$128,000**	**$640**	**1**
Develop Blossom Aquifer (Sulphur Basin)	**70**	**$148,000**	**$48,000**	**$686**	**1**
Develop Nacatoch Aquifer (Sulphur Basin)	**165**	**$392,000**	**$286,000**	**$1,733**	**1**
Increase Existing Contract	**10,133**		**$1,651,000**	**$163**	**1**
Increase Existing Contract	**10,568**		**$1,722,000**	**$163**	**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
Increase Existing Contract (Paris) (ac-ft/yr)	0	1,415	2,733	4,870	7,474	10,568

The recommended strategy for the Lamar County steam electric WUG to meet projected demands during the planning period is to purchase raw water from the City of Paris's Pat Mayse Lake.





Attachment A

Lamar County Steam Electric
Recommended Strategy
Increase Existing Contract (Paris)

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Lamar County Steam Electric - Raw Water Purchase from City of Paris

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (10568 acft/yr @ 162.91 $/acft)	$1,722,000
TOTAL ANNUAL COST	**$1,722,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	10,568
Annual Cost of Water ($ per acft)	$163
Annual Cost of Water ($ per 1,000 gallons)	$0.50

JMP *3/31/2015*

REGION D
EVALUATIONS OF WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

MARION COUNTY

WUGs:

Marion County Mining

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EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS MINING IN MARION COUNTY

Description of Water User Group:

The Mining WUG in Marion County is a split entity and has a demand that is projected to be decreasing from 489 ac-ft/yr in 2020 to 393 ac-ft/yr in 2070. Mining in Marion County has a current water supply consisting of water wells from the Carrizo-Wilcox Aquifer. The total rated available supply from these sources is 116 ac-ft/yr. Mining in Marion County is projected to have a water supply deficit of 373 ac-ft/yr in 2020 increasing to 645 in 2030 then decreasing to a deficit of 265 ac-ft/yr in 2070 for the Cypress River Basin portion of Marion County.

Water Supply and Demand Analysis:

Mining Harrison Cypress	2020	2030	2040	2050	2060	2070
Projected Water Demand	489	764	712	595	478	393
Current Water Supply	116	119	122	124	126	128
Projected Supply Surplus (+)/Deficit(-)	-373	-645	-590	-471	-352	-265

Evaluation of Potentially Feasible Water Management Strategies:

Three alternative strategies were considered to meet the Marion County Mining water supply shortages as summarized in the following table. Advanced conservation and water reuse was not considered because operational procedures for the existing mines is not available. Surface water alternatives were omitted since there is not a supply source within close proximity to the county with available supply.

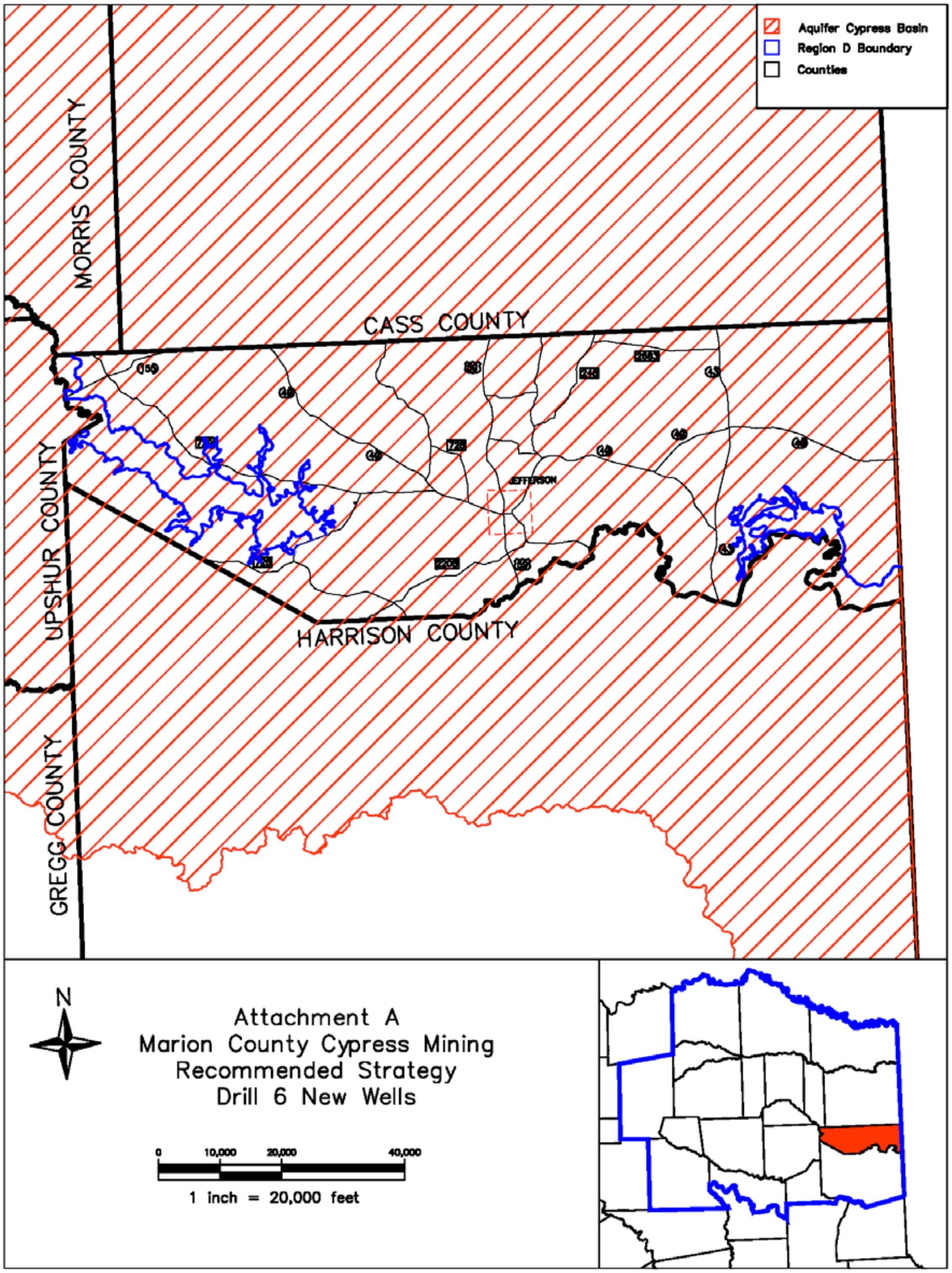
Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Carrizo-Wilcox, Cypress Basin)	**648**	**$1,569,000**	**$153,000**	**$236**	**1**
Surface Water					

Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Carrizo-Wilcox, Cypress Basin; ac-ft/yr)	432	648	648	648	648	648

The recommended strategy for the Marion County Mining to meet their projected deficit of 373 ac-ft/yr in 2020 and 645 ac-ft/yr in 2050 in the Cypress Basin would be to construct additional water wells similar to their existing wells just prior to each decade as the deficits occur till 2030. The recommended supply source will be the Carrizo-Wilcox Aquifer in Marion County. Six wells with rated capacity of 200 gpm each would provide approximately 108 acre-feet each or 648 ac-ft/yr. The Carrizo-Wilcox Aquifer in Marion County is projected to have a more than ample supply availability to meet the needs of the Mining in Marion County 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.


Aquifer Cypress Basin
Region D Boundary
Counties
MORRIS COUNTY
CASS COUNTY
UPSHUR COUNTY
HARRISON COUNTY
GREGG COUNTY
JEFFERSON
N
Attachment A
Marion County Cypress Mining
Recommended Strategy
Drill 6 New Wells
0
10,000
20,000
40,000
1 inch = 20,000 feet

Cost Estimate Summary
Water Supply Project Option
41518 Prices

Mining Marion Cypress - Drill New Wells (Marion - Cypress - Carrizo Wilcox)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$1,087,000
TOTAL COST OF FACILITIES	**$1,087,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$381,000
Environmental & Archaeology Studies and Mitigation	$38,000
Interest During Construction (4% for 1 years with a 1% ROI)	$53,000
TOTAL COST OF PROJECT	**$1,559,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$130,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$11,000
Pumping Energy Costs (136394 kW-hr @ 0.09 $/kW-hr)	$12,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$153,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	648
Annual Cost of Water ($ per acft)	$236
Annual Cost of Water ($ per 1,000 gallons)	$0.72
JTS	*11/6/2015*

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REGION D
EVALUATIONS OF WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

MORRIS COUNTY

WUGs:

Morris County Manufacturing

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EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS MANUFACTURING IN MORRIS COUNTY – CYPRESS

Description of Water User Group:

The Manufacturing WUG in Morris County has a demand that is projected to be increasing from 95,931 ac-ft/yr in 2020 to 130,868 ac-ft/yr in 2070. Manufacturing in Morris County has a current water supply consisting of water wells from the Queen City Aquifer, surface water from Ellison Creek Reservoir, Reuse, and contracts with Northeast Texas MWD for surface water from Ellison Creek Reservoir and Lake O' the Pines. The total rated available supply from these sources is 122,334 ac-ft/yr. Manufacturing in Morris County is projected to have a water supply surplus of 39,012 ac-ft/yr in 2020 decreasing to a deficit of 2,763 ac-ft/yr in 2070.

Water Supply and Demand Analysis:

Mining Harrison Sabine	2020	2030	2040	2050	2060	2070
Projected Water Demand	95,931	102,101	107,795	112,420	121,294	130,868
Current Water Supply	134,943	129,517	124,201	125,457	134,331	128,105
Projected Supply Surplus (+)/Deficit(-)	39,012	27,416	16,406	13,037	13,037	-2,763

Evaluation of Potentially Feasible Water Management Strategies:

Three alternative strategies were considered to meet the Harrison County Manufacturing water supply shortages as summarized in the following table. Advanced conservation was assumed to yield 10 percent of Demand and generates sufficient savings to satisfy the projected shortage. Water reuse was not considered because it is already being employed. Groundwater alternatives were omitted since surface water is already being utilized.

Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation	**13,087**	**$0**	**$0**	**$0**	**1**
Water Reuse					
Groundwater					
Surface Water					

Recommendations:

	2020	2030	2040	2050	2060	2070
Advanced Water Conservation (ac-ft/yr)	9,593	10,210	10,780	11,242	12,129	13,087

The recommended strategy for the Morris County Manufacturing to meet their projected deficit of 2,763 ac-ft/yr in 2070 would be to employ Advanced Water Conservation measures for the planning period, which is projected to save 13,087 ac-ft/yr in 2070.

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REGION D
EVALUATIONS OF WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

RAINS COUNTY

WUGs:

None

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REGION D
EVALUATIONS OF WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

RED RIVER COUNTY

WUGs:

The City of Clarksville
Red River County-Other
Red River County Irrigation
Red River County Manufacturing

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EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF CITY OF CLARKSVILLE

Description of Water User Group:

The City of Clarksville is located in Red River County. The system is projected to serve 3,315 people through the planning period. The current sources of supply are wells into the Blossom Aquifer, mixed with surface water from Langford Lake. Water quality issues with the groundwater (TDS) and surface water (turbidity) necessitate mixing of the supplies to meet Texas drinking water standards. The groundwater has over 1,000 ppm of dissolved solids including high levels of sodium, sulfate, and chloride. The City provides water to its own customers in the Sulphur basin and is projected to have a water supply deficit of 593 ac-ft/yr in 2040, due to sedimentation issues in Langford Lake. As the surface water supply for the City diminishes, the capability to mix the surface supply with the groundwater supply commensurately diminishes as well. Thus as surface supply diminishes, so too does the capability to utilize the City's existing groundwater supply. As noted in a 4 October, 2013 memorandum from the City's consultant, Murray, Thomas & Griffin, Inc. (MTG):

> "Clarksville has no available surface water when a water level of 417.0 (2006 low water level) and a sediment level at 415.0 (2013 lake bottom) are considered. Each of these conditions has occurred during the past ten years. The surface water is necessary to address total volume needs as well as for blending with the ground water."

The system does have a water conservation and drought management plan in place. A location map is included as Attachment A.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	3,315	3,315	3,315	3,315	3,315	3,315
Projected Water Demand	620	602	593	592	591	591
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	916	660	0	0	0	0
Projected Supply Surplus (+) / Deficit (-)	**296**	**58**	**-593**	**-592**	**-591**	**-591**

Evaluation of Potentially Feasible Water Management Strategies:

The various feasible strategies considered to meet Clarksville's water supply shortages are listed in the table below. Advanced conservation was not selected because Clarksville's supply would not be projected to meet TCEQ regulatory minimums. Furthermore, reduction in demand would not alleviate the aforementioned water quality issues with the City's projected supplies. There are no significant current water needs in Clarksville that could be met by water reuse. Additional pumping (five additional wells) from the Nacatoch Aquifer in the Sulphur River Basin and Reverse Osmosis treatment of all of the City's existing groundwater supplies has also been considered. The City's existing surface water supply is rapidly decreasing due to sedimentation issues in Langford Lake, the City's sole existing surface water supply. The City has requested the consideration of multiple potential surface water strategies to meet Clarksville's water supply needs. Potentially feasible strategies evaluated include:

- Treated Water Pipeline to DeKalb - purchasing water from the City of Texarkana's available supply from Wright Patman Reservoir;
- Dredging of sediment from Langford Lake;
- Construction of a new surface water reservoir, Dimple Reservoir;
- Construction of a raw water pipeline tying into to Region C's proposed Marvin Nichols Reservoir.
- Treated Water Pipeline to Detroit - purchasing water from the City of Paris (via Lamar County WSD) from Paris available supply.

The projected amount of firm supply necessary to meet the above projected demands differ due to the City's current methodology of mixing their surface and groundwater supplies at a ratio of 51%.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annual Cost	Unit Cost (During Debt Service)	Unit Cost (After Debt Service	Env. Impact
Advanced Water Conservation						
Water Reuse						
Drill Additional Wells and RO Treatment	**388**	**$7,878,000**	**$1,457,000**	**$3,755**	**$2,058**	**3**
Raw Water Pipeline to Marvin Nichols Reservoir (ac-ft/yr)						
Contract with Lamar County WSD	**303**	**$10,506,000**	**$1,513,000**	**$4,993**	**$2,092**	**3**
Contract with Texarkana and Treated Water Pipeline to DeKalb (ac-ft/yr)	**303**	**$10,053,000**	**$1,178,000**	**$3,888**	**$1,115**	**3**
Dredge Langford Lake (ac-ft/yr)	**303**	**$12,149,000**	**$1,017,000**	**$3,356**	**$0**	**4**
Dimple Reservoir (ac-ft/yr)	**303**	**$33,906,000**	**$2,545,000**	**$8,399**	**$757**	**5**

Description of evaluated projects

Raw Water Pipeline to Marvin Nichols Reservoir – The City of Clarksville has requested that their top priority for consideration as a water management strategy be a pipeline tying into Region C's water management strategy for the construction of Marvin Nichols Reservoir (as it is reported in the Sulphur River Basin Feasibility Study, SRBA 2014, that 20% of the water potentially available from Marvin Nichols Reservoir would be available for local use in Region D). Preliminary communications with Region C have indicated that this strategy is currently under consideration as a Proposed or Alternative Water Management Strategy for implementation by the year 2050 in the 2016 Region C Water Plan. As Region D has identified that the City of Clarksville has needs as early as 2040, Marvin Nichols as currently envisioned by Region C would not be available to meet the City's identified needs. Furthermore, the North East Texas Regional Water Planning Group opposes the construction of any reservoir in the Sulphur River Basin, and does not recommend this as a Recommended or Alternative Water Management Strategy. However, the City of Clarksville has noted that should this source be available during the planning period, it has reserved the right to work with the Sulphur River Basin Authority and to utilize this source once available.

New Groundwater Wells and Treatment Facility **–** A planning level analysis was performed to evaluate a strategy including the addition of new wells into the Nacatoch Aquifer, Sulphur River Basin, in Red River County, and additional treatment of all of the City's groundwater supplies to address the aforementioned water quality issues. The available yield from the project was determined to be 388 ac-ft/yr. This was the amount calculated to be necessary to meet the projected future demands for the City, once added to Clarksville's existing groundwater supplies. It is thus critical to note that consideration of this strategy is for the entire 593 ac-ft/yr of supply necessary to meet the City's projected demands. The planning process strictly considers the amount of supply necessary to meet the projected shortage, i.e., 388 ac-ft/yr, and uses this amount as the basis for cost estimation purposes. Nevertheless, the strategy would be for the development of sufficient groundwater sources to meet the full 591 ac-ft/yr of projected City demands. It has been assumed for this strategy that existing groundwater wells of the City's are maintained.

Additional assumptions for this analysis included assuming Total Dissolved Solids (TDS) of 1,275 mg/L, and that two Reverse Osmosis (RO), Level 4 treatment plants would be located at the end of a 5-mile, 8-inch transmission line sized sufficiently to carry the full flow of pre-treated water, since when brackish water is treated, approximately 20% of the supply is lost as concentrate. An average of nearby depth (650 ft.) and head (250 ft.) of wells was utilized to calculate the potential number of wells needed (seven new wells). For an assumed distance between wells of 1,500 ft., a total length of 5,250 ft. of 6-in. diameter well field piping was estimated. For the pipeline, 30 psi was assumed for the residual head at the end of the pipe, with a maximum pipeline pressure of 150 psi. Difference in elevation was assumed to be 50 ft. A pump efficiency of 0.72 and a peaking factor of 2 was assumed to calculate the necessary energy at 17,885 kWh. The treatment facilities would be of sufficient size (0.7 mgd) to treat the entirety of Clarksville's groundwater supply, both existing and proposed wells.

The TWDB's Unified Costing Model (UCM) was used to develop costs for this strategy. The total capital cost of the project is calculated to be approximately $7,878,000, with an annual cost of $1,457,000, for a unit cost during debt service of $3,755 per ac-ft ($11.52 per 1,000 gallons). After debt service, the unit cost would be approximately $2,058 per ac-ft.

Contract with Lamar County WSD and Treated Water Pipeline to Detroit - A strategy requested by the City of Clarksville is the construction of a 16" diameter pipeline from Clarksville to Detroit, and the purchase of up to 2 MGD of treated water from the Lamar County WSD. This strategy would be contingent upon the Lamar County WSD purchase of equivalent supply from the City of Paris. Cost estimates are based upon the TWDB's Unified Costing Model (UCM). The project is estimated to provide 303 ac-ft/yr by constructing a pipeline to Detroit, whereby the City of Clarksville would enter into a contract with the Lamar County WSD (contingent upon the District contracting for available supply from the City of Paris). This amount provides the surface water supply necessary for mixing with the City's existing groundwater supply, for a total project cost of $10.5 million, an annual cost of $1.5 million, and a unit cost for the additional supply of $4,993 per ac-ft. during debt service and $2,092 per ac-ft after debt service. Identifying uses for the additional production capability of the pipeline (up to 2 MGD) would likely lower the unit cost for this strategy.

Contract with Texarkana and Treated Water Pipeline to De Kalb – Another strategy previously requested by the City of Clarksville is the construction of a 16" diameter pipeline from Clarksville to De Kalb, and the purchase of up to 2 MGD of treated water from Texarkana. This project is based on a cost estimate developed by Riverbend Water Resources District, along with a similar project cost estimate from MTG Engineers. The total cost, annual cost, and unit cost of water from the project has been estimated based upon the results of these studies, as entered into the TWDB's Unified Costing Model (UCM). The project is estimated to have a total yield of 2,240 ac-ft/yr of supply by constructing a pipeline to De Kalb, whereby the City of Clarksville would enter into a contract with the City of Texarkana (or alternatively Riverbend Water Resources District) for up to 593 ac-ft/yr (0.53 MGD). The amount necessary to meet Clarksville's projected needs is 303 ac-ft/yr (0.27 MGD) This amount provides the surface water supply necessary for mixing with the City's existing groundwater supply, for a total project cost of $10.1 million, an annual cost of $2.5 million, and a unit cost for the additional supply of $3,891 per ac-ft. during debt service and $1,115 per ac-ft after debt service. Identifying uses for the additional production capability of the pipeline (up to 2 MGD) would likely lower the unit cost for this strategy.

Concerns about this strategy are with regard to present issues entailing the supply of Wright Patman Reservoir to Texarkana and the remaining Member Cities of Riverbend Water Resources District. Concerns regarding the priority of a new contract for Clarksville for treated water supply from Texarkana/Riverbend are somewhat ameliorated due to the fact that in times of drought, Texarkana's 2012 Water Conservation & Drought Contingency Plan specifies that curtailment of water deliveries to wholesale customers will be done by a pro-rata method as provided in Texas Water Code, §11.039. Furthermore, the amounts of supply considered within the 2016 North East Texas Regional Water Plan are based upon firm yields developed employing the TCEQ Water Availability Model, and reflect legal and infrastructure constraints to identify the amount of available supply. It is expected that costs association with this strategy would be negotiated between the City of Clarksville and Texarkana/Riverbend, as the City of Clarksville has expressed the interest in entering into a water supply relationship as a partner with these entities. This strategy, if implemented, would be contingent upon water management strategies identified for Texarkana and the remaining Riverbend Member Cities.

Dredge Langford Lake – As noted previously, the firm yield of Langford Lake decreases over time due to sedimentation in the reservoir reducing the total volume of conservation capacity. This strategy would entail the dredging of sediment from Langford Lake to restore storage capacity within the reservoir which has been lost due to this sedimentation. This project utilizes a 24" dredge to remove an estimated 3,000 ac-ft of sediment over a one-year calendar period. The unit cost of reservoir dredging, in units of dollars per ac-ft of sediment removed, has been calculated based upon a formula from the World Bank, as presented in the TWDB Report *Dredging vs. New Reservoirs* (2004). The resultant calculated cost was entered into the UCM to determine the debt service cost. The project is estimated to yield 520 ac-ft of firm supply by dredging an estimated total of 3,000 ac-ft of sediment from Langford Lake over one year, for a total project cost of $22.7 million, an annual cost of $1.9 million, and a unit cost of $3,658 per ac-ft. during debt service and $0 per ac-ft after debt service.

Concerns with this strategy include the location and impacts from disposition of dredged material, the efficiency of removal of the dredged material, and the potential need to repeat the effort in the future since dredging does not remove the source of sedimentation issues in the contributing watershed. As noted in TWDB (2005), issues with regard to dredging fall into four general categories: removal of the sediment, transportation, disposal, and re-use.

For the removal of sediment, dredging reservoirs, particularly at the shallow headwaters and reservoir margins can destroy habitats and affect wetland birds, etc. If the water sustains flora or fauna of particular value, or if fish issues are important, then issues exist regarding lowering the water level. Dredging may also result in a temporary loss of reservoir water quality, through removal of organic material, although there may be long-term improvements in the reservoir water quality through removal of such organic material. Downstream water quality may also be temporarily impacted due to dredging. There may also be a loss of land for containment areas to drain/treat the sediment.

Regarding transportation, reservoirs are often in remote areas. The impact of additional transportation during dredging can place pressure on local communities (e.g., noise/air pollution and physical damage to roads), although these impacts may be reduced if the sediment can be effectively dewatered at or near the reservoir site using, for example, a hydrocyclone and/or a filter bed press. The viability of disposal to land depends on the level of contaminants, whereby there may be risks to groundwater supplies from contamination by leaching.

Opportunities for the re-use of dredged material include sand/gravel/bricks for the construction industry, fertilizer, usage for filling abandoned quarry areas or mines, and usage for capping landfill sites.

Dimple Reservoir **–** The City has also identified a feasible strategy to meet future water supply needs as being the construction of a new 28,541 ac-ft reservoir with a projected surface are of 2,230 acres on White Oak Bayou, a tributary of Pecan Bayou, to be utilized as an interbasin transfer from the Red River Basin to the Sulphur River Basin. This reservoir project was originally described in a 1986 report from HDR to the Red River Authority and project participants, entitled *Preliminary Engineering Report for Proposed Dimple Reservoir Project on White Oak Bayou*. The 1986 report identified a potential project site, reservoir area capacity, drainage area, and estimated construction costs for the reservoir and intake structure without equipment. Intake structure equipment and water pipelines from the reservoir were not included in the report, nor was a cost estimate. This site is described in Section 8.9.5 of the 2016 Region D Plan, although it has not been recommended as a unique reservoir site by the NETRWPG for the present round of regional planning.

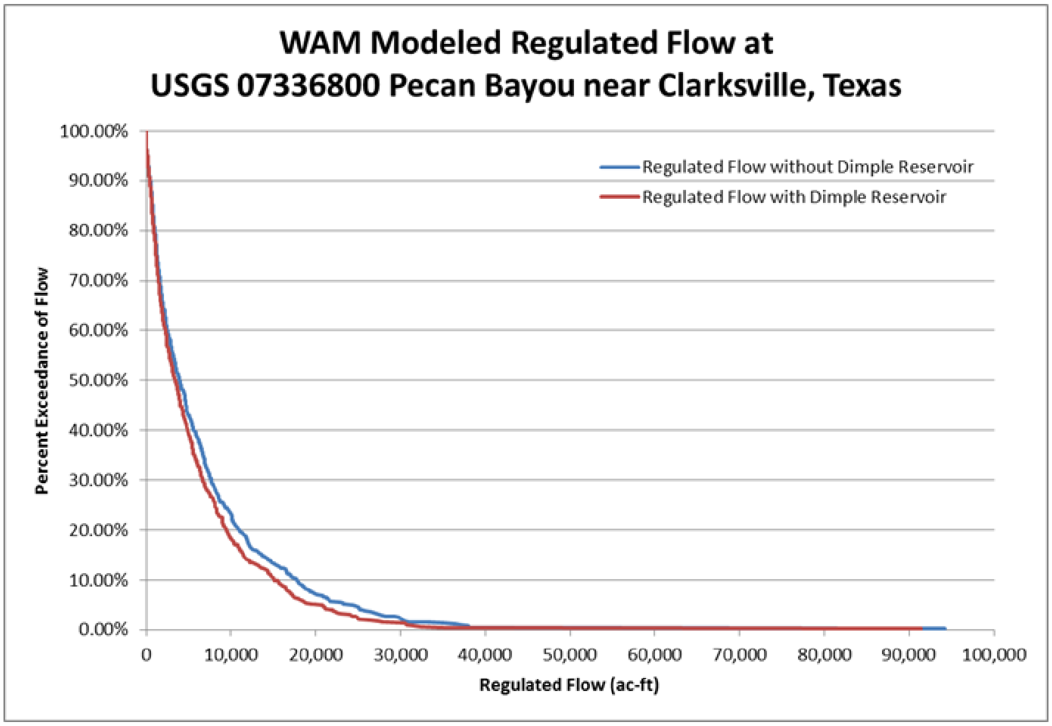
The reservoir construction costs from the 1986 report have been adjusted to September 2013 costs using the ENR Construction Cost Index (CCI) and entered into the UCM. Intake equipment and a raw water pipeline from the reservoir to the City of Clarksville's water treatment plant have also been preliminarily identified and included in the UCM. The raw water pipeline in the UCM is modeled to deliver the estimated firm yield with a peaking factor of 2. The project pipeline is 8" diameter, and approximately 8 miles long, following existing roadways with an elevation increase of 40 feet. The pipeline costing utilizes the UCM's assumption of 15 psi for the residual head at End of Pipe for raw water and assumes a maximum pipeline pressure of 250 psi. UCM calculations for pump and power requirements provide the cost estimate for the intake equipment. For the 2016 planning process, the reservoir has been modeled in the Red River WAM (Run 3), subject to consensus environmental criteria at a junior priority date, and modeled considering the full demand of existing water rights in the Red River Basin. The results of this WAM analysis indicate the project has a firm yield of 10,200 ac-ft per year, although Clarksville needs only 303 ac-ft/yr to have adequate supply to mix with the City's groundwater supplies to meet its projected needs beyond 2040. However, the City intends to use up to 593 ac-ft/yr to meet its full projected demands. This strategy includes constructing a new 28,541 ac-ft reservoir and 8" pipeline to Clarksville's WTP, for a total project cost of $33.9 million with an annual cost of $2.5 million and a unit cost for the needed supply of $8,399 per ac-ft. with debt service and $757 per ac-ft without debt service. It should be noted, however, that Dimple Reservoir, as envisioned herein, is based on existing studies (from 1986) and characterizations of the impoundment. Studies investigating alternative configurations, perhaps using a smaller footprint, are encouraged. Furthermore, needs from additional entities, if identified as willing participants to such an effort, could improve the unit costs calculated for Clarksville herein.

Concerns with this strategy include the potential need for obtaining a surface water permit for an interbasin transfer from the Red River Basin to the Sulphur River Basin. However, there is the potential that this could be waived given the project is located within the same county as the proposed use. The Texas Water Code §11.085 identifies factors to be considered in the applicable regional water plans to address the following:

(A) the availability of feasible and practicable alternative supplies in the receiving basin to the water proposed for transfer;
(B) the amount and purposes of use in the receiving basin for which water is needed;
(C) proposed methods and efforts by the receiving basin to avoid waste and implement water conservation and drought contingency measures;
(D) proposed methods and efforts by the receiving basin to put the water proposed for transfer to beneficial use;
(E) the projected economic impact that is reasonably expected to occur in each basin as a result of the transfer; and
(F) the projected impacts of the proposed transfer that are reasonably expected to occur on existing water rights, instream uses, water quality, aquatic and riparian habitat, and bays and estuaries that must be assessed under Sections 11.147, 11.150, and 11.152 of this code in each basin. If the water sought to be transferred is currently authorized to be used under an existing permit, certified filing, or certificate of adjudication, such impacts shall only be considered in relation to that portion of the permit, certified filing, or certificate of adjudication proposed for transfer and shall be based on historical uses of the permit, certified filing, or certificate of adjudication for which amendment is sought;

The other alternatives considered herein present available alternatives in the receiving basin to the water proposed for transfer. The water would be used for municipal purposes. The City maintains its Water Conservation and Drought Contingency Plan, implementing measures identified therein to avoid waste and conserve water during times of drought. Minimal economic impact is expected in the Red River Basin, whereas positive economic benefits may occur by maintaining the City's municipal supply. As noted above, minimal impacts are expected on existing water rights, as the WAM has been utilized to maintain priorities of these water rights. There exists significant concern with regard to potential environmental impacts of the proposed reservoir considering that the reservoir's contributing watershed represents approximately 25% of the watershed contributing to Pecan Bayou, a stream segment conditionally recognized in the 2016 Region D Plan and by the Texas Parks and Wildlife Department as being an ecologically unique stream segment in the North East Texas Region. Presented below is a monthly flow frequency chart depicting the variation in flows in Pecan Bayou for with- and without project conditions.

Significant impacts to agricultural and natural resources would also be expected within the footprint of the reservoir as well. Furthermore, mitigation and compensation may be necessary to the basin of origin.



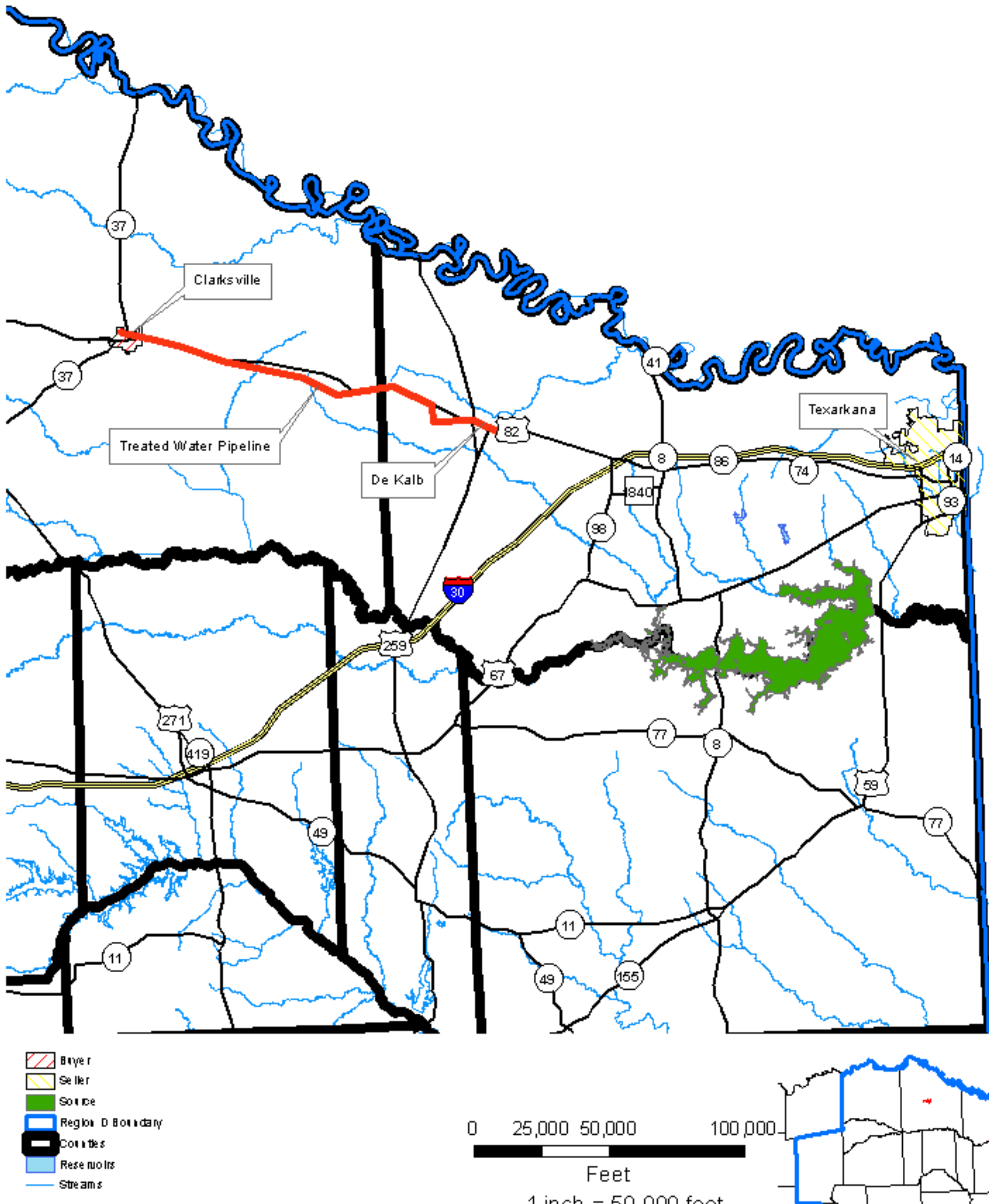
Flow Frequency Distribution of Regulated Flows at USGS Gage #07336800, Pecan Bayou near Clarksville, Texas, with- and without Dimple Reservoir.

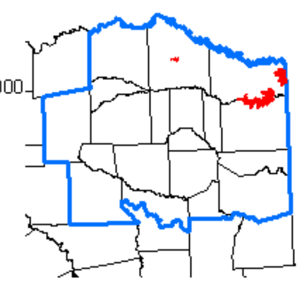
Recommendations:

	2020	2030	2040	2050	2060	2070
Contract with Texarkana and Treated Water Pipeline to DeKalb (ac-ft/yr)	0	0	303	303	303	303

To meet the City's projected deficit in 2040 it is recommended that Clarksville contract with the City of Texarkana for supply from Lake Wright Patman, which includes the development of a Treated Water Pipeline tying into Texarkana's system in DeKalb to provide 303 ac-ft/yr for the projected needs of the City of Clarksville, although Clarksville has indicated their intent, if this strategy were to be implemented to contract additional supply as necessary to meet their full projected demands. This strategy provides a reliable supply without construction of a new reservoir, thus minimizing potential impacts to the agricultural and natural resources within the Region. Further, this amount allows for the resumption of the City's utilization of existing groundwater supplies via mixing. Thus, this recommended strategy is contingent upon the City's use of its existing groundwater supplies, as well as contingent upon recommended strategies for the City of Texarkana and Riverbend Water Resources District.

At present, considerable uncertainty exists in each of the identified feasible water management strategies for the City of Clarksville. The NETRWPG supports any efforts by the City of Clarksville to further study all potential strategies to identify the best approach for the City to meeting all of its future water supply needs, and such a study should be considered consistent with the 2016 North East Texas Regional Water Plan.





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Attachment A

Clarksville
Recommended Strategy
Wright Patman Pipeline (Texarkana)

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Clarksville - Wright Patman Pipeline

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Transmission Pipeline (0 in dia., 27 miles)	$6,794,000
Transmission Pump Station(s) & Storage Tank(s)	$1,338,000
TOTAL COST OF FACILITIES	**$8,132,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,411,000
Land Acquisition and Surveying (5 acres)	$170,000
Interest During Construction (4% for 1 years with a 1% ROI)	$340,000
TOTAL COST OF PROJECT	**$10,053,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$841,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$97,000
Pumping Energy Costs (1048727 kW-hr @ 0.09 $/kW-hr)	$94,000
Purchase of Water (303 acft/yr @ 482.23 $/acft)	$146,000
TOTAL ANNUAL COST	**$1,178,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	303
Annual Cost of Water ($ per acft)	$3,888
Annual Cost of Water ($ per 1,000 gallons)	$11.93

Note: One or more cost element has been calculated externally

JMP *4/1/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF COUNTY-OTHER IN RED RIVER COUNTY

Description of Water User Group:

Red River County-Other is comprised of the Cities of Annona, Avery, Bogata, and Talco as well as 410 WSC, Red River County WCID, and a portion of Oak Grove WSC. The WUG population is projected to be 1,873 in 2020 and 49 by the year 2070. Entities comprising the WUG are supplied by groundwater from the Carrizo-Wilcox, Nacatoch and Trinity Aquifers, and purchases of surface water from Lamar County WSD and the City of Texarkana. Red River County-Other is not projected to have a shortage during the planning period; however, the cities of Avery and Annona are member cities in the Riverbend Water Resources District, and a request was received from Riverbend to include a strategy within the 2016 Plan for these entities.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	1,873	1,509	1,144	779	414	49
Projected Water Demand	238	184	139	94	50	6
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	332	328	324	324	324	324
Projected Supply Surplus (+) / Deficit (-)	**94**	**144**	**185**	**230**	**274**	**318**

Evaluation of Potentially Feasible Water Management Strategies:

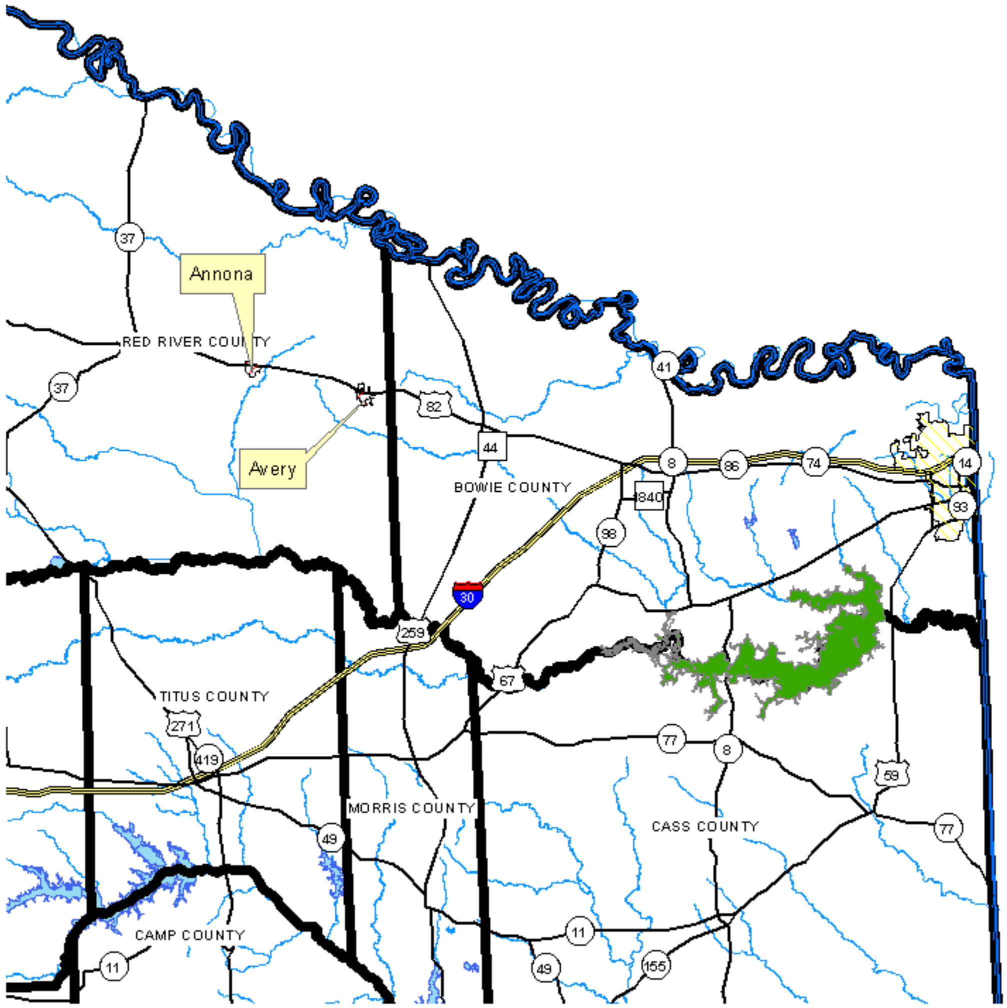
There were four alternative strategies considered to meet the SUD's water supply shortages. Advanced conservation was not selected because the WUG's overall supply is not projected to meet TCEQ regulatory minimums. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not considered as no shortages are reported and cities within the WUG purchase water from other entities such as Lamar County WSD and City of Texarkana. A request was submitted by Riverbend Water Resources District to consider a new Water Treatment Plant, pipeline, and intake to Wright Patman Reservoir. Thus, a renewal contract with Texarkana/Riverbend has been considered herein.

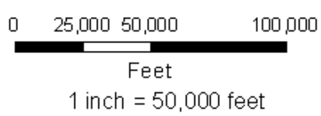
Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Ground Water					
Surface Water Contract	**185**		**$89,000**	**$481**	**1**

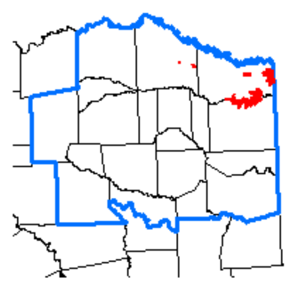
Recommendations:

	2020	2030	2040	2050	2060	2070
Renew Existing Contract (Texarkana) (ac-ft/yr)	185	185	185	185	185	185

It is recommended that entities within Red River County-Other continue their existing contract for 185 ac-ft per year from Texarkana, contingent upon Texarkana/Riverbend strategies.







Attachment A

Red River County Other
Recommended Strategy
Renew Existing Contract (Texarkana)

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Red River County Other - Water Purchase Contract with City of Texarkana

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (185 acft/yr @ 482.23 $/acft)	$89,000
TOTAL ANNUAL COST	**$89,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	185
Annual Cost of Water ($ per acft)	$481
Annual Cost of Water ($ per 1,000 gallons)	$1.48
JMP	*3/31/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF IRRIGATION IN RED RIVER COUNTY

Description of Water User Group:

The Irrigation WUG in Red River County has a demand that is projected to decrease from 5,156 ac-ft/yr in 2020 to 4,895 ac-ft/yr in 2070. Irrigation in Red River County is projected to be supplied by existing surface water from run-of-river diversions from the Red and Sulphur Rivers. A deficit of 4,376 ac-ft/yr is projected to occur in 2020 and decrease to 4,125 ac-ft/yr by 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Projected Water Demand	5,156	5,103	5,050	4,998	4,945	4,895
Current Water Supply	780	790	790	790	790	770
Projected Supply Surplus (+)/Deficit(-)	**-4,376**	**-4,313**	**-4,260**	**-4,208**	**-4,155**	**-4,125**

Projected Supply Surplus (+)/Deficit(-) by Basin	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Sulphur	-3,270	-3,221	-3,183	-3,146	-3,107	-3,091
Red	-1,106	-1,092	-1,077	-1,062	-1,048	-1,034
Total	**-4,376**	**-4,313**	**-4,260**	**-4,208**	**-4,155**	**-4,125**

Evaluation of Potentially Feasible Water Management Strategies:

Seventeen alternative strategies were considered to meet the Red River County Irrigation WUG's water supply shortages. Advanced water conservation for irrigation practices were not considered in this planning effort, as amounts potentially saved would not provide sufficient savings to meet the projected needs over the planning period. The use of reuse water from nearby municipalities is not considered feasible as it would not be effective to deliver reuse water to farm irrigation systems. Groundwater was identified as a potential source of water for irrigation in Red River County. However, due to limited availability, the Blossom, Nacatoch and Trinity aquifers will not cover all shortages. For this reason, groundwater development may not be a feasible strategy alone. However, total potentially available groundwater supply (exceeding the MAGs) was evaluated for consideration as an alternative strategy.

Treated surface water purchased from Lamar County WSD was considered as a viable supplement to the additional groundwater in order to meet projected demands. Purchasing sufficient treated surface water from Lamar County WSD to meet the entirety of the need was also considered as possible strategy. Purchasing raw water from the City of Paris has also been considered as a possible strategy, with a higher capital cost but an anticipated lower annual cost. The City's surface water permit for Pat Mayse Reservoir, as amended, allows for the interbasin transfer and use of water in both the Red and Sulphur River basins. However, the use of water via this permit would require a minor amendment to add irrigation as a permitted use.

Strategy	**Firm Yield (AF)**	**Total Capital Cost**	**Total Annualized Cost**	**Unit Cost**	**Env. Impact**
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Blossom Aquifer, Red Basin)	**350**	**$219,000**	**$196,000**	**$560**	**1**
Drill New Wells (Nacatoch Aquifer, Red Basin)	**50**	**$92,000**	**$34,000**	**$680**	**1**
Drill New Wells (Nacatoch Aquifer, Sulphur Basin)	**210**	**$364,000**	**$141,000**	**$671**	**1**
Drill New Wells, No MAG Enforcement (Nacatoch Aquifer, Sulphur Basin)	**2,057**	**$2,293,000**	**$1,240,000**	**$603**	**1**
Drill New Wells (Trinity Aquifer, Red Basin)	**240**	**$251,000**	**$144,000**	**$600**	**1**
Drill New Wells (Trinity	**185**	**$251,000**	**$117,000**	**$632**	**1**

Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Env. Impact
Aquifer, Sulphur Basin)					
Drill New Wells, No MAG Enforcement (Woodbine Aquifer, Red Basin)	**1,106**	**$1,227,000**	**$668,000**	**$604**	**1**
Pat Mayse Treated Water Pipeline from Lamar County WSD (Red Basin)	**466**	**$6,111,000**	**$1,332,000**	**$2,858**	**1**
Pat Mayse Treated Water Pipeline from Lamar County WSD (Sulphur)	**2,665**	**$9,361,000**	**$5,363,000**	**$2,012**	**1**
Pat Mayse Treated Water Pipeline from Lamar County WSD (Red Basin)	**1,106**	**$12,908,000**	**$3,222,000**	**$2,913**	**1**
Pat Mayse Treated Water Pipeline from Lamar County WSD (Sulphur)	**3,270**	**$15,695,000**	**$7,108,000**	**$2,174**	**1**
Pat Mayse Raw Water Pipeline from Paris (Red Basin)	**1,106**	**$21,718,000**	**$2,638,000**	**$2,385**	**1**
Pat Mayse Raw Water Pipeline from Paris (Sulphur)	**3,270**	**$33,448,000**	**$4,527,000**	**$1,384**	**1**
Pat Mayse Raw Water Pipeline from Paris (Red Basin)	**466**	**$21,718,000**	**$2,492,000**	**$2,253**	**1**
Pat Mayse Raw Water Pipeline from Paris (Sulphur)	**2,665**	**$33,448,000**	**$4,389,000**	**$1,342**	**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
Unmet Needs	**4,376**	**4,313**	**4,260**	**4,208**	**4,155**	**4,125**

The alternative supply scenarios considered herein that remain within the RWP guidelines with regard to the definition of available supply (i.e., the availability determination of groundwater supply employing solely the MAG) suggest that the most likely, cost effective strategy, i.e., the construction of additional wells, would be insufficient to meet the projected needs. The alternative solutions considered herein do not appear to be cost effective approaches, particularly given the fact that in reality, no regulatory entity exists within Region D to enforce the MAG limitations.

Thus, for the purposes of the 2016 Region D Plan, the Red River County Irrigation demands are considered an unmet need.

However, the drilling of new wells for the provision of supplies in exceedance of the MAG requirements is presented as an identified Alternative Water Management Strategy for the purposes of the 2016 Region D Plan. This alternative approach better reflects the reality of available groundwater supply in the area, while ascribing to the guidelines established by the TWDB for the regional planning process. A more detailed description of the aforementioned Alternative Water Management Strategy can be found within the Alternative Water Management Strategy section later in this Appendix.

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF MANUFACTURING IN RED RIVER COUNTY

Description of Water User Group:

The Manufacturing WUG in Red River County has a demand that is projected to increase from 9 ac-ft/yr in 2020 to 11 ac-ft/yr in 2070. Manufacturing in Red River County is projected to be supplied by groundwater from the Blossom Aquifer and surface water from Langford Lake. Additional groundwater from the Trinity Aquifer is purchased from the City of Detroit. A deficit of 7 ac-ft/yr is projected to occur in 2040 and increase to 9 ac-ft/yr by 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Projected Water Demand	9	9	9	9	10	11
Current Water Supply	9	9	2	2	2	2
Projected Supply Surplus (+)/Deficit(-)	**0**	**0**	**-7**	**-7**	**-8**	**-9**

Evaluation of Potentially Feasible Water Management Strategies:

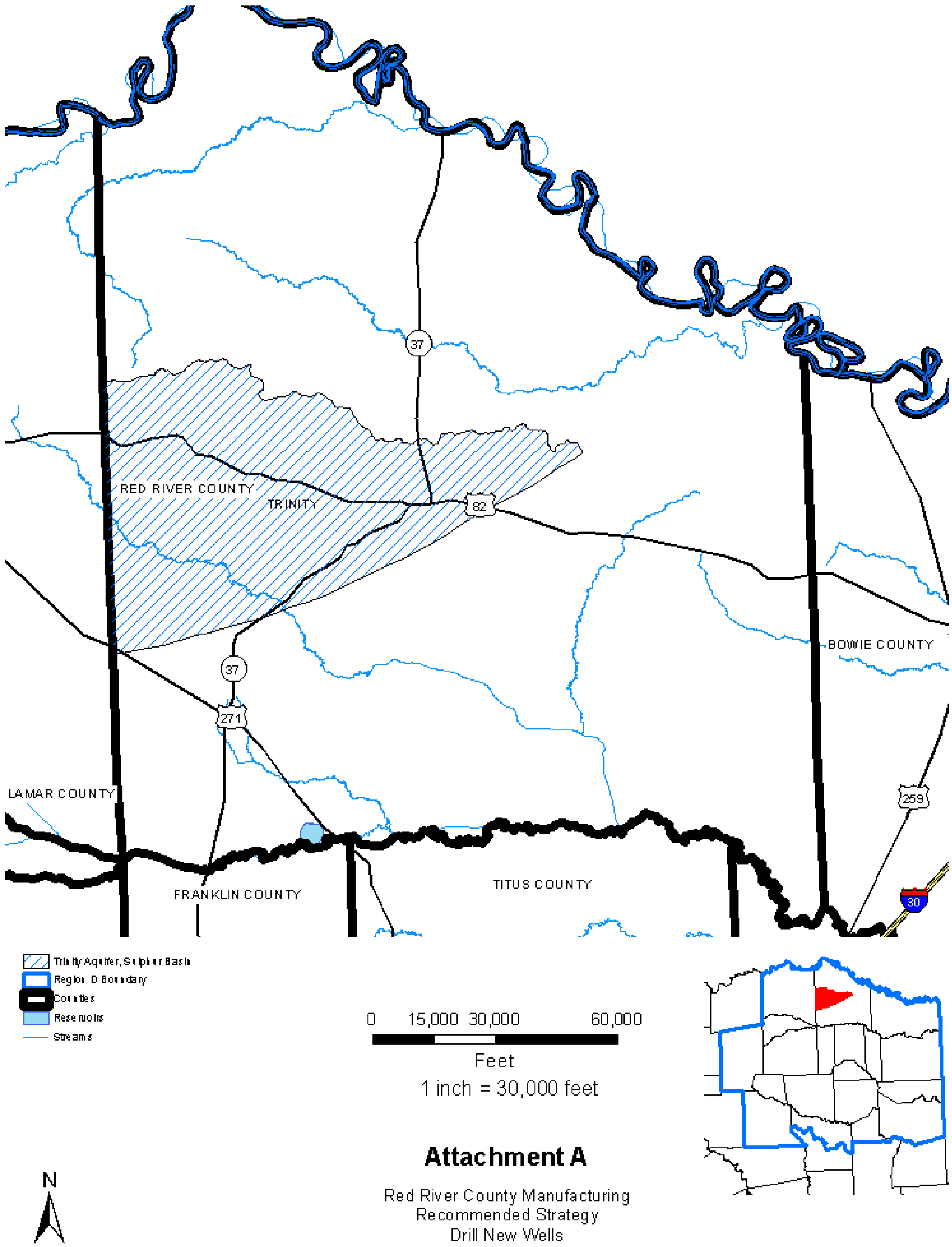
Four alternative strategies were considered to meet the Red River County Manufacturing WUG's water supply shortages. Advanced water conservation for manufacturing in Red River County is not feasible. The use of reuse water from nearby municipalities was not considered to be available. Groundwater has been identified as a potential source of water for manufacturing in Red River County. The purchase of surface water from Langford Lake was not considered due to sedimentation issues in the lake.

Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Env. Impacts
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Trinity Aquifer, Sulphur Basin)	**20**	**$136,000**	**$22,000**	**$1,100**	**1**
Surface Water					

Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Trinity Aquifer, Sulphur Basin; ac-ft/yr)	**0**	**0**	**20**	**20**	**20**	**20**

The recommended strategy for Red River County Manufacturing to meet projected demands of 7 ac-ft/yr in 2040 and 9 ac-ft/yr in 2070 is to develop one additional groundwater well prior to 2040 in the Trinity Aquifer within the Sulphur River Basin. One well with a rated capacity of 75 gpm would provide approximately 20 ac-ft/yr. The Trinity Aquifer in the Sulphur River Basin is projected to have sufficient supply availability to meet the identified needs for this WUG over the planning period.



Attachment A

Red River County Manufacturing
Recommended Strategy
Drill New Wells

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Manufacturing – Drill New Wells (Red River - Sulphur – Trinity)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$97,000
TOTAL COST OF FACILITIES	**$97,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$34,000
Interest During Construction (4% for 1 years with a 1% ROI)	$5,000
TOTAL COST OF PROJECT	**$136,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$11,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$1,000
Pumping Energy Costs (625 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (20 acft/yr @ 500 $/acft)	$10,000
TOTAL ANNUAL COST	**$22,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	20
Annual Cost of Water ($ per acft)	$1,100
Annual Cost of Water ($ per 1,000 gallons)	$3.38
KVA	*3/31/2015*

REGION D
EVALUATIONS OF WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

SMITH COUNTY

<u>WUGs:</u>

Crystal Systems Inc.
Hideaway
The City of Lindale
Smith County Manufacturing
Smith County Mining
The City of Overton
The City of Winona

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EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF CRYSTAL SYSTEMS TEXAS, INC.

Description of Water User Group:

The Crystal Systems Texas, Inc. system is located in northwestern Smith County and serves the unincorporated area surrounding Hideaway Lake. The population is projected to increase from 2,802 persons in 2020 to 5,969 persons in 2070. The System is included as a W.U.G. 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 3,420 GPM, or 1,840 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 deficit of 31 ac-ft/yr in 2020 increasing to a deficit of 1,836 ac-ft/yr in 2070.

Water Supply and Demand Analysis:

Sabine River Basin

	2020	2030	2040	2050	2060	2070
Population	1,970	2,248	2,564	2,932	3,367	3,883
Projected Water Demand	616	695	791	903	1,036	1,194
Current Water Supply	587	474	359	234	92	0
Projected Supply Surplus (+)/Deficit(-)	**-29**	**-221**	**-432**	**-669**	**-944**	**-1,194**

Neches River Basin

	2020	2030	2040	2050	2060	2070
Population	832	1,068	1,305	1,560	1,820	2,086
Projected Water Demand	260	330	403	481	560	642
Current Water Supply	248	225	184	125	50	0
Projected Supply Surplus (+)/Deficit(-)	**-12**	**-105**	**-219**	**-356**	**-510**	**-642**

Evaluation of Potentially Feasible Water Management Strategies:

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 gpcpd threshold set by the planning group. Water reuse was not considered because the system 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 system and surface water treatment is not economically feasible for a system of this size.

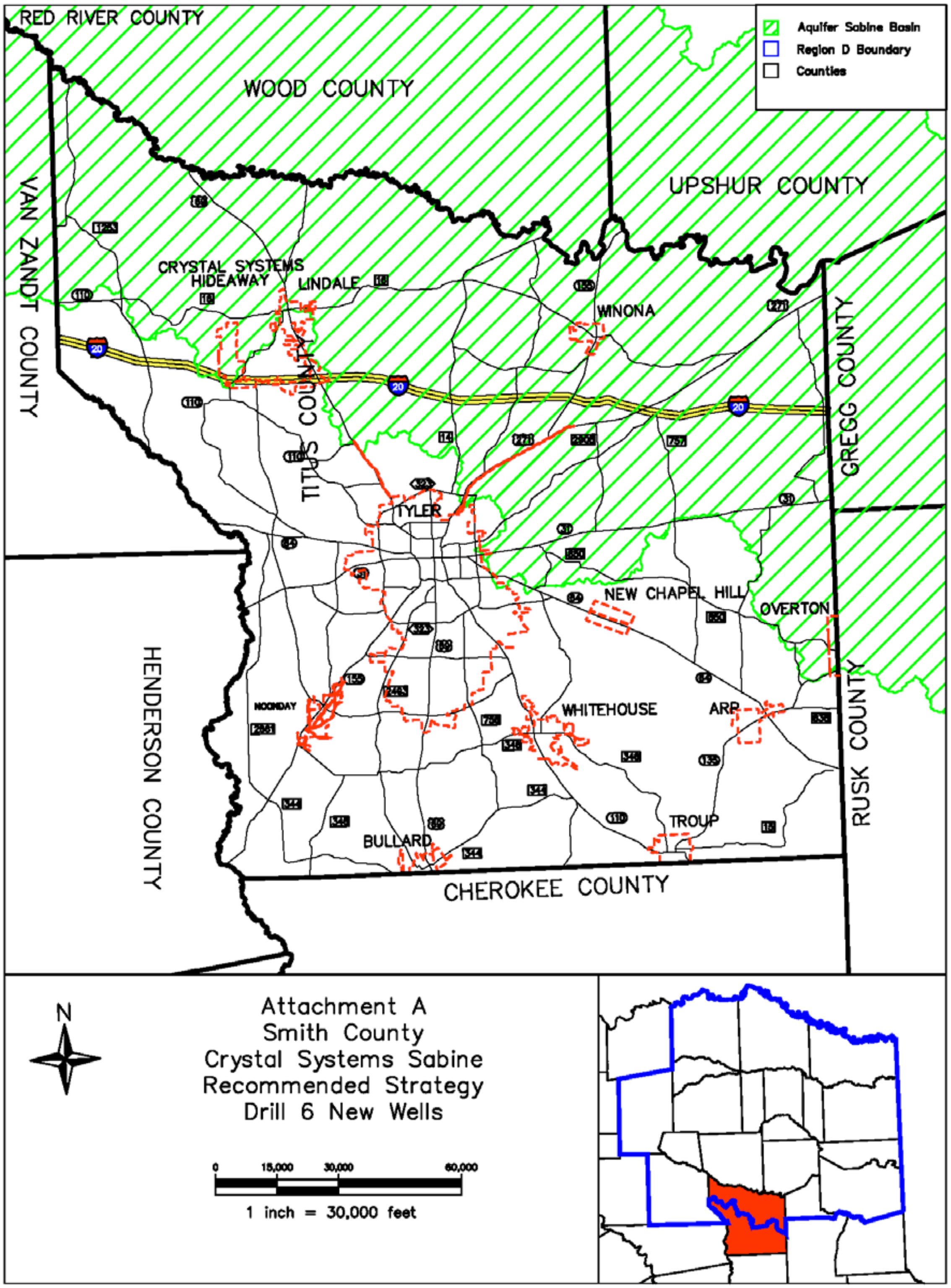
Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Queen City Aquifer, Sabine Basin)	**1,936**	**$ 7,084,000**	**$ 814,000**	**$ 420**	**1**
Drill New Wells (Queen City Aquifer, Neches)					
Surface Water					

Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Queen City Aquifer, Sabine; ac-ft/yr)	644	644	966	1,610	1,610	1,936

The recommended strategy for Crystal Systems to meet their projected deficit of 41 ac-ft/yr in 2020 and 1,836 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 Queen City Aquifer in Smith County. Six wells with rated capacity of 600 gpm each would provide approximately 322 acre-feet each. The Queen City 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 four wells will be drilled in the Queen City formation of the Sabine River Basin while two wells will be drilled into the Queen City 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.


Aquifer Sabine Basin
Region D Boundary
Counties
RED RIVER COUNTY
WOOD COUNTY
UPSHUR COUNTY
VAN ZANDT COUNTY
CRYSTAL SYSTEMS HIDEAWAY
LINDALE
WINONA
TITUS COUNTY
GREGG COUNTY
TYLER
NEW CHAPEL HILL
OVERTON
HENDERSON COUNTY
NOONDAY
WHITEHOUSE
ARP
TROUP
BULLARD
CHEROKEE COUNTY
RUSK COUNTY
N
Attachment A
Smith County
Crystal Systems Sabine
Recommended Strategy
Drill 6 New Wells
0
15,000
30,000
60,000
1 inch = 30,000 feet

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Crystal Systems - Drill New Wells (Crystal Systems - Sabine – Queen City)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$4,381,000
Water Treatment Plant (5.2 MGD)	$243,000
TOTAL COST OF FACILITIES	**$4,624,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,618,000
Environmental & Archaeology Studies and Mitigation	$73,000
Land Acquisition and Surveying (11 acres)	$66,000
Interest During Construction (4% for 1 years with a 1% ROI)	$224,000
TOTAL COST OF PROJECT	**$6,605,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$553,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$44,000
Water Treatment Plant (2.5% of Cost of Facilities)	$146,000
Pumping Energy Costs (793482 kW-hr @ 0.09 $/kW-hr)	$71,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$814,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	1,936
Annual Cost of Water ($ per acft)	$420
Annual Cost of Water ($ per 1,000 gallons)	$1.29

Note: One or more cost element has been calculated externally

JTS *4/9/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF THE HIDEAWAY COMMUNITY

Description of Water User Group:

The Hideaway community is located in northwestern Smith County and serves the un-incorporated area surrounding Hideaway Lake. The population is projected to increase from 3,504 persons in 2020 to 6,904 persons in 2070. The community is included as a W.U.G. in Smith County. The system's current water supply comes directly from Crystal Systems Texas, Inc. The system is surrounded in its entirety by Crystal Systems Texas, Inc. The system does not have a water conservation plan. The system is projected to have a neutral surplus/deficit in 2020 increasing to a deficit of 117 ac-ft/yr in 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	3,504	3,998	4,558	5,214	5,986	6,904
Projected Water Demand	1,004	1,140	1,296	1,480	1,697	1,956
Current Water Supply	1,004	1,140	1,296	1,480	1,697	1,839
Projected Supply Surplus (+)/Deficit(-)	**0**	**0**	**0**	**0**	**0**	**-117**

Evaluation of Potentially Feasible Water Management Strategies:

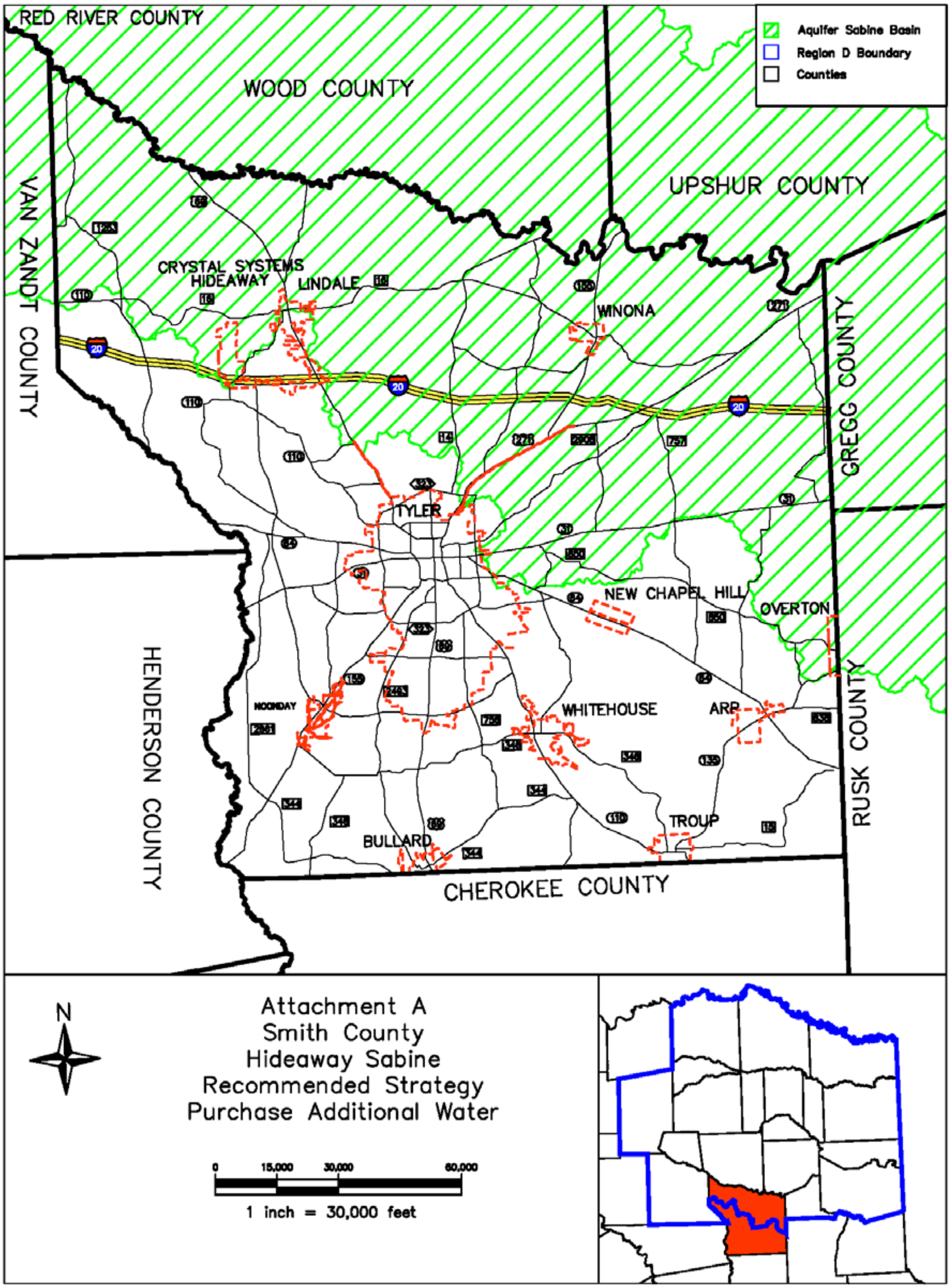
Four alternative strategies were considered to meet the Hideaway's water supply shortages as summarized in the following table. Advanced conservation was not considered because the per capita use per day was below the 140 gpcpd threshold set by the planning group. Water reuse was not considered because the system 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 system and surface water treatment is not economically feasible for a system of this size.

Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Renew Existing Contract (Crystal Systems, Inc.)	**117**		**$152,000**	**$1,303**	**1**
Surface Water					

Recommendations:

	2020	2030	2040	2050	2060	2070
Renew Existing Contract (Crystal Systems, Inc.; ac-ft/yr)	0	0	0	0	0	117

The recommended strategy for the Hideaway community to meet their projected 117 ac-ft/yr in 2070 would be to increase their purchase for additional water from their water supplier, Crystal Systems Texas, Inc. Crystal Systems Texas, Inc. has sufficient supply in 2070 to meet Hideaway's deficit. Note that Crystal Systems Texas, Inc. is proposing improvements to provide sufficient supply for both Hideaway and other customers, and this strategy would be contingent upon that recommended strategy.



Attachment A
Smith County
Hideaway Sabine
Recommended Strategy
Purchase Additional Water

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Hideaway - Increase Contract (Hideaway - Crystal Systems - Queen City)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (117 acft/yr @ 1303 $/acft)	$152,000
TOTAL ANNUAL COST	**$152,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	117
Annual Cost of Water ($ per acft)	$1,303
Annual Cost of Water ($ per 1,000 gallons)	$4.00
SRH	*4/9/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF CITY OF LINDALE

Description of Water User Group:

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 6,122 persons in 2020 to 15,246 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 1,837 GPM, or 988 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 691 ac-ft/yr in 2020 increasing to a deficit of 2,893 ac-ft/yr in 2070.

Water Supply and Demand Analysis:

Sabine River Basin

	2020	2030	2040	2050	2060	2070
Population	4,023	4,882	5,856	6,996	8,339	9,935
Projected Water Demand	913	1,091	1,298	1,544	1,838	2,188
Current Water Supply	274	274	274	274	274	274
Projected Supply Surplus (+)/Deficit(-)	**-639**	**-817**	**-1,049**	**-1,345**	**-1,691**	**-2,067**

Neches River Basin

	2020	2030	2040	2050	2060	2070
Population	2,099	2,704	3,311	3,964	4,629	5,311
Projected Water Demand	476	604	734	875	1,020	1,170
Current Water Supply	424	424	424	424	424	424
Projected Supply Surplus (+)/Deficit(-)	**-52**	**-180**	**-310**	**-451**	**-596**	**-746**

Evaluation of Potentially Feasible Water Management Strategies:

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 gpcpd 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.

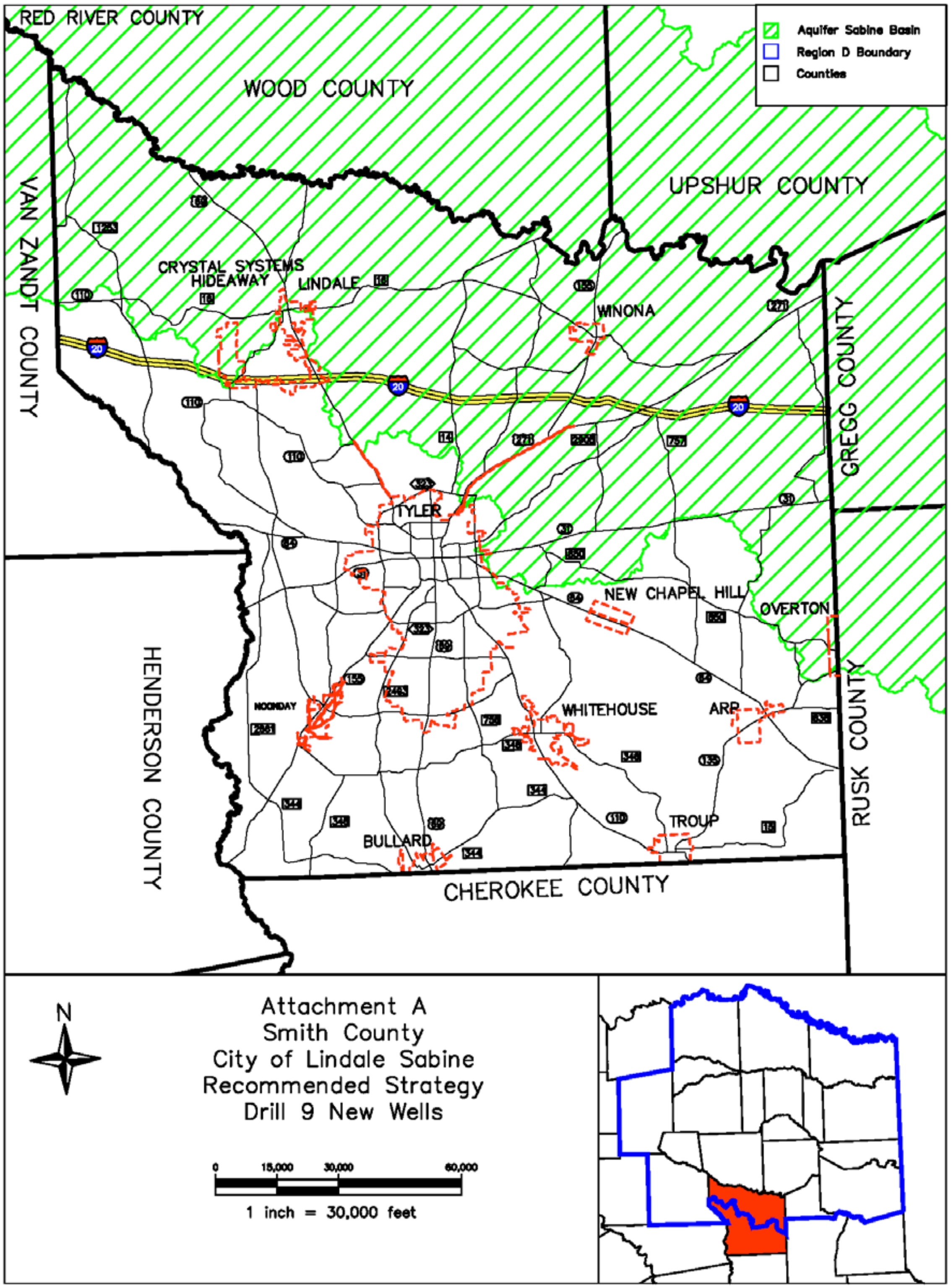
Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Queen City Aquifer, Sabine Basin)	**2,904**	**$ 10,977,000**	**$ 1,308,000**	**$ 450**	**1**
Surface Water					

Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Queen City Aquifer, Sabine Basin; ac-ft/yr)	966	1,288	1,610	1,932	2,576	2,898

The recommended strategy for the City of Lindale to meet their projected deficit of 691 ac-ft/yr in 2020 and 2,893 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 Queen City Aquifer in Smith County. Nine wells with rated capacity of 600 gpm each would provide approximately 322 acre-feet each. The Queen City Aquifer in Smith County 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.



Cost Estimate Summary
Water Supply Project Option
41518 Prices
Lindale - Drill New Wells (Lindale - Sabine - Carrizo Wilcox)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$6,572,000
Water Treatment Plant (7.8 MGD)	$350,000
TOTAL COST OF FACILITIES	**$6,922,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$2,423,000
Environmental & Archaeology Studies and Mitigation	$109,000
Land Acquisition and Surveying (13 acres)	$99,000
Interest During Construction (4% for 1 years with a 1% ROI)	$335,000
TOTAL COST OF PROJECT	**$9,888,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$827,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$66,000
Water Treatment Plant (2.5% of Cost of Facilities)	$210,000
Pumping Energy Costs (2278518 kW-hr @ 0.09 $/kW-hr)	$205,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$1,308,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	2,904
Annual Cost of Water ($ per acft)	$450
Annual Cost of Water ($ per 1,000 gallons)	$1.38

Note: One or more cost element has been calculated externally

JTS *4/9/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF MANUFACTURING IN SMITH COUNTY

Description of Water User Group:

Smith County Manufacturing is located primarily in Smith County within the Region I Texas Regional Water Planning Area, but serves a relatively smaller portion of population within the North East Texas Region (Region D). Thus, Region I is the RWPG with the primary responsibility for the evaluation and recommendation of water management strategies for this WUG. For completeness, the consultants have coordinated to include information on that Region's preliminary recommendations for the 2016 Region I IPP herein, as they relate to the demand and identified needs within the North East Texas Region (Region D). At the time of publication of the Region D IPP, cost information for the Region I recommendation(s) for this WUG was not available. Once available from the primary region, this information will be incorporated into the Final 2016 Region D Plan for adoption.

The Manufacturing WUG in Smith County is projected to be supplied by surface water purchased from the City of Tyler. A deficit of 300 ac-ft/yr is projected to occur in 2020, increasing to 442 ac-ft/yr by 2070

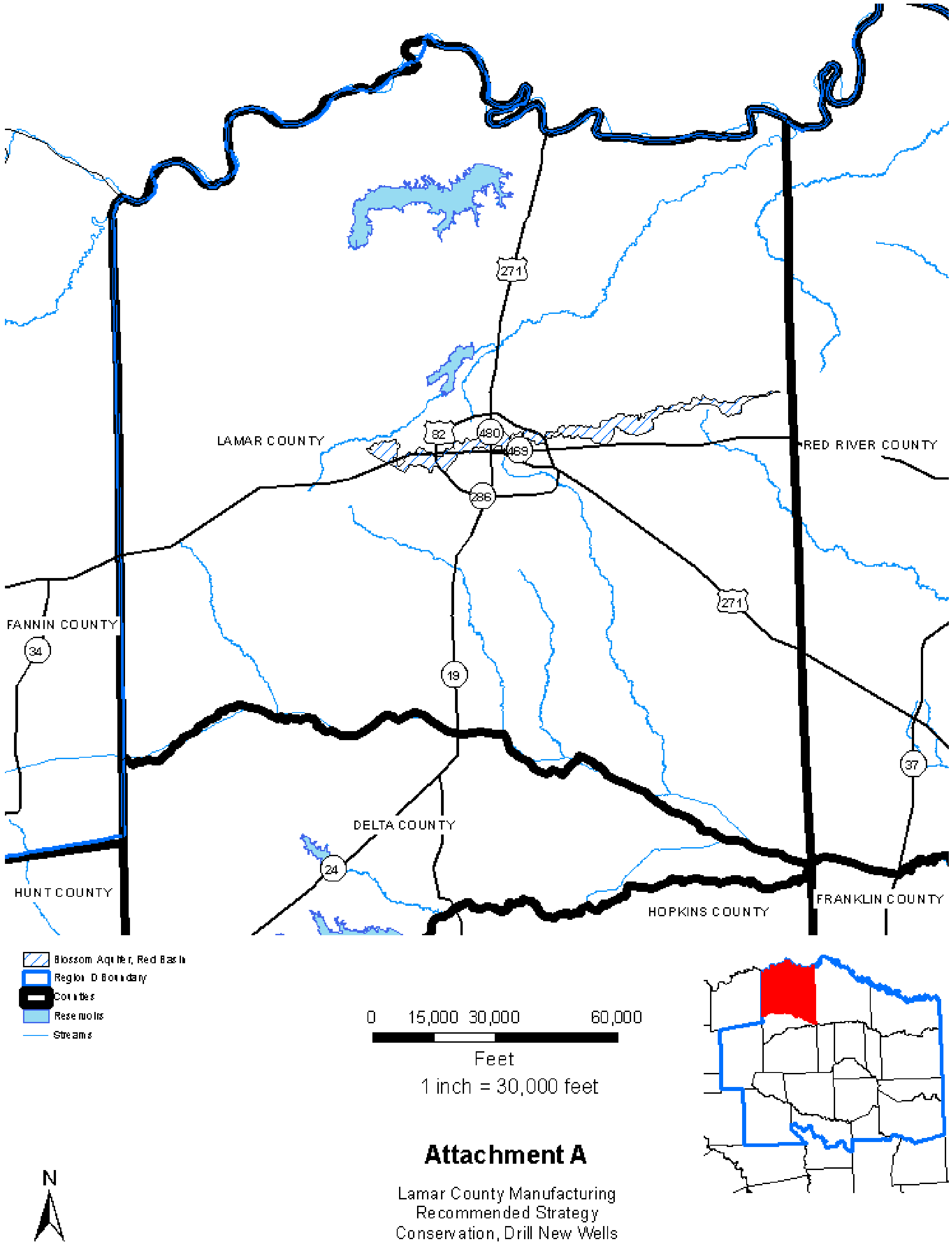
Water Supply and Demand Analysis:

Overton	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Need (ac-ft per year)	300	327	354	377	408	442
Recommended Strategy Increase Contract TYLER (ac-ft per year)	300	327	354	377	408	442

Recommendations:

	2020	**2030**	**2040**	**2050**	**2060**	**2070**
Increase Existing Contract (Tyler) (ac-ft/yr)	**300**	**327**	**354**	**377**	**408**	**442**

The North East Texas Regional Water Planning Group supports the recommendation from Region I for increasing the existing contract demand with the City of Tyler to meet projected future needs of Smith County Manufacturing.



Attachment A

Lamar County Manufacturing
Recommended Strategy
Conservation, Drill New Wells

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Manufacturing - Lamar - Red - Blossom

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
Well Fields (Wells, Pumps, and Piping)	$54,000
TOTAL COST OF FACILITIES	**$54,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$19,000
Interest During Construction (4% for 1 years with a 1% ROI)	$3,000
TOTAL COST OF PROJECT	**$76,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$6,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$1,000
Pumping Energy Costs (6813 kW-hr @ 0.09 $/kW-hr)	$1,000
Purchase of Water (120 acft/yr @ 500 $/acft)	$60,000
TOTAL ANNUAL COST	**$68,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	120
Annual Cost of Water ($ per acft)	$567
Annual Cost of Water ($ per 1,000 gallons)	$1.74

KVA *2/14/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS MINING IN SMITH COUNTY SABINE

Description of Water User Group:

The Mining WUG in Smith County is a split entity and has a demand that is projected to be increasing from 287 ac-ft/yr in 2020 to 497 ac-ft/yr in 2070. Mining in Smith County has a current water supply consisting of water wells from the Queen City Aquifer. The total rated available supply from these sources is 320 ac-ft/yr. Mining in Smith County is projected to have a water supply deficit of 8 ac-ft/yr in 2060 increasing to 45 ac-ft/yr in 2070 for the Smith Sabine split.

Water Supply and Demand Analysis:

Mining Gregg Sabine	2020	2030	2040	2050	2060	2070
Projected Water Demand	287	309	341	394	438	497
Current Water Supply	320	360	378	409	430	452
Projected Supply Surplus (+)/Deficit(-)	33	51	37	15	-8	-45

Evaluation of Potentially Feasible Water Management Strategies:

Three alternative strategies were considered to meet the Smith County Mining water supply shortages as summarized in the following table. Advanced conservation and water reuse was not considered because operational procedures for the existing mines are not available. Surface water alternatives were omitted since the existing source is groundwater and there is adequate available supply.

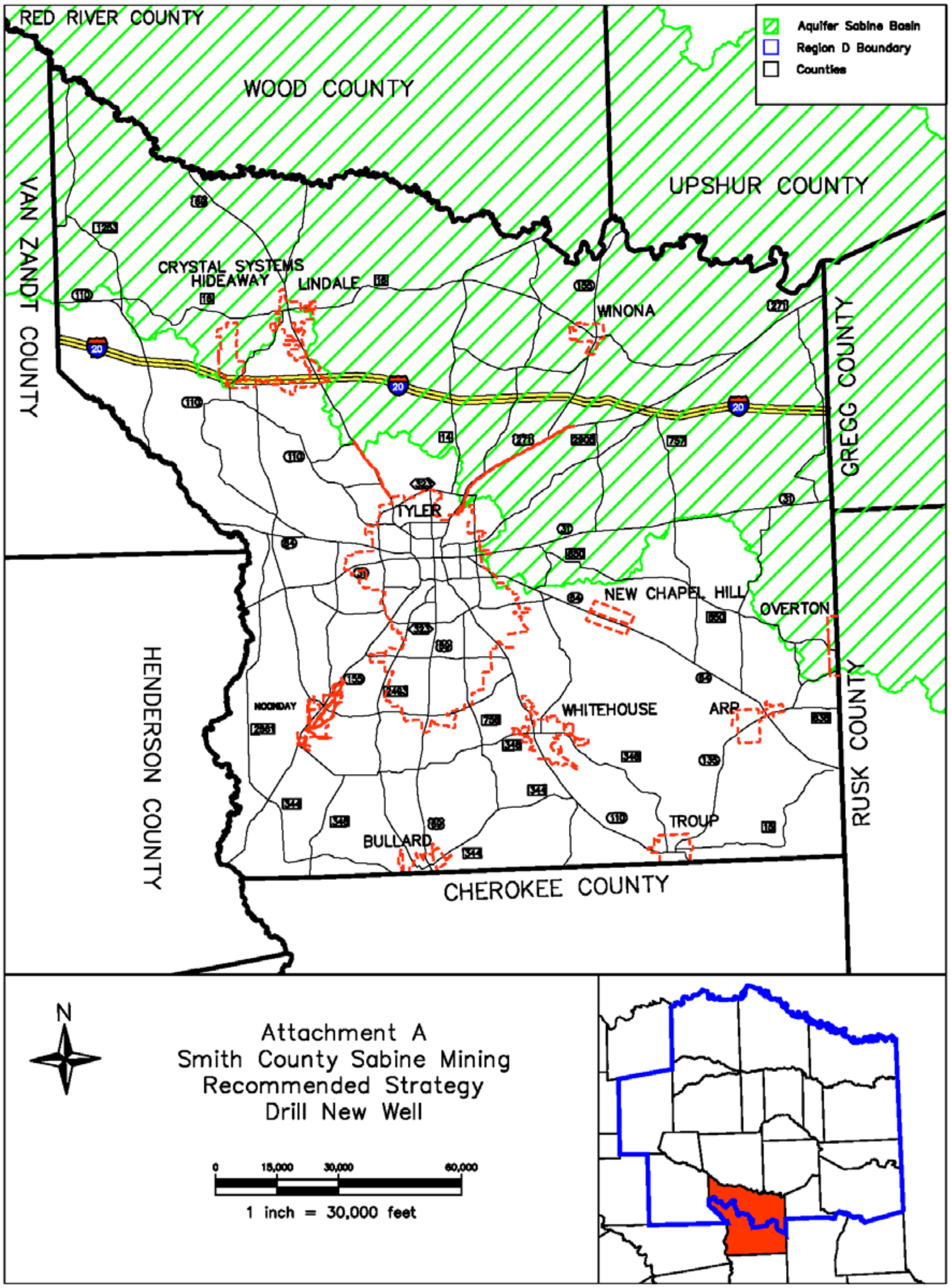
Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Queen City Aquifer, Sabine Basin)	**108**	**$607,000**	**$57,000**	**$528**	**1**
Surface Water					

Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Queen City Aquifer, Sabine Basin; ac-ft/yr)	0	0	0	0	108	108

The recommended strategy for the Smith County Mining to meet their projected deficit of 8 ac-ft/yr in 2060 and 45 ac-ft/yr in 2070 would be to construct one additional water well similar to their existing wells just prior to each decade as the deficits occur. The recommended supply source will be the Queen City Aquifer in Smith County. One well with rated capacity of 200 gpm would provide approximately 108 ac-ft/yr. The Queen City Aquifer in Smith County is projected to have a more than ample supply availability to meet the needs of the Mining in Smith County 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.


Aquifer Sabine Basin
Region D Boundary
Counties
RED RIVER COUNTY
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NEW CHAPEL HILL
OVERTON
NOONDAY
WHITEHOUSE
ARP
TROUP
BULLARD
N
Attachment A
Smith County Sabine Mining
Recommended Strategy
Drill New Well
0
15,000
30,000
60,000
1 inch = 30,000 feet

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Mining Smith Sabine - Drill New Wells (Smith - Sabine - Queen City)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$420,000
TOTAL COST OF FACILITIES	**$420,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$147,000
Environmental & Archaeology Studies and Mitigation	$19,000
Interest During Construction (4% for 1 years with a 1% ROI)	$21,000
TOTAL COST OF PROJECT	**$607,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$51,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$4,000
Pumping Energy Costs (24803 kW-hr @ 0.09 $/kW-hr)	$2,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$57,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	108
Annual Cost of Water ($ per acft)	$528
Annual Cost of Water ($ per 1,000 gallons)	$1.62

JTS *4/9/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF CITY OF OVERTON IN SMITH COUNTY

Description of Water User Group:

The City of Overton is located primarily in Rusk County within the Region I Texas Regional Water Planning Area, but serves a relatively smaller portion of population within the North East Texas Region (Region D). Thus, Region I is the RWPG with the primary responsibility for the evaluation and recommendation of water management strategies for this WUG. For completeness, the consultants have coordinated to include information on that Region's preliminary recommendations for the 2016 Region I IPP herein, as they relate to the demand and identified needs within the North East Texas Region (Region D). At the time of publication of the Region D IPP, cost information for the Region I recommendation(s) for this WUG was not available. Once available from the primary region, this information will be incorporated into the Final 2016 Region D Plan for adoption.

The City of Overton is located in western Rusk County, with a small area in Smith County. The current supply for this WUG is the Carrizo-Wilcox aquifer. The City's supply is limited by well capacities and water shortages are projected beginning in 2050. The City had an average per capita consumption of 200 gpcd in 2011. This value is well over the statewide goal of 140 gpcd. After performing a conservation cost analysis, the ETRWPG believes a water conservation strategy for the City is economically achievable and is therefore recommended. This strategy includes 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 Overton's demand by more than their projected need; therefore, municipal conservation is the only recommended WMS for the City.

Overton	2020	2030	2040	2050	2060	2070
Need (ac-ft per year)	0	0	0	43	108	177
Recommended Strategy OVERTON: Municipal Conservation (ac-ft per year)	0	0	97	167	223	269

Strategy	Yield (ac-ft per year)	Total Capital Cost	Total Annualized Cost	Unit Cost ($/ac-ft)	Unit Cost ($/1000 gal)
Rec. Strategy OVERTON: Municipal Conservation	269	0	$111,298	$914	$ 2.81

Recommendations:

	2020	2030	2040	2050	2060	2070
Advanced Water Conservation (ac-ft/yr)	0	0	97	167	223	269

The North East Texas Regional Water Planning Group supports the recommendation from Region I for Advanced water conservation to meet projected future needs of the City of Overton.

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF CITY OF WINONA

Description of Water User Group:

The City of Winona system is located in northeastern Smith County and serves the incorporated area of the City. The population is projected to increase from 654 persons in 2020 to 1,290 persons in 2070. The City is included as a W.U.G. 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 approximately 320 GPM, or 169 ac-ft/yr. The system is bounded on the north, west, and south by the Sand Flat WSC and on the east by the Star Mountain WSC. The System does have a water conservation plan. The System is projected to have a water supply surplus of 33 ac-ft/yr in 2020 decreasing to a deficit of 85 ac-ft/yr in 2070. A location map is included as Attachment A.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	654	747	851	974	1,118	1,290
Projected Water Demand	136	151	169	192	220	254
Current Water Supply	169	169	169	169	169	169
Projected Supply Surplus (+)/Deficit(-)	**33**	**18**	**0**	**-23**	**-51**	**-85**

Evaluation of Potentially Feasible Water Management Strategies:

Four alternative strategies were considered to meet the City'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 gpcpd threshold set by the planning group. Water reuse was not considered because the system 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 system and surface water treatment is not economically feasible for a system of this size. A groundwater worksheet is included as Attachment B.

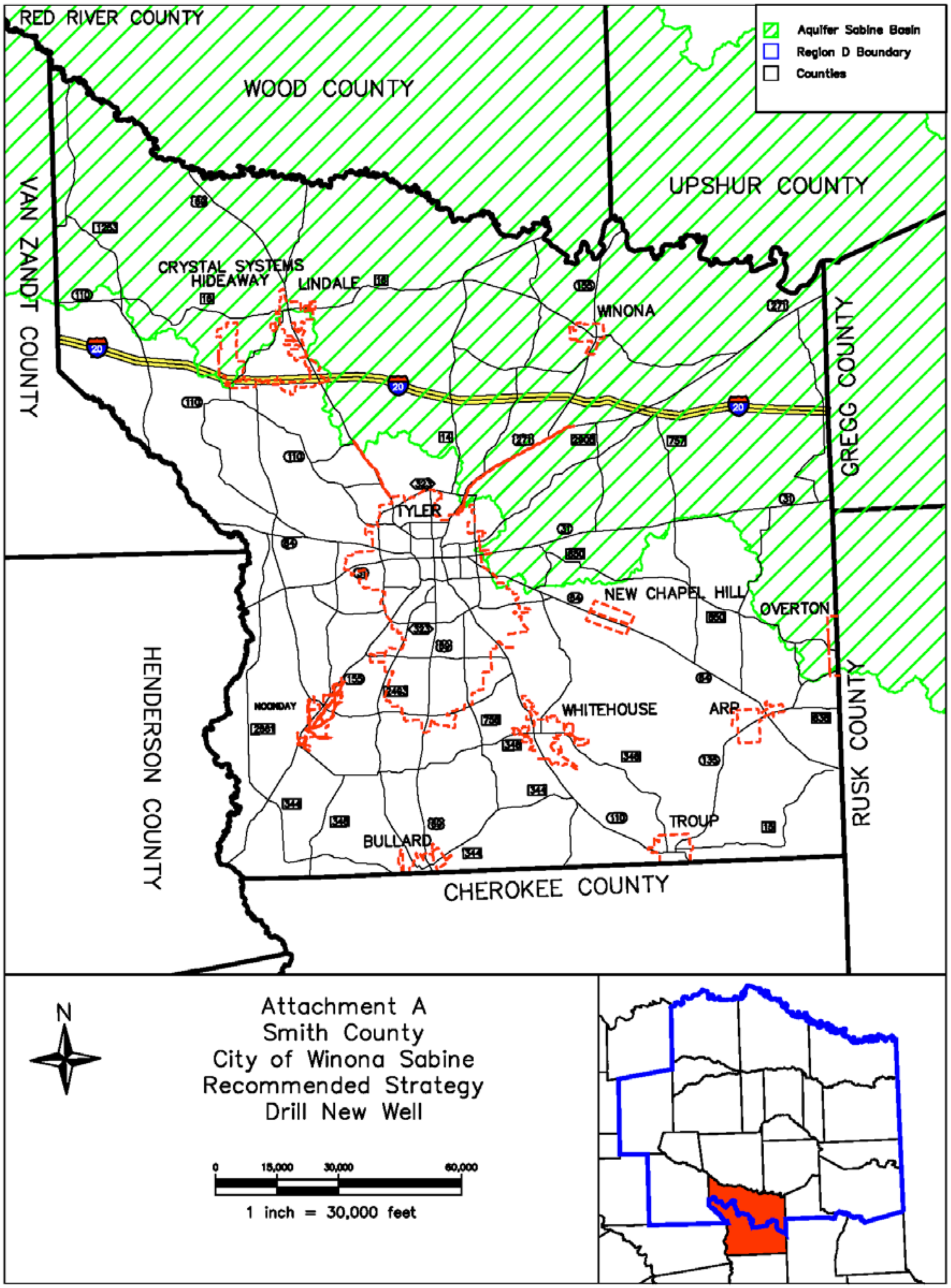
Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Queen City Aquifer, Sabine Basin)	**108**	**$ 755,000**	**$ 88,000**	**$ 815**	**1**
Surface Water					

Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Queen City Aquifer, Sabine Basin; ac-ft/yr)	0	0	0	108	108	108

The recommended strategy for the City to meet their projected surplus of 33 ac-ft/yr in 2020 and deficit of 85 ac-ft/yr in 2070 would be to construct one additional water well similar to what other water systems are achieving in the area just prior to each decade as the deficits occur. The recommended supply source will be the Queen City Aquifer in Smith County. One well with rated capacity of 200 gpm each would provide approximately 108 acre-feet each. The Queen City Aquifer in Smith County is projected to have a more than ample supply availability to meet the needs of Winona 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.



Aquifer Sabine Basin
Region D Boundary
Counties
RED RIVER COUNTY
WOOD COUNTY
UPSHUR COUNTY
VAN ZANDT COUNTY
GREGG COUNTY
RUSK COUNTY
HENDERSON COUNTY
CHEROKEE COUNTY
CRYSTAL SYSTEMS HIDEAWAY
LINDALE
WINONA
TYLER
NEW CHAPEL HILL
OVERTON
NOONDAY
WHITEHOUSE
ARP
TROUP
BULLARD
N
Attachment A
Smith County
City of Winona Sabine
Recommended Strategy
Drill New Well
0 15,000 30,000 60,000
1 inch = 30,000 feet

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Winona - Drill New Wells (Winona - Sabine - Carrizo Wilcox)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
Well Fields (Wells, Pumps, and Piping)	$491,000
Water Treatment Plant (0.3 MGD)	$29,000
TOTAL COST OF FACILITIES	**$520,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$182,000
Environmental & Archaeology Studies and Mitigation	$16,000
Land Acquisition and Surveying (6 acres)	$11,000
Interest During Construction (4% for 1 years with a 1% ROI)	$26,000
TOTAL COST OF PROJECT	**$755,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$63,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$5,000
Water Treatment Plant (2.5% of Cost of Facilities)	$18,000
Pumping Energy Costs (24803 kW-hr @ 0.09 $/kW-hr)	$2,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$88,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	108
Annual Cost of Water ($ per acft)	$815
Annual Cost of Water ($ per 1,000 gallons)	$2.50

Note: One or more cost element has been calculated externally

JTS *4/9/2015*

REGION D
EVALUATIONS OF WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

TITUS COUNTY

WUGs:

Northeast Texas Municipal Water District
Titus County Manufacturing
Titus County Steam Electric
Tri SUD

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EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF NORTHEAST TEXAS MUNICIPAL WATER DISTRICT

Description of Water User Group:

The Northeast Texas Municipal Water District (NETMWD) obtains water from numerous sources, listed below. This provider supplies the cities of Avinger, Daingerfield, Hughes Springs, Jefferson, Lone Star, Longview, Marshall, Ore City, and Pittsburg. Also supplied are Diana SUD, Harleton WSC, Tryon Road SUD, and Mims WSC. The NETMWD has existing contracts to supply an aggregate 46,668 ac-ft to three power plants owned by AEP-SWEPCO and one power plant operated by Luminant. U.S. Steel has contractual right to 32,400 ac-ft of water in Lake O' the Pines. The NETMWD is projected to maintain a supply surplus throughout the planning period, but is listed herein for the purpose of recommending seller water management strategies to utilize the District's available supplies to meet projected demands for the District's customer WUGs.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Water Demand from other entities	132,672	131,802	131,059	130,301	129,646	128,740
Current Water Supply	185,342	184,040	182,838	181,536	180,233	178,931
Projected Supply Surplus (+) / Deficit (-)	**52,670**	**52,238**	**51,779**	**51,235**	**50,587**	**50,191**

Evaluation of Potentially Feasible Water Management Strategies:

NETMWD is projected to have a supply surplus over the 2020 – 2070 planning period.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Env. Impact
Advanced Water Conservation					
Water Reuse					
Ground Water					
Voluntary Reallocation of Harrison County Steam Electric (ac-ft/yr)	**18,000**	**$0**	**$0**	**$0**	**1**
Voluntary Reallocation of Marion County Steam Electric (ac-ft/yr)	**1,592**	**$0**	**$0**	**$0**	**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
Voluntary Reallocation (Harrison County Steam Electric, Lake O' The Pines ac-ft/yr)	**0**	**0**	**0**	**0**	**0**	**18,000**
Voluntary Reallocation (Marion County Steam Electric, Lake O' The Pines ac-ft/yr)	**0**	**0**	**0**	**0**	**0**	**1,592**

It is recommended that NETMWD voluntarily reallocate the available surplus water supplies presently contracted with the Steam Electric WUGs in Harrison and Marion Counties out of Lake O' The Pines Reservoir. Demand projections for the Marion County Steam Electric WUG indicate sufficient supply to meet the Marion County Steam Electric WUG's projected demands over the 2020 – 2070 planning period, even with the voluntary removal of this supply. Voluntary reallocation of Harrison County Steam Electric supply in 2070 is recommended in conjunction with a recommended strategy for Harrison County Steam Electric to construct an intake and raw water pipeline for the purchase of supply from the Sabine River Authority from Toledo Bend Reservoir. In conjunction with this recommended water management strategy, sufficient supply is available to meet the projected Steam Electric WUG needs for Harrison, Marion, and Titus Counties. These voluntary reallocations would provide sufficient supply to meet the projected demands for the Titus County Steam Electric WUG, in combination with a recommendation for that WUG to increase its existing contract to purchase these supplies from the NETMWD.

As noted within the 2016 Plan, these recommendations are for the voluntary reallocation of supply. No entity should be required to participate.

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF MANUFACTURING IN TITUS COUNTY

Description of Water User Group:

Manufacturing in Titus County has a demand that is projected to increase from 8,995 ac-ft/yr in 2020 to 11,256 ac-ft/yr in 2070. Manufacturing in Titus County is currently supplied by groundwater from the Carrizo-Wilcox Aquifer, direct reuse, and surface water from Tankersley and Bob Sandlin purchased from the City of Mount Pleasant. A deficit of 3,603 ac-ft/yr is projected to occur in 2020 and increase to 5,440 ac-ft/yr by 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Projected Water Demand	8,995	9,315	9,615	9,864	10,537	11,256
Current Water Supply	5,392	5,596	5,782	5,806	5,804	5,816
Projected Supply Surplus (+)/Deficit(-)	**-3,603**	**-3,719**	**-3,833**	**-4,058**	**-4,733**	**-5,440**

Evaluation of Potentially Feasible Water Management Strategies:

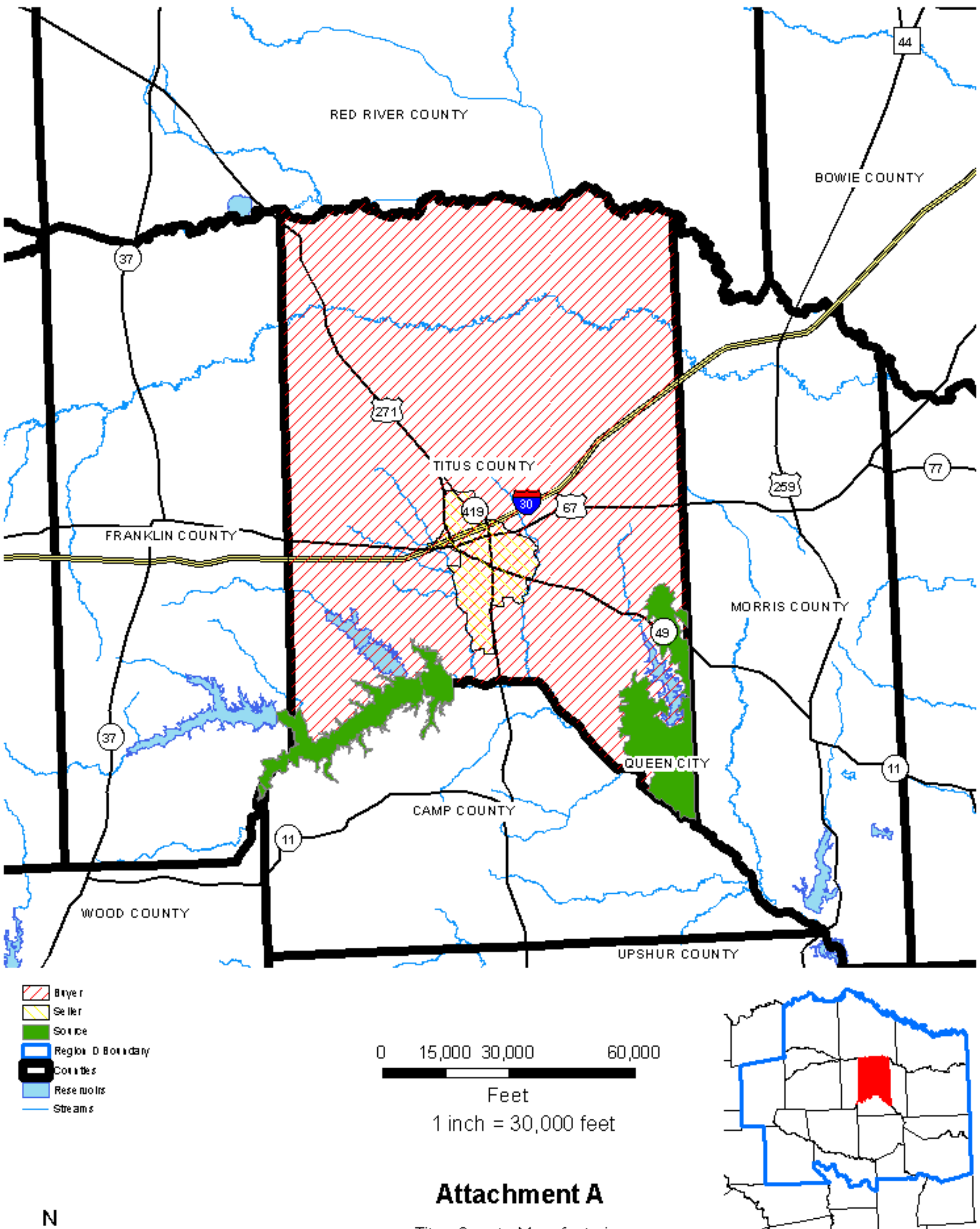
Six alternative strategies were considered to meet the Titus County Manufacturing WUG's water supply shortages. Advanced water conservation for manufacturing was considered in this planning effort to reduce overall demands; however, it does not resolve all identified needs. The use of reuse water from nearby municipalities was not considered in this planning period beyond those amounts currently reported by manufacturing entities in the county. Groundwater has been identified as a potential source of water for manufacturing in Titus County; however, manufacturing needs exceed the availability of groundwater in the basin based on the modeled available groundwater estimates. Surface water was considered as a potential alternative to meet projected demands, both individually, and in conjunction with drilling new wells.

Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation	**1,126**	**$0**	**$0**	**$0**	**1**
Water Reuse					
Drill New Wells (Queen City Aquifer, Cypress Basin)	**45**	**$113,000**	**$37,000**	**$822**	**1**
Drill New Wells (Carrizo-Wilcox Aquifer, Cypress Basin)	**500**	**$571,000**	**$310,000**	**$620**	**1**
Increase Existing Contract	**4,269**	**$0**	**$3,338,000**	**$782**	**1**
Increase Existing Contract	**5,395**	**$0**	**$4,219,000**	**$782**	**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
Advanced Water Conservation (ac-ft/yr)	**900**	**932**	**962**	**986**	**1,054**	**1,126**
Drill New Wells (Queen City, Cypress Basin; ac-ft/yr)	**45**	**45**	**45**	**45**	**45**	**45**
Increase Existing Contract (ac-ft/yr)	**2,658**	**2,742**	**2,826**	**3,027**	**3,634**	**4,269**

The recommended strategies for the Titus County Manufacturing WUG to meet projected demands starting in 2020 is to implement advanced conservation measures (via industrial water audits). It is projected that advanced conservation could produce up to 1,126 ac-ft of savings by the year 2070. The next recommended strategy would be to construct one additional water well by 2020. The recommended supply source will be the Queen City Aquifer in Titus County, in the Cypress Basin. One well with rated capacity of 75 gpm would provide approximately 45 ac-ft/yr. The Queen City Aquifer in Titus County is projected to have adequate supply availability to provide this amount of supply over the planning period. The final recommended strategy, and most significant in terms of supply, is for the increase of the existing contract(s) with the City of Mount Pleasant for raw water supply from Bob Sandlin Reservoir.



Attachment A

Titus County Manufacturing
Recommended Strategy
Conservation, Drill New Wells, Increase Existing Contract (Mount Pleasant)

Cost Estimate Summary
Water Supply Project Option
41518 Prices

Manufacturing – Drill New Wells (Titus - Cypress - Queen City)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$81,000
TOTAL COST OF FACILITIES	**$81,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$28,000
Interest During Construction (4% for 1 years with a 1% ROI)	$4,000
TOTAL COST OF PROJECT	**$113,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$10,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$1,000
Pumping Energy Costs (33598 kW-hr @ 0.09 $/kW-hr)	$3,000
Purchase of Water (45 acft/yr @ 500 $/acft)	$23,000
TOTAL ANNUAL COST	**$37,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	45
Annual Cost of Water ($ per acft)	$822
Annual Cost of Water ($ per 1,000 gallons)	$2.52
KVA	*2/17/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices

Titus County Manufacturing – Increase Existing Contract

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (4269 acft/yr @ 782 $/acft)	$3,338,000
TOTAL ANNUAL COST	**$3,338,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	4,269
Annual Cost of Water ($ per acft)	$782
Annual Cost of Water ($ per 1,000 gallons)	$2.40
JMP	*3/31/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF STEAM ELECTRIC IN TITUS COUNTY

Description of Water User Group:

The Steam Electric Power Generation WUG in Titus County has a demand that is projected to grow from 52,423 ac-ft/yr in 2020 to 120,703 ac-ft/yr in 2070. Supplies include purchased water supplies from Welsh Reservoir, Lake Monticello, and Lake O' The Pines from the Northeast Texas Municipal Water District (NETMWD), purchased water from Titus County FWD #1 from Lake Bob Sandlin, and groundwater wells in the Carrizo-Wilcox Aquifer. Both Luminant and Southwestern Electric Power Company (SWEPCO) have plants in Titus County. Steam Electric Power Generation in Titus County is projected to have a deficit of 20,558 ac-ft/yr in 2020, increasing to a deficit of 91,555ac-ft/yr in 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Projected Water Demand	52,423	61,288	72,096	85,270	101,329	120,703
Current Water Supply	31,865	31,165	30,465	29,665	29,517	29,148
Projected Supply Surplus (+)/Deficit(-)	**-20,558**	**-30,123**	**-41,631**	**-55,605**	**-71,812**	**-91,555**

Evaluation of Potentially Feasible Water Management Strategies:

Several approaches were considered to meet the Titus County Steam Electric WUG's water supply shortages. Advanced water conservation was not considered as a water management strategy as almost all steam electric plants and future plants in the area operate with all possible water conservation processes practicable, and have plans in place to continue to do so in the future. Groundwater has not been identified as a potential source of water for steam electric power in Titus County because limited aquifer availability indicates these sources will be able to meet only a fraction of the entire shortage. Surface water was considered as a viable alternative to meet projected demands. Projected demands can be satisfied by available supplies in Lake Bob Sandlin through 2030, although additional supplies from Lake O' the Pines will be needed by 2040. Voluntary reallocations of Steam Electric supplies in the region were also identified for consideration.

Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Env. Impact
Advanced Water Conservation					
Water Reuse					
Increase Existing Contract (Titus County FWD #1, Bob Sandlin Reservoir)	**24,942**		**$2,494,000**	**$100**	**1**
Increase Existing Contract (NETMWD, Lake O' The Pines)	**41,069**		**$4,107,000**	**$100**	**1**
Increase Existing Contract (NETMWD, Bob Sandlin Reservoir)	**9,890**		**$989,000**	**$100**	**1**
Voluntary Reallocation (Harrison County Steam Electric, Lake O' The Pines)	**18,000**		**$1,800,000**	**$100**	**1**
Voluntary Reallocation (Marion County Steam Electric, Lake O' The Pines)	**1,592**		**$159,000**	**$100**	**1**

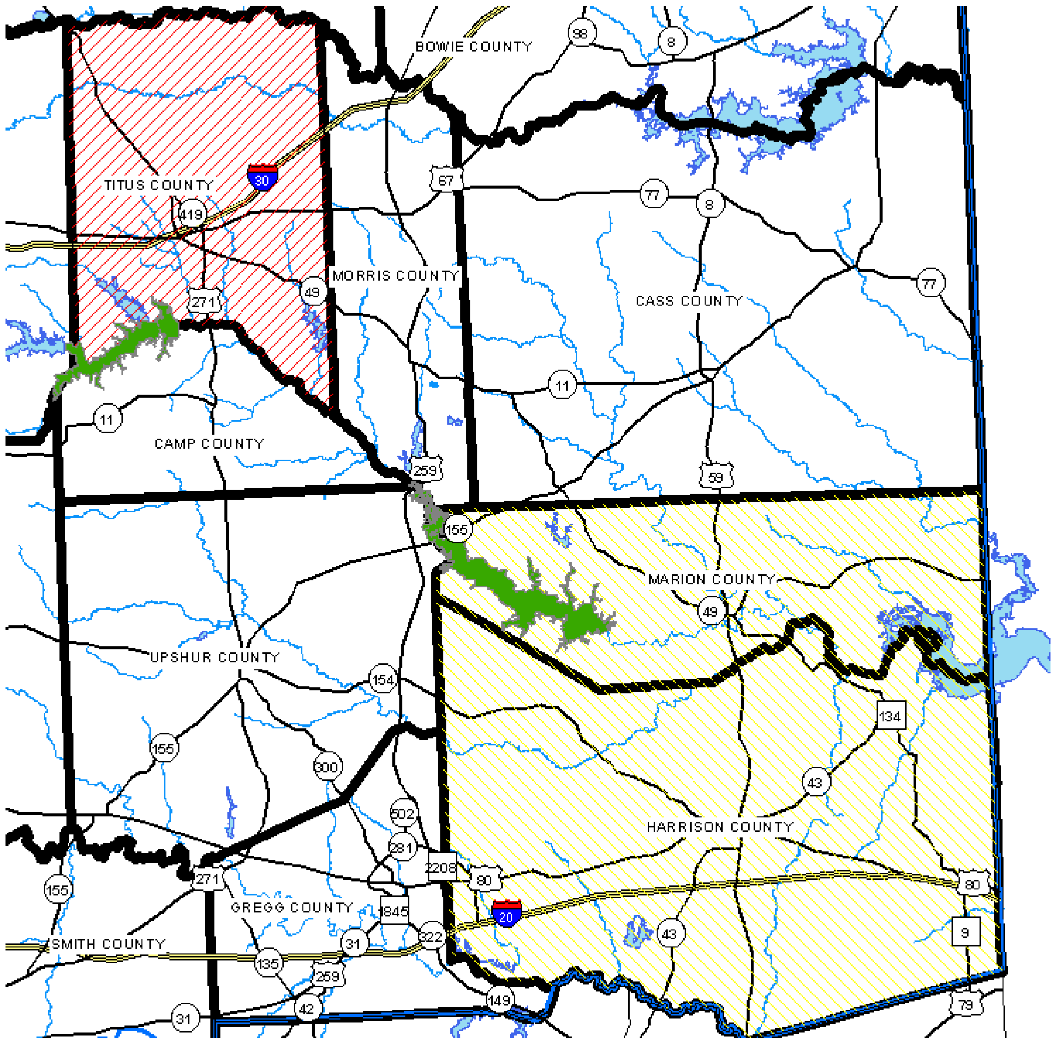
Recommendations:

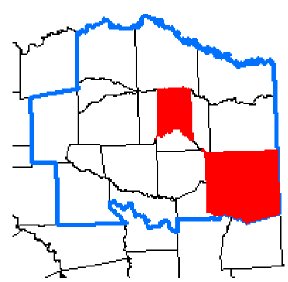
	2020	2030	2040	2050	2060	2070
Increase Existing Contract (Titus County FWD #1, Bob Sandlin Reservoir)	**24,942**	**24,826**	**24,712**	**24,487**	**23,812**	**22,592**
Increase Existing Contract (NETMWD, Bob Sandlin Reservoir)		**9,849**	**9,890**	**9,846**	**9,698**	**9,802**
Increase Existing Contract (NETMWD, Lake O' The Pines)			**41,069**	**40,569**	**40,069**	**39,569**
Voluntary Reallocation (Harrison County Steam Electric, Lake O' The Pines)						**18,000**
Voluntary Reallocation (Marion County Steam Electric, Lake O' The Pines)						**1,592**

Several strategies are recommended for the Titus County Steam Electric WUG to meet projected demands during the planning period. To meet projected needs in 2020, the recommended strategy is to increase the existing contract for the purchase of raw water from Titus County Freshwater District (Lake Bob Sandlin). To meet the projected needs in 2030, the recommended strategy is to increase the existing contract for the purchase of raw water from NETMWD (Bob Sandlin Reservoir). In 2040, the recommended strategy is to increase the existing contract for the purchase of raw water from NETMWD (Lake O' The Pines). These districts have sufficient supply from these sources to meet the projected Steam Electric demands in Titus County through 2060.

To meet the projected needs in 2070, surplus supply from Lake O' the Pines that is currently contracted for steam electric demands in Marion County are recommended to be voluntarily reallocated for the purchase of Steam Electric supply in Titus County. Additionally in 2070, contracted supplies from Lake O' the Pines for steam electric demands in Harrison County are recommended to be voluntarily reallocated for the purchase of this supply for Steam Electric Power Generation in Titus County. The resultant steam electric demands in Harrison County will be met by a recommended strategy for that WUG for construction of a new intake and pipeline for supplies from Toledo Bend Reservoir purchased from the Sabine River Authority, as described in greater detail within this Chapter 5 Appendix.

A capital cost has not been developed for these strategies, since the location of the future generator facilities is unknown; however, existing generation facilities in Titus County are presently served by Lake Bob Sandlin and Lake O' the Pines, so major infrastructure is already in place. Unit costs have been calculated for the purchase of these supplies based on presently available information, and are utilized herein to present an order of magnitude estimation of present potential cost.





Attachment A

Titus County Steam Electric
Recommended Strategy
Increase Existing Contract (NETMWD/Titus Co FWD), Voluntary Reallocation (Harrison/Marion Steam Elec)

Cost Estimate Summary
Water Supply Project Option
41518 Prices

Titus County Steam Electric - Increase Existing Contract (Titus County FWD #1, Bob Sandlin Reservoir)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (24942 acft/yr @ 100 $/acft)	$2,494,000
TOTAL ANNUAL COST	**$2,494,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	24,942
Annual Cost of Water ($ per acft)	$100
Annual Cost of Water ($ per 1,000 gallons)	$0.31
JMP	*4/4/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices

Titus County Steam Electric - Increase Existing Contract (NETMWD, Lake O' The Pines)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (41069 acft/yr @ 100 $/acft)	$4,107,000
TOTAL ANNUAL COST	**$4,107,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	41,069
Annual Cost of Water ($ per acft)	$100
Annual Cost of Water ($ per 1,000 gallons)	$0.31
JMP	*4/4/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices

Titus County Steam Electric - Increase Existing Contract (NETMWD, Bob Sandlin Reservoir)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (9890 acft/yr @ 100 $/acft)	$989,000
TOTAL ANNUAL COST	**$989,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	9,890
Annual Cost of Water ($ per acft)	$100
Annual Cost of Water ($ per 1,000 gallons)	$0.31
JMP	*4/4/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices

Titus County Steam Electric - Voluntary Reallocation (Harrison County Steam Electric, Lake O' The Pines)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (18000 acft/yr @ 100 $/acft)	$1,800,000
TOTAL ANNUAL COST	**$1,800,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	18,000
Annual Cost of Water ($ per acft)	$100
Annual Cost of Water ($ per 1,000 gallons)	$0.31
JMP	*4/4/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices

Titus County Steam Electric - Voluntary Reallocation (Marion County Steam Electric, Lake O' The Pines)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (1592 acft/yr @ 100 $/acft)	$159,000
TOTAL ANNUAL COST	**$159,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	1,592
Annual Cost of Water ($ per acft)	$100
Annual Cost of Water ($ per 1,000 gallons)	$0.31

JMP *4/4/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF TRI SUD

Description of Water User Group:

TRI SUD provides water service in Titus County (in the Cypress and Sulphur Basins) and Morris County (in the Cypress Basin). TRI SUD purchases treated water originating from Lake Bob Sandlin from the City of Mount Pleasant. The existing contract will expire in 2018; as a result, TRI SUD is projected to have shortages beginning in 2020. The WUG population is projected to be 15,713 in 2020 and 26,143 by the year 2070. TRI SUD is projected to have a deficit of 1,560 ac-ft in 2020, increasing to a deficit of 2,399 ac-ft by 2070.

Water Supply and Demand Analysis:

	2020	**2030**	**2040**	**2050**	**2060**	**2070**
Population	15,713	17,562	19,477	21,592	23,806	26,143
Projected Water Demand	1,560	1,681	1,819	1,991	2,187	2,399
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	0	0	0	0	0	0
Projected Supply Surplus (+) / Deficit (-)	**-1,560**	**-1,681**	**-1,819**	**-1,991**	**-2,187**	**-2,399**

Projected Supply Surplus (+) / Deficit (-) by Basin	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Cypress Titus County	**-918**	**-1,000**	**-1,091**	**-1,202**	**-1,329**	**-1,466**
Sulphur Titus County	**-478**	**-520**	**-568**	**-626**	**-692**	**-763**
Cypress Morris County	**-164**	**-161**	**-160**	**-163**	**-166**	**-170**
Total	**-1,560**	**-1,681**	**-1,819**	**-1,991**	**-2,187**	**-2,399**

Evaluation of Potentially Feasible Water Management Strategies:

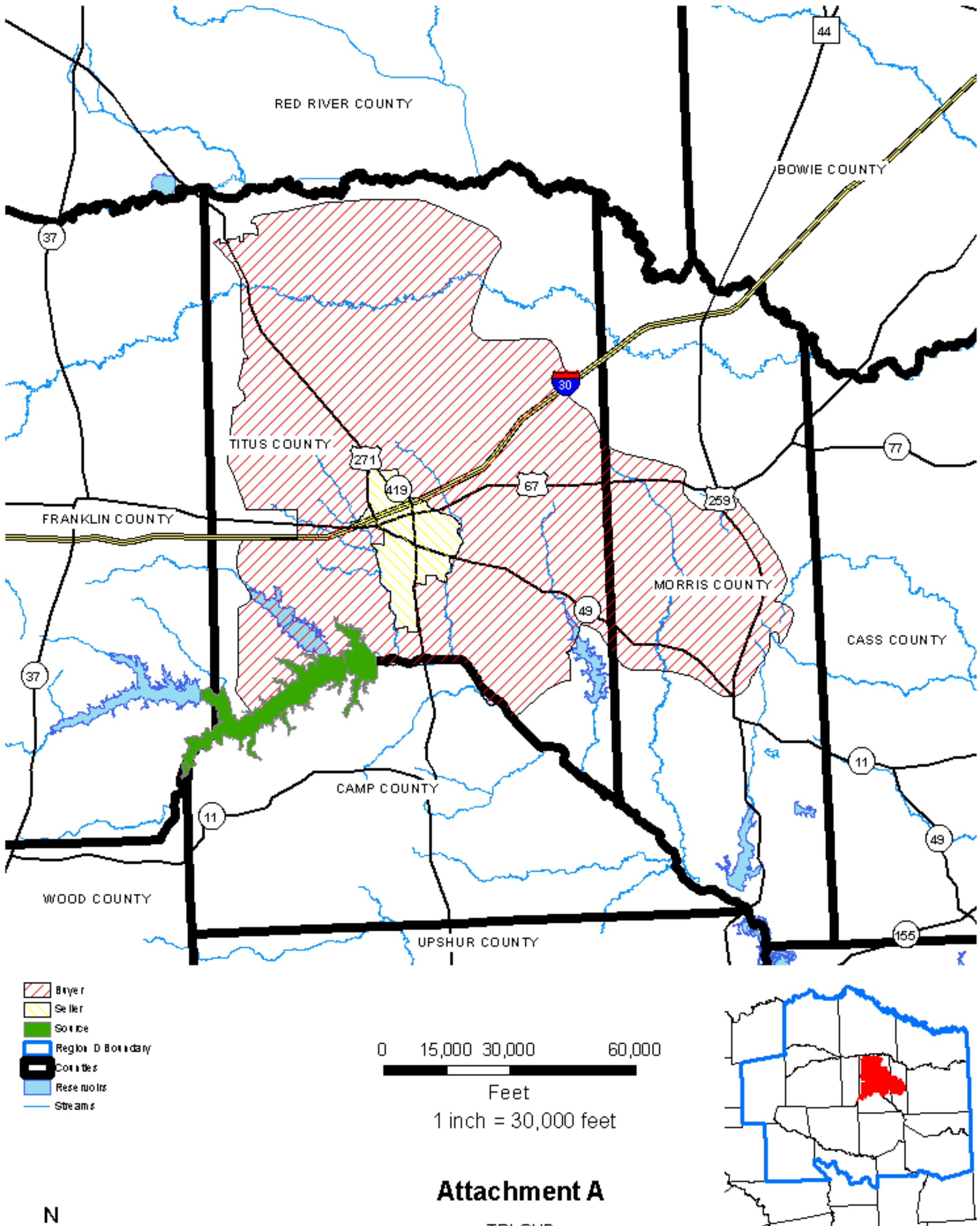
Four alternative strategies were considered to meet the SUD's water supply shortages as summarized in the table below. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was considered, but TRI SUD has indicated that it is planning on meeting future needs from water purchased from the City of Mount Pleasant. TRI SUD's contract for surface water from the City of Mount Pleasant expires in 2018, thus renewal and increase of the contracted amount was considered as a potential strategy.

Strategy	**Firm Yield (ac-ft)**	**Total Capital Cost**	**Total Annualized Cost**	**Unit Cost**	**Env. Impact**
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Queen City Aquifer, Cypress Basin)	**45**	**$569,000**	**$91,000**	**$2,022**	**1**
Drill New Wells (Carrizo Wilcox, Cypress Basin)	**920**	**$4,637,000**	**$907,000**	**$986**	**1**
Drill New Wells (Carrizo Wilcox, Sulphur Basin)	**1,175**	**$5,778,000**	**$1,142,000**	**$972**	**1**
Renew and Increase Existing Contract (Mount Pleasant)	**2,399**	**$0**	**$1,876,000**	**$782**	**1**

Recommendations:

Strategy	2020	2030	2040	2050	2060	2070
Renew and Increase Existing Contract (Mount Pleasant) (ac-ft/yr)	**1,560**	**1,681**	**1,819**	**1,991**	**2,187**	**2,399**

The recommended strategy for TRI SUD to meet the identified needs in 2020 is to renew and increase their existing contract with the City of Mount Pleasant for treated supply from Lake Bob Sandlin.



Attachment A

TRI SUD
Recommended Strategy
Increase Existing Contract (Mount Pleasant)

Cost Estimate Summary
Water Supply Project Option
41518 Prices
TRI SUD - Renew and Increase Existing Contract (Mount Pleasant)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (2399 acft/yr @ 782 $/acft)	$1,876,000
TOTAL ANNUAL COST	**$1,876,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	2,399
Annual Cost of Water ($ per acft)	$782
Annual Cost of Water ($ per 1,000 gallons)	$2.40
JMP	*4/4/2015*

REGION D
EVALUATIONS OF WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

UPSHUR COUNTY

WUGs:

The City of Gilmer
Upshur County Manufacturing
Upshur County Mining

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EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF CITY OF GILMER

Description of Water User Group:

The City of Gilmer system is located in central Upshur County and serves the incorporated area of the City. The population is projected to increase from 5,328 persons in 2020 to 7,178 persons in 2070. The City is included as a W.U.G. in Upshur County. The system's current water supply consists of six water wells from the Carrizo-Wilcox Aquifer. The total rated capacity of these wells is approximately 2050 GPM, or 1,103 ac-ft/yr. The system is bounded on the west and south by the Pritchett WSC, the east by Bi-County WSC, and the north by Sharon WSC. The System does have a water conservation plan. The System is projected to have a water supply surplus of 43 ac-ft/yr in 2020 decreasing to a deficit of 246 ac-ft/yr in 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	5,328	5,757	6,126	6,505	6,853	7,178
Projected Water Demand	1,051	1,108	1,157	1,217	1,280	1,340
Current Water Supply	1,094	1,094	1,094	1,094	1,094	1,094
Projected Supply Surplus (+)/Deficit(-)	**43**	**-14**	**-63**	**-123**	**-186**	**-246**

Evaluation of Potentially Feasible Water Management Strategies:

Four alternative strategies were considered to meet the City'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 gpcpd threshold set by the planning group. Water reuse was not considered because the system 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 system and surface water treatment is not economically feasible for a system of this size.

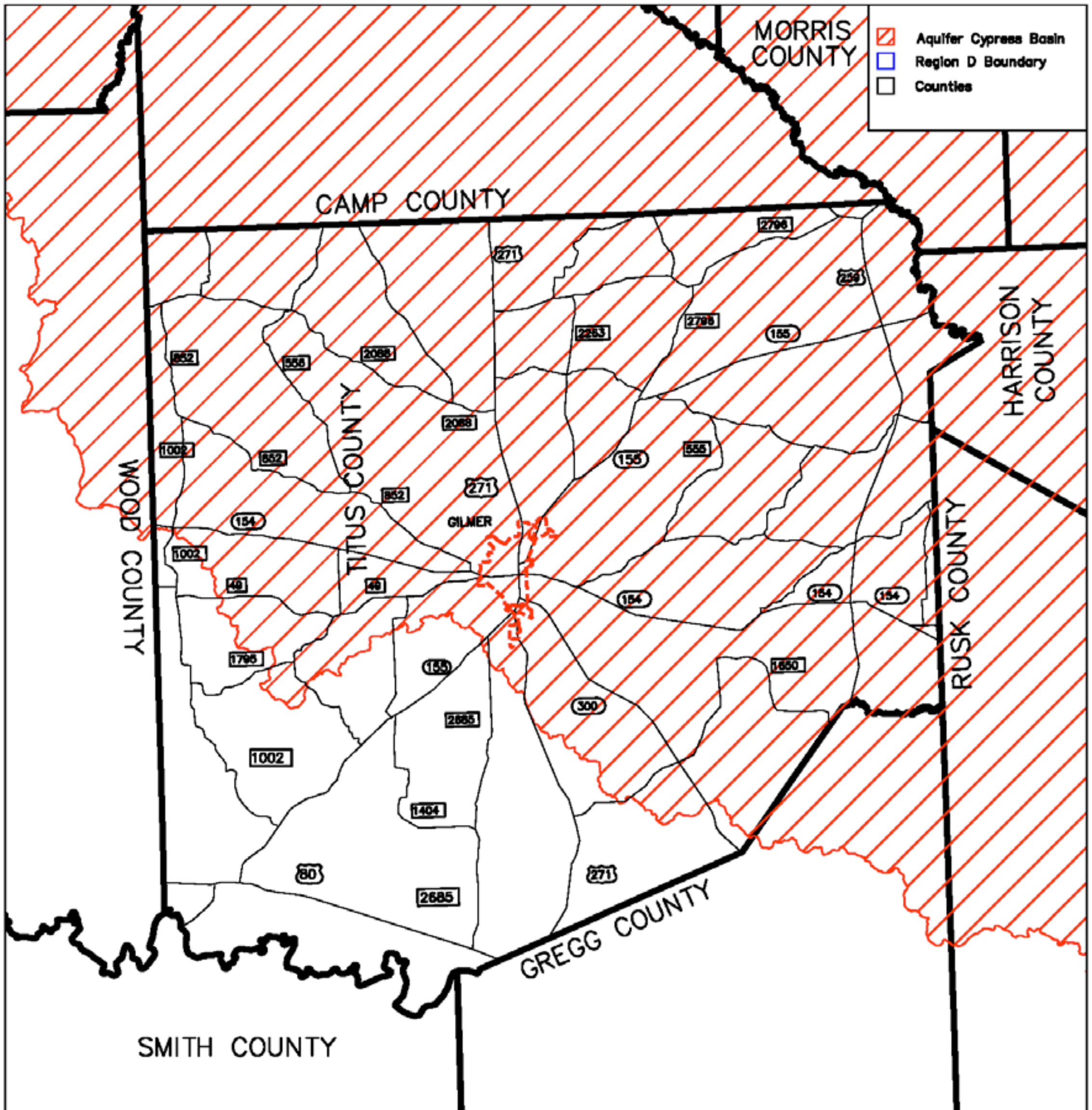
Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Queen City Aquifer, Cypress Basin)	**269**	**$ 1,075,000**	**$ 131,000**	**$ 487**	**1**
Surface Water					

Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Queen City Aquifer, Cypress Basin; ac-ft/yr)	0	269	269	269	269	269

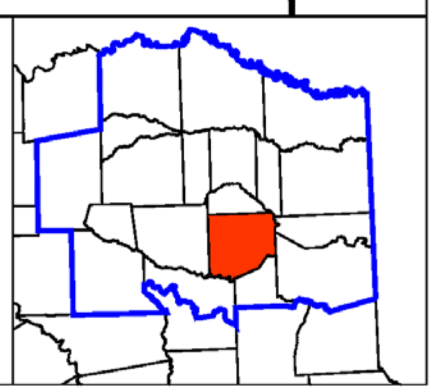
The recommended strategy for the City to meet their projected surplus of 43 ac-ft/yr in 2020 and deficit of 246 ac-ft/yr in 2070 would be to construct one additional water well similar to other wells within their system just prior to each decade as the deficits occur. The recommended supply source will be the Queen City Aquifer in Upshur County. One well with rated capacity of 500 gpm each would provide approximately 269 acre-feet each. The Queen City Aquifer in Upshur County is projected to have a more than ample supply availability to meet the needs of Gilmer 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.



Attachment A
Upshur County
City of Gilmer Cypress
Recommended Strategy
Drill New Well

0 12,500 25,000 50,000
1 inch = 25,000 feet



Cost Estimate Summary
Water Supply Project Option
41518 Prices
Gilmer - Drill New Wells (Gilmer - Cypress - Carrizo Wilcox)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$698,000
Water Treatment Plant (0.7 MGD)	$52,000
TOTAL COST OF FACILITIES	**$750,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$263,000
Environmental & Archaeology Studies and Mitigation	$14,000
Land Acquisition and Surveying (6 acres)	$11,000
Interest During Construction (4% for 1 years with a 1% ROI)	$37,000
TOTAL COST OF PROJECT	**$1,075,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$90,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$7,000
Water Treatment Plant (2.5% of Cost of Facilities)	$31,000
Pumping Energy Costs (37040 kW-hr @ 0.09 $/kW-hr)	$3,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$131,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	269
Annual Cost of Water ($ per acft)	$487
Annual Cost of Water ($ per 1,000 gallons)	$1.49

Note: One or more cost element has been calculated externally

JTS *4/9/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS MANUFACTURING IN UPSHUR COUNTY

Description of Water User Group:

The Manufacturing WUG in Upshur County has a demand that is projected to be increasing from 272 ac-ft/yr in 2020 to 382 ac-ft/yr in 2070. Manufacturing in Upshur County has a current water supply consisting of water wells from the Carrizo-Wilcox Aquifer. The total rated available supply from these sources is 6 ac-ft/yr. Manufacturing in Upshur County is projected to have a water supply deficit of 266 ac-ft/yr in 2020 increasing to a deficit of 376 ac-ft/yr in 2070.

Water Supply and Demand Analysis:

	2020	**2030**	**2040**	**2050**	**2060**	**2070**
Projected Water Demand	272	291	312	330	355	382
Current Water Supply	6	6	6	6	6	6
Projected Supply Surplus (+)/Deficit(-)	-266	-285	-306	-324	-349	-376

Evaluation of Potentially Feasible Water Management Strategies:

Three alternative strategies were considered to meet the Upshur County Manufacturing water supply shortages as summarized in the following table. Advanced conservation and water reuse was not considered because operational procedures for the existing mines are not available. Surface water alternatives were omitted since there is not a supply source within close proximity to the county with available supply.

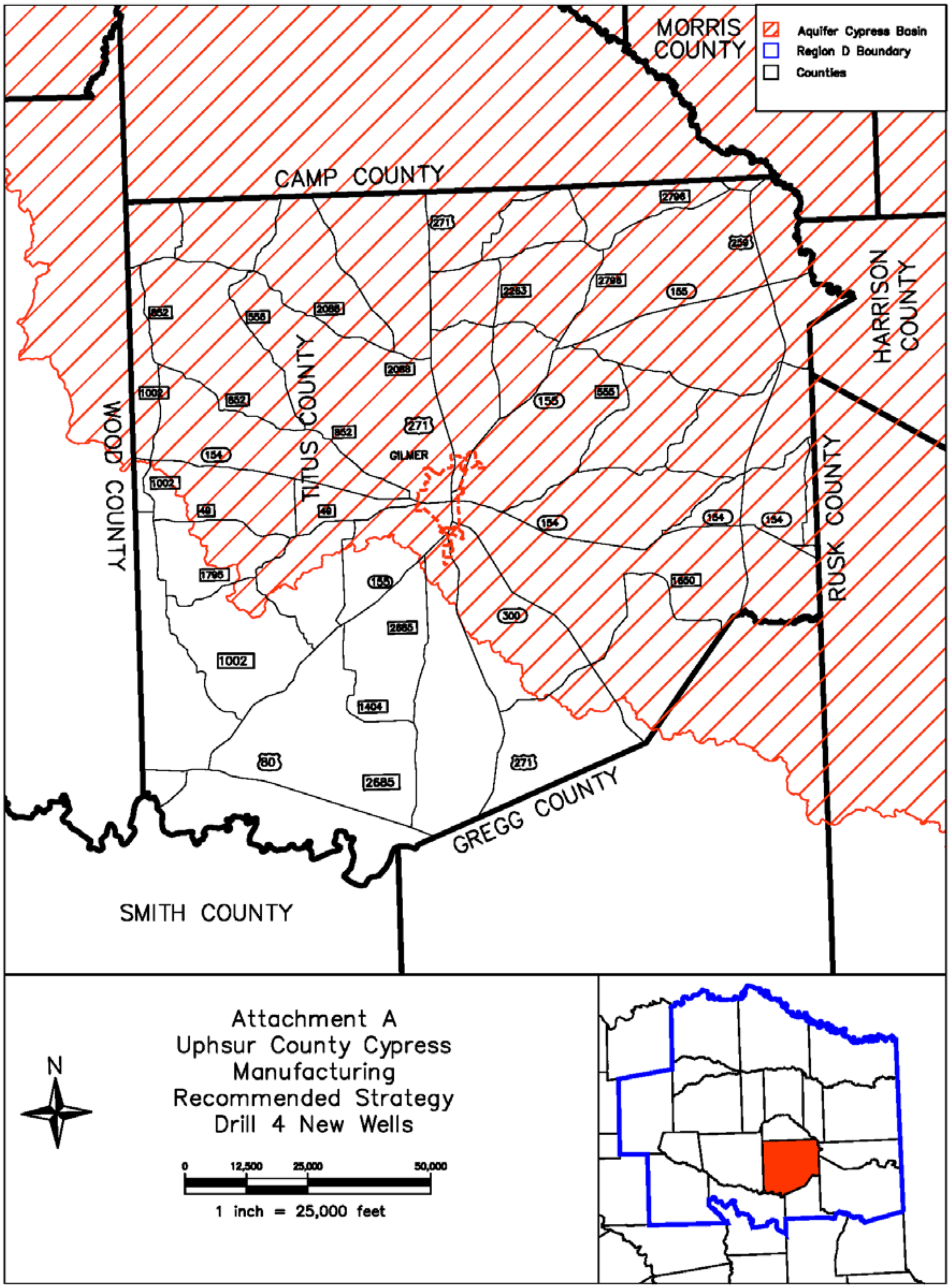
Strategy	**Firm Yield (AF)**	**Total Capital Cost**	**Total Annualized Cost**	**Unit Cost**	**Environmental Impact**
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Queen City Aquifer, Cypress Basin)	**430**	**$ 2,854,000**	**$ 258,000**	**$ 600**	**1**
Surface Water					

Recommendations:

	2020	**2030**	**2040**	**2050**	**2060**	**2070**
Drill New Wells (Queen City Aquifer, Cypress Basin; ac-ft/yr)	324	324	324	324	430	430

The recommended strategy for the Upshur County Manufacturing to meet their projected deficit of 266 ac-ft/yr in 2020 and 376 ac-ft/yr in 2070 would be to construct four additional water wells similar to other wells in the area just prior to each decade as the deficits occur. The recommended supply source will be the Queen City Aquifer in Upshur County. Four wells with rated capacity of 200 gpm each would provide approximately 108 acre-feet each or 430 ac-ft/yr. The Queen City Aquifer in Upshur County is projected to have a more than ample supply availability to meet the needs of the Manufacturing in Upshur County 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.


MORRIS COUNTY
Aquifer Cypress Basin
Region D Boundary
Counties
CAMP COUNTY
HARRISON COUNTY
WOOD COUNTY
TITUS COUNTY
RUSK COUNTY
GILMER
GREGG COUNTY
SMITH COUNTY
N
Attachment A
Uphsur County Cypress
Manufacturing
Recommended Strategy
Drill 4 New Wells
0
12,500
25,000
50,000
1 inch = 25,000 feet

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Manufacturing Uphsur Cypress - Drill New Wells (Uphsur - Cypress – Queen City)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$1,958,000
TOTAL COST OF FACILITIES	**$1,958,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$685,000
Environmental & Archaeology Studies and Mitigation	$47,000
Interest During Construction (4% for 1 years with a 1% ROI)	$95,000
TOTAL COST OF PROJECT	**$2,785,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$233,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$20,000
Pumping Energy Costs (53720 kW-hr @ 0.09 $/kW-hr)	$5,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$258,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	430
Annual Cost of Water ($ per acft)	$600
Annual Cost of Water ($ per 1,000 gallons)	$1.84

JTS *4/10/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS MINING IN UPSHUR COUNTY

Description of Water User Group:

The Mining WUG in Upshur County is a split entity and has a demand that is projected to be 379 ac-ft/yr in 2020 to 333 ac-ft/yr in 2070. The total rated available supply is 1 ac-ft/yr. Mining in Upshur County in the Cypress Basin is projected to have a water supply deficit of 298 ac-ft/yr in 2020, increasing to a maximum deficit of 608 ac-ft/yr in 2040, then decreasing to a deficit of 262 ac-ft/yr in 2070. Mining in Upshur County in the Sabine Basin is projected to have a water supply deficit of 80 ac-ft/yr in 2020, increasing to a maximum deficit of 162 ac-ft/yr in 2040, then decreasing to a deficit of 70 ac-ft/yr in 2070.

Water Supply and Demand Analysis:

Mining Upshur Cypress

	2020	2030	2040	2050	2060	2070
Projected Water Demand	299	574	609	481	355	263
Current Water Supply	1	1	1	1	1	1
Projected Supply Surplus (+)/Deficit(-)	-298	-573	-608	-480	-354	-262

Mining Upshur Sabine

	2020	2030	2040	2050	2060	2070
Projected Water Demand	80	152	162	128	95	70
Current Water Supply	0	0	0	0	0	0
Projected Supply Surplus (+)/Deficit(-)	-80	-152	-162	-128	-95	-70

Evaluation of Potentially Feasible Water Management Strategies:

Three alternative strategies were considered to meet the Upshur County Mining water supply shortages as summarized in the following table. Advanced conservation and water reuse was not considered because operational procedures for the existing mines are not available. Surface water alternatives were omitted since there is not a supply source within close proximity to the county with available supply.

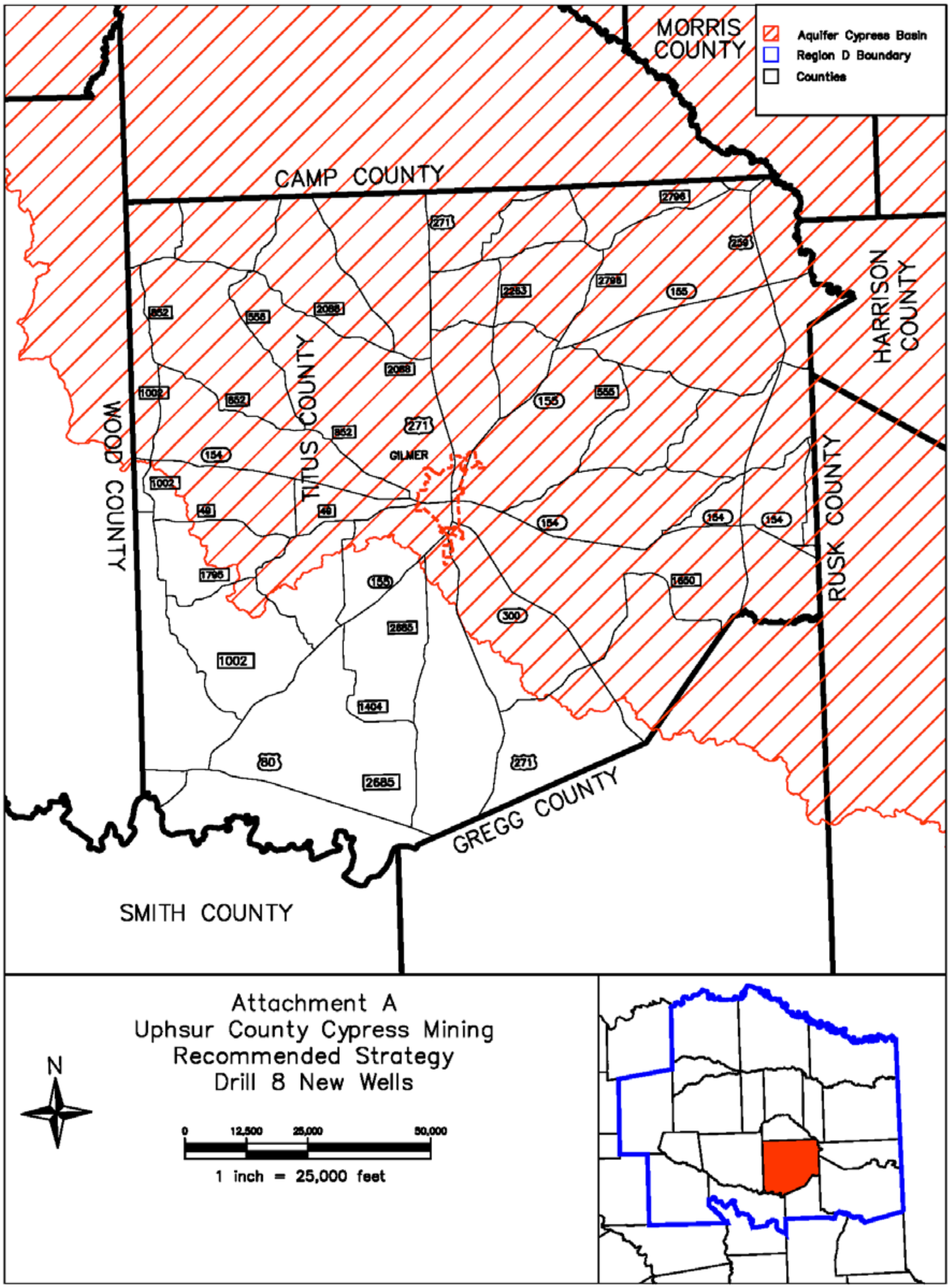
Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Queen City Aquifer, Cypress Basins)	**860**	**$ 5,570,000**	**$ 516,000**	**$ 600**	**1**
Drill New Wells (Queen City Aquifer, Sabine Basins)	**216**	**$1,202,000**	**$121,000**	**$560**	**1**
Surface Water					

Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Queen City Aquifer, Cypress Basins; ac-ft/yr)	430	860	860	860	860	860
Drill New Wells (Queen City Aquifer, Sabine Basins; ac-ft/yr)	216	216	216	216	216	216

The recommended strategy for the Upshur County Mining to meet their projected maximum deficit of 770 ac-ft/yr in 2040 would be to construct eight additional water wells similar to existing wells in the area just prior to each decade as the deficits occur to 2040. The recommended supply source will be the Queen City Aquifer in Upshur County. Eight wells with rated capacity of 200 gpm each would provide approximately 108 acre-feet each or 860 ac-ft/yr. The Queen City Aquifer in Upshur County is projected to have a more than ample supply availability to meet the needs of the Mining in Upshur County for the planning period. Note that six wells are proposed in the Upshur County Cypress Basin and two are located within the Upshur County Sabine Basin.

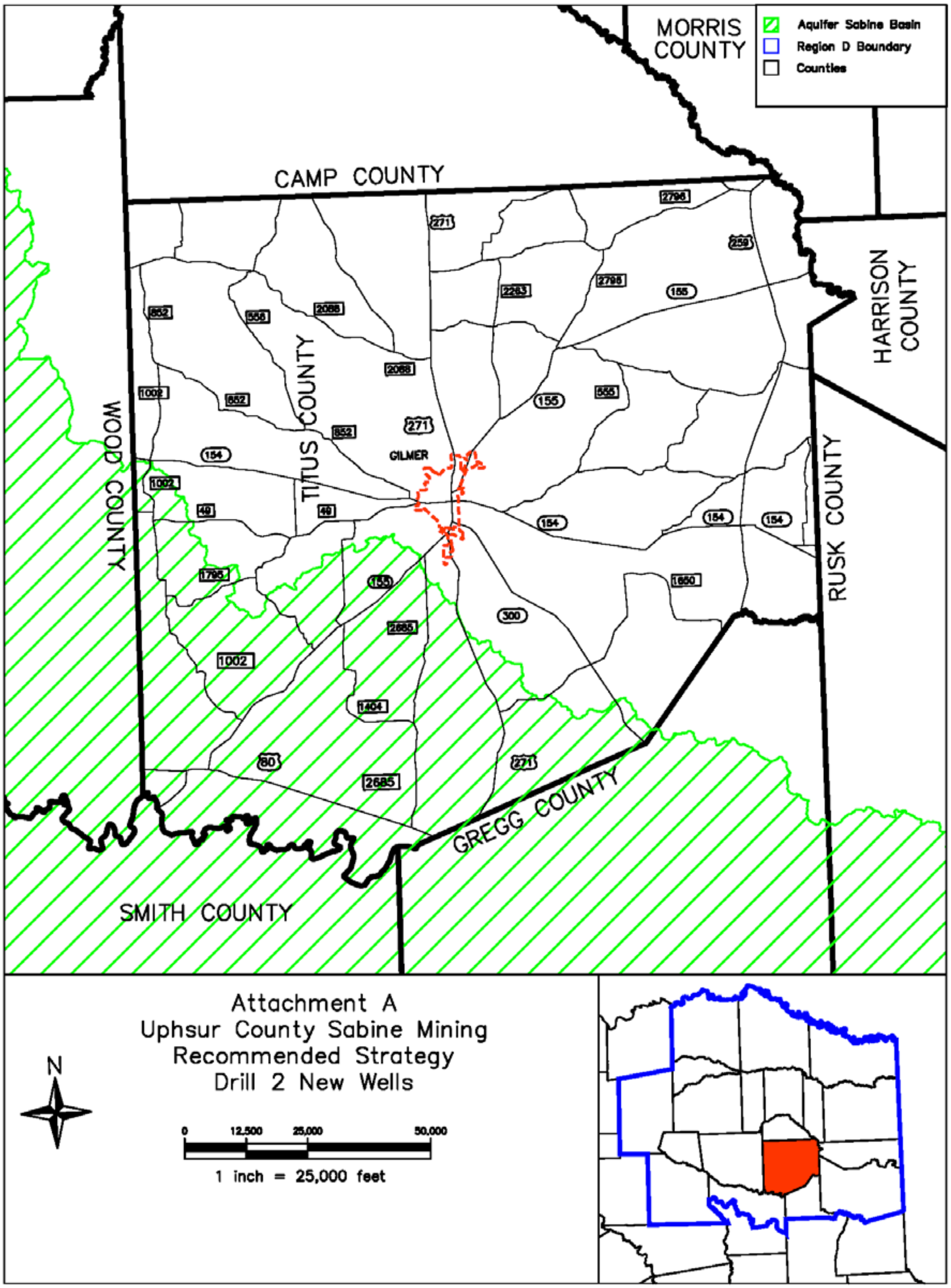
Given the increasing costs to comply with more stringent regulations and the decreasing reliability of groundwater as a future supply source due to quality issues in this region, it is recommended that groundwater supply systems consider combining resources and/or soliciting future water supply from 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.


Aquifer Cypress Basin
Region D Boundary
Counties
MORRIS COUNTY
CAMP COUNTY
HARRISON COUNTY
WOOD COUNTY
TITUS COUNTY
RUSK COUNTY
GREGG COUNTY
SMITH COUNTY
GILMER
Attachment A
Uphsur County Cypress Mining
Recommended Strategy
Drill 8 New Wells
N
0
12,500
25,000
50,000
1 inch = 25,000 feet

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Mining Uphsur Cypress - Drill New Wells (Uphsur – Cypress – Queen City)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$3,915,000
TOTAL COST OF FACILITIES	**$3,915,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,370,000
Environmental & Archaeology Studies and Mitigation	$85,000
Interest During Construction (4% for 1 years with a 1% ROI)	$188,000
TOTAL COST OF PROJECT	**$5,558,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$465,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$39,000
Pumping Energy Costs (136394 kW-hr @ 0.09 $/kW-hr)	$12,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$516,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	860
Annual Cost of Water ($ per acft)	$600
Annual Cost of Water ($ per 1,000 gallons)	$1.84
JTS	*4/9/2015*



Attachment A
Uphsur County Sabine Mining
Recommended Strategy
Drill 2 New Wells

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Mining Uphsur Sabine - Drill New Wells (Uphsur - Sabine – Queen City)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
Well Fields (Wells, Pumps, and Piping)	$839,000
TOTAL COST OF FACILITIES	**$839,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$294,000
Environmental & Archaeology Studies and Mitigation	$28,000
Interest During Construction (4% for 1 years with a 1% ROI)	$41,000
TOTAL COST OF PROJECT	**$1,202,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$101,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$8,000
Pumping Energy Costs (136394 kW-hr @ 0.09 $/kW-hr)	$12,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$121,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	216
Annual Cost of Water ($ per acft)	$560
Annual Cost of Water ($ per 1,000 gallons)	$1.72
JTS	*4/9/2015*

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REGION D
EVALUATIONS OF WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

VAN ZANDT COUNTY

WUGs:

The City of Canton
Van Zandt County Irrigation
Van Zandt County Manufacturing
R-P-M WSC

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EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF CITY OF CANTON

Description of Water User Group:

The City of Canton provides water service in Van Zandt County. The city's population is projected to be 3,963 by 2020 and increasing to 5,329 by 2070. The City of Canton utilizes groundwater from the Carrizo-Wilcox aquifer, and surface water from Mill Creek Reservoir and a run of river water right for water supplies. The City of Canton is not projected to have a shortage during the planning period.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	3,963	4,333	4,616	4,897	5,130	5,329
Projected Water Demand	961	1,032	1,085	1,143	1,196	1,242
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	1,544	1,544	1,544	1,544	1,544	1,544
Projected Supply Surplus (+) / Deficit (-)	**583**	**512**	**459**	**401**	**327**	**281**

Projected Supply Surplus (+) / Deficit (-) by Basin	2020	2030	2040	2050	2060	2070
Sabine	583	512	459	401	327	281
Trinity	0	0	0	0	0	0
Total	**583**	**512**	**459**	**401**	**327**	**281**

Evaluation of Potentially Feasible Water Management Strategies:

In 2008, the Canton City council authorized the appropriation of $70,000 to prepare a long-term water plan. The project evaluated four (4) reservoir sites in Van Zandt County. Two of the four proved to be feasible from a technical standpoint. The City spent an additional $30,000 in 2009 and 2010 to address questions and provide additional information requested by the committee members. In addition to these two long-term strategies, two additional water wells were included to satisfy short-term needs. These two additional wells have been completed. Additional groundwater supply is a potentially feasible strategy. Water reuse is a potentially feasible water supply strategy, as the City currently has a water rights application pending at the Texas Commission on Environmental Quality for the authorization of indirect reuse. At the request of the City of Canton, the construction of an additional water well by 2020 was identified as a feasible strategy because the City of Canton is planning on developing additional groundwater supply to supplement existing supplies. Also at the request of the City, a potential new reservoir on Grand Saline Creek was also considered as a feasible strategy for the City.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Indirect/Direct Reuse	**256**	**$6,234,000**	**$604,000**	**$2,359**	**1**
Drill New Well (Carrizo-Wilcox, Sabine Basin)	**100**	**$863,000**	**$154,000**	**$1,540**	**1**
New Reservoir on Grand Saline Creek	**1,810**	**$45,373,000**	**$5,588,000**	**$3,087**	**5**

New Reservoir on Grand Saline Creek – The City has identified a feasible strategy to meet future water supply needs as being the construction of a new 1,845 acre (24,980 ac-ft) reservoir on Grand Saline Creek, a tributary of Sabine River. This reservoir project was originally described in a 2008 report from Gary Burton Engineering, Inc. to the City of Canton, entitled *Long-Term Water Study Surface Water Supply.*

The 2008 report identified the project site, reservoir surface area, drainage area, and estimated construction costs for the reservoir, intake structure, transmission pipeline and water treatment plant expansion.

The construction costs associated with the new reservoir, raw water transmission line, and water treatment plant expansion are based on calculations from the UCM. For the 2016 planning process, the reservoir has been modeled in the Sabine River WAM (Run 3), subject to SB 3 environmental flow criteria at a junior priority date, and modeled considering the full demand of existing water rights in the Sabine River Basin. The results of this WAM analysis indicate the project has a firm yield of 1,810 ac-ft per year. The project is estimated to yield 1,810 ac-ft/yr of supply by constructing a new 24,980 ac-ft reservoir and 14" pipeline to Canton's WTP and expanding the WTP, for a total project cost of $45.4 million with an annual cost of $5.6 million and a unit cost for the additional supply of $3,087 per ac-ft. with debt service and $1,264 per ac-ft without debt service.

Recommendations:

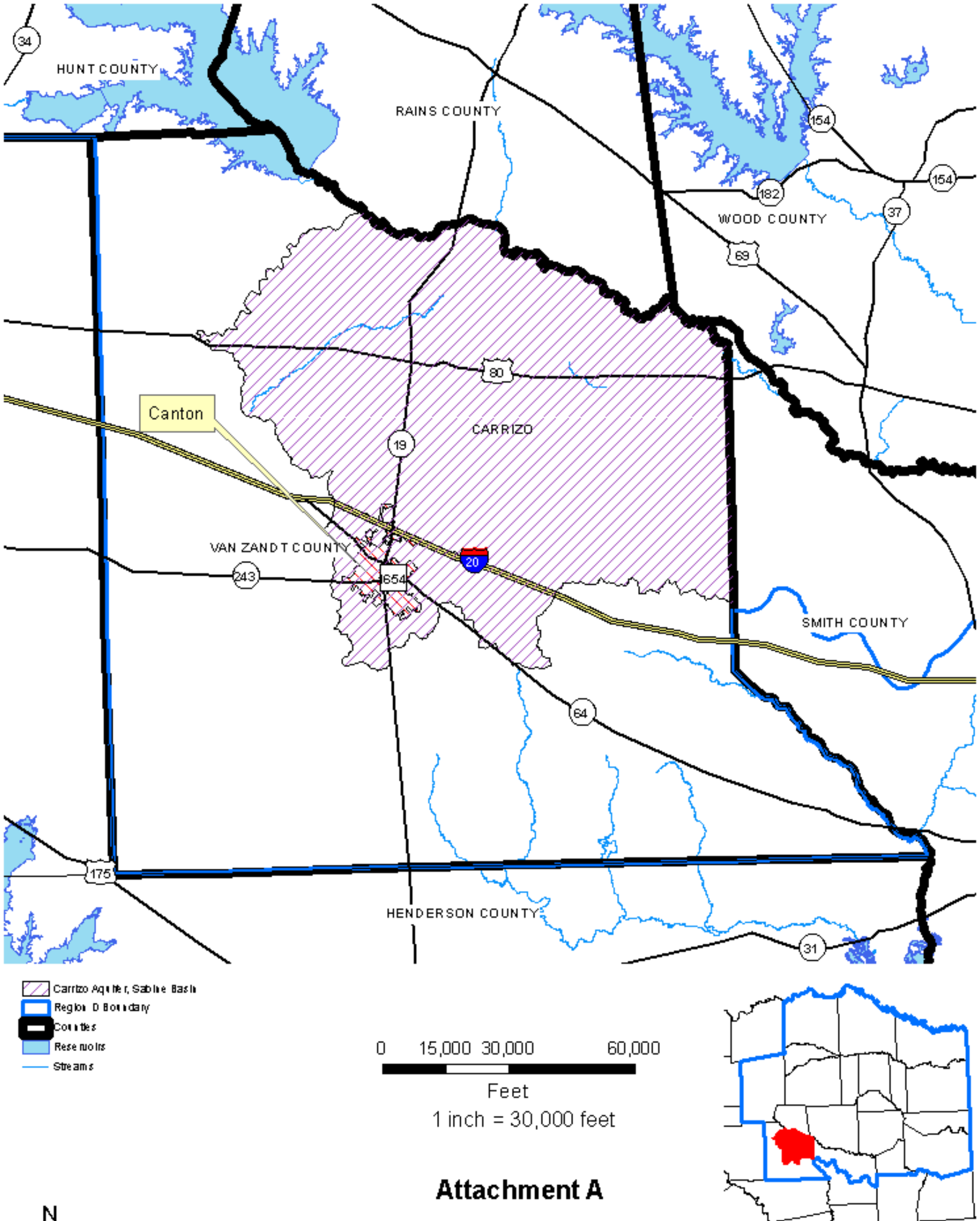
	2020	2030	2040	2050	2060	2070
Drill New Wells (Carrizo-Wilcox, Sabine) (ac-ft/yr)	100	100	100	100	100	100
Indirect/Direct Reuse	256	256	256	256	227	227

The recommended strategy for the City of Canton is to construct by 2020 an additional water well similar to existing wells in the area. The recommended supply source will be the Carrizo-Wilcox Aquifer in the Sabine Basin in Van Zandt County. One well with rated capacity of 180 gpm would provide approximately 100 ac-ft/yr. The Carrizo-Wilcox Aquifer in Van Zandt County is projected to have sufficient supply availability to provide this supply for the planning period.

A second recommended water conservation strategy option is the utilization of both direct and indirect water reuse. The City of Canton has submitted an application to the TCEQ to secure a water right for indirect reuse and may also seek to secure an authorization for direct reuse. These recommendations are based upon current NETRWPG population projections for the City of Canton.

Because of substantial disagreement over future population and water demands, the City has requested the following alternate strategy:

> The strategy to meet future needs "is with surface water from a proposed reservoir on Grand Saline Creek. The City of Canton has provided to NETRWPG resolutions from three other cities in Van Zandt County supporting the reservoir project. This show of support indicates that a regional surface water reservoir could possibly replace the groundwater strategies for other Van Zandt County public water supplies with projected deficits. However, due to the time typically required to obtain the necessary permits to impound surface water, the City plans to construct one or two additional wells, or implement a reuse option in the interim to meet increasing demands due to population growth and the First Monday influence." This alternative wording should be considered consistent with this plan in the event that population growth in the potential service area significantly exceeds current NETRWPG projections.



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Attachment A

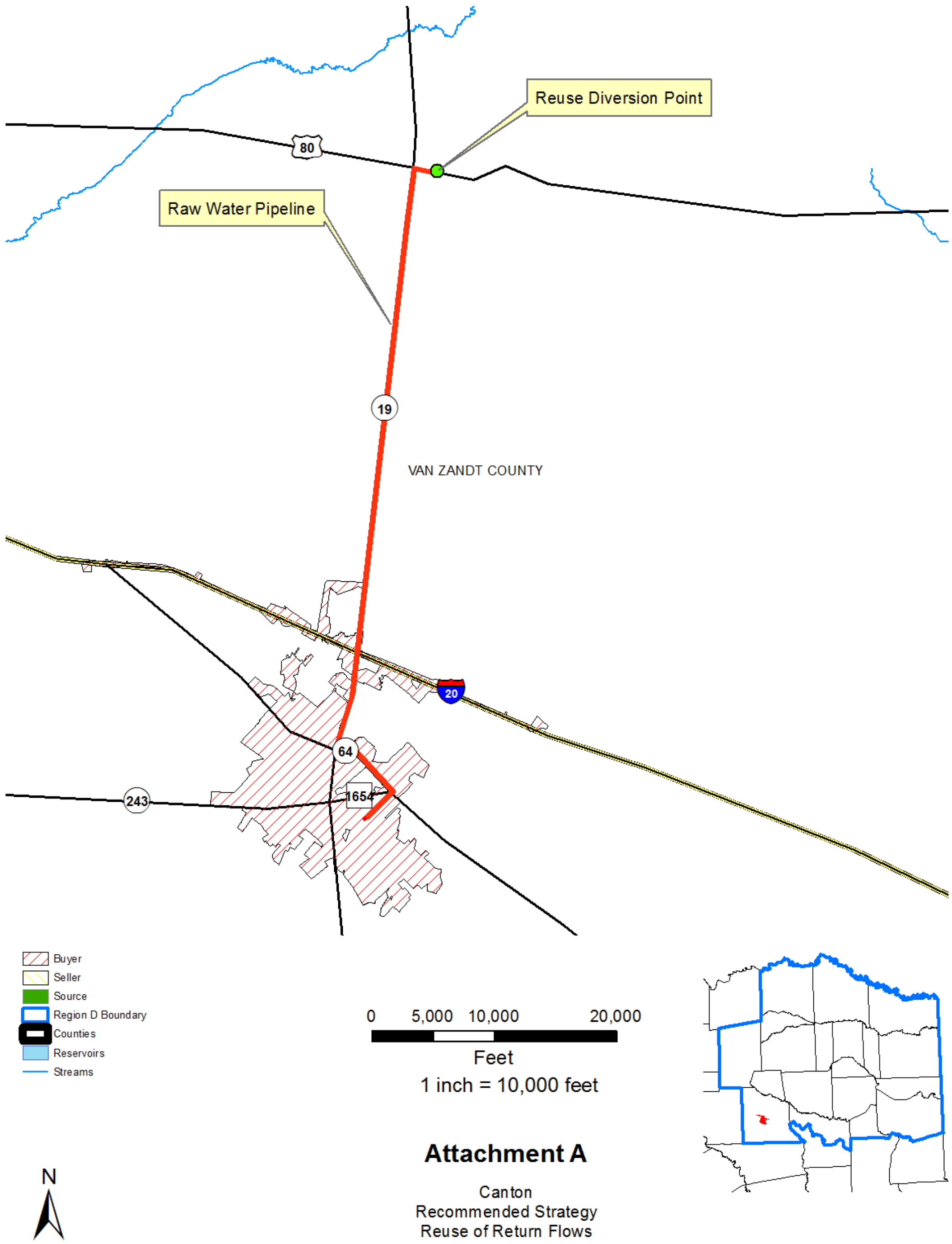
Canton
Recommended Strategy
Drill New Wells

Cost Estimate Summary
Water Supply Project Option
41518 Prices

City of Canton – Drill New Wells (Van Zandt - Sabine - Carrizo Wilcox)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$539,000
Water Treatment Plant (0.5 MGD)	$41,000
TOTAL COST OF FACILITIES	**$580,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$203,000
Environmental & Archaeology Studies and Mitigation	$50,000
Interest During Construction (4% for 1 years with a 1% ROI)	$30,000
TOTAL COST OF PROJECT	**$863,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$72,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$5,000
Water Treatment Plant (2.5% of Cost of Facilities)	$24,000
Pumping Energy Costs (32363 kW-hr @ 0.09 $/kW-hr)	$3,000
Purchase of Water (100 acft/yr @ 500 $/acft)	$50,000
TOTAL ANNUAL COST	**$154,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	100
Annual Cost of Water ($ per acft)	$1,540
Annual Cost of Water ($ per 1,000 gallons)	$4.73
KVA	*3/13/2015*



Attachment A

Canton
Recommended Strategy
Reuse of Return Flows

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Canton - Reuse

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Intake Pump Stations (0 MGD)	$1,004,000
Transmission Pipeline (0 in dia., 11 miles)	$2,372,000
Transmission Pump Station(s) & Storage Tank(s)	$967,000
TOTAL COST OF FACILITIES	**$4,343,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,401,000
Environmental & Archaeology Studies and Mitigation	$279,000
Interest During Construction (4% for 1 years with a 1% ROI)	$211,000
TOTAL COST OF PROJECT	**$6,234,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$522,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$70,000
Pumping Energy Costs (127801 kW-hr @ 0.09 $/kW-hr)	$12,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$604,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	256
Annual Cost of Water ($ per acft)	$2,359
Annual Cost of Water ($ per 1,000 gallons)	$7.24
JMP	*9/22/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF IRRIGATION IN VAN ZANDT COUNTY

Description of Water User Group:

The Irrigation WUG in Van Zandt County has a demand that is projected to remain constant at 437 ac-ft/yr for the planning period. The Irrigation WUG in Van Zandt County is currently supplied by groundwater from the Carrizo-Wilcox Aquifer and run-of-river diversions on the Sabine River. A deficit of 330 ac-ft/yr is projected to occur in throughout the planning period.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Projected Water Demand	437	437	437	437	437	437
Current Water Supply	107	107	107	107	107	107
Projected Supply Surplus (+)/Deficit(-)	**-330**	**-330**	**-330**	**-330**	**-330**	**-330**

Evaluation of Potentially Feasible Water Management Strategies:

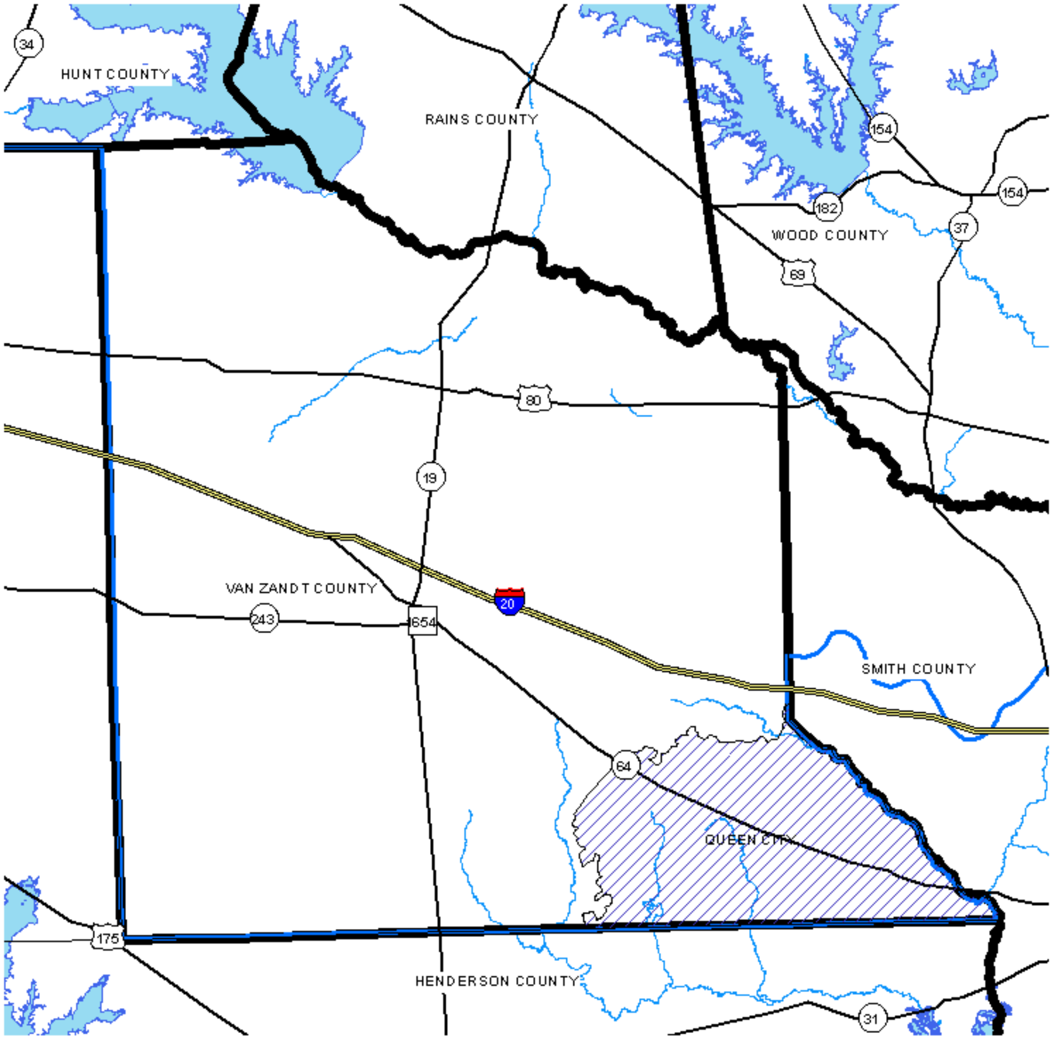
Three alternative strategies were considered to meet the Van Zandt County Irrigation WUG's water supply shortages. Advanced water conservation for irrigation practices were not considered in this planning effort for irrigation. The use of reuse water from nearby municipalities is not considered feasible as it would not be effective to deliver reuse water to farm irrigation systems. Groundwater from the Carrizo-Wilcox and Queen City aquifers has been identified as a potential source of water for irrigation in Van Zandt. Surface water was not considered as a potential alternative to meet projected demands due to cost efficiency.

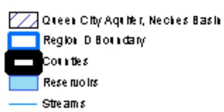
Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Carrizo-Wilcox Aquifer, Neches Basin)	**330**	**$376,000**	**$211,000**	**$639**	**1**
Drill New Wells (Queen City Aquifer, Neches Basin)	**330**	**$227,000**	**$188,000**	**$570**	**1**

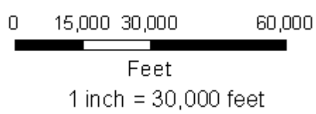
Recommendations:

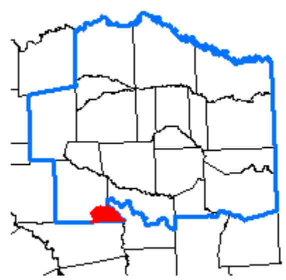
	2020	2030	2040	2050	2060	2070
Drill New Wells (Queen City, Neches) (ac-ft/yr)	**330**	**330**	**330**	**330**	**330**	**330**

The recommended strategy for Irrigation in Van Zandt County is to construct by 2020 an additional five water wells similar to existing wells in the area. The recommended supply source will be the Queen City Aquifer in the Neches River Basin in Van Zandt County. Five wells with rated capacity of 50 gpm would provide approximately 330 ac-ft/yr. The Queen City Aquifer in Van Zandt County is projected to have sufficient supply availability to provide this supply for the planning period.









Attachment A

Van Zandt County Irrigaiton
Recommended Strategy
Drill New Wells

Cost Estimate Summary
Water Supply Project Option
41518 Prices

Irrigation – Drill New Wells (Van Zandt - Neches - Queen City)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
Well Fields (Wells, Pumps, and Piping)	$162,000
TOTAL COST OF FACILITIES	**$162,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$57,000
Interest During Construction (4% for 1 years with a 1% ROI)	$8,000
TOTAL COST OF PROJECT	**$227,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$19,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$2,000
Pumping Energy Costs (19674 kW-hr @ 0.09 $/kW-hr)	$2,000
Purchase of Water (330 acft/yr @ 500 $/acft)	$165,000
TOTAL ANNUAL COST	**$188,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	330
Annual Cost of Water ($ per acft)	$570
Annual Cost of Water ($ per 1,000 gallons)	$1.75

KVA	*3/13/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF MANUFACTURING IN VAN ZANDT COUNTY

Description of Water User Group:

The Manufacturing WUG in Van Zandt County has a demand that is projected to increase from 681 ac-ft/yr in 2020 to 928 ac-ft/yr in 2070. Manufacturing in Van Zandt County is supplied by groundwater from the Carrizo-Wilcox Aquifer, purchased groundwater from Golden WSC and Grand Saline, and surface water from run-of-river permits on the Sabine River, a permit for diversion from Lake Tawakoni. A deficit of 158 ac-ft/yr is projected to occur in 2020, increasing to 287 ac-ft/yr by 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Projected Water Demand	681	724	764	797	860	928
Current Water Supply	523	549	573	593	620	641
Projected Supply Surplus (+)/Deficit(-)	**-158**	**-175**	**-191**	**-204**	**-240**	**-287**

Projected Supply Surplus (+)/Deficit(-) by Basin	2020	2030	2040	2050	2060	2070
Sabine	-154	-171	-186	-199	-234	-281
Trinity	-4	-4	-5	-5	-6	-6
Total	**-158**	**-175**	**-191**	**-204**	**-240**	**-287**

Evaluation of Potentially Feasible Water Management Strategies:

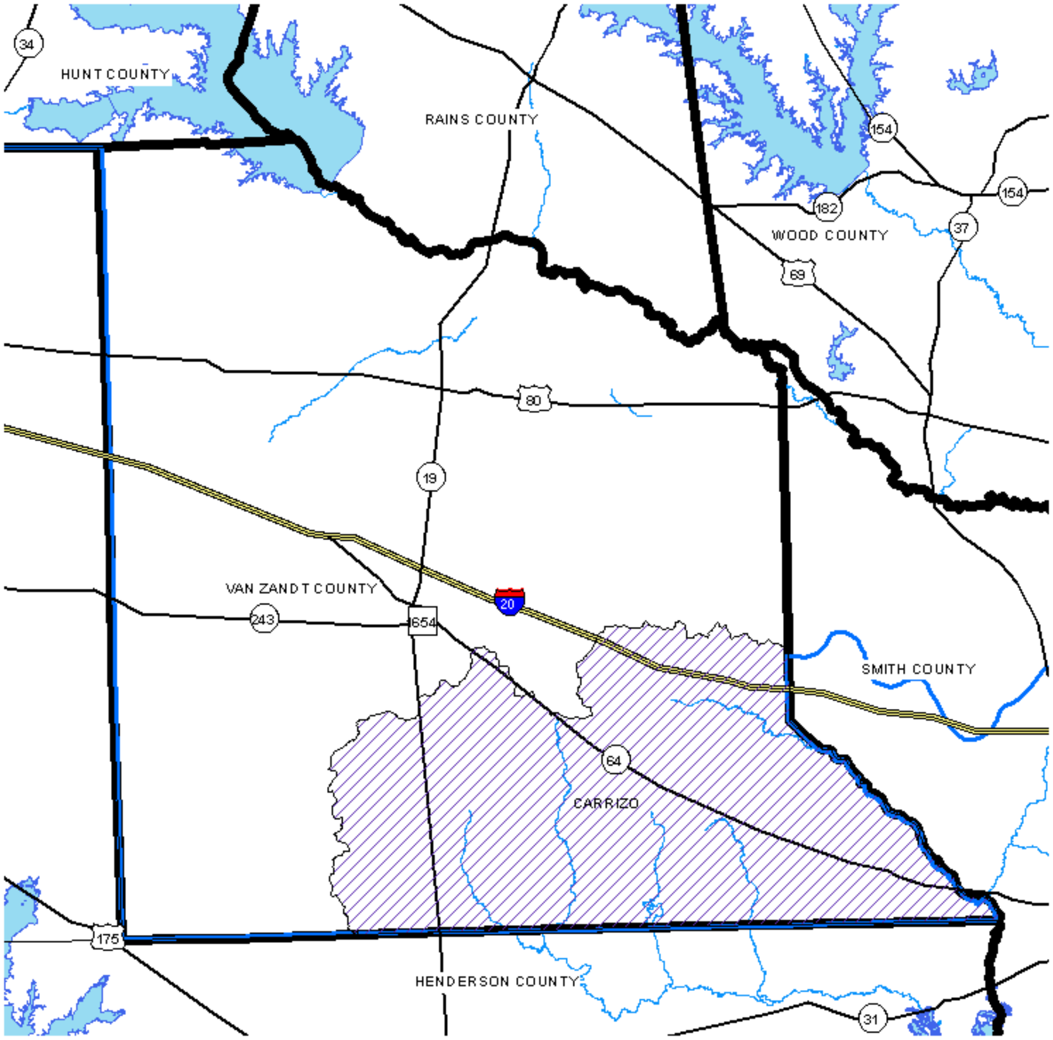
Three alternative strategies were considered to meet the Van Zandt County Manufacturing WUG's water supply shortages. Projected manufacturing demands for Van Zandt County did not meet the threshold for consideration of advanced water conservation, so conservation was not included in the strategies. The use of reuse water from nearby municipalities was not considered to be available at present. Surface water was not considered as a viable alternative to meet projected demands because no supplies are readily available in the proximity of the identified needs. Groundwater has been identified as a potential source of water for manufacturing in Van Zandt County; however, manufacturing needs exceed the availability of groundwater in the Sabine Basin based on the modeled available groundwater estimates. In addition, groundwater supplies can be contracted from City of Grand Saline and Golden WSC.

Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Carrizo-Wilcox Aquifer; Neches Basin)	**290**	**$734,000**	**$220,000**	**$759**	**1**
Increase Existing Contract for Carrizo-Wilcox from Grand Saline	**216**	**$0**	**$605,400**	**$2,803**	**1**
Contract Carrizo-Wilcox from Golden WSC	**47**	**$0**	**$61,241**	**$1,303**	**1**

Recommendations:

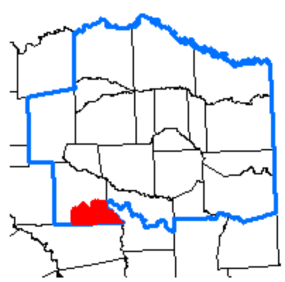
	2020	2030	2040	2050	2060	2070
Drill New Wells (Carrizo-Wilcox, Neches) (ac-ft/yr)	**194**	**194**	**194**	**290**	**290**	**290**

The recommended strategy for Manufacturing in Van Zandt County is to construct by 2020 an additional two water wells, with the addition of a third water well by 2050. The recommended supply source will be the Carrizo-Wilcox Aquifer in the Neches River Basin in Van Zandt County. Two wells with rated capacities of 75 gpm each would provide approximately 194 ac-ft/yr. Addition of the third well in 2050 with a rated capacity of 75 gpm would, when combined with the previous two wells, provide 290 ac-ft/yr. The Carrizo-Wilcox Aquifer in Van Zandt County is projected to have sufficient supply availability to provide this supply for the planning period.



Carrizo Aquifer, Neches Basin
Region D Boundary
Counties
Reservoirs
Streams

0 15,000 30,000 60,000
Feet
1 inch = 30,000 feet



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Attachment A

Van Zandt County Manufacturing
Recommended Strategy
Drill New Wells

Cost Estimate Summary
Water Supply Project Option
41518 Prices

Manufacturing – Drill New Wells (Van Zandt - Neches - Carrizo Wilcox)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$525,000
TOTAL COST OF FACILITIES	**$525,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$184,000
Interest During Construction (4% for 1 years with a 1% ROI)	$25,000
TOTAL COST OF PROJECT	**$734,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$61,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$5,000
Pumping Energy Costs (102910 kW-hr @ 0.09 $/kW-hr)	$9,000
Purchase of Water (290 acft/yr @ 500 $/acft)	$145,000
TOTAL ANNUAL COST	**$220,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	290
Annual Cost of Water ($ per acft)	$759
Annual Cost of Water ($ per 1,000 gallons)	$2.33

KVA *2/17/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF RPM WATER SUPPLY CORPORATION IN VAN ZANDT COUNTY

Description of Water User Group:

R-P-M WSC provides water service in Van Zandt, Henderson and Smith Counties. The WUG population is projected to be 3,298 by 2020 and increases to 6,168 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 16 ac-ft/yr in 2020 and increasing to a deficit of 283 ac-ft/yr by 2070; the shortage projected to occur in Van Zandt County is 12 ac-ft/yr in 2020 increasing to 197 ac-ft/yr by 2070. The shortage in Henderson County is 3 ac-ft/yr in 2020, increasing to 63 ac-ft/yr in 2070. Shortages in Smith County range from 1 ac-ft/yr in 2020 up to 23 ac-ft/yr in 2070.

Water Supply and Demand Analysis:

RPM WSC	2020	2030	2040	2050	2060	2070
Population	3,298	4,017	4,585	5,190	5,705	6,168
Projected Water Demand	360	423	473	530	582	627
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	344	344	344	344	344	344
Projected Supply Surplus (+) / Deficit (-)	**-16**	**-79**	**-129**	**-186**	**-238**	**-283**

Projected Supply Surplus (+) / Deficit (-) by County	2020	2030	2040	2050	2060	2070
Van Zandt	-12	-56	-93	-132	-167	-197
Henderson	-3	-17	-26	-39	-52	-63
Smith	-1	-6	-10	-15	-19	-23
Total	**-16**	**-79**	**-129**	**-186**	**-238**	**-283**

Evaluation of Potentially Feasible Water Management Strategies:

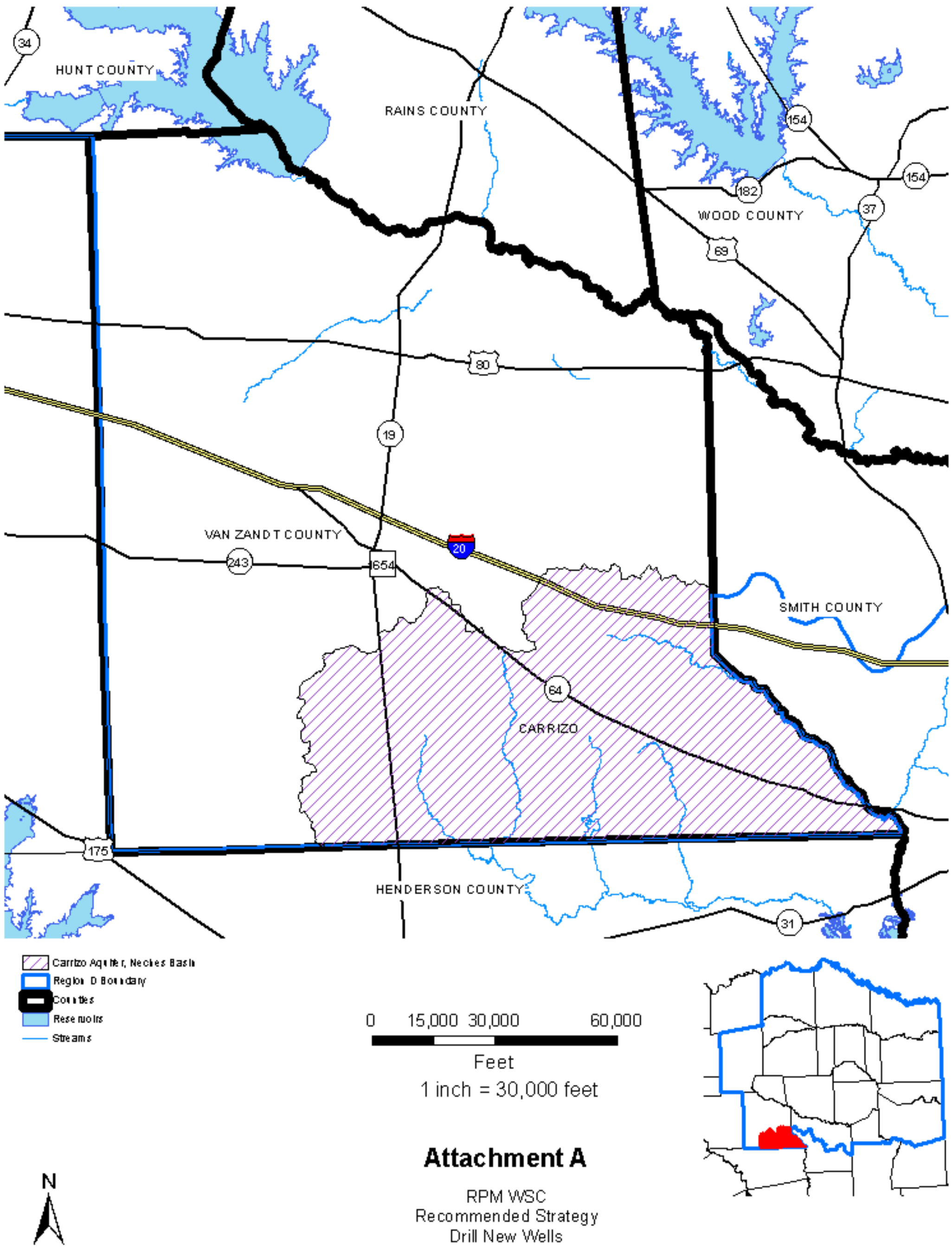
Three alternative strategies were considered to meet the WSC's water supply shortages as summarized in the following table. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcd threshold set by the water planning group. However, the Region I RWPG did identify demand reduction as a feasible strategy. 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 (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Demand Reduction	**23**	**$0**	**$0**	**$0**	**1**
Water Reuse					
Drill New Wells (Carrizo-Wilcox Aquifer, Neches Basin)	**285**	**$3,836,000**	**$184,000**	**$646**	**1**
Drill New Wells (Queen City Aquifer, Neches Basin)	**285**	**$1,545,000**	**$240,000**	**$842**	**1**

Recommendations:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Carrizo-Wilcox, Neches Basin; ac-ft/yr)	75	150	150	225	285	285
Demand Reduction (Enhanced Public and School Education	1	6	10	15	19	23

The recommended strategy for R-P-M WSC to meet their projected deficit of 16 ac-ft/yr in 2020 and 283 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 the Neches Basin in Van Zandt County. Four wells with rated capacity of 75 gpm each, pumping at an approximately depth of 560 ft., would provide approximately 75 acre-feet each. The Carrizo-Wilcox Aquifer is projected to have sufficient supply availability to meet the needs of RPM WSC for the planning period. The ETRWPG (Region I) has recommended demand reduction through enhanced public and school education for R-P-M WSC as well.



Attachment A

RPM WSC
Recommended Strategy
Drill New Wells

Cost Estimate Summary
Water Supply Project Option
41518 Prices

RPM WSC - Van Zandt - Neches - Carrizo Wilcox

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
Well Fields (Wells, Pumps, and Piping)	$792,000
Water Treatment Plant (0.2 MGD)	$24,000
TOTAL COST OF FACILITIES	**$816,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$285,000
Environmental & Archaeology Studies and Mitigation	$100,000
Interest During Construction (4% for 1 years with a 1% ROI)	$43,000
TOTAL COST OF PROJECT	**$1,244,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$104,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$8,000
Water Treatment Plant (2.5% of Cost of Facilities)	$14,000
Pumping Energy Costs (55444 kW-hr @ 0.09 $/kW-hr)	$5,000
Purchase of Water (105 acft/yr @ 500 $/acft)	$53,000
TOTAL ANNUAL COST	**$184,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	285
Annual Cost of Water ($ per acft)	$646
Annual Cost of Water ($ per 1,000 gallons)	$1.98
KVA	*3/31/2015*

REGION D
EVALUATIONS OF WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

WOOD COUNTY

WUGs:

None

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County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Year 2020	2030	2040	2050	2060	2070	Strategy	Contingency	Seller (if applicable)	Supply Source Groundwater	Surface Water	County	Basin	Reliability of Source	Total Capital Cost	Total Annual Cost
BOWIE	TEXAMERICAS CENTER	-514	-527	-529	-528	-528	-528										
		514	527	530	530	530	530	NEW RAW WATER INTAKE RAW WATER PIPELINE	TEXARKANA/RIVERBEND STRATEGIES	TEXARKANA		WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	SULPHUR	HIGH	$ 42,178,000	$ 8,145,000
HOPKINS	BRINKER WSC	0	0	0	0	-29	-63										
		0	0	0	0	65	65	DRILL NEW WELLS			CARRIZO-WILCOX AQUIFER		HOPKINS	SULPHUR	HIGH	$ 344,000	$ 79,000
HOPKINS	IRRIGATION HOPKINS	-2,126	-2,126	-2,126	-2,126	-2,126	-2,126										
		354	354	354	354	354	354	DRILL NEW WELLS			CARRIZO-WILCOX AQUIFER		HOPKINS	SULPHUR	HIGH	$ 372,000	$ 216,000
		709	709	709	709	709	709	DRILL NEW WELLS			CARRIZO-WILCOX AQUIFER		HOPKINS	SABINE	HIGH	$ 817,000	$ 436,000
		1,063	1,063	1,063	1,063	1,063	1,063	DRILL NEW WELLS			NACATOCH AQUIFER		HOPKINS	SULPHUR	HIGH	$ 2,064,000	$ 755,000
HUNT	GREENVILLE	-3,299	-4,847	-6,900	-7,521	-9,361	-14,315										
		10,750	10,750	10,750	10,750	10,750	10,750	CHAPMAN RAW WATER PIPELINE AND NEW WTP				CHAPMAN /COOPER LAKE /RESERVOIR NON-SYSTEM PORTION	HUNT	SULPHUR	HIGH	$ 193,438,000	$ 28,159,000
		0	0	0	2,410	10,043	21,230	TOLEDO BEND TIE-IN PIPELINE	SRA TOLEDO BEND TRANSFER	SABINE RIVER AUTHORITY		TOLEDO BEND RESERVOIR	SHELBY	SABINE	HIGH	$ 78,477,000	$ 12,550,000
HUNT	NORTH HUNT SUD	0	-36	-134	-268	-460	-738										
		0	0	0	0	131	394	DRILL NEW WELLS			WOODBINE AQUIFER		HUNT	SULPHUR	HIGH	$ 4,958,000	$ 646,000
HUNT	STEAM ELECTRIC POWER HUNT	-12,085	-14,188	-16,751	-19,877	-23,687	-28,213										
		4,637	6,790	7,610	10,889	14,649	16,152	INCREASE EXISTING CONTRACT	GREENVILLE CHAPMAN PIPELINE, GREENVILLE TOLDEO BEND TIE-IN PIPELINE, AND SRA TOLEDO BEND TRANSFER	GREENVILLE/SABINE RIVER AUTHORITY		CHAPMAN /COOPER LAKE /RESERVOIR NON-SYSTEM PORTION, TOLEDO BEND RESERVOIR	HUNT	SABINE	HIGH	$ -	$ 3,683,000
RED RIVER	CLARKSVILLE	0	0	-593	-592	-591	-591										
		0	0	303	303	303	303	DIMPLE RESERVOIR				DIMPLE	RED RIVER	RED	HIGH	$ 33,906,000	$ 2,545,000
		0	0	388	388	388	388	DRILL NEW WELLS AND RO TREATEMENT			NACATOCH AQUIFER		RED RIVER	SULPHUR	HIGH	$ 7,878,000	$ 1,457,000
		0	0	303	303	303	303	PAT MAYSE TREATED WATER PIPELINE TO DEROIT AND CONTRACT		LAMAR CO WSD		PAT MAYSE	RED RIVER	RED	HIGH	$ 10,506,000	$ 1,513,000
RED RIVER	IRRIGATION RED RIVER	-4,376	-4,313	-4,260	-4,208	-4,155	-4,125										
		1,106	1,106	1,106	1,106	1,106	1,106	DRILL NEW WELLS	NO MAG		WOODBINE AQUIFER		RED RIVER	RED	HIGH	$ 1,227,000	$ 668,000
		2,057	2,057	2,057	2,057	2,057	2,057	DRILL NEW WELLS	NO MAG		NACATOCH AQUIFER		RED RIVER	SULPHUR	HIGH	$ 2,293,000	$ 1,240,000
		1,213	1,150	1,097	1,045	992	962	UNMET NEED									
TITUS	MANUFACTURING TITUS	-3,603	-3,719	-3,833	-4,058	-4,733	-5,440										
		500	500	500	500	500	500	DRILL NEW WELLS			CARRIZO-WILCOX AQUIFER		TITUS	CYPRESS	HIGH	$ 571,000	$ 310,000
		2,658	2,742	2,826	3,027	3,634	4,269	INCREASE EXISTING CONTRACT		MOUNT PLEASANT		BOB SANDLIN LAKE/RESERVOIR	TITUS	CYPRESS	HIGH	$ -	$ 3,338,000
VAN ZANDT	CANTON	0	0	0	0	0	0										
		1,810	1,810	1,810	1,810	1,810	1,810	GRAND SALINE RESERVOIR				GRAND SALINE RESERVOIR	VAN ZANDT	SABINE	HIGH	$ 45,373,000	$ 5,588,000
VAN ZANDT	IRRIGATION VAN ZANDT	-330	-330	-330	-330	-330	-330										
		330	330	330	330	330	330	DRILL NEW WELLS			CARRIZO-WILCOX AQUIFER		VAN ZANDT	NECHES	HIGH	$ 376,000	$ 211,000
VAN ZANDT	R-P-M WSC	-12	-56	-93	-132	-167	-197										
		75	150	150	225	285	285	DRILL NEW WELLS			QUEEN CITY AQUIFER		VAN ZANDT	NECHES	HIGH	$ 1,545,000	$ 240,000

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Alternative Projects Associated with Water Management Strategies

Project Sponsor Region: D

Sponsor Name	Is Sponsor a WWP?	Project Name	Project Description	Capital Cost	Online Decade
BRINKER WSC	N	DRILL NEW WELLS (BRINKER WSC, CARRIZO-WILCOX, SULPHUR)	SINGLE WELL	$344,000	2060
CANTON	N	ALT CANTON GRAND SALINE RESERVOIR	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE; NEW WATER RIGHT/PERMIT; PUMP STATION; WATER TREATMENT PLANT EXPANSION	$45,373,000	2020
CLARKSVILLE	N	ALT CLARKSVILLE TREATED PIPELINE PAT MAYSE WATER	CONVEYANCE/TRANSMISSION PIPELINE; NEW CONTRACT; PUMP STATION	$10,506,000	2040
CLARKSVILLE	N	ALT DRILL NEW WELLS (CLARKSVILLE, NACATOCH, SULPHUR)	MULTIPLE WELLS/WELL FIELD; WATER TREATMENT PLANT EXPANSION	$7,878,000	2040
CLARKSVILLE	N	DIMPLE RESERVOIR	CONVEYANCE/TRANSMISSION PIPELINE; DIVERSION AND CONTROL STRUCTURE; NEW WATER RIGHT/PERMIT; RESERVOIR CONSTRUCTION	$33,906,000	2040
GREENVILLE	Y	ALT TOLEDO BEND TIE-IN PIPELINE (GREENVILLE)	CONVEYANCE/TRANSMISSION PIPELINE; DIVERSION AND CONTROL STRUCTURE	$78,477,000	2050
IRRIGATION, HOPKINS	N	ALT DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, SABINE)	MULTIPLE WELLS/WELL FIELD	$817,000	2020
IRRIGATION, HOPKINS	N	DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, SULPHUR)	MULTIPLE WELLS/WELL FIELD	$372,000	2020
IRRIGATION, HOPKINS	N	DRILL NEW WELLS (IRRIGATION HOPKINS, NACATOCH, SULPHUR)	MULTIPLE WELLS/WELL FIELD	$2,064,000	2020
IRRIGATION, RED RIVER	N	ALT DRILL NEW WELLS (IRRIGATION RED RIVER, NACATOCH, SULPHUR)	MULTIPLE WELLS/WELL FIELD	$2,293,000	2020
IRRIGATION, RED RIVER	N	ALT DRILL NEW WELLS (IRRIGATION RED RIVER, WOODBINE, RED)	MULTIPLE WELLS/WELL FIELD	$1,227,000	2020
IRRIGATION, VAN ZANDT	N	ALT DRILL NEW WELLS (IRRIGATION VAN ZANDT, CARRIZO-WILCOX, NECHES)	MULTIPLE WELLS/WELL FIELD	$376,000	2020
MANUFACTURING, TITUS	N	ALT DRILL NEW WELLS (MANUFACTURING TITUS, CARRIZO-WILCOX, CYPRESS)	MULTIPLE WELLS/WELL FIELD	$571,000	2020
NORTH HUNT SUD	N	DRILL NEW WELLS (NORTH HUNT SUD, WOODBINE , SULPHUR, 2060)	SINGLE WELL	$1,683,000	2060
NORTH HUNT SUD	N	DRILL NEW WELLS (NORTH HUNT SUD, WOODBINE , SULPHUR, 2070)	MULTIPLE WELLS/WELL FIELD	$3,275,000	2070
R-P-M WSC	N	ALT DRILL NEW WELLS (R-P-M WSC, QUEEN CITY, NECHES, 2020)	SINGLE WELL	$356,000	2020
R-P-M WSC	N	ALT DRILL NEW WELLS (R-P-M WSC, QUEEN CITY, NECHES, 2030)	SINGLE WELL	$356,000	2030
R-P-M WSC	N	ALT DRILL NEW WELLS (R-P-M WSC, QUEEN CITY, NECHES, 2050)	MULTIPLE WELLS/WELL FIELD	$477,000	2050
R-P-M WSC	N	ALT DRILL NEW WELLS (R-P-M WSC, QUEEN CITY, NECHES, 2060)	SINGLE WELL	$356,000	2060
TEXAMERICAS CENTER	Y	NEW RAW WATER INTAKE AND PIPELINE (TEXAMERICA)	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE	$42,178,000	2020

Region D Total Alternative Capital Cost	**$232,885,000**

***Projects with a capital cost of zero are excluded from the report list.**

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

WUG Entity Primary Region: D

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
BRINKER WSC	D	ALT DRILL NEW WELLS (BRINKER WSC)	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	0	0	0	0	65	65	N/A	$1215
CANTON	D	ALT CANTON GRAND SALINE RESERVOIR	D | GRAND SALINE LAKE/RESERVOIR	1,810	1,810	1,810	1,810	1,810	1,810	$3087	$1264
CLARKSVILLE	D	ALT CLARKSVILLE TREATED PIPELINE PAT MAYSE WATER	D | PAT MAYSE LAKE/RESERVOIR	0	0	303	303	303	303	N/A	$2092
CLARKSVILLE	D	ALT DRILL NEW WELLS WITH RO TREATMENT (CLARKSVILLE, NACATOCH)	D | NACATOCH AQUIFER | RED RIVER COUNTY	0	0	388	388	388	388	N/A	$2058
CLARKSVILLE	D	DIMPLE RESERVOIR	D | DIMPLE LAKE/RESERVOIR	0	0	303	303	303	303	N/A	$5789
GREENVILLE	D	ALT CHAPMAN RAW WATER PIPELINE (GREENVILLE, 2020)	D | CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	750	750	750	0	0	750	$2619	$1114
GREENVILLE	D	ALT CHAPMAN RAW WATER PIPELINE AND NEW WTP (GREENVILLE, 2020)	D | CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	5,363	4,097	6,150	7,521	9,361	10,000	$2619	$1114
GREENVILLE	D	ALT TOLEDO BEND TIE-IN PIPELINE (GREENVILLE, 2050)	I | TOLEDO BEND LAKE/RESERVOIR	0	0	0	0	0	5,078	N/A	$591
IRRIGATION, HOPKINS	D	ALT DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, SABINE)	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	709	709	709	709	709	709	$615	$518
IRRIGATION, HOPKINS	D	ALT DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, SULPHUR)	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	354	354	354	354	354	354	$610	$522
IRRIGATION, HOPKINS	D	ALT DRILL NEW WELLS (IRRIGATION HOPKINS, NACATOCH, SULPHUR)	D | NACATOCH AQUIFER | HOPKINS COUNTY	1,063	1,063	1,063	1,063	1,063	1,063	$710	$547
IRRIGATION, RED RIVER	D	ALT DRILL NEW WELLS (IRRIGATION RED RIVER, NACATOCH, SULPHUR)	D | NACATOCH AQUIFER | RED RIVER COUNTY	2,057	2,057	2,057	2,057	2,057	2,057	$603	$510
IRRIGATION, RED RIVER	D	ALT DRILL NEW WELLS (IRRIGATION RED RIVER, WOODBINE, RED)	D | WOODBINE AQUIFER | RED RIVER COUNTY	1,106	1,106	1,106	1,106	1,106	1,106	$604	$511
IRRIGATION, VAN ZANDT	D	ALT DRILL NEW WELLS (IRRIGATION VAN ZANDT, CARRIZO-WILCOX, NECHES)	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	330	330	330	330	330	330	$639	$540
MANUFACTURING, TITUS	D	ALT DRILL NEW WELLS (MANUFACTURING TITUS, CARRIZO-WILCOX, CYPRESS)	D | CARRIZO-WILCOX AQUIFER | TITUS COUNTY	500	500	500	500	500	500	$620	$523
MANUFACTURING, TITUS	D	ALT INCREASE EXISTING CONTRACT (MANUFACTURING TITUS, CYPRESS)	D | BOB SANDLIN LAKE/RESERVOIR	2,658	2,742	2,826	3,027	3,634	4,269	$782	$782
NORTH HUNT SUD	D	ALT DRILL NEW WELLS (NORTH HUNT SUD, WOODBINE , SULPHUR)	D | WOODBINE AQUIFER | HUNT COUNTY	0	0	0	0	131	394	N/A	$1681
R-P-M WSC	D	ALT DRILL NEW WELLS (R-P-M WSC)	D | QUEEN CITY AQUIFER | VAN ZANDT COUNTY	75	150	150	225	285	285	$1055	$713
STEAM ELECTRIC POWER, HUNT	D	ALT CHAPMAN RAW WATER PIPELINE (GREENVILLE, 2020)	D | CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	0	0	0	750	750	0	N/A	N/A
STEAM ELECTRIC POWER, HUNT	D	ALT CHAPMAN RAW WATER PIPELINE AND NEW WTP (GREENVILLE, 2020)	D | CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	4,637	5,903	3,850	2,479	639	0	$228	N/A
STEAM ELECTRIC POWER, HUNT	D	ALT TOLEDO BEND TIE-IN PIPELINE (GREENVILLE, 2050)	I | TOLEDO BEND LAKE/RESERVOIR	0	0	0	2,410	10,043	16,152	N/A	$228
TEXAMERICAS CENTER	D	NEW RAW WATER INTAKE AND PIPELINE (TEXAMERICAS)	D | WRIGHT PATMAN LAKE/RESERVOIR	514	527	530	530	530	530	$7972	$1313
			Region D Total Alternative WMS Supplies	21,926	22,098	23,179	25,865	34,361	46,446		

REGION D
EVALUATIONS OF ALTERNATIVE WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

BOWIE COUNTY

WUGs:

TexAmericas Center

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EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF TEXAMERICAS CENTER

Description of Water User Group:

TexAmericas Center provides water service in Bowie County. The WUG population is projected to be 533 by 2020 and increasing to 553 by 2070. TexAmericas has a contract for water supply with the City of Texarkana for surface water from Wright Patman. TexAmericas is not projected to have a shortage in the current planning period; however, as a member city in the Riverbend Water Resources District, a request was received from Riverbend to include the consideration of multiple strategies within the 2016 Plan.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	533	548	553	553	553	553
Projected Water Demand	514	527	529	528	528	528
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	514	527	529	528	528	528
Projected Supply Surplus (+) / Deficit (-)	**0**	**0**	**0**	**0**	**0**	**0**

Evaluation of Potentially Feasible Water Management Strategies:

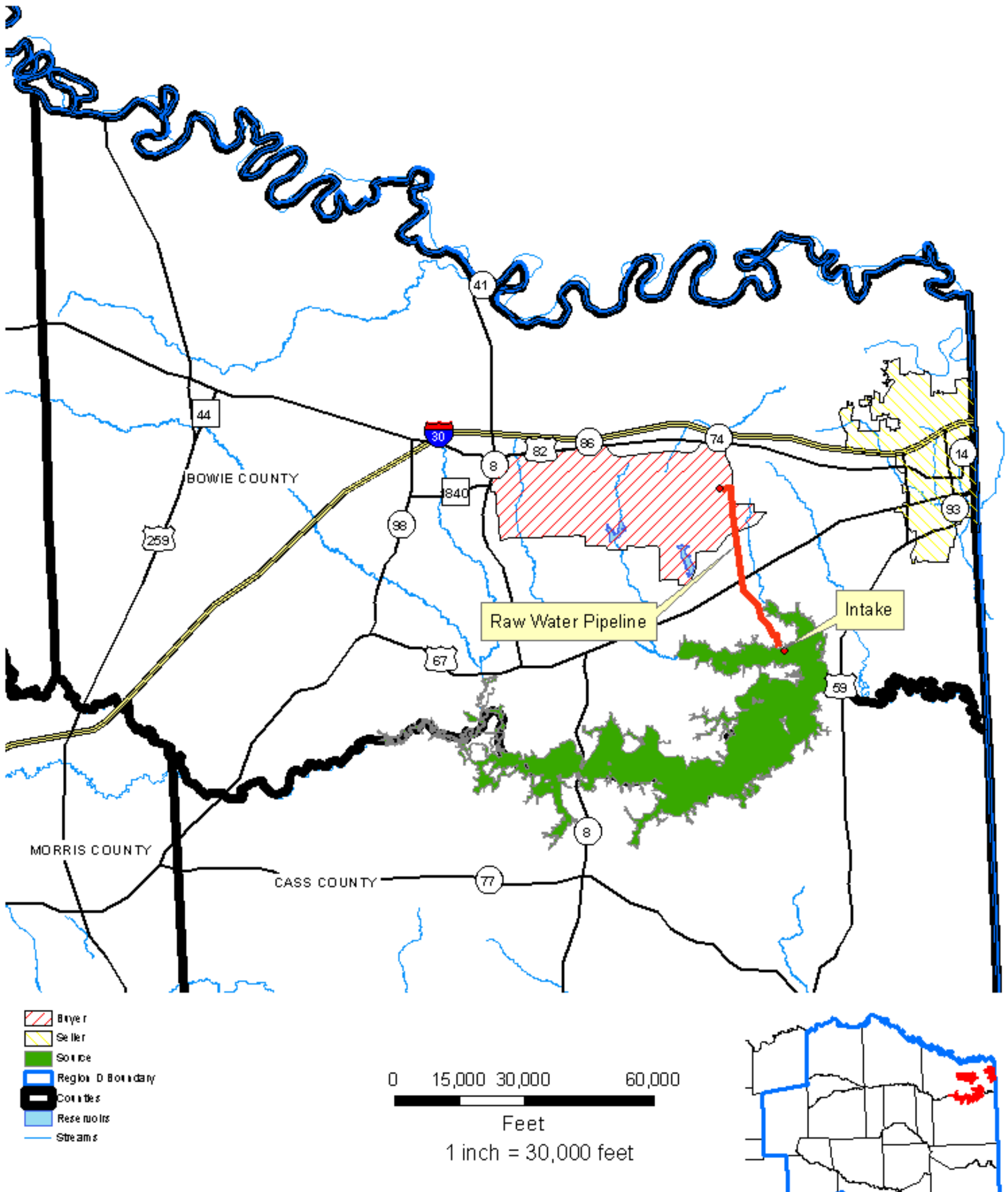
There were four alternative strategies considered to meet the TexAmericas' water supply shortages as summarized in the Table below. Advanced conservation is not considered as the entity has no existing shortages. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because TexAmericas has historically utilized surface water supplies and, at present, is planning on continuing to purchase surface water from the City of Texarkana. A request was submitted by Riverbend Water Resources District for the consideration of a new pipeline and intake to Wright Patman Reservoir as an explicit strategy for consideration in the 2016 Plan for TexAmericas Center, based upon the results of a study performed by CH2M-Hill in 2009. Surface water infrastructure was thus considered to increase available supplies for potential future industrial development, based upon the analyses provided by Riverbend. Another strategy was considered, and recommended, whereby a renewal contract with Texarkana/Riverbend is implemented, contingent upon the development of Riverbend's recommended strategy for the development of a new Water Treatment Plant, pipeline, and intake, connecting Wright Patman reservoir to a new facility at TexAmericas Center, for subsequent connection to the member cities' system.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Groundwater					
New Intake and Raw Water Pipeline from Wright Patman	**22,403**	**$42,178,000**	**$8,145,000**	**$364**	**3**
Renew Existing Contract	**530**		**$256,000**	**$483**	**1**

Alternate Strategy:

	2020	2030	2040	2050	2060	2070
New Intake and Raw Water Pipeline from Wright Patman (ac-ft/yr)	22,403	22,403	22,403	22,403	22,403	22,403

Although no immediate need has been identified in the present RWP process, Riverbend Water Resources District has requested the consideration of a strategy to construct a new intake at Wright Patman Reservoir and construct a raw water pipeline (42” diameter) to TexAmericas Center, a member of Riverbend. This strategy differs from the recommended full strategy for a similar approach, as the proposed approach herein is strictly for the new intake and raw water pipeline from Lake Wright Patman to TexAmericas Center (no treatment plant). Surface water infrastructure has been considered to increase available supplies for potential future industrial development, based upon analyses provided by Riverbend. Details of this alternative strategy are presented within the CH2M-Hill (2009) study performed for Riverbend. A proposed approach that is consistent with the project envisioned and described in the CH2M-Hill (2009) report, sans treatment facility, is to be considered consistent with this Alternative Water Management Strategy for the purposes of the 2016 Region D Plan. However, the NETRWPG recognizes that Riverbend or Texarkana, Tx, may become the sponsoring entity for this strategy. The strategy presented within the TexAmericas Center section of this plan as an Alternate Strategy, should be considered consistent with the plan for this planning cycle if Texarkana, Tx, or Riverbend are the sponsor rather than TexAmericas, as long as the water source remains Lake Wright Patman.



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Attachment A

Tex Americas
Alternative Strategy
New Intake and Raw Water Pipeline from Wright Patman

Cost Estimate Summary
Water Supply Project Option
41518 Prices

TexAmericas - New Intake and Raw Water Pipeline from Wright Patman

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Intake Pump Stations (0 MGD)	$13,968,00 0
Transmission Pipeline (0 in dia., 0 miles)	$20,962,00 0
TOTAL COST OF FACILITIES	**$34,930,00 0**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$5,315,000
Land Acquisition and Surveying (0 acres)	$506,000
Interest During Construction (4% for 1 years with a 1% ROI)	$1,427,000
TOTAL COST OF PROJECT	**$42,178,00 0**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$3,529,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$559,000
Pumping Energy Costs (465889 kW-hr @ 0.09 $/kW-hr)	$42,000
Purchase of Water (22403 acft/yr @ 179.21 $/acft)	$4,015,000
TOTAL ANNUAL COST	**$8,145,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	22,403
Annual Cost of Water ($ per acft)	$364
Annual Cost of Water ($ per 1,000 gallons)	$1.12

Note: One or more cost element has been calculated externally

JMP *3/31/2015*

REGION D
EVALUATIONS OF ALTERNATIVE WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

CAMP COUNTY

WUGs:

None

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REGION D
EVALUATIONS OF ALTERNATIVE WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

CASS COUNTY

WUGs:

None

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REGION D
EVALUATIONS OF ALTERNATIVE WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

DELTA COUNTY

WUGs:

None

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REGION D
EVALUATIONS OF ALTERNATIVE WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

FRANKLIN COUNTY

WUGs:

None

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REGION D
EVALUATIONS OF ALTERNATIVE WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

GREGG COUNTY

WUGs:

None

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REGION D
EVALUATIONS OF ALTERNATIVE WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

HARRISON COUNTY

WUGs:

None

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REGION D
EVALUATIONS OF ALTERNATIVE WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

HOPKINS COUNTY

WUGs:

Brinker WSC

Hopkins County Irrigation

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EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF BRINKER WATER SUPPLY CORPORATION IN HOPKINS COUNTY

Description of Water User Group:

Brinker WSC provides water service in Hopkins County. It is projected that the users in the WUG will have a shortage in 2060. The WUG population is projected to be 2,252 by 2020 and increases to 3,990 by 2070. The WSC utilizes groundwater from the Carrizo-Wilcox aquifer and has a contract for water supply with City of Sulphur Springs for 77 ac-ft/yr. Brinker WSC is projected to have a deficit of 29 ac-ft in 2060 and increasing to a deficit of 63 ac-ft by 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	2,252	2,601	2,919	3,284	3,636	3,990
Projected Water Demand	241	268	293	325	359	393
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	329	328	328	329	330	330
Projected Supply Surplus (+) / Deficit (-)	**88**	**60**	**35**	**4**	**-29**	**-63**

Evaluation of Potentially Feasible Water Management Strategies:

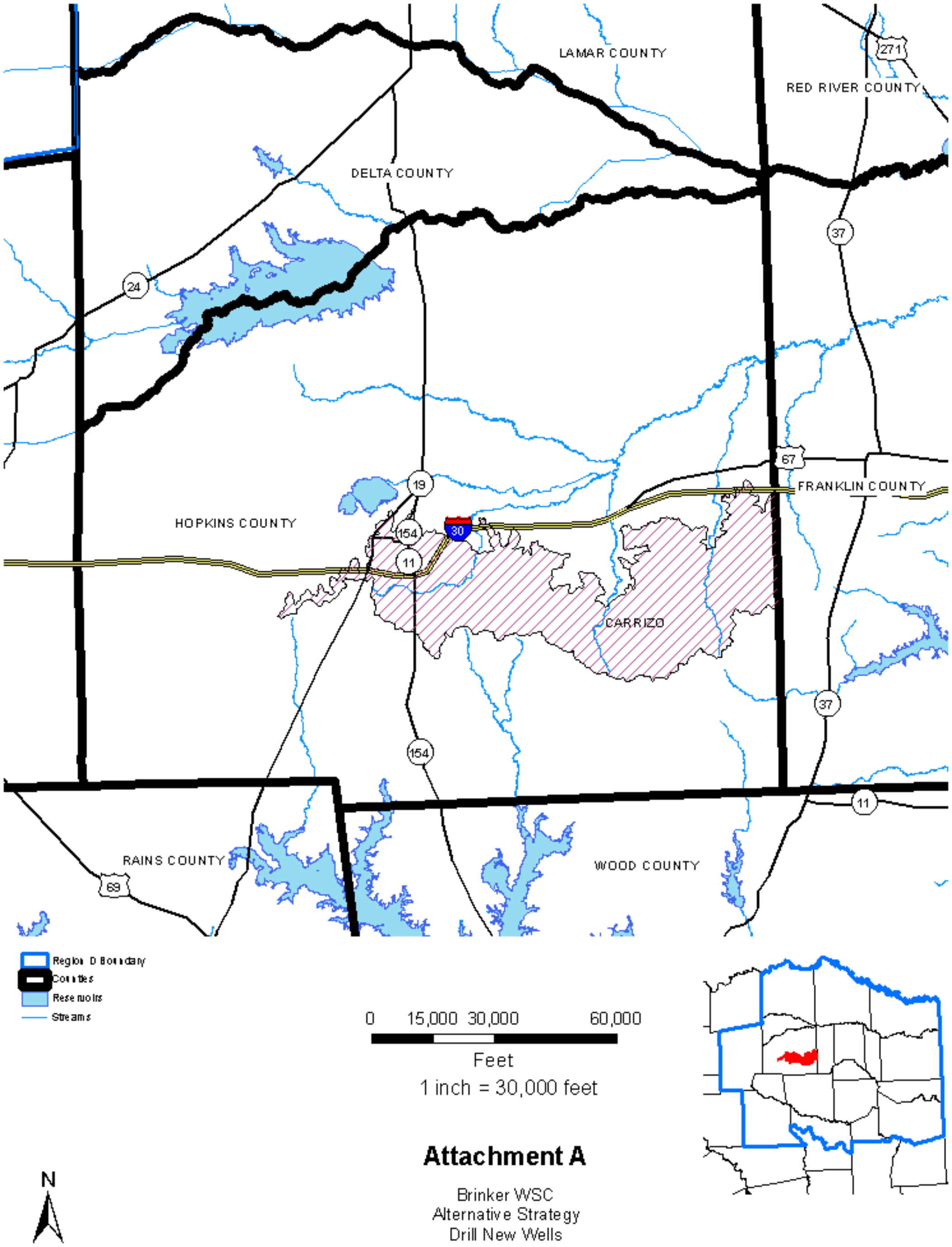
Four alternative strategies considered to meet the WSC's water supply shortages as summarized in the table below. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. Additional use of groundwater from the Carrizo-Wilcox has been identified as a likely source of water for Brinker WSC in Hopkins County; however, projected needs exceed the availability of groundwater in the basin based on the modeled available groundwater (MAG) estimates. Brinker WSC has indicated that the likely future strategy would be the additional use of groundwater. However, due to current TWDB guidelines for the Regional Water Planning process, this strategy could not be recommended as a water management strategy. Thus, the recommended strategy was for Brinker WSC to purchase additional surface water from Sulphur Springs Lake by Increasing its existing contract with the City of Sulphur Springs.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Carrizo-Wilcox, Sulphur Basin)	**63**	**$344,000**	**$79,000**	**$1,215**	**1**
Increase Existing Contract	**63**	**$0**	**$74,100**	**$1,176**	**1**

Alternate Strategy:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Carrizo-Wilcox, Sulphur Basin; ac-ft/yr)	0	0	0	0	65	65

The identified Alternative Water Management Strategy for Brinker WSC to meet their projected deficit of 29 ac-ft/yr in 2060 and 63 ac-ft/yr in 2070 would be to construct one additional water well similar to their existing wells just prior to 2060. The recommended supply source will be the Carrizo-Wilcox Aquifer in the Sulphur Basin in Hopkins County. One well with rated capacity of 150 gpm would provide approximately 75 acre-feet each. The Carrizo-Wilcox Aquifer is projected to have sufficient supply availability to meet the needs of RPM WSC for the planning period.



Attachment A

Brinker WSC
Alternative Strategy
Drill New Wells

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Brinker WSC - Drill New Wells (Hopkins - Sulphur - Carrizo Wilcox)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$222,000
Water Treatment Plant (0.2 MGD)	$24,000
TOTAL COST OF FACILITIES	**$246,000**
Interest During Construction (4% for 1 years with a 1% ROI)	$12,000
TOTAL COST OF PROJECT	**$344,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$29,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$2,000
Water Treatment Plant (2.5% of Cost of Facilities)	$14,000
Pumping Energy Costs (15131 kW-hr @ 0.09 $/kW-hr)	$1,000
Purchase of Water (65 acft/yr @ 500 $/acft)	$33,000
TOTAL ANNUAL COST	**$79,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	65
Annual Cost of Water ($ per acft)	$1,215
Annual Cost of Water ($ per 1,000 gallons)	$3.73

KVA *4/3/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF IRRIGATION IN HOPKINS COUNTY

Description of Water User Group:

The Irrigation WUG in Hopkins County has a demand that is projected to remain constant at 2,269 ac-ft/yr for the planning period. The Irrigation WUG in Hopkins County is supplied by groundwater from the Carrizo-Wilcox Aquifer and run-of-river diversions from the Sabine and Sulphur Rivers. A deficit of 2,126 ac-ft/yr is projected to occur in throughout the planning period.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Projected Water Demand	2,269	2,269	2,269	2,269	2,269	2,269
Current Water Supply	143	143	143	143	143	143
Projected Supply Surplus (+)/Deficit(-)	**-2,126**	**-2,126**	**-2,126**	**-2,126**	**-2,126**	**-2,126**

Evaluation of Potentially Feasible Water Management Strategies:

Three alternative strategies were considered to meet the projected shortages for Hopkins County Irrigation. Advanced water conservation for irrigation practices was not considered, as present irrigation practices likely already incorporate many BMPs to extend water supplies, thus no additional conservation would be feasible. The use of reuse water from nearby municipalities is not considered feasible as it would not be effective to deliver reuse water to farm irrigation systems. Groundwater from the Carrizo-Wilcox and Nacatoch aquifers has been identified as a potential source of water for irrigation in Hopkins County; however, the total irrigation needs exceed the availability of groundwater in these aquifers based on the managed available groundwater (MAG) estimates. The construction of a pipeline to convey raw surface water from Sulphur Springs Lake purchased via the City of Sulphur Springs was also considered as a potential alternative to meet projected demands.

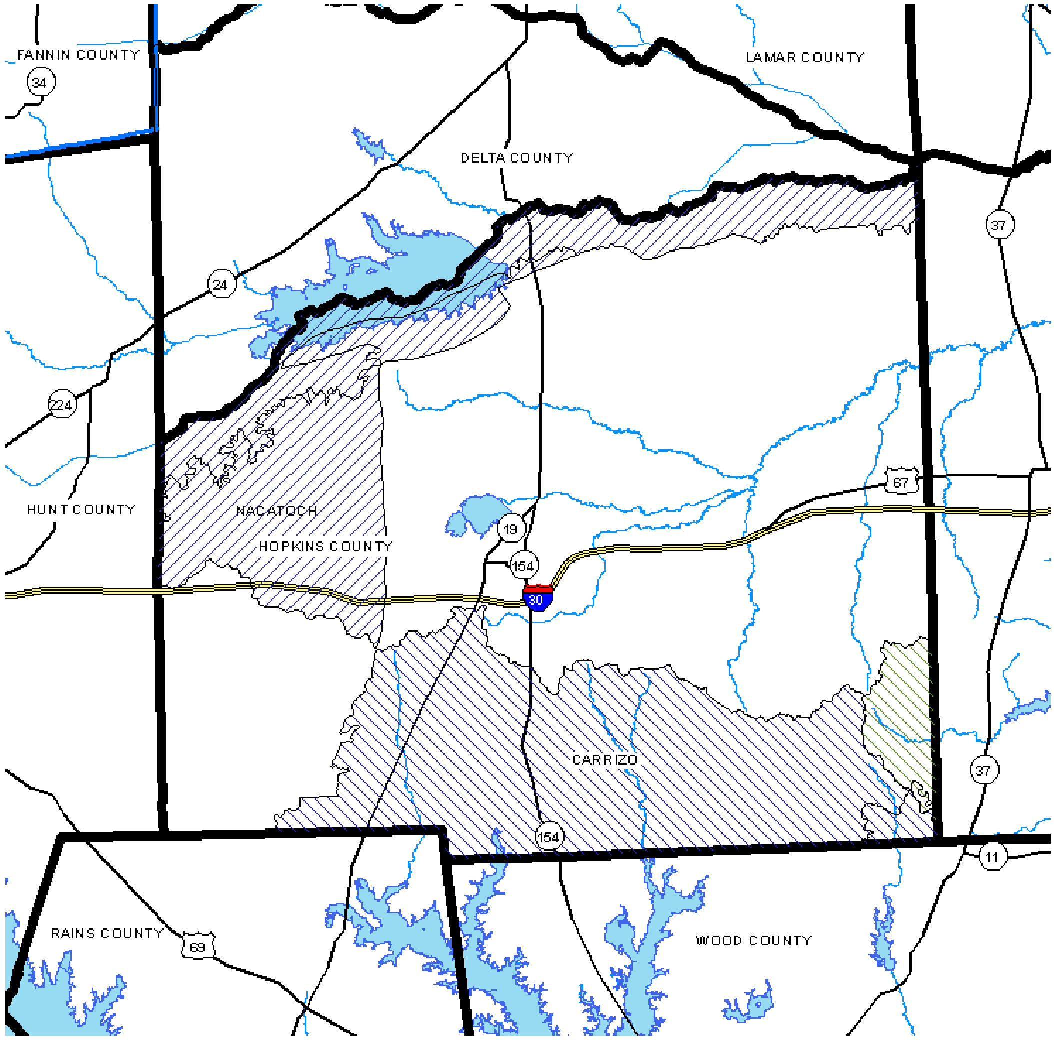
The recommended strategies for the Hopkins County Irrigation to meet their projected deficit of 2,126 ac-ft/yr are to construct three additional water wells in the Carrizo-Wilcox/Cypress/Hopkins aquifer, and five additional water wells in the Carrizo-Wilcox/Sabine/Hopkins aquifer. To meet the remaining needs, it was recommended that a 10” diameter pipeline to Lake Sulphur Springs be developed for the purchase of raw water from the City of Sulphur Springs.

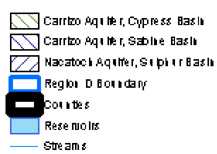
Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Env. Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Carrizo-Wilcox, Sabine Basin)	**709**	**$817,000**	**$436,000**	**$615**	**1**
Drill New Wells (Carrizo-Wilcox, Sulphur Basin)	**354**	**$372,000**	**$216,000**	**$610**	**1**
Drill New Wells (Nacatoch, Sulphur Basin)	**1,063**	**$2,064,000**	**$755,000**	**$710**	**1**
Drill New Wells (Carrizo-Wilcox, Cypress Basin)	**210**	**$313,000**	**$140,000**	**$667**	**1**
Drill New Wells (Carrizo-Wilcox, Sabine Basin)	**610**	**$681,000**	**$374,000**	**$613**	**1**
Drill New Wells (Carrizo-Wilcox, Sulphur Basin)	**415**	**$447,000**	**$253,000**	**$610**	**1**
Drill New Wells (Nacatoch, Sulphur Basin)	**415**	**$884,000**	**$323,000**	**$778**	**1**
Sulphur Springs Raw Water Pipeline	**1,306**	**$4,758,000**	**$2,132,000**	**$1,632**	**3**

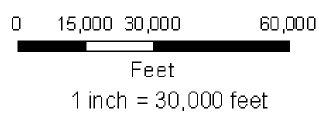
Alternate Strategies:

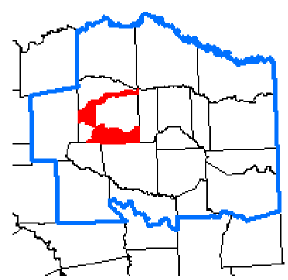
	2020	2030	2040	2050	2060	2070
Drill New Wells (Carrizo-Wilcox, Sulphur Basin; ac-ft/yr)	**354**	**354**	**354**	**354**	**354**	**354**
Drill New Wells (Carrizo-Wilcox, Sabine Basin; ac-ft/yr)	**709**	**709**	**709**	**709**	**709**	**709**
Drill New Wells (Nacatoch, Sulphur Basin)	**1,063**	**1,063**	**1,063**	**1,063**	**1,063**	**1,063**

The identified alternative water strategies for Hopkins County Irrigation to meet their projected deficit of 2,126 ac-ft/yr would be to construct five additional water wells in the Carrizo-Wilcox/Sulphur/Hopkins aquifer, six additional water wells in the Carrizo-Wilcox/Sabine/Hopkins aquifer, and 14 additional water wells in the Nacatoch/Sulphur/Hopkins aquifer. The recommended supply source will be the Carrizo-Wilcox Aquifer in the Sulphur and Sabine Basins, and the Nacatoch Aquifer in the Sulphur Basin, all in Hopkins County. In the Carrizo-Wilcox Aquifer in the Sabine basin, six wells with rated capacities of 80 gpm are projected to provide approximately 709 ac-ft/yr. In the Carrizo-Wilcox Aquifer in the Sulphur Basin, five wells with rated capacities of 50 gpm are projected to provide approximately 354 ac-ft/yr. In the Nacatoch Aquifer in the Sulphur River Basin, 14 wells with rated capacities of 50 gpm are projected to provide approximately 1,063 ac-ft/yr. The Carrizo-Wilcox and Nacatoch aquifers are projected to have sufficient supply availability to meet the needs of Hopkins County Irrigation for the planning period.









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Attachment A

Hopkins County Irrigation
Alternative Strategy
Drill New Wells

Cost Estimate Summary
Water Supply Project Option
41518 Prices

Irrigation - Drill New Wells (Hopkins - Sabine - Carrizo Wilcox)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$584,000
TOTAL COST OF FACILITIES	**$584,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$205,000
Interest During Construction (4% for 1 years with a 1% ROI)	$28,000
TOTAL COST OF PROJECT	**$817,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$68,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$6,000
Pumping Energy Costs (76309 kW-hr @ 0.09 $/kW-hr)	$7,000
Purchase of Water (709 acft/yr @ 500 $/acft)	$355,000
TOTAL ANNUAL COST	**$436,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	709
Annual Cost of Water ($ per acft)	$615
Annual Cost of Water ($ per 1,000 gallons)	$1.89

JNS *4/5/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Irrigation - Drill New Wells (Hopkins - Sulphur - Carrizo Wilcox)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
Well Fields (Wells, Pumps, and Piping)	$266,000
TOTAL COST OF FACILITIES	**$266,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$93,000
Interest During Construction (4% for 1 years with a 1% ROI)	$13,000
TOTAL COST OF PROJECT	**$372,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$31,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$3,000
Pumping Energy Costs (58907 kW-hr @ 0.09 $/kW-hr)	$5,000
Purchase of Water (354 acft/yr @ 500 $/acft)	$177,000
TOTAL ANNUAL COST	**$216,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	354
Annual Cost of Water ($ per acft)	$610
Annual Cost of Water ($ per 1,000 gallons)	$1.87

JNS *4/5/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Irrigation - Drill New Wells (Hopkins - Sulphur - Nacotoch)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$1,477,000
TOTAL COST OF FACILITIES	**$1,477,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$517,000
Interest During Construction (4% for 1 years with a 1% ROI)	$70,000
TOTAL COST OF PROJECT	**$2,064,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$173,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$15,000
Pumping Energy Costs (388786 kW-hr @ 0.09 $/kW-hr)	$35,000
Purchase of Water (1063 acft/yr @ 500 $/acft)	$532,000
TOTAL ANNUAL COST	**$755,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	1,063
Annual Cost of Water ($ per acft)	$710
Annual Cost of Water ($ per 1,000 gallons)	$2.18

JNS *4/5/2015*

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REGION D
EVALUATIONS OF ALTERNATIVE WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

HUNT COUNTY

WUGs:

The City of Greenville
Hunt County Steam Electric
North Hunt SUD

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EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF CITY OF GREENVILLE

Description of Water User Group:

The City of Greenville provides water service in Hunt County. The WUG population is projected to be 28,700 in 2020 increasing to 74,659 by the year 2070. The City of Greenville uses surface water from Greenville's city lake and purchases surface water out of Lake Tawakoni from the Sabine River Authority. The City of Greenville sells water to the City of Caddo Mills, entities within Hunt County-Other, Manufacturing, Mining and Steam Electric WUGs in Hunt County. The City of Greenville is projected to have a deficit of 2,194 ac-ft in 2050 increasing to 10,548 ac-ft by 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	28,700	32,964	38,749	46,738	58,120	74,659
Projected Water Demand	8,908	10,070	11,709	14,051	17,451	22,405
Water Demand from other entities	2,409	2,586	2,785	3,000	3,191	3,388
Current Water Supply	11,317	14,443	14,642	14,857	15,048	15,245
Projected Supply Surplus (+) / Deficit (-)	**0**	**1,787**	**148**	**-2,194**	**-5,594**	**-10,548**
Hunt Steam Electric Demands	12,436	14,539	17,102	20,228	24,038	28,564
Projected Supply Surplus (+) / Deficit (-) with Steam Electric Demands after Conservation	**-4,576**	**-5,089**	**-7,696**	**-2,761**	**-10,394**	**-21,581**

Evaluation of Potentially Feasible Water Management Strategies:

A suite of alternative strategies were considered to meet the City of Greenville's water supply shortages as summarized in the below table. Advanced conservation was not considered because the per capita use per day was below the 140 gpcpd 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 strategies considered included the purchase of water out of Chapman Lake from the City of Sulphur Springs and purchase of raw water from the Sabine River Authority's proposed Toledo Bend Transfer. The Chapman Lake surface water strategy would require the City to construct an intake structure, pump station, and pipeline to bring water from Chapman Lake to the City. According to preliminary discussions with Region C, the Toledo Bend pipeline would not be needed until 2070, so was not considered a feasible alternative for Greenville until 2070.

Because the City of Greenville currently provides wholesale water to a number of entities in the surrounding area, unmet needs for Caddo Mills, Caddo Basin SUD, and County-Other were included in the analysis of needed supply for Greenville under the assumption that Greenville would sell treated and untreated water, as needed, to these other entities. The City of Sulphur Springs has up to 11,260 acre-feet available from Chapman Lake. To meet projected demands for the city along with the other entities, the City of Greenville would need to implement a contract and develop infrastructure in place by 2050 to convey 10,750 acre-feet per year from Chapman Lake. It has been assumed for the purposes of the 2016 Plan that the conveyance of this supply would not require an amendment for interbasin transfer, as the retail service area for the City of Sulphur Springs is contiguous the City of Greenville's retail service area, and would thus be exempt per TAC §297.18(k)(5). Even with this supply in place, the City of Greenville would still require an additional 5,100 acre-feet of supply by 2070 to meet projected demands. This demand could be met by purchasing water from the Sabine River Authority through the Toledo Bend Transfer.

The City's existing water treatment plant was expanded in 1993-1994 to a capacity of 13 MGD. Based on TWDB projections, the City will need to expand the WTP by 2020 to accommodate projected demand.

Expanding the WTP to include an additional 16 MGD of capacity will ensure adequate capacity through 2050 when additional raw water is made available from the Chapman Lake pipeline. In 2050, the City will need to construct a new WTP with a capacity of at least 22 MGD to ensure adequate capacity for projected demands through 2070.

Projected demands for Steam Electric power generation are associated with a proposed 1,750 MW combined cycle generation facility at Greenville. This facility was announced in 2002, but has not yet been constructed. The facility has been estimated to require approximately 4,000 acre-feet per year of supply, while the projections for Steam Electric water demand in Hunt County range from 12,400 ac-ft in 2020 to 28,500 ac-ft in 2070. Because of the uncertainty in demand and when this facility will be constructed, for the purposes of the 2016 Plan, Steam Electric demands were not included in the strategy for the City of Greenville, and were left as unmet needs given their present uncertainty. However, consideration has been given to these Hunt Steam Electric demands for the purposes of evaluating strategies to meet the projected needs. To meet the projected needs when considering Hunt Steam Electric demands, the City would need to construct a pipeline to Chapman Lake by 2020 (30 years earlier than the same strategy being recommended in 2050) and the recommended Toledo Bend Tie-In Pipeline would need to be constructed by 2050, which is 20 years earlier than the preliminarily identified Toledo Bend Transfer strategy considered by Region C.

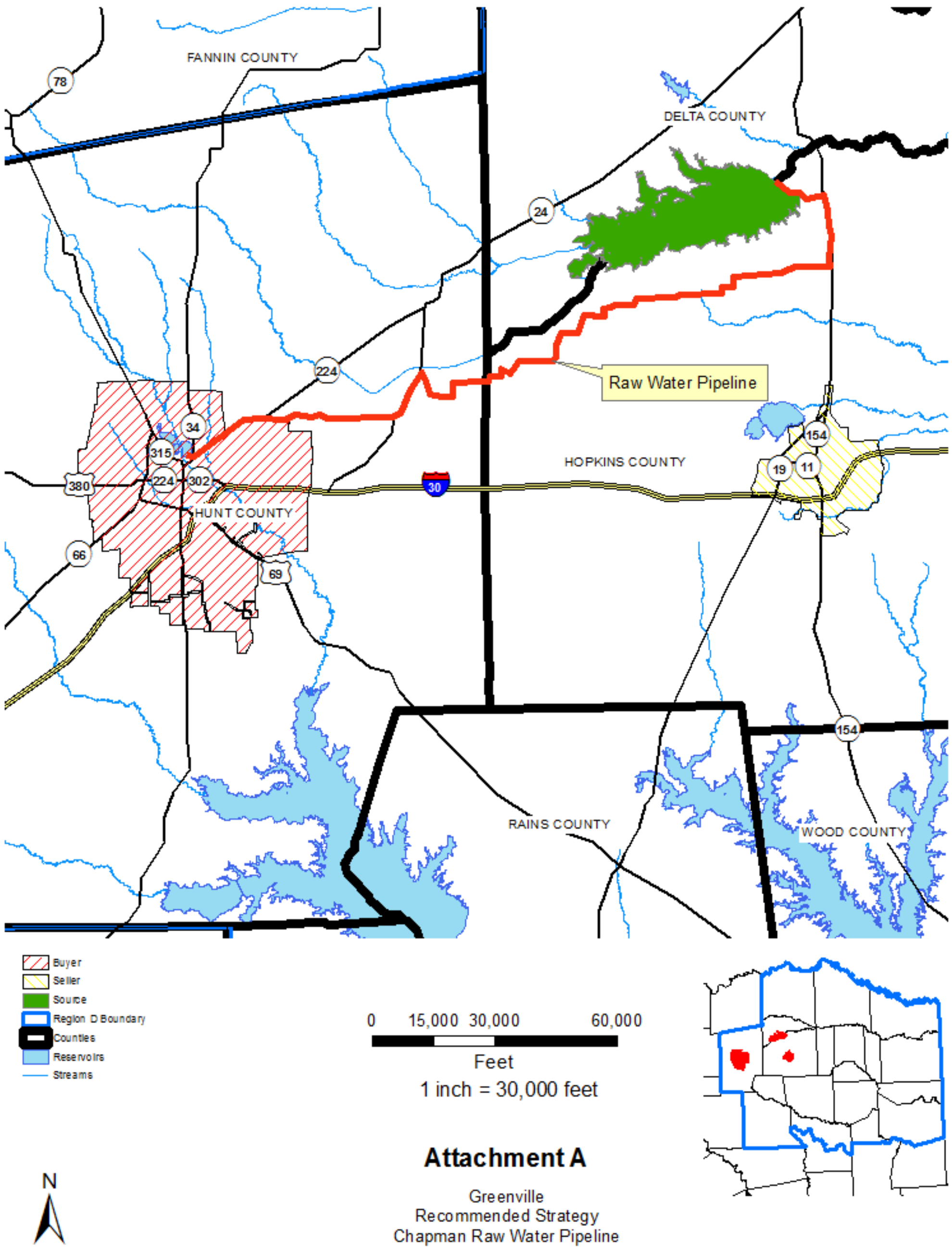
Strategy	**Firm Yield (ac-ft)**	**Start Year**	**Total Capital Cost**	**Total Annualized Cost**	**Unit Cost**	**Env. Impact**
Advanced Water Conservation						
Water Reuse						
Ground Water						
Voluntary Reallocation of Hunt Manufacturing Surplus purchased from Greenville (purchased from SRA Tawakoni)	825	2020	$0	$0	$0	1
WTP Expansion	9,715	2020	$36,074,000	$5,601,000	$577	2
Replacement WTP	18,842	2050	$117,779,000	$18,285,000	$970	2
Chapman Raw Water Pipeline	10,750	2050	$75,659,000	$9,874,000	$919	3
Toledo Bend Tie-In Pipeline	5,100	2070	$42,470,000	$5,171,000	$1,014	3
Chapman Raw Water Pipeline and New WTP	10,750	2020	$193,438,000	$28,159,000	$2,619	3
Toledo Bend Tie-In Pipeline	21,230	2050	$78,477,000	$12,550,000	$591	3

Alternative Strategy:

	2020	**2030**	**2040**	**2050**	**2060**	**2070**
Chapman Raw Water Pipeline and New WTP (ac-ft/yr)	**10,750**	**10,750**	**10,750**	**10,750**	**10,750**	**10,750**
Toledo Bend Tie-In Pipeline (ac-ft/yr)				**2,410**	**10,043**	**21,230**

The alternative strategies identified herein are contingent upon the recommended strategies for the City of Greenville related to the voluntary reallocation of surplus Hunt Manufacturing supplies purchased from the City of Greenville (which purchases this supply from the purchase of water from the Sabine River Authority from Lake Tawakoni); as well as the recommended WTP expansion and replacement WTP in 2050.

The identified Alternative Water Management Strategies to meet the projected demands of the City of Greenville and its wholesale customers (both existing and future), including Hunt County Steam Electric needs, is for the City, by 2020, to contract with the City of Sulphur Springs for 10,750 ac-ft/yr of available supply from Chapman Lake, and to construct an intake, pump station, and 43-mile, 36" diameter pipeline for the development of this supply. By 2050, the recommended strategy is for the City to construct a tie-in pipeline (23-miles, 48" diameter) for up to 21,230 ac-ft/yr of supply available from the Toledo Bend Transfer from the Sabine River Authority, contingent upon implementation of the Toledo Bend Transfer by 2050 (a strategy under contemplation for the purposes of the 2016 Region C Plan in the year 2070). This strategy is considered to be in combination with the recommended strategy for the Hunt County-Other Tie-In Pipeline and the Alternative Water Management Strategy identified for Hunt Steam Electric increasing its existing contract with the City of Greenville.

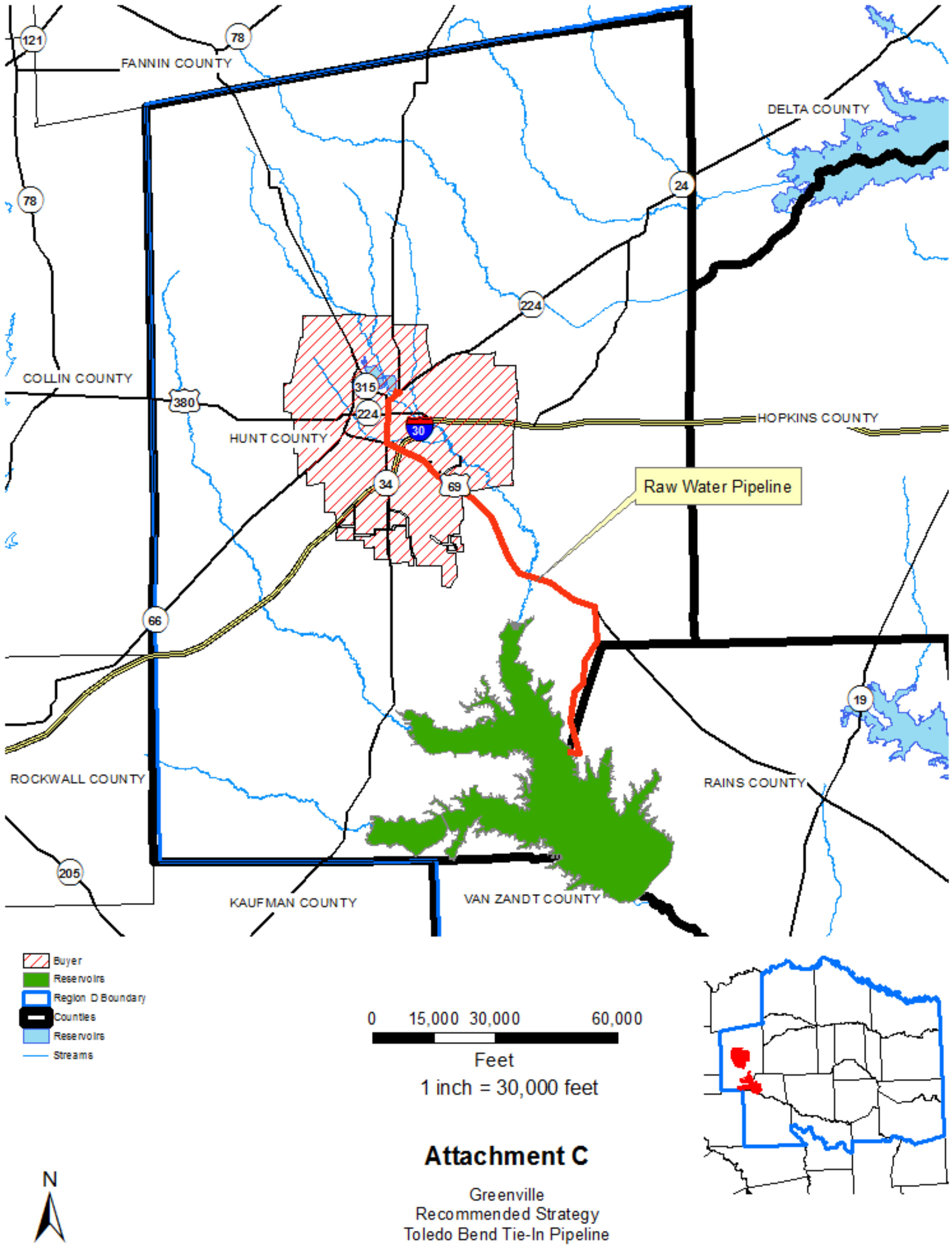


Cost Estimate Summary
Water Supply Project Option
41518 Prices

Greenville - Chapman Raw Water Pipeline and New WTP

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Intake Pump Stations (0 MGD)	$10,060,000
Transmission Pipeline (0 in dia., 43 miles)	$44,957,000
Water Treatment Plant (30 MGD)	$84,293,000
TOTAL COST OF FACILITIES	**$139,310,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$46,511,000
Environmental & Archaeology Studies and Mitigation	$1,075,000
Interest During Construction (4% for 1 years with a 1% ROI)	$6,542,000
TOTAL COST OF PROJECT	**$193,438,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$16,187,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$701,000
Water Treatment Plant (2.5% of Cost of Facilities)	$8,429,000
Pumping Energy Costs (4349786 kW-hr @ 0.09 $/kW-hr)	$391,000
Purchase of Water (10750 acft/yr @ 228 $/acft)	$2,451,000
TOTAL ANNUAL COST	**$28,159,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1.8	10,750
Annual Cost of Water ($ per acft)	$2,619
Annual Cost of Water ($ per 1,000 gallons)	$8.04
TLS	*4/6/2015*



Attachment C

Greenville
Recommended Strategy
Toledo Bend Tie-In Pipeline

Cost Estimate Summary *Water Supply Project Option* *41518 Prices* *Greenville - Toledo Bend Tie-In Pipeline*	
Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518	
Item	***Estimated Costs for Facilities***
Intake Pump Stations (0 MGD)	$9,297,000
Transmission Pipeline (0 in dia., 23 miles)	$48,219,000
TOTAL COST OF FACILITIES	**$57,516,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$17,720,000
Environmental & Archaeology Studies and Mitigation	$587,000
Interest During Construction (4% for 1 years with a 1% ROI)	$2,654,000
TOTAL COST OF PROJECT	**$78,477,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$6,567,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$715,000
Pumping Energy Costs (4751404 kW-hr @ 0.09 $/kW-hr)	$428,000
Purchase of Water (21230 acft/yr @ 228 $/acft)	$4,840,000
TOTAL ANNUAL COST	**$12,550,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1.8	21,230
Annual Cost of Water ($ per acft)	$591
Annual Cost of Water ($ per 1,000 gallons)	$1.81
JMP	*4/4/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF STEAM ELECTRIC IN HUNT COUNTY

Description of Water User Group:

The Steam Electric WUG in Hunt County has a demand that is projected to grow from 12,436 ac-ft/yr in 2020 to 28,564 ac-ft/yr in 2070. This projected demand is associated with the proposed Cobisa generation facility near Greenville, a proposed 1,750 MW combined cycle plant announced in 2002, but not yet constructed. The facility has been estimated to require about 4,000 acre-feet per year of supply, while the projections for Steam Electric water demand in Hunt County range from 12,436 ac-ft in 2020 to 28,564 ac-ft in 2070. Actual current demand is about 351 ac-ft for the existing powerline facility at Greenville.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Projected Water Demand	12,436	14,539	17,102	20,228	24,038	28,564
Current Water Supply	351	351	351	351	351	351
Projected Supply Surplus (+)/Deficit(-)	**-12,085**	**-14,188**	**-16,751**	**-19,877**	**-23,687**	**-28,213**

Evaluation of Potentially Feasible Water Management Strategies:

Projected demands for steam electric power generation in 2020 are substantially greater (by a factor of approximately 3) than existing demand plus anticipated demand for the Cobisa facility, if constructed. The differences are attributable to differing estimation methods and assumptions for future steam electric demands. TWDB projections for steam electric demand are conservatively based at the higher end of unit water use for electricity generation. Because the proposed Cobisa facility would be a combined cycle plant, actual water use would potentially be significantly lower than the adopted projections. Other factors, such as water requirements for carbon capture if required in the future, also elevate the projected demands. Uncertainty increases as projections are made further into the future.

Because the proposed Cobisa facility would be a combined cycle generation facility, the implementation of a combined cycle generation facility was considered advanced conservation for the purposes of the 2016 Plan. Projections of estimated savings are based upon projections developed by the University of Texas Bureau of Economic Geology (2008), utilizing a projection of four times Business As Usual (4BUA) as a conservative estimate. This conservation would meet a substantial portion (7,450 ac-ft/yr in 2020 to 12,060 ac-ft/yr in 2070) of the projected demand. No cost was assumed because the facility would be constructed with this level of conservation built in. With advanced conservation, remaining demands range from 4,990 ac-ft/yr in 2020 to 16,500 ac-ft/yr in 2070.

Because the proposed facility would be located at Greenville, it is assumed the demands would be met under contract with the City of Greenville. Groundwater is not feasible due to the limited managed available capacity of aquifers. Greenville currently contracts with the Sabine River Authority for its supply and utilizes the city lake for storage. However, all SRA water from Lake Tawakoni and Lake Fork has been contracted, thus no additional water is available from these lakes to meet the projected steam electric demands. The recommended strategy for Greenville is to supplement existing supplies with water from Chapman Lake by 2050. To meet the projected steam electric demands (after conservation), this water would need to be available as soon as any additional, unspecified facility is constructed, such that the contract and infrastructure for Greenville would be needed by 2020. The available supply from Chapman Lake would not be sufficient to meet projected steam electric demands without conservation.

Conservation and supply from Chapman Lake would be sufficient to meet projected steam electric demands through 2040, but additional supplies would be necessary by 2050. Region C has preliminarily indicated that the Toledo Bend Transfer strategy to the North Texas region is being considered by 2070 to meet anticipated future needs. Analysis of available supplies in the area suggest no other wholesale water provider in the area can meet projected steam electric demands in Hunt County; thus, the purchase of SRA water by the City of Greenville from the Toledo Bend Reservoir has been identified as an Alternative Water Management Strategy to meet demands by 2050 for the City of Greenville.

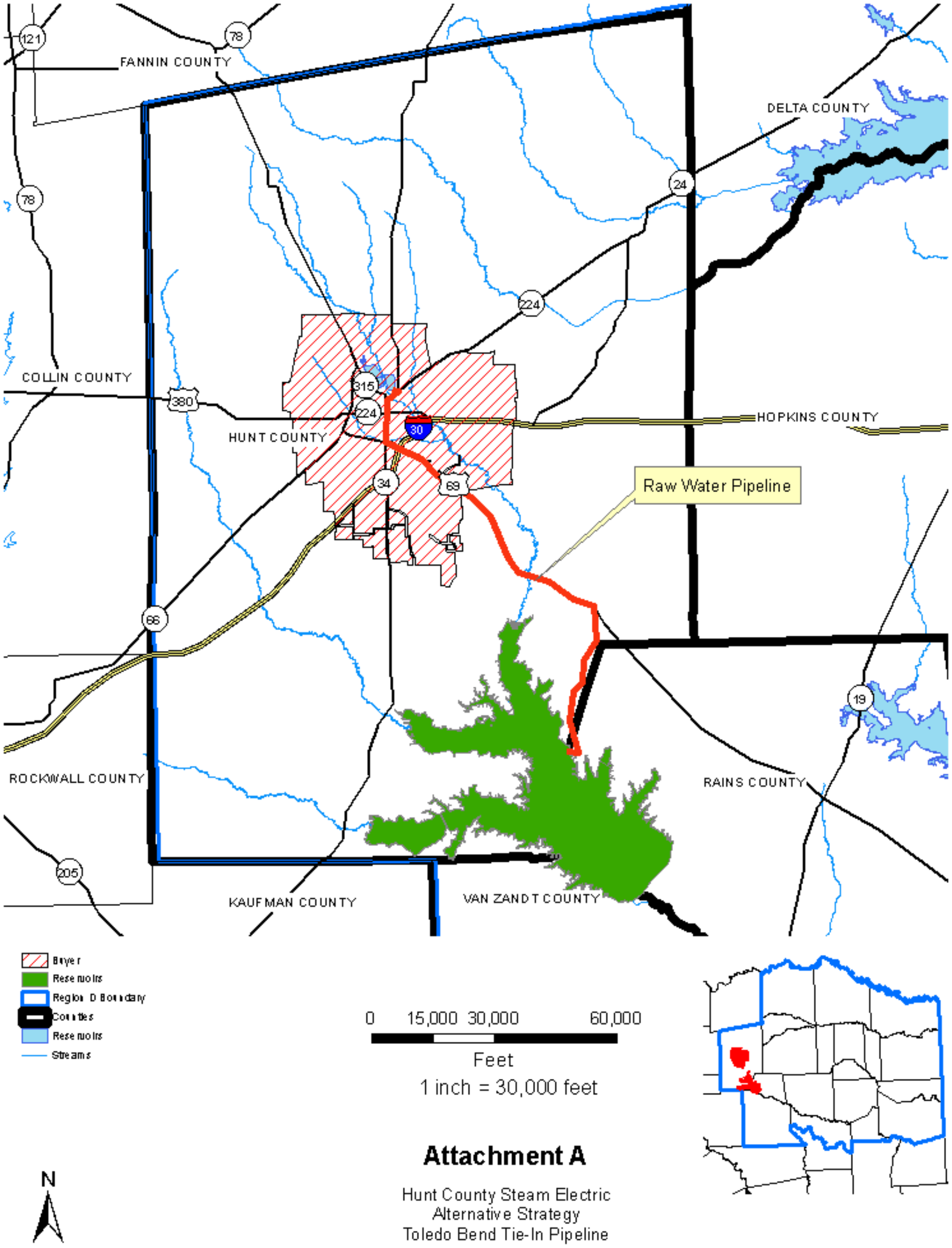
Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Env. Impact
Advanced Water Conservation	12,061	$0	$0	$0	1
Water Reuse					
Groundwater					
Increase Existing Contract	16,152		$3,683,000	$228	3

Alternative Strategy:

	2020	2030	2040	2050	2060	2070
Increase Existing Contract (ac-ft/yr)	**4,637**	**6,790**	**7,610**	**10,889**	**14,649**	**16,152**

The identified Alternative Water Management Strategy for Hunt County Steam Electric is the purchase of up to an additional 16,152 ac-ft/yr of water from the City of Greenville by increasing existing contract(s) prior to the decade of increased need. This alternative is contingent upon:

- The City of Greenville's recommended strategy for the voluntary reallocation of Hunt Manufacturing surplus supply;
- The Toledo Bend Transfer, under consideration for the purposes of the 2016 Region C Plan, being implemented by the year 2050 (present information suggests the Toledo Bend Transfer project is currently envisioned by the Region C Planning Group for the year 2070);
- The recommended strategy of Advanced Water Conservation for Hunt County Steam Electric;
- The City of Greenville's Alternative Water Management Strategy for the construction (by 2020) of the Chapman Raw Water Pipeline for the purchase of water from Lake Chapman from the City of Sulphur Springs; and
- The City of Greenville's Alternative Water Management Strategy for the construction (by 2050) of the Toledo Bend Tie-In Pipeline for the purchase of Sabine River Authority supply from the Toledo Bend Transfer.



Attachment A

Hunt County Steam Electric
Alternative Strategy
Toledo Bend Tie-In Pipeline

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Hunt County Steam Electric - Increase Existing Contract

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (16152 acft/yr @ 228 $/acft)	$3,683,000
TOTAL ANNUAL COST	**$3,683,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	16,152
Annual Cost of Water ($ per acft)	$228
Annual Cost of Water ($ per 1,000 gallons)	$0.70

TLS *4/4/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF NORTH HUNT SUD IN HUNT COUNTY

Description of Water User Group:

North Hunt SUD provides water service in Hunt, Fannin, and Delta counties. It is projected North Hunt SUD will have a shortage in 2030. The WUG population is projected to be 4,246 in 2020 and 16,003 by the year 2070. The SUD has a contract for water supply with the City of Commerce for 147 ac-ft/yr, a well in Hunt county with a rating of 170 gpm , and a well in Fannin County that is rated at 318 gpm. The SUD is projected to have a deficit of 99 ac-ft in 2040, increasing to 713 ac-ft in 2070. In Hunt County, the SUD is projected to have a deficit of 36 ac-ft in 2030 increasing to 738 ac-ft by 2070.

Water Supply and Demand Analysis:

WUG Total	2020	2030	2040	2050	2060	2070
Population	4,246	5,369	6,858	8,895	11,801	16,003
Projected Water Demand	287	362	463	599	795	1,077
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	366	364	364	364	364	364
Projected Supply Surplus (+) / Deficit (-)	**79**	**2**	**-99**	**-235**	**-431**	**-713**

North Hunt SUD in Hunt County	2020	2030	2040	2050	2060	2070
Population	3,483	4,551	6,000	8,001	10,851	14,993
Projected Water Demand	235	306	404	538	730	1008
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	252	270	270	270	270	270
Projected Supply Surplus (+) / Deficit (-)	**17**	**-36**	**-134**	**-268**	**-460**	**-738**

Evaluation of Potentially Feasible Water Management Strategies:

The four alternative strategies considered to meet North Hunt SUD's water supply shortages are listed in the table below. 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. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater from the Woodbine Aquifer was considered because North Hunt SUD is currently using this aquifer as a source of supply for the system. However, due to the limited availability of this groundwater source, this aquifer will not be able to meet all of North Hunt SUD's shortage. Additional supplies are available from the Paluxy Aquifer, another existing source used by the SUD, but no present MAG exists for the aquifer. Additional purchase of water from the City of Commerce is another alternative; however, Commerce has only a limited volume, potentially available only if existing supplies to the Manufacturing WUG can be reallocated. A separate feasible strategy was considered to utilize surplus supply from Delta County-Other, specifically Delta County MUD (an entity within Delta County-Other). The North Hunt SUD service area is contiguous with the service area for Delta County MUD, which purchases supply from the City of Cooper. Delta County MUD is projected to have sufficient surplus supplies to have the capability to meet North Hunt SUD needs starting in 2060. This strategy would require a pipeline connecting the two systems, of sufficient size the provide up to 325 ac-ft/yr.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Env. Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells	**394**	**$4,958,000**	**$646,000**	**$1,640**	**1**

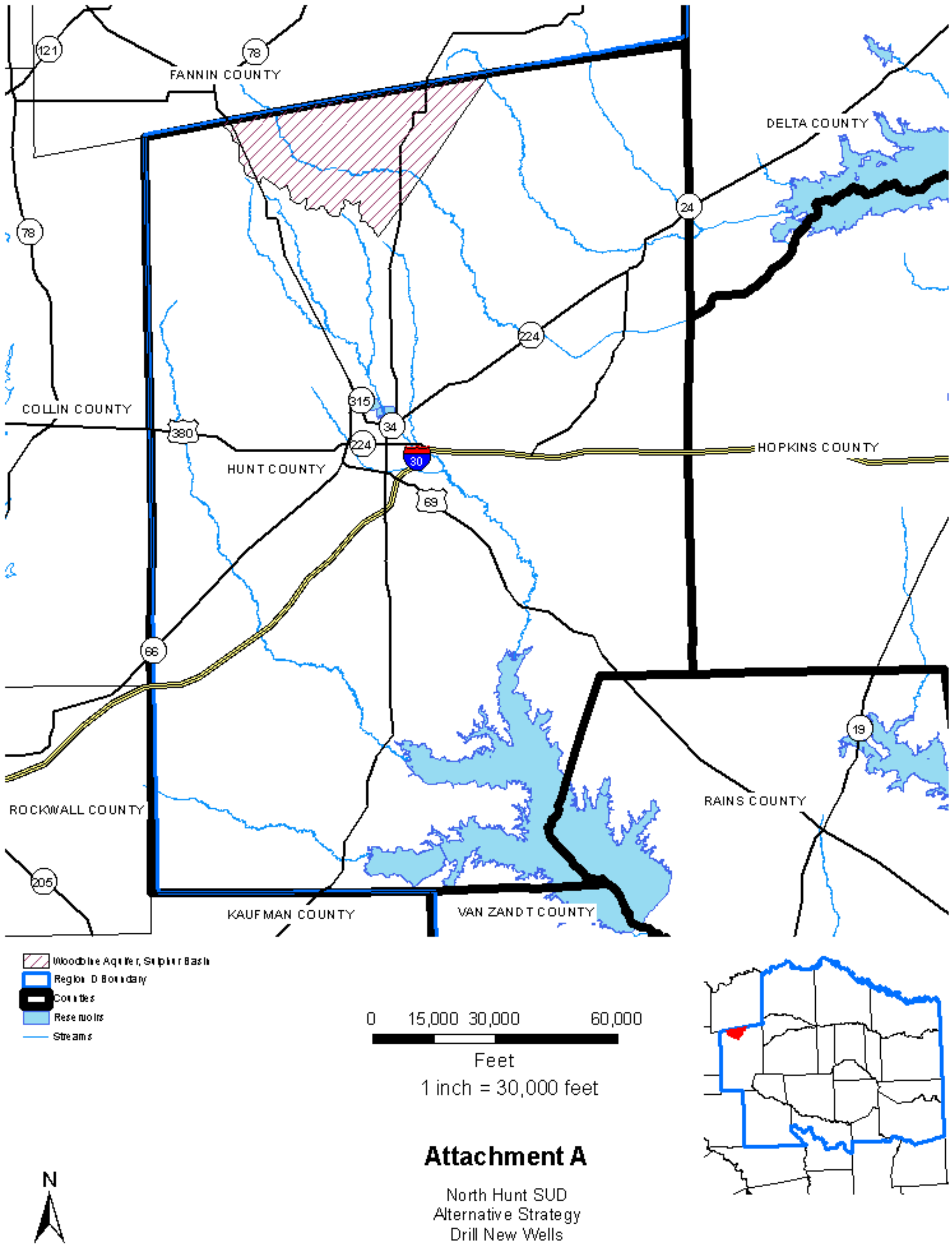
(Woodbine/Paluxy Aquifers, Sulphur Basin)					
Voluntary Reallocation of Hunt County Manufacturing Surplus purchased from Commerce WD	**338**	**$0**	**$720,496**	**$1,085**	**1**
Delta County Pipeline	**325**	**$1,662,000**	**$461,000**	**$1,418**	**3**

Alternate Strategies:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Woodbine/Paluxy Aquifers, Sulphur Basin; ac-ft/yr)	0	0	0	0	131	394

As additional projected demands are encountered in 2060 and 2070, the identified alternative strategy is to construct three additional water wells similar to their existing wells, to be constructed just prior to each decade as the deficits occur. The recommended supply source will be the Woodbine and Paluxy aquifers in Hunt County, in the Sulphur River Basin. Individual wells with rated capacity of 244 gpm each are predicted to provide approximately 131 acre-feet each.

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.



Attachment A

North Hunt SUD
Alternative Strategy
Drill New Wells

Cost Estimate Summary
Water Supply Project Option
41518 Prices
North Hunt SUD - Drill New Wells (Hunt - Woodbine - Sulphur)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$3,473,000
TOTAL COST OF FACILITIES	**$3,473,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,215,000
Interest During Construction (4% for 1 years with a 1% ROI)	$165,000
TOTAL COST OF PROJECT	**$4,867,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$407,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$35,000
Pumping Energy Costs (76309 kW-hr @ 0.09 $/kW-hr)	$7,000
Purchase of Water (394 acft/yr @ 500 $/acft)	$197,000
TOTAL ANNUAL COST	**$646,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 3	394
Annual Cost of Water ($ per acft)	$1,640
Annual Cost of Water ($ per 1,000 gallons)	$5.03
JNS	*4/6/2015*

REGION D
EVALUATIONS OF ALTERNATIVE WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

LAMAR COUNTY

WUGs:

None

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REGION D
EVALUATIONS OF ALTERNATIVE WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

MARION COUNTY

WUGs:

None

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REGION D
EVALUATIONS OF ALTERNATIVE WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

MORRIS COUNTY

WUGs:

None

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REGION D
EVALUATIONS OF ALTERNATIVE WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

RAINS COUNTY

WUGs:

None

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REGION D
EVALUATIONS OF ALTERNATIVE WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

RED RIVER COUNTY

WUGs:

City of Clarksville
Red River County Irrigation

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EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF CITY OF CLARKSVILLE

Description of Water User Group:

The City of Clarksville is located in Red River County. The system is projected to serve 3,315 people through the planning period. The current sources of supply are wells into the Blossom Aquifer, mixed with surface water from Langford Lake. Water quality issues with the groundwater (TDS) and surface water (turbidity) necessitate mixing of the supplies to meet Texas drinking water standards. The groundwater has over 1,000 ppm of dissolved solids including high levels of sodium, sulfate, and chloride. The City provides water to its own customers in the Sulphur basin and is projected to have a water supply deficit of 593 ac-ft/yr in 2040, due to sedimentation issues in Langford Lake. As the surface water supply for the City diminishes, the capability to mix the surface supply with the groundwater supply commensurately diminishes as well. Thus as surface supply diminishes, so too does the capability to utilize the City's existing groundwater supply. As noted in a 4 October, 2013 memorandum from the City's consultant, Murray, Thomas & Griffin, Inc. (MTG):

> "Clarksville has no available surface water when a water level of 417.0 (2006 low water level) and a sediment level at 415.0 (2013 lake bottom) are considered. Each of these conditions has occurred during the past ten years. The surface water is necessary to address total volume needs as well as for blending with the ground water."

The system does have a water conservation and drought management plan in place. A location map is included as Attachment A.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	3,315	3,315	3,315	3,315	3,315	3,315
Projected Water Demand	620	602	593	592	591	591
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	916	660	0	0	0	0
Projected Supply Surplus (+) / Deficit (-)	**296**	**58**	**-593**	**-591**	**-591**	**-591**

Evaluation of Potentially Feasible Water Management Strategies:

The various feasible strategies considered to meet Clarksville's water supply shortages are listed in the table below. Advanced conservation was not selected because Clarksville's supply would not be projected to meet TCEQ regulatory minimums. Furthermore, reduction in demand would not alleviate the aforementioned water quality issues with the City's projected supplies. There are no significant current water needs in Clarksville that could be met by water reuse. Additional pumping (five additional wells) from the Nacatoch Aquifer in the Sulphur River Basin and Reverse Osmosis treatment of all of the City's existing groundwater supplies has also been considered. The City's existing surface water supply is rapidly decreasing due to sedimentation issues in Langford Lake, the City's sole existing surface water supply. The City has requested the consideration of multiple potential surface water strategies to meet Clarksville's water supply needs. Potentially feasible strategies evaluated include:

- Treated Water Pipeline to DeKalb - purchasing water from the City of Texarkana's available supply from Wright Patman Reservoir;
- Dredging of sediment from Langford Lake;
- Construction of a new surface water reservoir, Dimple Reservoir;
- Construction of a raw water pipeline tying into to Region C's proposed Marvin Nichols Reservoir.
- Treated Water Pipeline to Detroit - purchasing water from the City of Paris (via Lamar County WSD) from Paris available supply.

The projected amount of firm supply necessary to meet the above projected demands differ due to the City's current methodology of mixing their surface and groundwater supplies at a ratio of 51%.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annual Cost	Unit Cost (During Debt Service)	Unit Cost (After Debt Service	Env. Impact
Advanced Water Conservation						
Water Reuse						
Drill Additional Wells and RO Treatment	**388**	**$7,878,000**	**$1,457,000**	**$3,755**	**$2,058**	**3**
Raw Water Pipeline to Marvin Nichols Reservoir (ac-ft/yr)						
Contract with Lamar County WSD	**303**	**$10,506,000**	**$1,513,000**	**$4,993**	**$2,092**	**3**
Contract with Texarkana and Treated Water Pipeline to DeKalb (ac-ft/yr)	**303**	**$10,053,000**	**$1,178,000**	**$3,888**	**$1,115**	**3**
Dredge Langford Lake (ac-ft/yr)	**303**	**$12,149,000**	**$1,017,000**	**$3,356**	**$0**	**4**
Dimple Reservoir (ac-ft/yr)	**303**	**$33,906,000**	**$2,545,000**	**$8,399**	**$757**	**5**

Description of evaluated projects

Raw Water Pipeline to Marvin Nichols Reservoir – The City of Clarksville has requested that their top priority for consideration as a water management strategy be a pipeline tying into Region C's water management strategy for the construction of Marvin Nichols Reservoir (as it is reported in the Sulphur River Basin Feasibility Study, SRBA 2014, that 20% of the water potentially available from Marvin Nichols Reservoir would be available for local use in Region D). Preliminary communications with Region C have indicated that this strategy is currently under consideration as a Proposed or Alternative Water Management Strategy for implementation by the year 2050 in the 2016 Region C Water Plan. As Region D has identified that the City of Clarksville has needs as early as 2040, Marvin Nichols as currently envisioned by Region C would not be available to meet the City's identified needs. Furthermore, the North East Texas Regional Water Planning Group opposes the construction of any reservoir in the Sulphur River Basin, and does not recommend this as a Recommended or Alternative Water Management Strategy. However, the City of Clarksville has noted that should this source be available during the planning period, it has reserved the right to work with the Sulphur River Basin Authority and to utilize this source once available.

New Groundwater Wells and Treatment Facility – A planning level analysis was performed to evaluate a strategy including the addition of new wells into the Nacatoch Aquifer, Sulphur River Basin, in Red River County, and additional treatment of all of the City's groundwater supplies to address the aforementioned water quality issues. The available yield from the project was determined to be 388 ac-ft/yr. This was the amount calculated to be necessary to meet the projected future demands for the City, once added to Clarksville's existing groundwater supplies. It is thus critical to note that consideration of this strategy is for the entire 593 ac-ft/yr of supply necessary to meet the City's projected demands. The planning process strictly considers the amount of supply necessary to meet the projected shortage, i.e., 388 ac-ft/yr, and uses this amount as the basis for cost estimation purposes. Nevertheless, the strategy would be for the development of sufficient groundwater sources to meet the full 591 ac-ft/yr of projected City demands. It has been assumed for this strategy that existing groundwater wells of the City's are maintained.

Additional assumptions for this analysis included assuming Total Dissolved Solids (TDS) of 1,275 mg/L, and that two Reverse Osmosis (RO), Level 4 treatment plants would be located at the end of a 5-mile, 8-inch transmission line sized sufficiently to carry the full flow of pre-treated water, since when brackish water is treated, approximately 20% of the supply is lost as concentrate. An average of nearby depth (650 ft.) and head (250 ft.) of wells was utilized to calculate the potential number of wells needed (seven new wells). For an assumed distance between wells of 1,500 ft., a total length of 5,250 ft. of 6-in. diameter well field piping was estimated. For the pipeline, 30 psi was assumed for the residual head at the end of the pipe, with a maximum pipeline pressure of 150 psi. Difference in elevation was assumed to be 50 ft. A pump efficiency of 0.72 and a peaking factor of 2 was assumed to calculate the necessary energy at 17,885 kWh. The treatment facilities would be of sufficient size (0.7 mgd) to treat the entirety of Clarksville's groundwater supply, both existing and proposed wells.

The TWDB's Unified Costing Model (UCM) was used to develop costs for this strategy. The total capital cost of the project is calculated to be approximately $7,878,000, with an annual cost of $1,457,000, for a unit cost during debt service of $3,755 per ac-ft ($11.52 per 1,000 gallons). After debt service, the unit cost would be approximately $2,058 per ac-ft.

Contract with Lamar County WSD and Treated Water Pipeline to Detroit - A strategy requested by the City of Clarksville is the construction of a 16" diameter pipeline from Clarksville to Detroit, and the purchase of up to 2 MGD of treated water from the Lamar County WSD. This strategy would be contingent upon the Lamar County WSD purchase of equivalent supply from the City of Paris. Cost estimates are based upon the TWDB's Unified Costing Model (UCM). The project is estimated to provide 303 ac-ft/yr by constructing a pipeline to Detroit, whereby the City of Clarksville would enter into a contract with the Lamar County WSD (contingent upon the District contracting for available supply from the City of Paris). This amount provides the surface water supply necessary for mixing with the City's existing groundwater supply, for a total project cost of $10.5 million, an annual cost of $1.5 million, and a unit cost for the additional supply of $4,993 per ac-ft. during debt service and $2,092 per ac-ft after debt service. Identifying uses for the additional production capability of the pipeline (up to 2 MGD) would likely lower the unit cost for this strategy.

Contract with Texarkana and Treated Water Pipeline to De Kalb – Another strategy previously requested by the City of Clarksville is the construction of a 16" diameter pipeline from Clarksville to De Kalb, and the purchase of up to 2 MGD of treated water from Texarkana. This project is based on a cost estimate developed by Riverbend Water Resources District, along with a similar project cost estimate from MTG Engineers. The total cost, annual cost, and unit cost of water from the project has been estimated based upon the results of these studies, as entered into the TWDB's Unified Costing Model (UCM). The project is estimated to have a total yield of 2,240 ac-ft/yr of supply by constructing a pipeline to De Kalb, whereby the City of Clarksville would enter into a contract with the City of Texarkana (or alternatively Riverbend Water Resources District) for up to 593 ac-ft/yr (0.53 MGD). The amount necessary to meet Clarksville's projected needs is 303 ac-ft/yr (0.27 MGD) This amount provides the surface water supply necessary for mixing with the City's existing groundwater supply, for a total project cost of $10.1 million, an annual cost of $2.5 million, and a unit cost for the additional supply of $3,891 per ac-ft. during debt service and $1,115 per ac-ft after debt service. Identifying uses for the additional production capability of the pipeline (up to 2 MGD) would likely lower the unit cost for this strategy.

Concerns about this strategy are with regard to present issues entailing the supply of Wright Patman Reservoir to Texarkana and the remaining Member Cities of Riverbend Water Resources District. Concerns regarding the priority of a new contract for Clarksville for treated water supply from Texarkana/Riverbend are somewhat ameliorated due to the fact that in times of drought, Texarkana's 2012 Water Conservation & Drought Contingency Plan specifies that curtailment of water deliveries to wholesale customers will be done by a pro-rata method as provided in Texas Water Code, §11.039. Furthermore, the amounts of supply considered within the 2016 North East Texas Regional Water Plan are based upon firm yields developed employing the TCEQ Water Availability Model, and reflect legal and infrastructure constraints to identify the amount of available supply. It is expected that costs association with this strategy would be negotiated between the City of Clarksville and Texarkana/Riverbend, as the City of Clarksville has expressed the interest in entering into a water supply relationship as a partner with these entities. This strategy, if implemented, would be contingent upon water management strategies identified for Texarkana and the remaining Riverbend Member Cities.

Dredge Langford Lake – As noted previously, the firm yield of Langford Lake decreases over time due to sedimentation in the reservoir reducing the total volume of conservation capacity. This strategy would entail the dredging of sediment from Langford Lake to restore storage capacity within the reservoir which has been lost due to this sedimentation. This project utilizes a 24" dredge to remove an estimated 3,000 ac-ft of sediment over a one-year calendar period. The unit cost of reservoir dredging, in units of dollars per ac-ft of sediment removed, has been calculated based upon a formula from the World Bank, as presented in the TWDB Report *Dredging vs. New Reservoirs* (2004). The resultant calculated cost was entered into the UCM to determine the debt service cost. The project is estimated to yield 520 ac-ft of firm supply by dredging an estimated total of 3,000 ac-ft of sediment from Langford Lake over one year, for a total project cost of $22.7 million, an annual cost of $1.9 million, and a unit cost of $3,658 per ac-ft. during debt service and $0 per ac-ft after debt service.

Concerns with this strategy include the location and impacts from disposition of dredged material, the efficiency of removal of the dredged material, and the potential need to repeat the effort in the future since dredging does not remove the source of sedimentation issues in the contributing watershed. As noted in TWDB (2005), issues with regard to dredging fall into four general categories: removal of the sediment, transportation, disposal, and re-use.

For the removal of sediment, dredging reservoirs, particularly at the shallow headwaters and reservoir margins can destroy habitats and affect wetland birds, etc. If the water sustains flora or fauna of particular value, or if fish issues are important, then issues exist regarding lowering the water level. Dredging may also result in a temporary loss of reservoir water quality, through removal of organic material, although there may be long-term improvements in the reservoir water quality through removal of such organic material. Downstream water quality may also be temporarily impacted due to dredging. There may also be a loss of land for containment areas to drain/treat the sediment.

Regarding transportation, reservoirs are often in remote areas. The impact of additional transportation during dredging can place pressure on local communities (e.g., noise/air pollution and physical damage to roads), although these impacts may be reduced if the sediment can be effectively dewatered at or near the reservoir site using, for example, a hydrocyclone and/or a filter bed press. The viability of disposal to land depends on the level of contaminants, whereby there may be risks to groundwater supplies from contamination by leaching.

Opportunities for the re-use of dredged material include sand/gravel/bricks for the construction industry, fertilizer, usage for filling abandoned quarry areas or mines, and usage for capping landfill sites.

Dimple Reservoir **–** The City has also identified a feasible strategy to meet future water supply needs as being the construction of a new 28,541 ac-ft reservoir with a projected surface are of 2,230 acres on White Oak Bayou, a tributary of Pecan Bayou, to be utilized as an interbasin transfer from the Red River Basin to the Sulphur River Basin. This reservoir project was originally described in a 1986 report from HDR to the Red River Authority and project participants, entitled *Preliminary Engineering Report for Proposed Dimple Reservoir Project on White Oak Bayou*. The 1986 report identified a potential project site, reservoir area capacity, drainage area, and estimated construction costs for the reservoir and intake structure without equipment. Intake structure equipment and water pipelines from the reservoir were not included in the report, nor was a cost estimate. This site is described in Section 8.9.5 of the 2016 Region D Plan, although it has not been recommended as a unique reservoir site by the NETRWPG for the present round of regional planning.

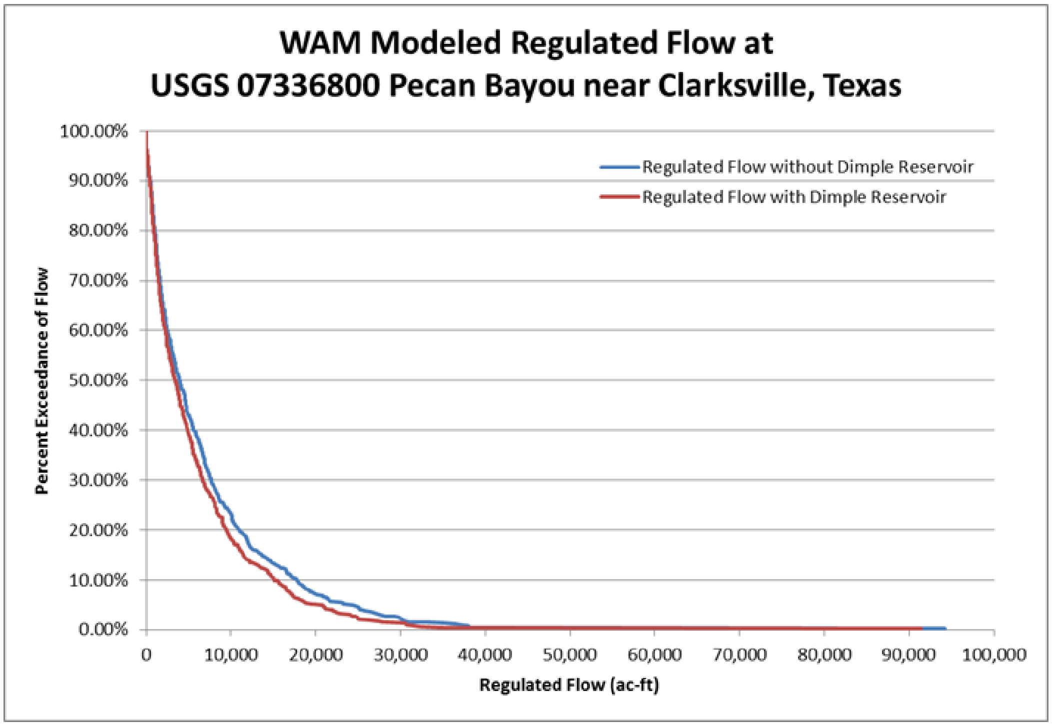
The reservoir construction costs from the 1986 report have been adjusted to September 2013 costs using the ENR Construction Cost Index (CCI) and entered into the UCM. Intake equipment and a raw water pipeline from the reservoir to the City of Clarksville's water treatment plant have also been preliminarily identified and included in the UCM. The raw water pipeline in the UCM is modeled to deliver the estimated firm yield with a peaking factor of 2. The project pipeline is 8" diameter, and approximately 8 miles long, following existing roadways with an elevation increase of 40 feet. The pipeline costing utilizes the UCM's assumption of 15 psi for the residual head at End of Pipe for raw water and assumes a maximum pipeline pressure of 250 psi. UCM calculations for pump and power requirements provide the cost estimate for the intake equipment. For the 2016 planning process, the reservoir has been modeled in the Red River WAM (Run 3), subject to consensus environmental criteria at a junior priority date, and modeled considering the full demand of existing water rights in the Red River Basin. The results of this WAM analysis indicate the project has a firm yield of 10,200 ac-ft per year, although Clarksville needs only 303 ac-ft/yr to have adequate supply to mix with the City's groundwater supplies to meet its projected needs beyond 2040. However, the City intends to use up to 593 ac-ft/yr to meet its full projected demands. This strategy includes constructing a new 28,541 ac-ft reservoir and 8" pipeline to Clarksville's WTP, for a total project cost of $33.9 million with an annual cost of $2.5 million and a unit cost for the needed supply of $8,399 per ac-ft. with debt service and $757 per ac-ft without debt service. It should be noted, however, that Dimple Reservoir, as envisioned herein, is based on existing studies (from 1986) and characterizations of the impoundment. Studies investigating alternative configurations, perhaps using a smaller footprint, are encouraged. Furthermore, needs from additional entities, if identified as willing participants to such an effort, could improve the unit costs calculated for Clarksville herein.

Concerns with this strategy include the potential need for obtaining a surface water permit for an interbasin transfer from the Red River Basin to the Sulphur River Basin. However, there is the potential that this could be waived given the project is located within the same county as the proposed use. The Texas Water Code §11.085 identifies factors to be considered in the applicable regional water plans to address the following:

- (A) the availability of feasible and practicable alternative supplies in the receiving basin to the water proposed for transfer;
- (B) the amount and purposes of use in the receiving basin for which water is needed;
- (C) proposed methods and efforts by the receiving basin to avoid waste and implement water conservation and drought contingency measures;
- (D) proposed methods and efforts by the receiving basin to put the water proposed for transfer to beneficial use;
- (E) the projected economic impact that is reasonably expected to occur in each basin as a result of the transfer; and
- (F) the projected impacts of the proposed transfer that are reasonably expected to occur on existing water rights, instream uses, water quality, aquatic and riparian habitat, and bays and estuaries that must be assessed under Sections 11.147, 11.150, and 11.152 of this code in each basin. If the water sought to be transferred is currently authorized to be used under an existing permit, certified filing, or certificate of adjudication, such impacts shall only be considered in relation to that portion of the permit, certified filing, or certificate of adjudication proposed for transfer and shall be based on historical uses of the permit, certified filing, or certificate of adjudication for which amendment is sought;

The other alternatives considered herein present available alternatives in the receiving basin to the water proposed for transfer. The water would be used for municipal purposes. The City maintains its Water Conservation and Drought Contingency Plan, implementing measures identified therein to avoid waste and conserve water during times of drought. Minimal economic impact is expected in the Red River Basin, whereas positive economic benefits may occur by maintaining the City's municipal supply. As noted above, minimal impacts are expected on existing water rights, as the WAM has been utilized to maintain priorities of these water rights. There exists significant concern with regard to potential environmental impacts of the proposed reservoir considering that the reservoir's contributing watershed represents approximately 25% of the watershed contributing to Pecan Bayou, a stream segment conditionally recognized in the 2016 Region D Plan and by the Texas Parks and Wildlife Department as being an ecologically unique stream segment in the North East Texas Region. Presented below is a monthly flow frequency chart depicting the variation in flows in Pecan Bayou for with- and without project conditions.

Significant impacts to agricultural and natural resources would also be expected within the footprint of the reservoir as well. Furthermore, mitigation and compensation may be necessary to the basin of origin.



Flow Frequency Distribution of Regulated Flows at USGS Gage #07336800, Pecan Bayou near Clarksville, Texas, with- and without Dimple Reservoir.

Alternatives:

	2020	2030	2040	2050	2060	2070
Dimple Reservoir (ac-ft/yr)	0	0	593	591	591	591
Drill Additional Wells and RO Treatment (ac-ft/yr)			388	388	388	388
Detroit Pipeline (ac-ft/yr)			303	303	303	303

At present, considerable uncertainty exists in each of the identified feasible water management strategies for the City of Clarksville. The NETRWPG supports any efforts by the City of Clarksville to further study all potential strategies to identify the best approach for the City to meeting all of its future water supply needs, and such a study should be considered consistent with the 2016 North East Texas Regional Water Plan.

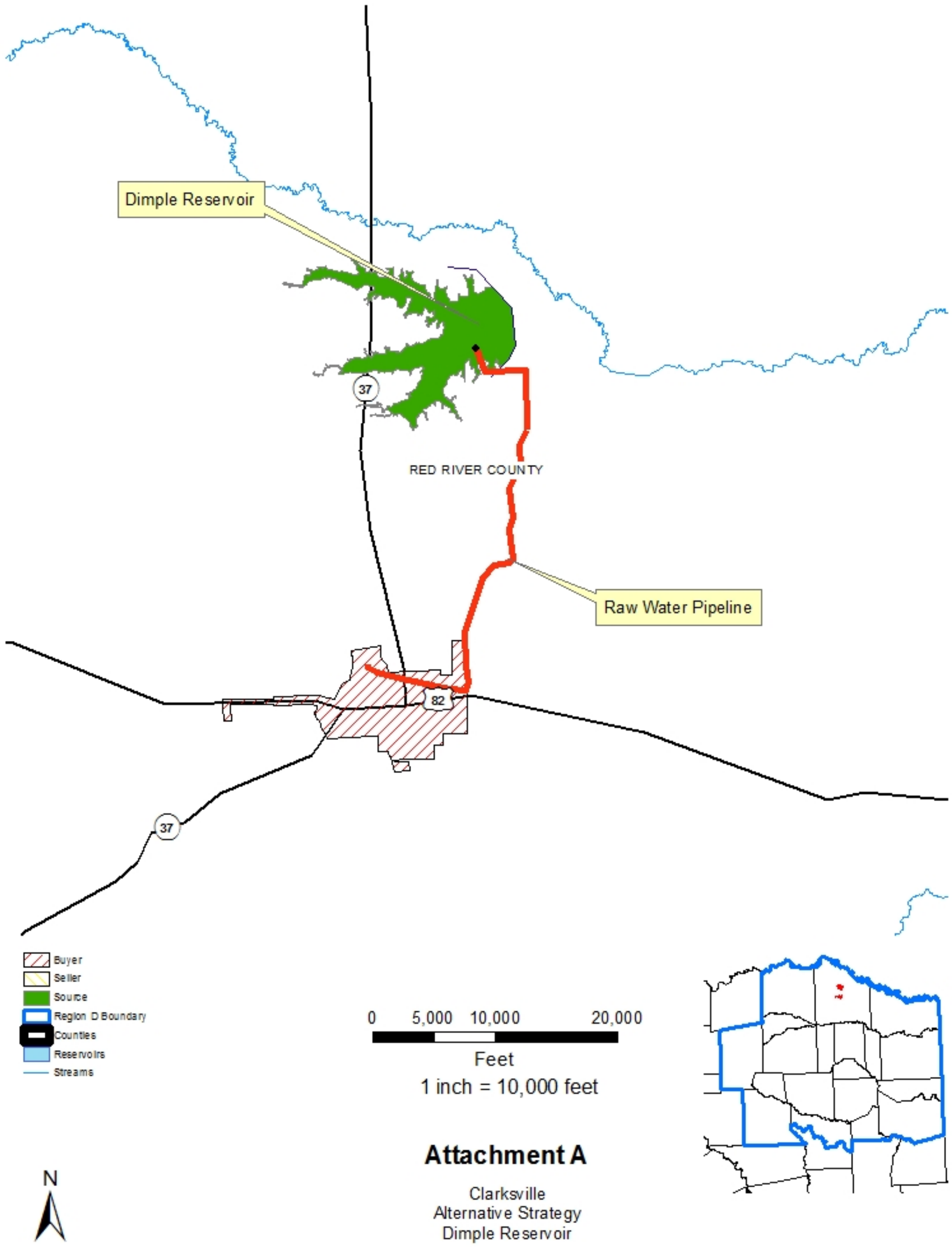
Should development of a Treated Water Pipeline to the City of Texarkana/Riverbend's system in DeKalb and contract to provide up to 593 ac-ft (ac-ft/yr) be determined to not be cost feasible, the City will need alternative strategies. To meet the City's projected deficit in 2040, identified alternative strategies for water supply include the study and development one of the following options*:

- Construct and develop Dimple Reservoir to provide a maximum 10,200 ac-ft/yr. To meet the City's projected deficit in 2040 an identified alternative strategy is for the City of Clarksville to pursue the development of Dimple Reservoir to meet the City's projected deficit in 2040. This project has the capability to meet the City's identified needs, as well as developing a supply to be potentially utilized by other demands in the area.
- Retire Langford Lake and development of a new well field and associated RO treatment facilities.

- Contract with the Lamar County WSD for supply from the City of Paris, which includes the development of a Treated Water Pipeline tying into Lamar County WSD's system in Detroit, Texas, to provide 303 ac-ft/yr for the projected needs of the City of Clarksville, although the City of Clarksville has indicated their intent, if this strategy is implemented, to contract additional supply as necessary to meet their full projected demands. This strategy allows for the resumption of the City's utilization of existing groundwater supplies via mixing. This strategy is contingent upon the Lamar County WSD contracting for the necessary additional supply from the City of Paris.

*Assuming that water from the Sulphur River is not available from an upper region reservoir.

Given Clarksville's geographic location, it will be necessary that Clarksville establish working relationships with the City of Texarkana, Riverbend Water Resources District, the Sulphur River Basin Authority and/or the Red River Basin Authority to develop any new reservoir and/or water supply strategy.



Attachment A

Clarksville
Alternative Strategy
Dimple Reservoir

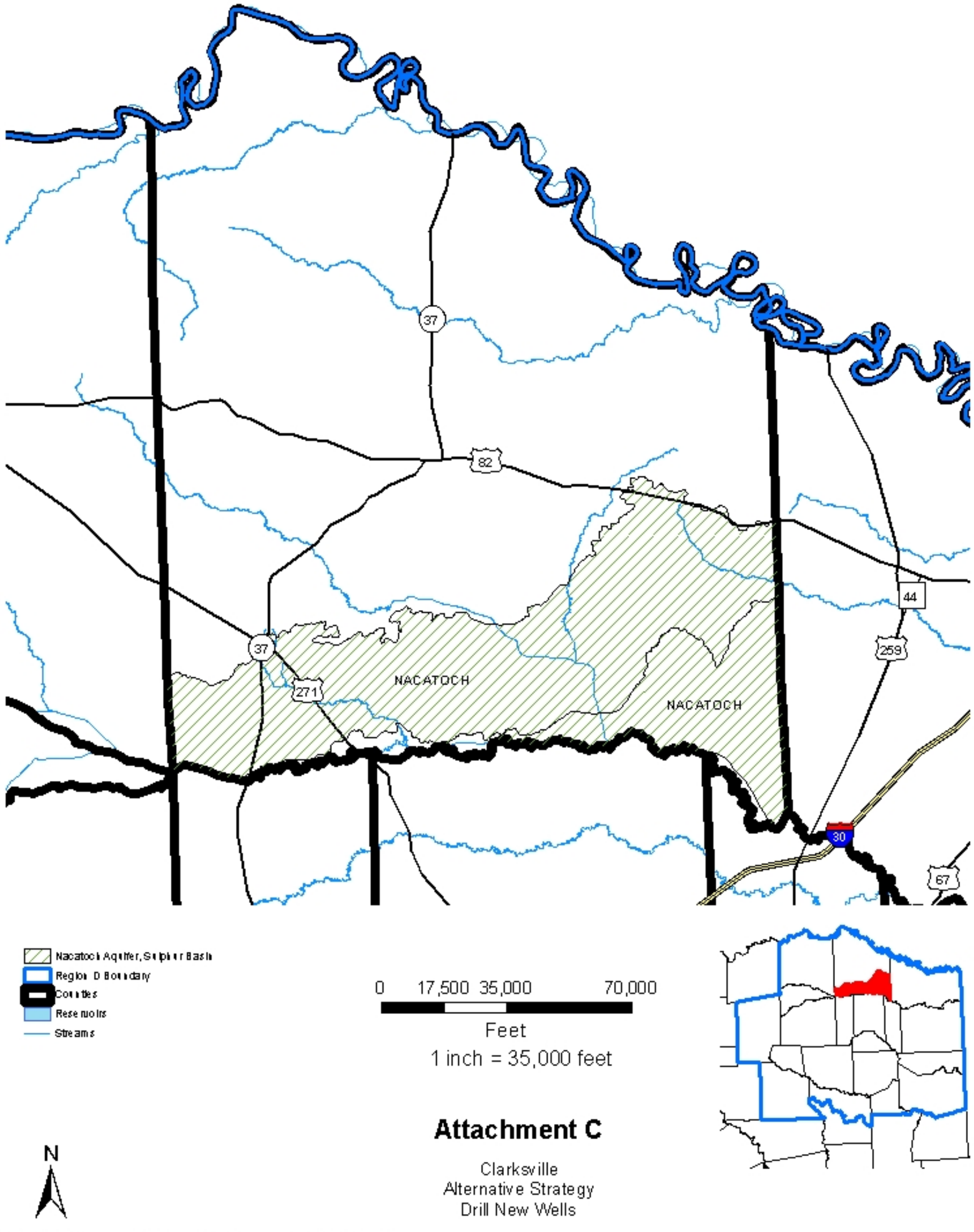
Cost Estimate Summary
Water Supply Project Option
41518 Prices
Clarksville - Dimple Reservoir

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Dam and Reservoir (Conservation Pool 28541 acft, 2130 acres)	$11,044,000
Intake Pump Stations (0 MGD)	$1,793,000
Transmission Pipeline (0 in dia., 8 miles)	$1,386,000
Integration, Relocations, & Other	$3,043,000
TOTAL COST OF FACILITIES	**$17,266,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$4,776,000
Environmental & Archaeology Studies and Mitigation	$4,434,000
Land Acquisition and Surveying (2135 acres)	$4,208,000
Interest During Construction (4% for 3 years with a 1% ROI)	$3,222,000
TOTAL COST OF PROJECT	**$33,906,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$790,000
Reservoir Debt Service (5.5 percent, 40 years)	$1,525,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$59,000
Dam and Reservoir (1.5% of Cost of Facilities)	$166,000
Pumping Energy Costs (54912 kW-hr @ 0.09 $/kW-hr)	$5,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$2,545,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	303
Annual Cost of Water ($ per acft)	$8,399
Annual Cost of Water ($ per 1,000 gallons)	$25.77

Note: One or more cost element has been calculated externally

JMP *4/9/2015*



Attachment C

Clarksville
Alternative Strategy
Drill New Wells

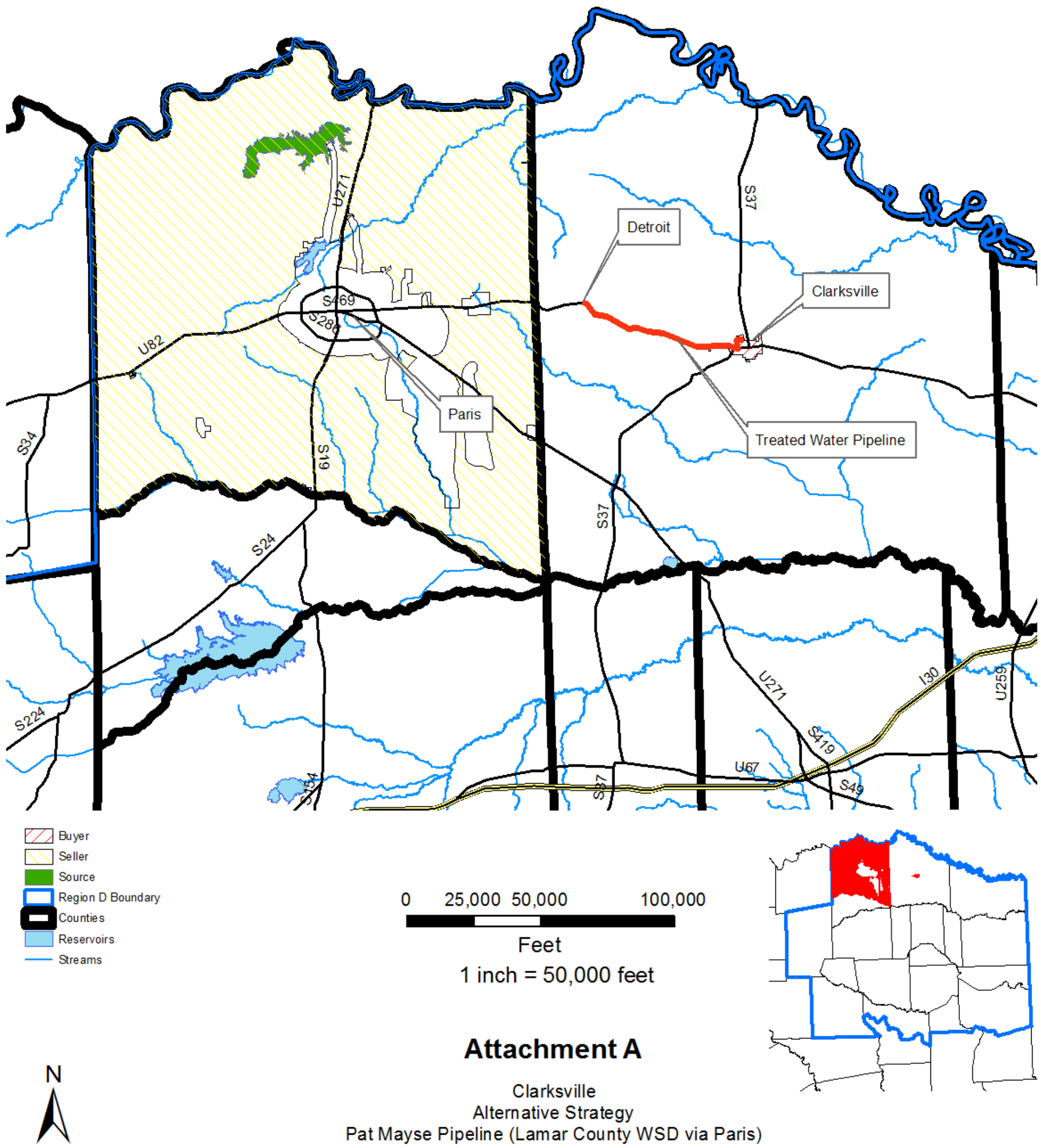
Cost Estimate Summary
Water Supply Project Option
41518 Prices

City of Clarksville - Drill New Wells (Red River - Sulphur - Nacatoch)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Intake Pump Stations (0 MGD)	$1,026,000
Well Fields (Wells, Pumps, and Piping)	$1,658,000
Two Water Treatment Plants (0.7 MGD and 0.7 MGD)	$2,843,000
TOTAL COST OF FACILITIES	**$5,527,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,934,000
Environmental & Archaeology Studies and Mitigation	$150,000
Interest During Construction (4% for 1 years with a 1% ROI)	$267,000
TOTAL COST OF PROJECT	**$7,878,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$659,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$42,000
Water Treatment Plant (2.5% of Cost of Facilities)	$552,000
Pumping Energy Costs (111939 kW-hr @ 0.09 $/kW-hr)	$10,000
Purchase of Water (388 acft/yr @ 500 $/acft)	$194,000
TOTAL ANNUAL COST	**$1,457,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	388
Annual Cost of Water ($ per acft)	$3,755
Annual Cost of Water ($ per 1,000 gallons)	$11.52

KVA *4/9/2015*



Attachment A

Clarksville
Alternative Strategy
Pat Mayse Pipeline (Lamar County WSD via Paris)

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Cost Estimate Summary
Water Supply Project Option
41518 Prices

Clarksville - Detroit Pipeline

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$1,431,000
Transmission Pipeline (0 in dia., 13 miles)	$6,054,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$7,485,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$2,317,000
Environmental & Archaeology Studies and Mitigation	$322,000
Land Acquisition and Surveying (52 acres)	$26,000
Interest During Construction (4% for 1 years with a 1% ROI)	$356,000
TOTAL COST OF PROJECT	**$10,506,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$879,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$96,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (488684 kW-hr @ 0.09 $/kW-hr)	$44,000

Purchase of Water (303 acft/yr @ 1629.14 $/acft)	$494,000
TOTAL ANNUAL COST	**$1,513,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	303
Annual Cost of Water ($ per acft)	$4,993
Annual Cost of Water ($ per 1,000 gallons)	$15.32
JMP	*9/22/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF IRRIGATION IN RED RIVER COUNTY

Description of Water User Group:

The Irrigation WUG in Red River County has a demand that is projected to decrease from 5,156 ac-ft/yr in 2020 to 4,895 ac-ft/yr in 2070. Irrigation in Red River County is projected to be supplied by existing surface water from run-of-river diversions from the Red and Sulphur Rivers. A deficit of 4,376 ac-ft/yr is projected to occur in 2020 and decrease to 4,125 ac-ft/yr by 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Projected Water Demand	5,156	5,103	5,050	4,998	4,945	4,895
Current Water Supply	780	790	790	790	790	770
Projected Supply Surplus (+)/Deficit(-)	**-4,376**	**-4,313**	**-4,260**	**-4,208**	**-4,155**	**-4,125**

Projected Supply Surplus (+)/Deficit(-) by Basin	2020	2030	2040	2050	2060	2070
Sulphur	-3,270	-3,221	-3,183	-3,146	-3,107	-3,091
Red	-1,106	-1,092	-1,077	-1,062	-1,048	-1,034
Total	**-4,376**	**-4,313**	**-4,260**	**-4,208**	**-4,155**	**-4,125**

Evaluation of Potentially Feasible Water Management Strategies:

Seventeen alternative strategies were considered to meet the Red River County Irrigation WUG's water supply shortages. Advanced water conservation for irrigation practices were not considered in this planning effort, as present irrigation practices likely already incorporate many BMPs to extend water supplies, thus no additional conservation would be feasible. The use of reuse water from nearby municipalities is not considered feasible as it would not be effective to deliver reuse water to farm irrigation systems. Groundwater was identified as a potential source of water for irrigation in Red River County. However, due to limited availability, the Blossom, Nacatoch and Trinity aquifers will not cover all shortages. For this reason, groundwater development may not be a feasible strategy alone. Treated surface water purchased from Lamar County WSD was considered as a viable supplement to the additional groundwater in order to meet projected demands. Purchasing sufficient treated surface water from Lamar County WSD to meet the entirety of the need was also considered as possible strategy. Purchasing raw water from the City of Paris has also been considered as a possible strategy, with a higher capital cost but an anticipated lower annual cost. The City's surface water permit for Pat Mayse Reservoir, as amended, allows for the interbasin transfer and use of water in both the Red and Sulphur River basins. However, the use of water via this permit would require a minor amendment to add irrigation as a permitted use.

Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Env. Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Blossom Aquifer, Red Basin)	**350**	**$219,000**	**$196,000**	**$560**	**1**
Drill New Wells (Nacatoch Aquifer, Red Basin)	**50**	**$92,000**	**$34,000**	**$680**	**1**
Drill New Wells (Nacatoch Aquifer, Sulphur Basin)	**210**	**$364,000**	**$141,000**	**$671**	**1**
Drill New Wells (Nacatoch Aquifer, Sulphur Basin)	**2,057**	**$2,293,000**	**$1,240,000**	**$603**	**1**
Drill New Wells (Trinity Aquifer, Red Basin)	**240**	**$251,000**	**$144,000**	**$600**	**1**
Drill New Wells (Trinity Aquifer, Sulphur Basin)	**185**	**$251,000**	**$117,000**	**$632**	**1**
Drill New Wells (Woodbine Aquifer, Red Basin)	**1,106**	**$1,227,000**	**$668,000**	**$604**	**1**

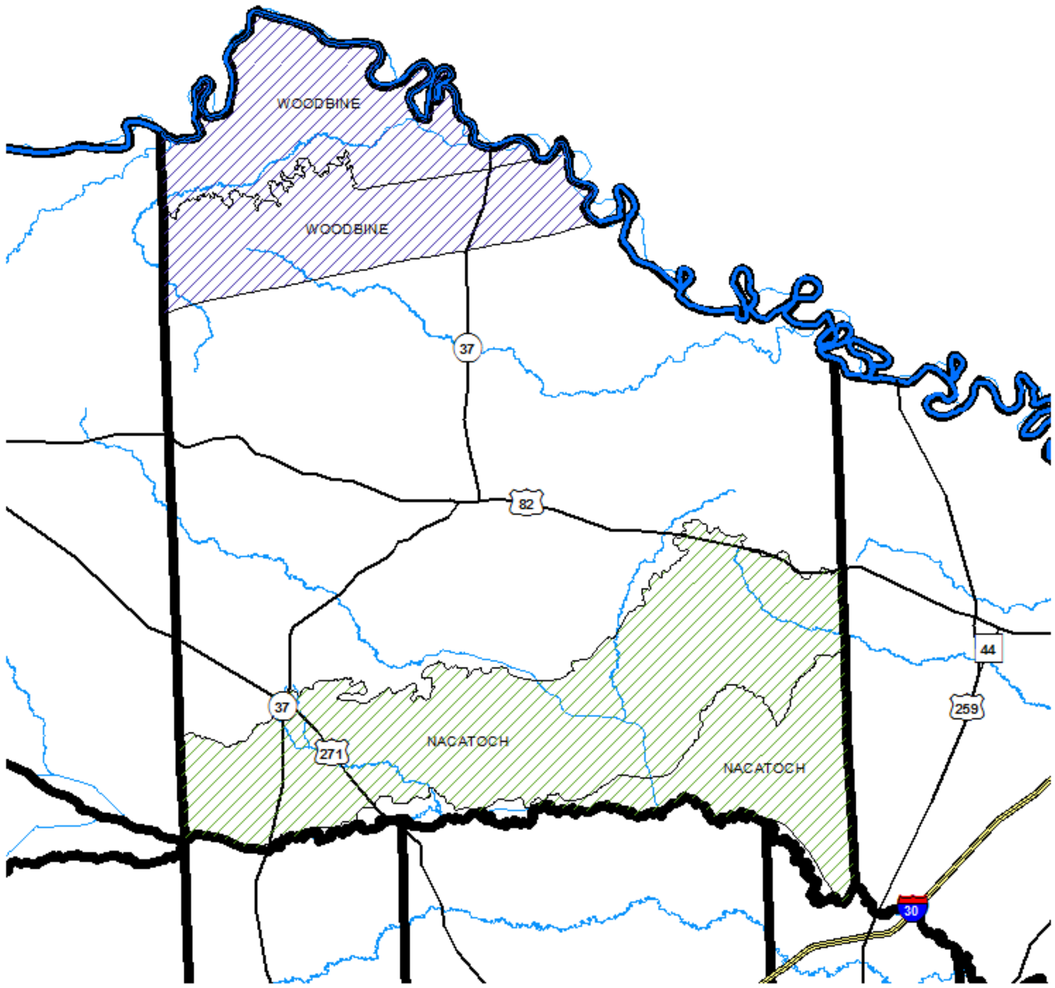
Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Env. Impact
Pat Mayse Treated Water Pipeline from Lamar County WSD (Red Basin)	**466**	**$6,111,000**	**$1,332,000**	**$2,858**	**1**
Pat Mayse Treated Water Pipeline from Lamar County WSD (Sulphur)	**2,665**	**$9,361,000**	**$5,363,000**	**$2,012**	**1**
Pat Mayse Treated Water Pipeline from Lamar County WSD (Red Basin)	**1,106**	**$12,908,000**	**$3,222,000**	**$2,913**	**1**
Pat Mayse Treated Water Pipeline from Lamar County WSD (Sulphur)	**3,270**	**$15,695,000**	**$7,108,000**	**$2,174**	**1**
Pat Mayse Raw Water Pipeline from Paris (Red Basin)	**1,106**	**$21,718,000**	**$2,638,000**	**$2,385**	**1**
Pat Mayse Raw Water Pipeline from Paris (Sulphur)	**3,270**	**$33,448,000**	**$4,527,000**	**$1,384**	**1**
Pat Mayse Raw Water Pipeline from Paris (Red Basin)	**466**	**$21,718,000**	**$2,492,000**	**$2,253**	**1**
Pat Mayse Raw Water Pipeline from Paris (Sulphur)	**2,665**	**$33,448,000**	**$4,389,000**	**$1,342**	**1**

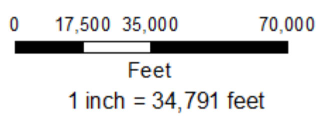
Alternative Strategy:

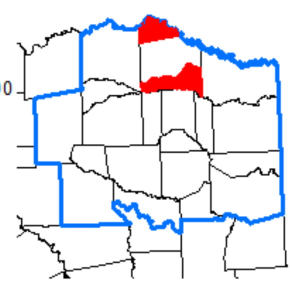
	2020	2030	2040	2050	2060	2070
Drill New Wells (Woodbine Aquifer, Red Basin) (ac-ft/yr)	**1,106**	**1,106**	**1,106**	**1,106**	**1,106**	**1,106**
Drill New Wells (Nacatoch Aquifer, Sulphur Basin) (ac-ft/yr)	**2,057**	**2,057**	**2,057**	**2,057**	**2,057**	**2,057**
Unmet Needs	**1,213**	**1,150**	**1,097**	**1,045**	**992**	**962**

The identified alternative water management strategy for the Red River County Irrigation WUG to meet projected demands during the planning period to drill new wells in the Woodbine Aquifer, Red Basin and the Nacatoch Aquifer, Sulphur Basin. The Woodbine Aquifer in the Red Basin is estimated to produce 161 ac-ft/yr (100 gpm), thus 7 wells approximately 600 feet deep are needed to meet the projected need of 1,106 ac-ft/year for a total capital cost of $1.2 million, annual cost of $0.7 million and annual unit cost of $604 per ac-ft.. The Nacatoch Aquifer in the Sulphur Basin is estimated to produce 121 ac-ft/yr (75 gpm), it is assumed that only 17 wells approximately 500 feet deep would be possible for a supply of approximately 2,057 ac-ft/yr for a total capital cost of $2.3 million, annual cost of $1.2 million and annual unit cost of $603 per ac-ft.

Even when exceeding the MAG, the best available information suggests inadequate groundwater supplies to meet the entirety of the projected demands for Red River County Irrigation over the planning period. The remaining needs are unmet due to brackish groundwater supplies, and utilization of available surface water supplies do not appear to be cost effective solutions.







Attachment A

Red River County Irrigation
Alternative Strategy
Drill New Wells

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Irrigation - Red River - Red - Woodbine

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
Well Fields (Wells, Pumps, and Piping)	$878,000
TOTAL COST OF FACILITIES	**$878,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$307,000
Interest During Construction (4% for 1 years with a 1% ROI)	$42,000
TOTAL COST OF PROJECT	**$1,227,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$103,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$9,000
Pumping Energy Costs (35770 kW-hr @ 0.09 $/kW-hr)	$3,000
Purchase of Water (1106 acft/yr @ 500 $/acft)	$553,000
TOTAL ANNUAL COST	**$668,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	1,106
Annual Cost of Water ($ per acft)	$604
Annual Cost of Water ($ per 1,000 gallons)	$1.85

JMP *4/6/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Irrigation - Red River - Sulphur - Nacatoch

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$1,641,000
TOTAL COST OF FACILITIES	**$1,641,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$574,000
Interest During Construction (4% for 1 years with a 1% ROI)	$78,000
TOTAL COST OF PROJECT	**$2,293,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$192,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$16,000
Pumping Energy Costs (35770 kW-hr @ 0.09 $/kW-hr)	$3,000
Purchase of Water (2057 acft/yr @ 500 $/acft)	$1,029,000
TOTAL ANNUAL COST	**$1,240,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	2,057
Annual Cost of Water ($ per acft)	$603
Annual Cost of Water ($ per 1,000 gallons)	$1.85

JMP *4/6/2015*

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REGION D
EVALUATIONS OF ALTERNATIVE WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

SMITH COUNTY

WUGs:

None

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REGION D
EVALUATIONS OF ALTERNATIVE WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

TITUS COUNTY

WUGs:

Titus County Manufacturing

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EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF MANUFACTURING IN TITUS COUNTY

Description of Water User Group:

Manufacturing in Titus County has a demand that is projected to increase from 8,995 ac-ft/yr in 2020 to 11,256 ac-ft/yr in 2070. Manufacturing in Titus County is currently supplied by groundwater from the Carrizo-Wilcox Aquifer, direct reuse, and surface water from Tankersley and Bob Sandlin purchased from the City of Mount Pleasant. A deficit of 3,603 ac-ft/yr is projected to occur in 2020 and increase to 5,440 ac-ft/yr by 2070.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Projected Water Demand	8,995	9,315	9,615	9,864	10,537	11,256
Current Water Supply	5,392	5,596	5,782	5,806	5,804	5,816
Projected Supply Surplus (+)/Deficit(-)	**-3,603**	**-3,719**	**-3,833**	**-4,058**	**-4,733**	**-5,440**

Evaluation of Potentially Feasible Water Management Strategies:

Six alternative strategies were considered to meet the Titus County Manufacturing WUG's water supply shortages. Advanced water conservation for manufacturing was considered in this planning effort to reduce overall demands; however, it does not resolve all identified needs. The use of reuse water from nearby municipalities was not considered in this planning period beyond those amounts currently reported by manufacturing entities in the county. Groundwater has been identified as a potential source of water for manufacturing in Titus County; however, manufacturing needs exceed the availability of groundwater in the basin based on the modeled available groundwater estimates. Surface water was considered as a potential alternative to meet projected demands, both individually, and in conjunction with drilling new wells.

Three strategies were recommended to meet the projected demands: Advanced water conservation, construction of one additional well in the Queen City Aquifer, and increasing the existing contract with the City of Mount Pleasant for supply from Lake Bob Sandlin.

Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation	**1,126**	**$0**	**$0**	**$0**	**1**
Water Reuse					
Drill New Wells (Queen City Aquifer, Cypress Basin)	**45**	**$113,000**	**$37,000**	**$822**	**1**
Drill New Wells (Carrizo-Wilcox Aquifer, Cypress Basin)	**500**	**$571,000**	**$310,000**	**$620**	**1**
Increase Existing Contract	**4,269**	**$0**	**$3,338,000**	**$782**	**1**
Increase Existing Contract	**5,395**	**$0**	**$4,219,000**	**$782**	**1**

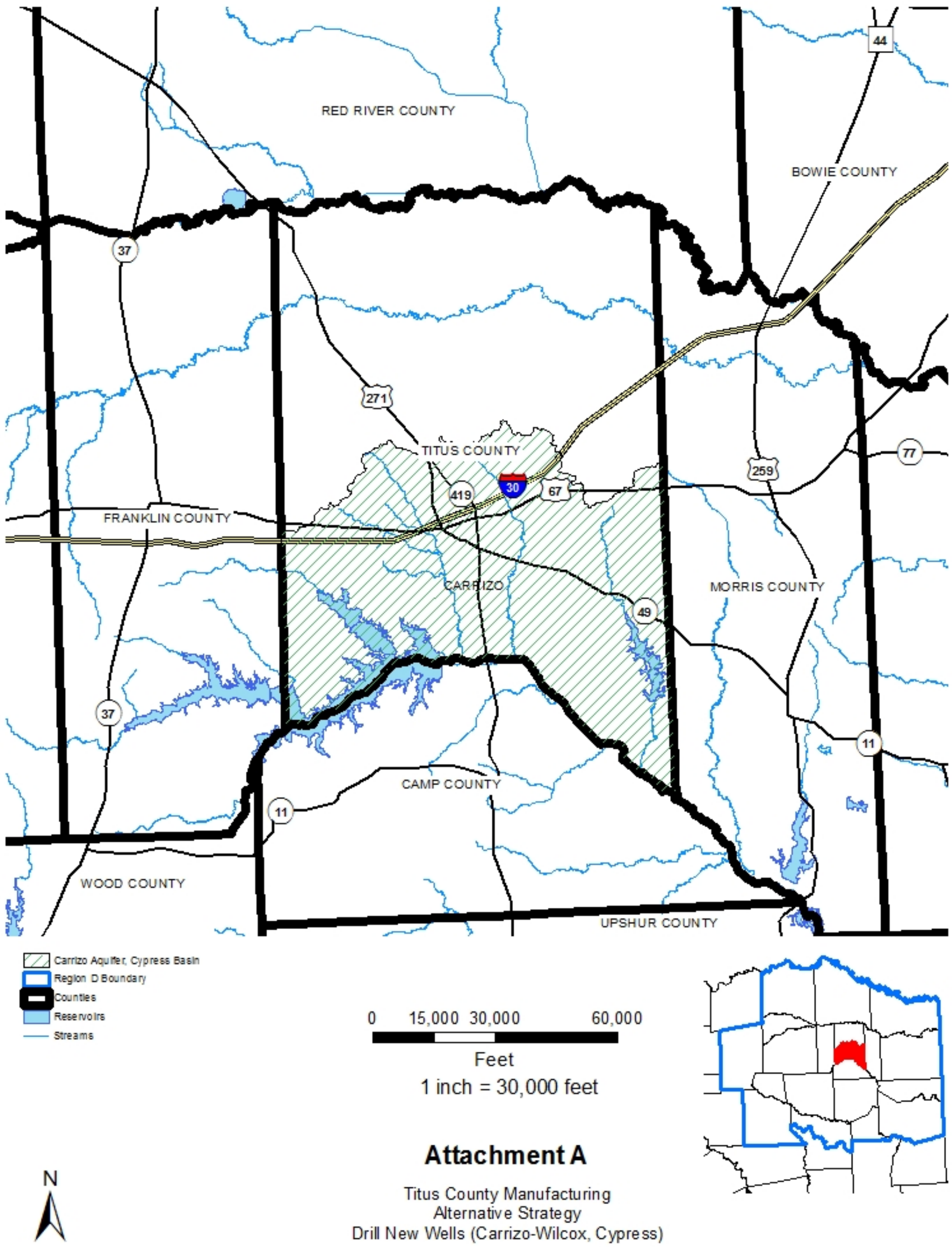
Alternate Strategies:

	2020	2030	2040	2050	2060	2070
Drill New Wells (Carrizo-Wilcox, Cypress) (ac-ft/yr)	**500**	**500**	**500**	**500**	**500**	**500**
Increase Existing Contract (Mount Pleasant) (ac-ft/yr)	**2,658**	**2,742**	**2,826**	**3,027**	**3,634**	**4,269**

Two Alternative Water Management Strategies have been identified. The first is the development of an amount greater than the MAG from groundwater supplies in the Carrizo-Wilcox Aquifer to supplement existing supplies. This alternative strategy would include construction of five additional water wells by 2020. The alternate supply source will be the Carrizo-Wilcox Aquifer in Titus County, in the Cypress Basin. Five wells with rated capacity of 75 gpm would provide approximately 500 ac-ft/yr. The projected supply exceeds the established MAG for the Carrizo-Wilcox Aquifer in Titus County in the Cypress Basin, and alone does not meet the entirety of projected needs for the Titus County Manufacturing WUG.

Thus, the second Alternative Water Management Strategy to be performed in conjunction with the aforementioned development of wells would be to increase the amount of raw water purchased from the City of Mount Pleasant from available supply in Bob Sandlin Reservoir by up to 4,269 ac-ft/yr in 2070.

These two alternative strategies would together provide sufficient supply to meet the projected needs for Titus County Manufacturing, contingent upon implementation of the recommended strategy of Advanced Water Conservation for the WUG.



Attachment A

Titus County Manufacturing
Alternative Strategy
Drill New Wells (Carrizo-Wilcox, Cypress)

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Manufacturing – Drill New Wells (Titus - Cypress - Carrizo Wilcox)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$408,000
TOTAL COST OF FACILITIES	**$408,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$143,000
Interest During Construction (4% for 1 years with a 1% ROI)	$20,000
TOTAL COST OF PROJECT	**$571,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$48,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$4,000
Pumping Energy Costs (83747 kW-hr @ 0.09 $/kW-hr)	$8,000
Purchase of Water (500 acft/yr @ 500 $/acft)	$250,000
TOTAL ANNUAL COST	**$310,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	500
Annual Cost of Water ($ per acft)	$620
Annual Cost of Water ($ per 1,000 gallons)	$1.90
KVA	*2/17/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices

Titus County Manufacturing – Increase Existing Contract

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
ANNUAL COST	
Operation and Maintenance	
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (4269 acft/yr @ 782 $/acft)	$3,338,000
TOTAL ANNUAL COST	**$3,338,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	4,269
Annual Cost of Water ($ per acft)	$782
Annual Cost of Water ($ per 1,000 gallons)	$2.40
JMP	*3/31/2015*

REGION D
EVALUATIONS OF ALTERNATIVE WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

UPSHUR COUNTY

WUGs:

None

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REGION D
EVALUATIONS OF ALTERNATIVE WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

VAN ZANDT COUNTY

WUGs:

City of Canton

R-P-M WSC

Van Zandt County Irrigation

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EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF CITY OF CANTON

Description of Water User Group:

The City of Canton provides water service in Van Zandt County. The city's population is projected to be 3,963 by 2020 and increasing to 5,329 by 2070. The City of Canton utilizes groundwater from the Carrizo-Wilcox aquifer, and surface water from Mill Creek Reservoir and a run of river water right for water supplies. The City of Canton is not projected to have a shortage during the planning period.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Population	3,963	4,333	4,616	4,897	5,130	5,329
Projected Water Demand	961	1,032	1,085	1,143	1,196	1,242
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	1,544	1,544	1,544	1,544	1,544	1,544
Projected Supply Surplus (+) / Deficit (-)	**583**	**512**	**459**	**401**	**327**	**281**

Projected Supply Surplus (+) / Deficit (-) by Basin	2020	2030	2040	2050	2060	2070
Sabine	583	512	459	401	327	281
Trinity	0	0	0	0	0	0
Total	**583**	**512**	**459**	**401**	**327**	**281**

Evaluation of Potentially Feasible Water Management Strategies:

In 2008, the Canton City council authorized the appropriation of $70,000 to prepare a long-term water plan. The project evaluated four (4) reservoir sites in Van Zandt County. Two of the four proved to be feasible from a technical standpoint. The City spent an additional $30,000 in 2009 and 2010 to address questions and provide additional information requested by the committee members. In addition to these two long-term strategies, two additional water wells were included to satisfy short-term needs. These two additional wells have been completed. Additional groundwater supply is a potentially feasible strategy. Water reuse is a potentially feasible water supply strategy, as the City currently has a water rights application pending at the Texas Commission on Environmental Quality for the authorization of indirect reuse. At the request of the City of Canton, the construction of an additional water well by 2020 was identified as a feasible strategy because the City of Canton is planning on developing additional groundwater supply to supplement existing supplies. Also at the request of the City, a potential new reservoir on Grand Saline Creek was also considered as a feasible strategy for the City.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Indirect/Direct Reuse	**256**	**$6,234,000**	**$604,000**	**$2,359**	**1**
Drill New Well (Carrizo-Wilcox, Sabine Basin)	**100**	**$863,000**	**$154,000**	**$1,540**	**1**
New Reservoir on Grand Saline Creek	**1,810**	**$45,373,000**	**$5,588,000**	**$3,087**	**5**

New Reservoir on Grand Saline Creek – The City has identified a feasible strategy to meet future water supply needs as being the construction of a new 1,845 acre (24,980 ac-ft) reservoir on Grand Saline Creek, a tributary of Sabine River. This reservoir project was originally described in a 2008 report from Gary Burton Engineering, Inc. to the City of Canton, entitled *Long-Term Water Study Surface Water Supply.*

The 2008 report identified the project site, reservoir surface area, drainage area, and estimated construction costs for the reservoir, intake structure, transmission pipeline and water treatment plant expansion.

The construction costs associated with the new reservoir, raw water transmission line, and water treatment plant expansion are based on calculations from the UCM. For the 2016 planning process, the reservoir has been modeled in the Sabine River WAM (Run 3), subject to SB 3 environmental flow criteria at a junior priority date, and modeled considering the full demand of existing water rights in the Sabine River Basin. The results of this WAM analysis indicate the project has a firm yield of 1,810 ac-ft per year. The project is estimated to yield 1.810 ac-ft/yr of supply by constructing a new 24,980 ac-ft reservoir and 14" pipeline to Canton's WTP and expanding the WTP, for a total project cost of $45.4 million with an annual cost of $5.6 million and a unit cost for the additional supply of $3,087 per ac-ft. with debt service and $1,264 per ac-ft without debt service.

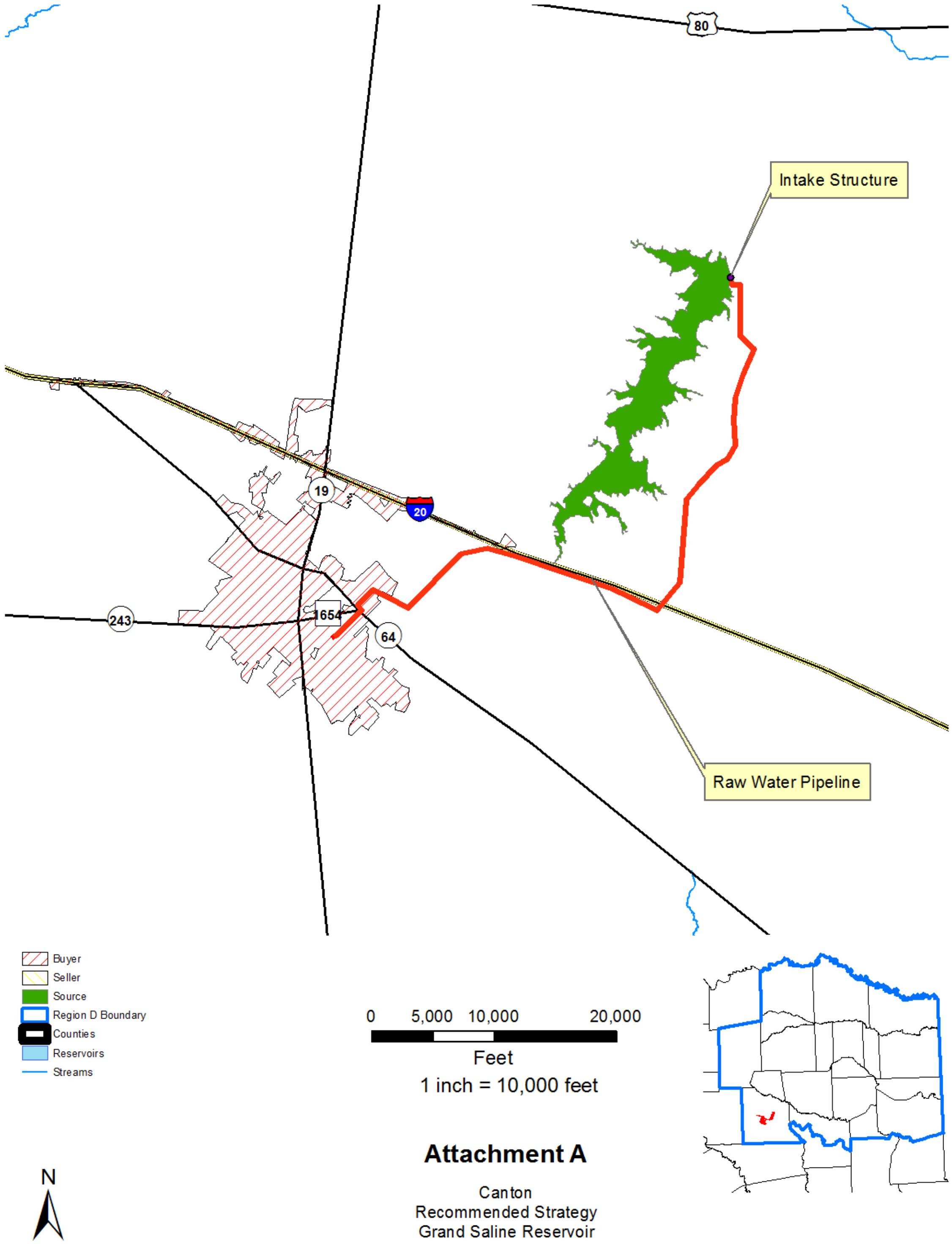
Alternative:

	2020	2030	2040	2050	2060	2070
New Reservoir on Grand Saline Creek (ac-ft/yr)	3,470	3,470	3,470	3,470	3,470	3,470

Because of substantial disagreement over future population and water demands, the City has requested the following alternate strategy:

> The strategy to meet future needs "is with surface water from a proposed reservoir on Grand Saline Creek. The City of Canton has provided to NETRWPG resolutions from three other cities in Van Zandt County supporting the reservoir project. This show of support indicates that a regional surface water reservoir could possibly replace the groundwater strategies for other Van Zandt County public water supplies with projected deficits. However, due to the time typically required to obtain the necessary permits to impound surface water, the City plans to construct one or two additional wells, or implement a reuse option in the interim to meet increasing demands due to population growth and the First Monday influence." This alternative wording should be considered consistent with this plan in the event that population growth in the potential service area significantly exceeds current NETRWPG projections.

This alternative strategy for the City of Canton is to construct by 2020 a new 1,845 acre (24,980 ac-ft) reservoir on Grand Saline Creek, a tributary of Sabine River, construct a 14" pipeline from the new reservoir's intake to Canton's WTP and expanding the WTP. The project is estimated to yield 1,810 ac-ft/yr of supply.



Attachment A

Canton
Recommended Strategy
Grand Saline Reservoir

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Canton - New Reservoir on Grand Saline

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Dam and Reservoir (Conservation Pool 24982 acft, 1845 acres)	$9,162,000
Intake Pump Stations (0 MGD)	$3,995,000
Transmission Pipeline (0 in dia., 12 miles)	$5,061,000
Water Treatment Plant (2.2 MGD)	$6,672,000
TOTAL COST OF FACILITIES	**$24,890,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$8,458,000
Environmental & Archaeology Studies and Mitigation	$5,325,000
Land Acquisition and Surveying (1866 acres)	$5,165,000
Interest During Construction (4% for 1 years with a 1% ROI)	$1,535,000
TOTAL COST OF PROJECT	**$45,373,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$1,850,000
Reservoir Debt Service (5.5 percent, 40 years)	$1,450,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (4.87% of Cost of Facilities)	$441,000
Dam and Reservoir (4.87% of Cost of Facilities)	$446,000
Water Treatment Plant (4.87% of Cost of Facilities)	$1,340,000
Pumping Energy Costs (674623 kW-hr @ 0.09 $/kW-hr)	$61,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$5,588,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	1,810
Annual Cost of Water ($ per acft)	$3,087
Annual Cost of Water ($ per 1,000 gallons)	$9.47

Note: One or more cost element has been calculated externally

TLS *9/22/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF RPM WATER SUPPLY CORPORATION IN VAN ZANDT COUNTY

Description of Water User Group:

R-P-M WSC provides water service in Van Zandt, Henderson and Smith Counties. The WUG population is projected to be 3,298 by 2020 and increases to 6,168 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 16 ac-ft/yr in 2020 and increasing to a deficit of 283 ac-ft/yr by 2070; the shortage projected to occur in Van Zandt County is 12 ac-ft/yr in 2020 increasing to 197 ac-ft/yr by 2070. The shortage in Henderson County is 3 ac-ft/yr in 2020, increasing to 63 ac-ft/yr in 2070. Shortages in Smith County range from 1 ac-ft/yr in 2020 up to 23 ac-ft/yr in 2070.

Water Supply and Demand Analysis:

RPM WSC	2020	2030	2040	2050	2060	2070
Population	3,298	4,017	4,585	5,190	5,705	6,168
Projected Water Demand	360	423	473	530	582	627
Water Demand from other entities	0	0	0	0	0	0
Current Water Supply	344	344	344	344	344	344
Projected Supply Surplus (+) / Deficit (-)	**-16**	**-79**	**-129**	**-186**	**-238**	**-283**

Projected Supply Surplus (+) / Deficit (-) by County	2020	2030	2040	2050	2060	2070
Van Zandt	-12	-56	-93	-132	-167	-197
Henderson	-3	-17	-26	-39	-52	-63
Smith	-1	-6	-10	-15	-19	-23
Total	**-16**	**-79**	**-129**	**-186**	**-238**	**-283**

Evaluation of Potentially Feasible Water Management Strategies:

Three 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. However, the Region I RWPG did identify demand reduction as a feasible strategy. 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 source of additional water for R-P-M WSC.

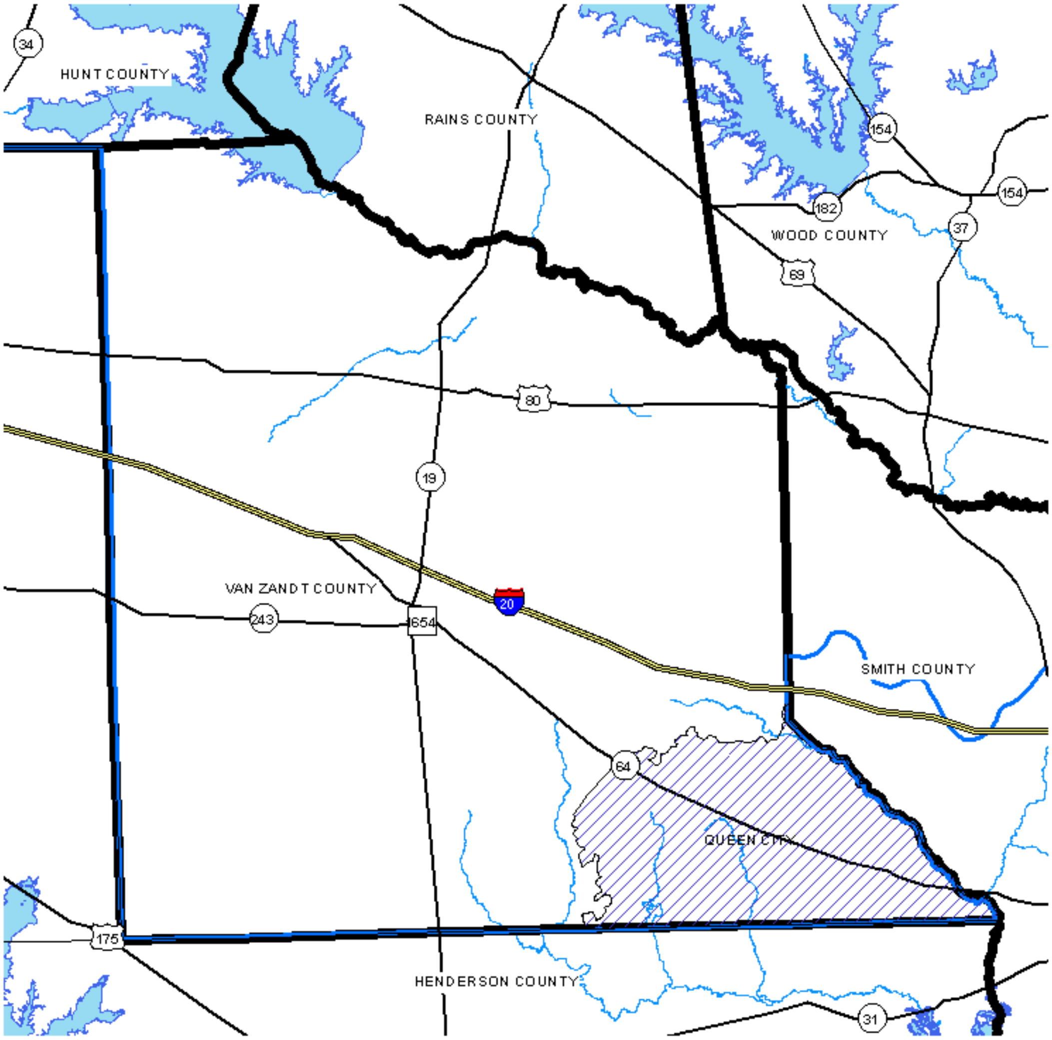
The recommended strategy was for the development of additional groundwater supplies through the construction of wells in the Carrizo-Wilcox Aquifer in Van Zandt County in the Neches River Basin. The ETRWPG (Region I) has recommended demand reduction through enhanced public and school education for R-P-M WSC as well.

Strategy	Firm Yield (ac-ft)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Demand Reduction	**23**	**$0**	**$0**	**$0**	**1**
Water Reuse					
Drill New Wells (Carrizo-Wilcox Aquifer, Neches Basin)	**285**	**$3,836,000**	**$184,000**	**$646**	**1**
Drill New Wells (Queen City Aquifer, Neches Basin)	**285**	**$1,545,000**	**$240,000**	**$842**	**1**

Alternative Strategy:

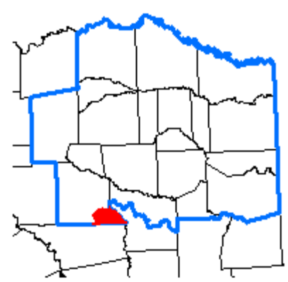
	2020	2030	2040	2050	2060	2070
Drill New Wells (Queen City, Neches Basin; ac-ft/yr)	75	150	150	225	285	285

The identified Alternative Water Management Strategy for RPM WSC to meet their projected deficit of 16 ac-ft/yr in 2020 and 283 ac-ft/yr in 2070 would be to construct five additional water wells similar to their existing wells just prior to each decade as the deficits occur. The alternative supply source will be the Queen City Aquifer in the Neches Basin in Van Zandt County. Five wells with rated capacity of 75gpm, pumping at an approximate depth of 60 ft., would provide approximately 75 acre-feet each. The Carrizo-Wilcox Aquifer is projected to have sufficient supply availability to meet the needs of RPM WSC for the planning period.



Queen City Aquifer, Neches Basin
Region D Boundary
Counties
Reservoirs
Streams

0 15,000 30,000 60,000
Feet
1 inch = 30,000 feet



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Attachment A

RPM WSC
Alternate Strategy
Drill New Wells

Cost Estimate Summary
Water Supply Project Option
41518 Prices
RPM WSC – Drill New Wells (Van Zandt - Neches - Queen City)

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$528,000
Water Treatment Plant (0.4 MGD)	$35,000
TOTAL COST OF FACILITIES	**$563,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$197,000
Environmental & Archaeology Studies and Mitigation	$36,000
Interest During Construction (4% for 1 years with a 1% ROI)	$28,000
TOTAL COST OF PROJECT	**$824,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$69,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$5,000
Water Treatment Plant (2.5% of Cost of Facilities)	$21,000
Pumping Energy Costs (25082 kW-hr @ 0.09 $/kW-hr)	$2,000
Purchase of Water (285 acft/yr @ 500 $/acft)	$143,000
TOTAL ANNUAL COST	**$240,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	285
Annual Cost of Water ($ per acft)	$842
Annual Cost of Water ($ per 1,000 gallons)	$2.58
KVA	*3/13/2015*

EVALUATION OF WATER MANAGEMENT STRATEGIES FOR MEETING THE PROJECTED WATER SUPPLY NEEDS OF IRRIGATION IN VAN ZANDT COUNTY

Description of Water User Group:

The Irrigation WUG in Van Zandt County has a demand that is projected to remain constant at 437 ac-ft/yr for the planning period. The Irrigation WUG in Van Zandt County is currently supplied by groundwater from the Carrizo-Wilcox Aquifer and run-of-river diversions on the Sabine River. A deficit of 330 ac-ft/yr is projected to occur in throughout the planning period.

Water Supply and Demand Analysis:

	2020	2030	2040	2050	2060	2070
Projected Water Demand	437	437	437	437	437	437
Current Water Supply	107	107	107	107	107	107
Projected Supply Surplus (+)/Deficit(-)	**-330**	**-330**	**-330**	**-330**	**-330**	**-330**

Evaluation of Potentially Feasible Water Management Strategies:

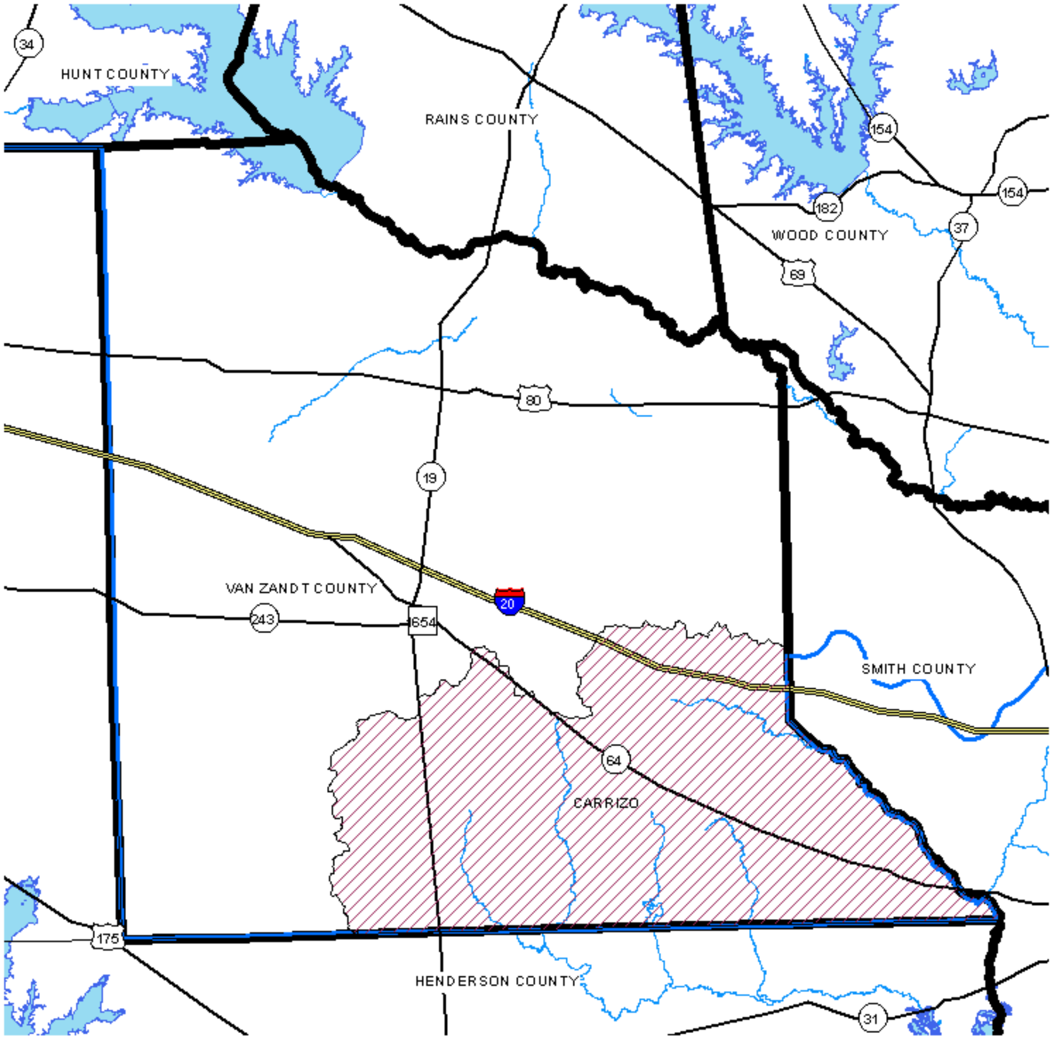
Three alternative strategies were considered to meet the Van Zandt County Irrigation WUG's water supply shortages. Advanced water conservation for irrigation practices were not considered in this planning effort for irrigation. The use of reuse water from nearby municipalities is not considered feasible as it would not be effective to deliver reuse water to farm irrigation systems. Groundwater from the Carrizo-Wilcox and Queen City aquifers has been identified as a potential source of water for irrigation in Van Zandt. Surface water was not considered as a potential alternative to meet projected demands due to cost efficiency.

The recommended strategy was the construction of new wells in the Queen City Aquifer in the Neches Basin in Van Zandt County.

Strategy	Firm Yield (AF)	Total Capital Cost	Total Annualized Cost	Unit Cost	Environmental Impact
Advanced Water Conservation					
Water Reuse					
Drill New Wells (Carrizo-Wilcox Aquifer, Neches Basin)	**330**	**$376,000**	**$211,000**	**$639**	**1**
Drill New Wells (Queen City Aquifer, Neches Basin)	**330**	**$227,000**	**$188,000**	**$570**	**1**

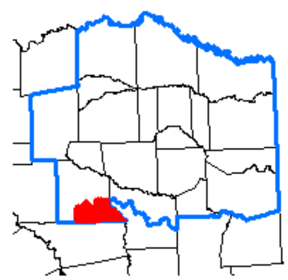
Alternative:

The alternate strategy for Irrigation in Van Zandt County is to construct by 2020 an additional three water wells similar to existing wells in the area. The recommended supply source will be the Carrizo-Wilcox Aquifer in the Neches River Basin in Van Zandt County. Three wells with rated capacity of 75 gpm would provide approximately 330 ac-ft/yr. The Carrizo-Wilcox Aquifer in Van Zandt County is projected to have sufficient supply availability to provide this supply for the planning period.



Carrizo Aquifer, Neches Basin
Region D Boundary
Counties
Reservoirs
Streams

0 15,000 30,000 60,000
Feet
1 inch = 30,000 feet



Attachment A

Van Zandt County Irrigaiton
Alternative Strategy
Drill New Wells

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Cost Estimate Summary
Water Supply Project Option
41518 Prices

Irrigation – Drill New Wells (Van Zandt - Neches - Carrizo Wilcox)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Well Fields (Wells, Pumps, and Piping)	$269,000
TOTAL COST OF FACILITIES	**$269,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$94,000
Interest During Construction (4% for 1 years with a 1% ROI)	$13,000
TOTAL COST OF PROJECT	**$376,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$32,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$3,000
Pumping Energy Costs (117104 kW-hr @ 0.09 $/kW-hr)	$11,000
Purchase of Water (330 acft/yr @ 500 $/acft)	$165,000
TOTAL ANNUAL COST	**$211,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	330
Annual Cost of Water ($ per acft)	$639
Annual Cost of Water ($ per 1,000 gallons)	$1.96

KVA *2/17/2015*

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REGION D
EVALUATIONS OF ALTERNATIVE WATER MANAGEMENT STRATEGIES
FOR MEETING PROJECTED WATER SUPPLY NEEDS
TO YEAR 2070

WOOD COUNTY

WUGs:

None

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Supply Source		County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Year						Strategy	Contingency	Seller (if applicable)	County	Basin	Reliability of Source
Groundwater	Surface Water			2020	2030	2040	2050	2060	2070						
BLOSSOM AQUIFER		LAMAR	MANUFACTURING LAMAR	0	0	0	0	0	120	DRILL NEW WELLS			LAMAR	RED	HIGH
BLOSSOM AQUIFER		RED RIVER	CLARKSVILLE	0	0	371	371	371	371	BLEND GROUNDWATER WITH SURFACE WATER	CONTRACT FOR ADDITIONAL SURFACE WATER		RED RIVER		HIGH
CARRIZO-WILCOX AQUIFER		BOWIE	IRRIGATION BOWIE	3,700	3,700	3,638	3,483	3,338	3,276	DRILL NEW WELLS			BOWIE	SULPHUR	HIGH
CARRIZO-WILCOX AQUIFER		CASS	MANUFACTURING CASS	151	151	151	151	151	151	DRILL NEW WELLS			CASS	CYPRESS	HIGH
CARRIZO-WILCOX AQUIFER		CASS	MANUFACTURING CASS	11,508	12,123	12,711	13,219	14,116	15,073	ADVANCED WATER CONSERVATION			CASS	CYPRESS	HIGH
CARRIZO-WILCOX AQUIFER		VAN ZANDT	CANTON	100	100	100	100	100	100	DRILL NEW WELLS			VAN ZANDT	SABINE	HIGH
CARRIZO-WILCOX AQUIFER		VAN ZANDT	MANUFACTURING VAN ZANDT	194	194	194	290	290	290	DRILL NEW WELLS			VAN ZANDT	NECHES	HIGH
CARRIZO-WILCOX AQUIFER		VAN ZANDT	R-P-M WSC	75	150	150	225	285	285	DRILL NEW WELLS			VAN ZANDT	NECHES	HIGH
CARRIZO-WILCOX AQUIFER		GREGG	MINING GREGG	54	54	54	54	54	54	DRILL NEW WELLS			GREGG	CYPRESS	HIGH
CARRIZO-WILCOX AQUIFER		GREGG	MINING GREGG	226	339	339	339	339	339	DRILL NEW WELLS			GREGG	SABINE	HIGH
CARRIZO-WILCOX AQUIFER		HARRISON	IRRIGATION HARRISON	236	236	236	236	236	236	DRILL NEW WELLS			HARRISON	CYPRESS	HIGH
CARRIZO-WILCOX AQUIFER		HARRISON	IRRIGATION HARRISON	54	54	54	54	54	54	DRILL NEW WELLS			HARRISON	SABINE	HIGH
CARRIZO-WILCOX AQUIFER		HARRISON	MINING HARRISON	324	324	324	324	108	0	DRILL NEW WELLS			HARRISON	CYPRESS	HIGH
CARRIZO-WILCOX AQUIFER		HARRISON	MINING HARRISON	1,398	1,398	1,398	1,398	1,398	1,398	DRILL NEW WELLS			HARRISON	SABINE	HIGH
CARRIZO-WILCOX AQUIFER		HARRISON	WASKOM	46	46	46	92	138	184	DRILL NEW WELLS			HARRISON	CYPRESS	HIGH
CARRIZO-WILCOX AQUIFER		HOPKINS	IRRIGATION HOPKINS	210	210	210	210	210	210	DRILL NEW WELLS			HOPKINS	CYPRESS	HIGH
CARRIZO-WILCOX AQUIFER		HOPKINS	IRRIGATION HOPKINS	610	610	610	610	610	610	DRILL NEW WELLS			HOPKINS	SABINE	HIGH
CARRIZO-WILCOX AQUIFER		HOPKINS	MARTIN SPRINGS WSC	0	0	0	0	60	120	DRILL NEW WELLS			HOPKINS	SABINE	HIGH
NACATOCH AQUIFER		BOWIE	IRRIGATION BOWIE	1,540	1,525	1,441	1,193	1,000	1,000	DRILL NEW WELLS			BOWIE	RED	HIGH
NACATOCH AQUIFER		BOWIE	IRRIGATION BOWIE	0	15	0	0	0	0	VOLUNTARY REALLOCATION BOWIE COUNTY OTHER TO IRRIGATION			BOWIE		HIGH
NACATOCH AQUIFER		HOPKINS	CUMBY	0	79	78	76	75	73	DRILL NEW WELLS			HOPKINS	SABINE	HIGH
NACATOCH AQUIFER		HOPKINS	CUMBY	0	1	2	4	5	7	DRILL NEW WELLS			HOPKINS	SULPHUR	HIGH
NACATOCH AQUIFER		HUNT	COUNTY-OTHER HUNT	0	600	1,200	1,800	2,385	2,387	DRILL NEW WELLS			HUNT	SABINE	HIGH
NACATOCH AQUIFER		HUNT	IRRIGATION HUNT	150	150	150	150	146	146	DRILL NEW WELLS			HUNT	SABINE	HIGH
NACATOCH AQUIFER		HUNT	MINING HUNT	75	75	75	75	7	0	DRILL NEW WELLS			HUNT	SABINE	HIGH
QUEEN CITY AQUIFER		CAMP	BI COUNTY WSC	0	0	0	0	161	269	DRILL NEW WELLS			CAMP	CYPRESS	HIGH
QUEEN CITY AQUIFER		UPSHUR	BI COUNTY WSC	0	0	0	0	54	54	DRILL NEW WELLS			UPSHUR	CYPRESS	HIGH
QUEEN CITY AQUIFER		MARION	MINING MARION	432	648	648	648	648	648	DRILL NEW WELLS			MARION	CYPRESS	HIGH
QUEEN CITY AQUIFER		SMITH	CRYSTAL SYSTEMS INC	644	644	966	1,610	1,610	1,936	DRILL NEW WELLS			SMITH	SABINE	HIGH
QUEEN CITY AQUIFER		SMITH	HIDEAWAY	0	0	0	0	0	117	INCREASE EXISTING CONTRACT	CRYSTAL SYSTEMS INC DRILL NEW WELLS	CRYSTAL SYSTEMS INC	SMITH	SABINE	HIGH
QUEEN CITY AQUIFER		SMITH	LINDALE	966	1,288	1,610	1,932	2,576	2,898	DRILL NEW WELLS			SMITH	SABINE	HIGH

Supply Source		County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Year						Strategy	Contingency	Seller (if applicable)	County	Basin	Reliability of Source
Groundwater	Surface Water			2020	2030	2040	2050	2060	2070						
QUEEN CITY AQUIFER		SMITH	MINING SMITH	0	0	0	0	108	108	DRILL NEW WELLS			SMITH	SABINE	HIGH
QUEEN CITY AQUIFER		SMITH	WINONA	0	0	0	108	108	108	DRILL NEW WELLS			SMITH	SABINE	HIGH
QUEEN CITY AQUIFER		TITUS	MANUFACTURING TITUS	45	45	45	45	45	45	DRILL NEW WELLS			TITUS	CYPRESS	HIGH
QUEEN CITY AQUIFER		UPSHUR	GILMER	0	269	269	269	269	269	DRILL NEW WELLS			UPSHUR	CYPRESS	HIGH
QUEEN CITY AQUIFER		UPSHUR	MANUFACTURING UPSHUR	324	324	324	324	430	430	DRILL NEW WELLS			UPSHUR	CYPRESS	HIGH
QUEEN CITY AQUIFER		UPSHUR	MINING UPSHUR	430	860	860	860	860	860	DRILL NEW WELLS			UPSHUR	CYPRESS /SABINE	HIGH
QUEEN CITY AQUIFER		VAN ZANDT	IRRIGATION VAN ZANDT	330	330	330	330	330	330	DRILL NEW WELLS			VAN ZANDT	NECHES	HIGH
TRINITY AQUIFER		HUNT	HICKORY CREEK SUD	0	0	0	189	378	463	DRILL NEW WELLS			HUNT	SABINE	HIGH
TRINITY AQUIFER		RED RIVER	MANUFACTURING RED RIVER	0	0	20	20	20	20	DRILL NEW WELLS			RED RIVER	SULPHUR	HIGH
WOODBINE AQUIFER		HUNT	WOLFE CITY	0	0	0	81	192	271	DRILL NEW WELLS			HUNT	SULPHUR	HIGH
WOODBINE AQUIFER		HUNT	CELESTE	0	0	0	102	102	204	DRILL NEW WELLS			HUNT	SABINE	HIGH
WOODBINE AQUIFER		HUNT	HICKORY CREEK SUD	0	0	189	378	567	1,138	DRILL NEW WELLS			HUNT	SABINE	HIGH
	BIG CREEK LAKE /RESERVOIR	HUNT	NORTH HUNT SUD	0	0	0	0	122	350	DELTA COUNTY PIPELINE		DELTA COUNTY-OTHER (DELTA CO. MUD)	HUNT	SULPHUR	HIGH
	BOB SANDLIN LAKE/RESERVOIR	MORRIS	TRI SUD	164	161	160	163	166	170	RENEW AND INCREASE EXISTING CONTRACT		MOUNT PLEASANT	TITUS	CYPRESS	HIGH
	BOB SANDLIN LAKE/RESERVOIR	TITUS	MANUFACTURING TITUS	2,658	2,742	2,826	3,027	3,634	4,269	INCREASE EXISTING CONTRACT		MOUNT PLEASANT	TITUS	CYPRESS	HIGH
	BOB SANDLIN LAKE/RESERVOIR	TITUS	STEAM ELECTRIC POWER TITUS	24,942	24,826	24,712	24,487	23,812	22,592	INCREASE EXISTING CONTRACT		TITUS COUNTY FWD #1	TITUS	CYPRESS	HIGH
	BOB SANDLIN LAKE/RESERVOIR	TITUS	STEAM ELECTRIC POWER TITUS	0	9,849	9,890	9,846	9,698	9,802	INCREASE EXISTING CONTRACT		NETMWD	TITUS	CYPRESS	HIGH
	BOB SANDLIN LAKE/RESERVOIR	TITUS	TRI SUD	918	1,000	1,091	1,202	1,329	1,466	RENEW AND INCREASE EXISTING CONTRACT		MOUNT PLEASANT	TITUS	CYPRESS	HIGH
	BOB SANDLIN LAKE/RESERVOIR	TITUS	TRI SUD	478	520	568	626	692	763	RENEW AND INCREASE EXISTING CONTRACT		MOUNT PLEASANT	TITUS	SULPHUR	HIGH
	CHAPMAN LAKE/RESERVOIR	HUNT	NORTH HUNT SUD	0	36	134	268	338	388	INCREASE EXISTING CONTRACT	COMMERCE VOLUNTARY REALLOCATION OF HUNT MANUFACTURING SUPPLY FROM CHAPMAN TO NORTH HUNT SUD	COMMERCE WD	HUNT	SULPHUR	HIGH
	CHAPMAN /COOPER LAKE /RESERVOIR NON-SYSTEM PORTION	HUNT	CADDO BASIN SUD	0	0	0	77	409	967	NEW CONTRACT	GREENVILLE CHAPMAN RAW WATER PIPELINE	GREENVILLE	HUNT	SULPHUR	HIGH
	CHAPMAN /COOPER LAKE /RESERVOIR NON-SYSTEM PORTION	HUNT	GREENVILLE	0	0	0	10,223	9,891	9,333	CHAPMAN RAW WATER PIPELINE AND NEW WTP		SULPHUR SPRINGS	HUNT	SULPHUR	HIGH

Supply Source		County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Year						Strategy	Contingency	Seller (if applicable)	County	Basin	Reliability of Source
Groundwater	Surface Water			2020	2030	2040	2050	2060	2070						
	FORK LAKE /RESERVOIR	HUNT	COUNTY-OTHER HUNT	0	0	0	0	1,045	628	POETRY WSC INCREASE CONTRACT	SRA VOLUNTARY REALLOCATION COMBINED CONSUMERS SUD SURPLUS TO POETRY WSC	SABINE RIVER AUTHORITY	HUNT	SABINE	HIGH
	FORK LAKE/RESERVOIR	HUNT	SABINE RIVER AUTHORITY	0	0	0	0	1,045	628	VOLUNTARY REALLOCATION COMBINED CONSUMERS SUD SURPLUS PURCHASE FROM SRA TO POETRY WSC			HUNT	SABINE	HIGH
	GREENVILLE SYSTEM	HUNT	GREENVILLE	3,224	6,351	6,550	4,650	3,046	2,942	WTP EXPANSION			HUNT	SABINE	HIGH
	O' THE PINES LAKE/RESERVOIR	HARRISON	MARSHALL	0	0	0	0	41	701	INCREASE EXISTING CONTRACT		NETMWD	MARION	CYPRESS	HIGH
	O' THE PINES LAKE/RESERVOIR	TITUS	NETMWD	0	0	0	0	0	18,000	VOLUNTARY REALLOCATION OF HARRISON STEAM ELECTRIC			MARION	CYPRESS	HIGH
	O' THE PINES LAKE/RESERVOIR	TITUS	NETMWD	0	0	0	0	0	1,592	VOLUNTARY REALLOCATION OF MARION STEAM ELECTRIC			MARION	CYPRESS	HIGH
	O' THE PINES LAKE/RESERVOIR	TITUS	STEAM ELECTRIC POWER TITUS	0	0	41,069	40,569	40,028	38,868	INCREASE EXISTING CONTRACT		NETMWD	MARION	CYPRESS	HIGH
	O' THE PINES LAKE/RESERVOIR	TITUS	STEAM ELECTRIC POWER TITUS	0	0	0	0	0	18,000	INCREASE EXISTING CONTRACT	NETMWD VOLUNTARY REALLOCATION OF HARRISON STEAM ELECTRIC	NETMWD	MARION	CYPRESS	HIGH
	O' THE PINES LAKE/RESERVOIR	TITUS	STEAM ELECTRIC POWER TITUS	0	0	0	0	0	2,293	INCREASE EXISTING CONTRACT	NETMWD VOLUNTARY REALOCATION OF MARION STEAM ELECTRIC	NETMWD	MARION	CYPRESS	HIGH
	PAT MAYSE LAKE/RESERVOIR	LAMAR	COUNTY-OTHER LAMAR	116	116	116	116	116	116	INCREASE EXISTING CONTRACT		LAMAR COUNTY WSD	LAMAR	RED	HIGH
	PAT MAYSE LAKE/RESERVOIR	LAMAR	IRRIGATION LAMAR	18,312	18,308	18,305	18,302	18,299	18,302	PAT MAYSE RAW WATER PIPELINE		PARIS	LAMR	RED	HIGH
	PAT MAYSE LAKE/RESERVOIR	LAMAR	STEAM ELECTRIC LAMAR	0	1,415	2,733	4,870	7,474	10,568	INCREASE EXISTING CONTRACT		PARIS	LAMAR	RED	HIGH
	SULPHUR SPRINGS LAKE/RESERVOIR	HOPKINS	BRINKER WSC	0	0	0	0	29	63	INCREASE EXISTING CONTRACT		SULPHUR SPRINGS	HOPKINS	SULPHUR	HIGH
	SULPHUR SPRINGS LAKE/RESERVOIR	HOPKINS	IRRIGATION HOPKINS	1,306	1,306	1,306	1,306	1,306	1,306	SULPHUR SPRINGS RAW WATER PIPELINE		SULPHUR SPRINGS	HOPKINS	SULPHUR	HIGH
	TAWAKONI LAKE /RESERVOIR	HUNT	CADDO BASIN SUD	75	282	462	609	613	570	NEW CONTRACT	GREENVILLE WTP EXPANSION AND VOLUNTARY REALLOC OF HUNT MAN SURPLUS	GREENVILLE	HUNT	SABINE	HIGH
	TAWAKONI LAKE /RESERVOIR	HUNT	CADDO MILLS	0	1	36	68	108	255	INCREASE EXISTING CONTRACT	GREENVILLE WTP EXPANSION AND VOLUNTARY REALLOC OF HUNT MAN SURPLUS	GREENVILLE	HUNT	SABINE	HIGH

Supply Source		County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Year						Strategy	Contingency	Seller (if applicable)	County	Basin	Reliability of Source
Groundwater	Surface Water			2020	2030	2040	2050	2060	2070						
	TAWAKONI LAKE /RESERVOIR	HUNT	COMMERCE WD	0	36	134	268	338	388	VOLUNTARY REALLOCATION OF HUNT MANUFACTURING SUPPLY FROM TAWAKONI TO NORTH HUNT SUD			HUNT	SABINE	HIGH
	TAWAKONI LAKE /RESERVOIR	HUNT	COUNTY-OTHER HUNT	0	0	670	670	670	551	POETRY WSC INCREASE CONTRACT	SRA VOLUNTARY REALLOCATION WEST TAWAKONI SURPLUS TO POETRY WSC	SABINE RIVER AUTHORITY	HUNT	SABINE	HIGH
	TAWAKONI LAKE /RESERVOIR	HUNT	GREENVILLE	484	546	613	677	721	825	VOLUNTARY REALLOCATION OF HUNT MANUFACTURING SURPLUS	GREENVILLE WTP EXPANSION		HUNT	SABINE	HIGH
	TAWAKONI LAKE /RESERVOIR	HUNT	LONE OAK	0	0	0	0	0	56	INCREASE EXISTING CONTRACT		CASH SUD	HUNT	SABINE	HIGH
	TAWAKONI LAKE/RESERVOIR	HUNT	SABINE RIVER AUTHORITY	0	0	670	670	670	551	SRA VOLUNTARY REALLOCATION WEST TAWAKONI SURPLUS TO POETRY WSC			HUNT	SABINE	HIGH
	TOLEDO BEND RESERVOIR	HARRISON	MANUFACTURING HARRISON	50,000	55,000	65,000	70,000	80,000	0	TOLEDO BEND INTAKE AND RAW WATER PIPELINE		SABINE RIVER AUTHORITY	SHELBY	SABINE	HIGH
	TOLEDO BEND RESERVOIR	HARRISON	STEAM ELECTRIC POWER HARRISON	2,000	6,000	10,000	15,000	21,000	47,000	TOLEDO BEND INTAKE AND RAW WATER PIPELINE		SABINE RIVER AUTHORITY	SHELBY	SABINE	HIGH
	TOLEDO BEND RESERVOIR	HUNT	COUNTY-OTHER HUNT	0	0	0	0	0	3,990	GREENVILLE TIE-IN PIPELINE	SRA TOLEDO BEND TRANSFER AND GREENVILLE TOLEDO BEND TIE-IN PIPELINE	GREENVILLE	SHELBY	SABINE	HIGH
	TOLEDO BEND RESERVOIR	HUNT	GREENVILLE	0	0	0	0	0	5,100	TOLEDO BEND TIE-IN PIPELINE	SRA TOLEDO BEND TRANSFER	SABINE RIVER AUTHORITY	SHELBY	SABINE	HIGH
	TYLER SURFACE SUPPLY	SMITH	MANUFACTURING SMITH	300	327	354	377	408	442	INCREASE EXISTING CONTRACT		TYLER	SMITH	SABINE	HIGH
	WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	DE KALB	304	303	299	298	297	297	RENEW EXISTING CONTRACT	TEXARKANA/RIVERBEND STRATEGIES	TEXARKANA	BOWIE	SULPHUR	HIGH
	WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	HOOKS	265	258	249	244	243	243	RENEW EXISTING CONTRACT	TEXARKANA/RIVERBEND STRATEGIES	TEXARKANA	BOWIE	SULPHUR	HIGH
	WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	MACEDONIA-EYLAU MUD #1	565	574	577	577	577	577	RENEW EXISTING CONTRACT	TEXARKANA/RIVERBEND STRATEGIES	TEXARKANA	BOWIE	SULPHUR	HIGH
	WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	MAUD	170	169	167	165	164	164	RENEW EXISTING CONTRACT	TEXARKANA/RIVERBEND STRATEGIES	TEXARKANA	BOWIE	SULPHUR	HIGH
	WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	NASH	206	212	214	214	214	214	RENEW EXISTING CONTRACT	TEXARKANA/RIVERBEND STRATEGIES	TEXARKANA	BOWIE	SULPHUR	HIGH
	WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	NEW BOSTON	1,098	1,104	1,094	1,091	1,089	1,089	RENEW EXISTING CONTRACT	TEXARKANA/RIVERBEND STRATEGIES	TEXARKANA	BOWIE	SULPHUR	HIGH
	WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	REDWATER	82	82	79	77	77	77	RENEW EXISTING CONTRACT	TEXARKANA/RIVERBEND STRATEGIES	TEXARKANA	BOWIE	SULPHUR	HIGH
	WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	TEXAMERICAS CENTER	514	527	530	530	530	530	RENEW EXISTING CONTRACT	TEXARKANA/RIVERBEND STRATEGIES	TEXARKANA	BOWIE	SULPHUR	HIGH
	WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	TEXARKANA					2,000	18,000	DREDGE WRIGHT PATMAN			BOWIE	SULPHUR	HIGH
	WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	TEXARKANA	6,368	6,664	6,815	6,742	6,729	6,728	RIVERBEND STRATEGY			BOWIE	SULPHUR	HIGH
	WRIGHT PATMAN LAKE/RESERVOIR	BOWIE	WAKE VILLAGE	677	669	654	644	642	642	RENEW EXISTING CONTRACT	TEXARKANA/RIVERBEND STRATEGIES	TEXARKANA	BOWIE	SULPHUR	HIGH

Supply Source		County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Year						Strategy	Contingency	Seller (if applicable)	County	Basin	Reliability of Source
Groundwater	Surface Water			2020	2030	2040	2050	2060	2070						
	WRIGHT PATMAN LAKE/RESERVOIR	CASS	MANUFACTURING CASS	0	0	0	0	16,000	47,990	INCREASE EXISTING CONTRACT	TEXARKANA ADVANCED WATER CONSERVATION DREDGE WRIGHT PATMAN	TEXARKANA	BOWIE	SULPHUR	HIGH
	WRIGHT PATMAN LAKE/RESERVOIR	RED RIVER	CLARKSVILLE	0	0	303	303	303	303	CONTRACT WITH TEXARKANA AND TREATED WATER PIPELINE TO DEKALB	CITY OF CLARKSVILLE'S EXISTING SURFACE WATER SUPPLIES	TEXARKANA /RIVERBEND	BOWIE	SULPHUR	HIGH
	WRIGHT PATMAN LAKE/RESERVOIR	RED RIVER	COUNTY-OTHER	94	144	185	230	274	318	RENEW EXISTING CONTRACT	TEXARKANA/RIVERBEND STRATEGIES	TEXARKANA /RIVERBEND	BOWIE	SULPHUR	HIGH
		BOWIE	TEXARKANA	6,403	6,664	6,815	6,742	6,729	6,728	ADVANCED WATER CONSERVATION			BOWIE	SULPHUR	HIGH
		HARRISON	MANUFACTURING HARRISON	9,501	10,408	11,316	12,108	13,038	14,039	ADVANCED WATER CONSERVATION			HARRISON	SABINE	HIGH
		LAMAR	MANUFACTURING LAMAR	565	592	620	642	685	834	ADVANCED WATER CONSERVATION			LAMAR	RED	HIGH
		MORRIS	MANUFACTURING MORRIS	9,593	10,210	10,780	11,242	12,129	13,087	ADVANCED WATER CONSERVATION			MORRIS	CYPRESS	HIGH
		SMITH	OVERTON	17	18	21	23	27	31	ADVANCED WATER CONSERVATION			SMITH	SABINE	HIGH
		TITUS	MANUFACTURING TITUS	900	932	962	986	1,054	1,126	ADVANCED WATER CONSERVATION			TITUS	CYPRESS	HIGH
		VAN ZANDT	ABLES SPRINGS WSC	1	0	2	2	3	2	ADVANCED WATER CONSERVATION	REGION C STRATEGY		SEE HUNT COUNTY	SEE HUNT COUNTY	HIGH
		HUNT	ABLES SPRINGS WSC	2	4	3	6	9	15	ADVANCED WATER CONSERVATION	REGION C STRATEGY		HUNT	SABINE	HIGH
		HUNT	BLACKLAND WSC	12	19	22	26	31	36	ADVANCED WATER CONSERVATION	REGION C STRATEGY		HUNT	SABINE	HIGH
		HUNT	CADDO BASIN SUD	2	3	4	7	10	14	ADVANCED WATER CONSERVATION	REGION C STRATEGY		HUNT	SABINE	HIGH
		HUNT	JOSEPHINE	2	4	5	9	11	13	ADVANCED WATER CONSERVATION	REGION C STRATEGY		HUNT	SABINE	HIGH
		HUNT	ROYSE CITY	4	12	20	26	40	61	ADVANCED WATER CONSERVATION	REGION C STRATEGY		HUNT	SABINE	HIGH
		VAN ZANDT	R-P-M WSC	1	6	10	15	19	23	ADVANCED WATER CONSERVATION	REGION I STRATEGY		VAN ZANDT	NECHES	HIGH
		HUNT	STEAM ELECTRIC POWER HUNT	7,448	7,398	9,141	8,988	9,038	12,061	ADVANCED WATER CONSERVATION			HUNT	SABINE	HIGH
		HUNT	BLACKLAND WSC	48	153	204	246	296	356	DIRECT CONNECTION AND ADDITIONAL WATER	REGION C STRATEGY	NTMWD	HUNT	SABINE	HIGH
		HUNT	ABLES SPRINGS WSC	86	184	278	391	544	756	INCREASE EXISTING CONTRACT	REGION C STRATEGY	NTMWD	HUNT	SABINE	HIGH
		HUNT	JOSEPHINE	38	121	201	286	311	339	INCREASE EXISTING CONTRACT	REGION C STRATEGY	NTMWD	HUNT	SABINE	HIGH
		VAN ZANDT	CANTON	323	323	323	323	323	323	INDIRECT REUSE			VAN ZANDT	SABINE	HIGH
		HARRISON	MANUFACTURING HARRISON	0	0	0	0	0	86,355	UNMET NEED					
		HOPKINS	MINING HOPKINS	320	320	440	540	540	640	UNMET NEED					
		HUNT	STEAM ELECTRIC POWER HUNT	4,637	6,790	7,610	10,889	14,649	16,152	UNMET NEED					
		RED RIVER	IRRIGATION RED RIVER	4,376	4,313	4,260	4,208	4,155	4,125	UNMET NEED					

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WATER LOSS ESTIMATE OF RECOMMENDED STRATEGIES

County	Entity	Strategy	Estimated % Loss
BOWIE	DE KALB	RENEW EXISTING CONTRACT	18.6%
BOWIE	HOOKS	RENEW EXISTING CONTRACT	13.7%
BOWIE	IRRIGATION BOWIE	DRILL NEW WELLS	13.7%
BOWIE	IRRIGATION BOWIE	DRILL NEW WELLS	13.7%
BOWIE	IRRIGATION BOWIE	VOLUNTARY REALLOCATION BOWIE COUNTY OTHER TO IRRIGATION	13.7%
BOWIE	MACEDONIA-EYLAU MUD #1	RENEW EXISTING CONTRACT	13.7%
BOWIE	MAUD	RENEW EXISTING CONTRACT	13.7%
BOWIE	NASH	RENEW EXISTING CONTRACT	13.7%
BOWIE	NEW BOSTON	RENEW EXISTING CONTRACT	13.7%
BOWIE	REDWATER	RENEW EXISTING CONTRACT	13.7%
BOWIE	TEXAMERICAS CENTER	RENEW EXISTING CONTRACT	1.4%
BOWIE	TEXARKANA	ADVANCED WATER CONSERVATION	0.0%
BOWIE	TEXARKANA	DREDGE WRIGHT PATMAN	21.4%
BOWIE	TEXARKANA	RIVERBEND STRATEGY	21.4%
BOWIE	WAKE VILLAGE	RENEW EXISTING CONTRACT	13.7%
CAMP	BI COUNTY WSC	DRILL NEW WELLS	13.7%
CASS	MANUFACTURING CASS	INCREASE EXISTING CONTRACT	13.7%
CASS	MANUFACTURING CASS	DRILL NEW WELLS	13.7%
CASS	MANUFACTURING CASS	ADVANCED WATER CONSERVATION	0.0%
GREGG	MINING GREGG	DRILL NEW WELLS	13.7%
GREGG	MINING GREGG	DRILL NEW WELLS	13.7%
HARRISON	IRRIGATION HARRISON	DRILL NEW WELLS	13.7%
HARRISON	IRRIGATION HARRISON	DRILL NEW WELLS	13.7%
HARRISON	MANUFACTURING HARRISON	ADVANCED WATER CONSERVATION	0.0%
HARRISON	MANUFACTURING HARRISON	TOLEDO BEND INTAKE AND RAW WATER PIPELINE	13.7%
HARRISON	MANUFACTURING HARRISON	UNMET NEED	N/A
HARRISON	MARSHALL	INCREASE EXISTING CONTRACT	23.3%
HARRISON	MINING HARRISON	DRILL NEW WELLS	13.7%
HARRISON	MINING HARRISON	DRILL NEW WELLS	13.7%
HARRISON	STEAM ELECTRIC POWER HARRISON	TOLEDO BEND INTAKE AND RAW WATER PIPELINE	13.7%
HARRISON	WASKOM	DRILL NEW WELLS	20.4%
HOPKINS	BRINKER WSC	INCREASE EXISTING CONTRACT	13.7%
HOPKINS	CUMBY	DRILL NEW WELLS	0.0%
HOPKINS	CUMBY	DRILL NEW WELLS	0.0%
HOPKINS	IRRIGATION HOPKINS	DRILL NEW WELLS	13.7%
HOPKINS	IRRIGATION HOPKINS	DRILL NEW WELLS	13.7%
HOPKINS	IRRIGATION HOPKINS	SULPHUR SPRINGS RAW WATER PIPELINE	13.7%
HOPKINS	MARTIN SPRINGS WSC	DRILL NEW WELLS	13.7%
HOPKINS	MINING HOPKINS	UNMET NEED	N/A

WATER LOSS ESTIMATE OF RECOMMENDED STRATEGIES

County	Entity	Strategy	Estimated % Loss
HUNT	ABLES SPRINGS WSC	ADVANCED WATER CONSERVATION	0.0%
HUNT	ABLES SPRINGS WSC	INCREASE EXISTING CONTRACT	13.7%
HUNT	BLACKLAND WSC	ADVANCED WATER CONSERVATION	0.0%
HUNT	BLACKLAND WSC	DIRECT CONNECTION AND ADDITIONAL WATER	13.7%
HUNT	CADDO BASIN SUD	ADVANCED WATER CONSERVATION	0.0%
HUNT	CADDO BASIN SUD	NEW CONTRACT	13.7%
HUNT	CADDO BASIN SUD	NEW CONTRACT	13.7%
HUNT	CADDO MILLS	INCREASE EXISTING CONTRACT	13.7%
HUNT	CELESTE	DRILL NEW WELLS	20.1%
HUNT	COMMERCE WD	VOLUNTARY REALLOCATION OF HUNT MANUFACTURING SUPPLY FROM TAWAKONI TO NORTH HUNT SUD	26.5%
HUNT	COUNTY-OTHER HUNT	DRILL NEW WELLS	13.7%
HUNT	COUNTY-OTHER HUNT	POETRY WSC INCREASE CONTRACT	13.7%
HUNT	COUNTY-OTHER HUNT	POETRY WSC INCREASE CONTRACT	13.7%
HUNT	COUNTY-OTHER HUNT	GREENVILLE TIE-IN PIPELINE	13.7%
HUNT	GREENVILLE	VOLUNTARY REALLOCATION OF HUNT MANUFACTURING SURPLUS	6.8%
HUNT	GREENVILLE	WTP EXPANSION	6.8%
HUNT	GREENVILLE	CHAPMAN RAW WATER PIPELINE AND NEW WTP	6.8%
HUNT	GREENVILLE	TOLEDO BEND TIE-IN PIPELINE	6.8%
HUNT	HICKORY CREEK SUD	DRILL NEW WELLS	13.7%
HUNT	HICKORY CREEK SUD	DRILL NEW WELLS	13.7%
HUNT	IRRIGATION HUNT	DRILL NEW WELLS	13.7%
HUNT	JOSEPHINE	ADVANCED WATER CONSERVATION	0.0%
HUNT	JOSEPHINE	INCREASE EXISTING CONTRACT	13.7%
HUNT	LONE OAK	INCREASE EXISTING CONTRACT	29.4%
HUNT	MINING HUNT	DRILL NEW WELLS	13.7%
HUNT	NORTH HUNT SUD	INCREASE EXISTING CONTRACT	13.7%
HUNT	NORTH HUNT SUD	DELTA COUNTY PIPELINE	13.7%
HUNT	ROYSE CITY	ADVANCED WATER CONSERVATION	0.0%
HUNT	SABINE RIVER AUTHORITY	SRA VOLUNTARY REALLOCATION WEST TAWAKONI SURPLUS TO POETRY WSC	13.7%
HUNT	SABINE RIVER AUTHORITY	VOLUNTARY REALLOCATION COMBINED CONSUMERS SUD SURPLUS PURCHASE FROM SRA TO POETRY WSC	13.7%

WATER LOSS ESTIMATE OF RECOMMENDED STRATEGIES

County	Entity	Strategy	Estimated % Loss
HUNT	STEAM ELECTRIC POWER HUNT	ADVANCED WATER CONSERVATION	0.0%
HUNT	STEAM ELECTRIC POWER HUNT	UNMET NEED	N/A
HUNT	WOLFE CITY	DRILL NEW WELLS	13.7%
LAMAR	COUNTY-OTHER LAMAR	INCREASE EXISTING CONTRACT	13.7%
LAMAR	IRRIGATION LAMAR	PAT MAYSE RAW WATER PIPELINE	13.7%
LAMAR	MANUFACTURING LAMAR	ADVANCED WATER CONSERVATION	0.0%
LAMAR	MANUFACTURING LAMAR	DRILL NEW WELLS	13.7%
LAMAR	STEAM ELECTRIC LAMAR	INCREASE EXISTING CONTRACT	13.7%
MARION	MINING MARION	DRILL NEW WELLS	13.7%
MORRIS	MANUFACTURING MORRIS	ADVANCED WATER CONSERVATION	13.7%
MORRIS	TRI SUD	RENEW AND INCREASE EXISTING CONTRACT	23.0%
RED RIVER	CLARKSVILLE	BLEND GROUNDWATER WITH SURFACE WATER	13.7%
RED RIVER	CLARKSVILLE	CONTRACT WITH TEXARKANA AND TREATED WATER PIPELINE TO DEKALB	13.7%
RED RIVER	COUNTY-OTHER	RENEW EXISTING CONTRACT	13.7%
RED RIVER	IRRIGATION RED RIVER	UNMET NEED	N/A
RED RIVER	MANUFACTURING RED RIVER	DRILL NEW WELLS	13.7%
SMITH	CRYSTAL SYSTEMS INC	DRILL NEW WELLS	7.6%
SMITH	HIDEAWAY	INCREASE EXISTING CONTRACT	13.7%
SMITH	LINDALE	DRILL NEW WELLS	13.7%
SMITH	MANUFACTURING SMITH	INCREASE EXISTING CONTRACT	13.7%
SMITH	MINING SMITH	DRILL NEW WELLS	13.7%
SMITH	OVERTON	ADVANCED WATER CONSERVATION	0.0%
SMITH	WINONA	DRILL NEW WELLS	13.7%
TITUS	MANUFACTURING TITUS	ADVANCED WATER CONSERVATION	0.0%
TITUS	MANUFACTURING TITUS	DRILL NEW WELLS	13.7%
TITUS	MANUFACTURING TITUS	INCREASE EXISTING CONTRACT	13.7%
TITUS	NETMWD	VOLUNTARY REALLOCATION OF HARRISON STEAM ELECTRIC	0.0%
TITUS	NETMWD	VOLUNTARY REALLOCATION OF MARION STEAM ELECTRIC	0.0%
TITUS	STEAM ELECTRIC POWER TITUS	INCREASE EXISTING CONTRACT	13.7%
TITUS	STEAM ELECTRIC POWER TITUS	INCREASE EXISTING CONTRACT	13.7%
TITUS	STEAM ELECTRIC POWER TITUS	INCREASE EXISTING CONTRACT	13.7%
TITUS	STEAM ELECTRIC POWER TITUS	INCREASE EXISTING CONTRACT	13.7%
TITUS	STEAM ELECTRIC POWER TITUS	INCREASE EXISTING CONTRACT	13.7%
TITUS	TRI SUD	RENEW AND INCREASE EXISTING CONTRACT	23.0%
TITUS	TRI SUD	RENEW AND INCREASE EXISTING CONTRACT	23.0%
UPSHUR	BI COUNTY WSC	DRILL NEW WELLS	13.7%
UPSHUR	GILMER	DRILL NEW WELLS	13.7%
UPSHUR	MANUFACTURING UPSHUR	DRILL NEW WELLS	13.7%
UPSHUR	MINING UPSHUR	DRILL NEW WELLS	13.7%
VAN ZANDT	ABLES SPRINGS WSC	ADVANCED WATER CONSERVATION	0.0%
VAN ZANDT	CANTON	DRILL NEW WELLS	13.7%
VAN ZANDT	CANTON	INDIRECT REUSE	13.7%
VAN ZANDT	IRRIGATION VAN ZANDT	DRILL NEW WELLS	13.7%
VAN ZANDT	MANUFACTURING VAN ZANDT	DRILL NEW WELLS	13.7%
VAN ZANDT	R-P-M WSC	ADVANCED WATER CONSERVATION	0.0%
VAN ZANDT	R-P-M WSC	DRILL NEW WELLS	22.5%

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Water User Group (WUG) Management Supply Factor

REGION D	WUG MANAGEMENT SUPPLY FACTOR					
	2020	2030	2040	2050	2060	2070
ALBA	1.5	1.5	1.5	1.5	1.5	1.5
ATLANTA	1.0	1.0	1.0	1.0	1.0	1.0
BI COUNTY WSC	1.3	1.2	1.1	1.0	1.1	1.0
BIG SANDY	1.3	1.2	1.2	1.1	1.1	1.0
BLOSSOM	1.6	1.7	1.8	1.8	1.8	1.8
BOGATA	2.2	2.3	2.4	2.4	2.4	2.4
BRIGHT STAR-SALEM SUD	2.6	5.6	5.8	5.7	5.7	5.7
BRINKER WSC	1.4	1.2	1.1	1.0	1.0	1.0
CADDO BASIN SUD	1.1	1.2	1.3	1.3	1.4	1.3
CADDO MILLS	1.2	1.0	1.0	1.0	1.0	1.0
CAMPBELL	2.1	1.7	1.5	1.4	1.4	1.0
CANTON	2.0	1.9	1.8	1.7	1.6	1.5
CASH SUD	1.1	2.3	2.1	1.8	1.5	1.2
CELESTE	1.6	1.4	1.1	1.3	1.0	1.0
CENTRAL BOWIE COUNTY WSC	1.0	1.0	1.0	1.0	1.0	1.0
CLARKSVILLE	1.5	1.1	1.1	1.1	1.1	1.1
CLARKSVILLE CITY	2.4	2.3	2.2	2.0	1.8	1.7
COMBINED CONSUMERS SUD	4.2	3.7	3.1	2.6	1.2	1.2
COMMERCE	1.0	1.0	1.0	1.0	1.0	1.0
COMO	1.6	1.5	1.4	1.4	1.3	1.2
COOPER	4.0	4.1	4.1	4.1	4.0	3.9
COUNTY-OTHER, BOWIE	1.5	1.5	1.6	1.5	1.5	1.5
COUNTY-OTHER, CAMP	3.2	3.8	4.5	5.6	7.3	10.0
COUNTY-OTHER, CASS	1.7	1.9	2.0	2.1	2.1	2.2
COUNTY-OTHER, DELTA	5.5	5.1	5.2	5.2	4.6	3.2
COUNTY-OTHER, FRANKLIN	1.3	1.4	1.4	1.4	1.4	1.4
COUNTY-OTHER, GREGG	1.8	1.8	1.8	1.8	1.8	1.6
COUNTY-OTHER, HARRISON	1.3	1.3	1.3	1.2	1.2	1.1
COUNTY-OTHER, HOPKINS	2.1	2.1	2.1	2.1	2.0	1.9
COUNTY-OTHER, HUNT	1.1	1.1	1.2	1.2	1.1	1.1
COUNTY-OTHER, LAMAR	1.1	1.1	1.1	1.0	1.0	1.0
COUNTY-OTHER, MARION	3.2	3.2	3.2	3.2	3.2	3.2
COUNTY-OTHER, MORRIS	1.2	1.2	1.3	1.2	1.2	1.2
COUNTY-OTHER, RAINS	1.2	1.2	1.2	1.2	1.2	1.2
COUNTY-OTHER, RED RIVER	1.8	2.6	3.7	5.9	12.0	107.0
COUNTY-OTHER, SMITH	1.7	1.7	1.6	1.6	1.6	1.5
COUNTY-OTHER, TITUS	3.2	3.1	2.9	2.7	2.5	2.3
COUNTY-OTHER, UPSHUR	1.3	1.3	1.2	1.2	1.1	1.1
COUNTY-OTHER, VAN ZANDT	1.6	1.6	1.6	1.6	1.6	1.5
COUNTY-OTHER, WOOD	9.3	9.1	9.0	8.8	8.7	8.7
CRYSTAL SYSTEMS INC	1.7	1.4	1.5	1.7	1.4	1.4
CUMBY	1.0	1.5	1.4	1.2	1.1	1.0
CYPRESS SPRINGS SUD	4.5	4.5	4.4	4.3	4.0	3.8
DAINGERFIELD	3.3	3.4	3.4	3.3	3.3	3.2
DE KALB	1.0	1.0	1.0	1.0	1.0	1.0
DEPORT	2.3	2.6	2.7	2.7	2.6	2.6
DETROIT	2.0	2.0	2.0	2.0	2.0	2.0
DIANA SUD	2.6	2.5	2.5	2.4	2.3	2.2
EAST MOUNTAIN	3.5	3.3	3.2	3.1	2.9	2.8
EAST TAWAKONI	3.9	3.8	3.8	3.8	3.7	3.7

Water User Group (WUG) Management Supply Factor

REGION D	WUG MANAGEMENT SUPPLY FACTOR					
	2020	2030	2040	2050	2060	2070
EASTERN CASS WSC	3.8	3.9	4.0	4.1	4.1	4.1
EASTON	2.4	2.3	2.2	2.1	2.0	1.8
EDGEWOOD	1.0	3.3	3.2	3.0	2.9	2.8
ELDERVILLE WSC	2.6	2.4	2.2	2.0	1.8	1.6
EMORY	1.0	1.6	1.6	1.5	1.5	1.5
FOUKE WSC	1.2	1.2	1.2	1.2	1.2	1.2
GILL WSC	1.9	1.9	1.8	1.7	1.6	1.5
GILMER	1.0	1.2	1.2	1.1	1.1	1.0
GLADEWATER	1.3	1.3	1.2	1.1	1.0	1.0
GOLDEN WSC	1.7	1.8	1.8	1.8	1.8	1.7
GRAND SALINE	1.7	1.7	1.7	1.7	1.6	1.5
GREENVILLE	1.0	1.2	1.0	1.6	1.2	1.2
GUM SPRINGS WSC	1.9	1.8	1.8	1.7	1.5	1.4
HALLSVILLE	1.6	1.5	1.4	1.3	1.2	1.1
HAWKINS	3.1	3.0	3.0	3.0	2.9	2.9
HICKORY CREEK SUD	1.7	1.2	1.1	1.1	1.0	1.0
HIDEAWAY	1.0	1.0	1.0	1.0	1.0	1.0
HOLLY RANCH WATER COMPANY	3.1	3.0	2.9	2.9	2.8	2.8
HOOKS	1.0	1.0	1.0	1.0	1.0	1.0
HUGHES SPRINGS	3.2	3.4	3.5	3.5	3.5	3.5
IRRIGATION, BOWIE	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, DELTA	1.7	1.7	1.7	1.7	1.7	1.7
IRRIGATION, FRANKLIN	11.5	11.5	11.5	11.5	11.5	11.5
IRRIGATION, GREGG	7.6	7.6	7.6	7.6	7.6	7.6
IRRIGATION, HARRISON	1.1	1.1	1.1	1.1	1.1	1.1
IRRIGATION, HOPKINS	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, HUNT	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, LAMAR	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, RAINS	1.4	1.4	1.4	1.4	1.4	1.4
IRRIGATION, RED RIVER	0.2	0.2	0.2	0.2	0.2	0.2
IRRIGATION, TITUS	1.1	1.1	1.1	1.1	1.1	1.1
IRRIGATION, UPSHUR	1.5	1.5	1.5	1.5	1.5	1.5
IRRIGATION, VAN ZANDT	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, WOOD	1.3	1.3	1.3	1.3	1.3	1.3
JEFFERSON	4.3	4.4	4.5	4.5	4.5	4.5
JONES WSC	1.8	1.9	1.9	1.9	1.9	1.8
KILGORE	1.2	1.5	1.4	1.3	1.2	1.1
LAKEPORT	1.9	1.9	1.8	1.8	1.6	1.5
LAMAR COUNTY WSD	4.0	3.9	3.7	3.6	3.5	3.4
LIBERTY CITY WSC	1.7	1.6	1.5	1.4	1.2	1.1
LINDALE	1.6	1.6	1.6	1.5	1.6	1.5
LINDALE RURAL WSC	2.0	1.9	1.7	1.5	1.3	1.1
LINDEN	1.5	1.6	1.6	1.6	1.6	1.6
LIVESTOCK, BOWIE	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, CAMP	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, CASS	1.2	1.2	1.2	1.2	1.2	1.2
LIVESTOCK, DELTA	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, FRANKLIN	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, GREGG	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, HARRISON	1.1	1.2	1.2	1.2	1.2	1.2

Water User Group (WUG) Management Supply Factor

REGION D	WUG MANAGEMENT SUPPLY FACTOR					
	2020	2030	2040	2050	2060	2070
LIVESTOCK, HOPKINS	1.1	1.1	1.1	1.1	1.1	1.1
LIVESTOCK, HUNT	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, LAMAR	1.2	1.2	1.2	1.2	1.2	1.2
LIVESTOCK, MARION	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, MORRIS	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, RAINS	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, RED RIVER	1.1	1.1	1.1	1.1	1.1	1.1
LIVESTOCK, TITUS	1.1	1.1	1.1	1.1	1.0	1.0
LIVESTOCK, UPSHUR	1.1	1.1	1.1	1.1	1.1	1.1
LIVESTOCK, VAN ZANDT	1.3	1.3	1.3	1.3	1.3	1.3
LIVESTOCK, WOOD	1.2	1.2	1.2	1.2	1.2	1.2
LONE OAK	2.6	2.2	1.7	1.4	1.0	1.0
LONE STAR	4.0	4.1	4.2	4.1	4.1	4.0
LONGVIEW	1.6	1.5	1.3	1.2	1.1	1.0
MACBEE SUD	1.0	3.8	3.5	3.2	2.9	2.7
MACEDONIA-EYLAU MUD #1	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, BOWIE	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, CAMP	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, CASS	1.1	1.1	1.0	1.0	1.1	1.0
MANUFACTURING, GREGG	1.6	1.5	1.3	1.2	1.1	1.0
MANUFACTURING, HARRISON	1.1	1.0	1.0	1.0	1.0	0.4
MANUFACTURING, HOPKINS	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, HUNT	1.3	1.2	1.1	1.0	1.0	1.0
MANUFACTURING, LAMAR	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, MARION	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, MORRIS	1.5	1.4	1.3	1.2	1.2	1.1
MANUFACTURING, RAINS	1.7	1.7	1.7	1.7	1.7	1.7
MANUFACTURING, RED RIVER	1.0	1.0	2.4	2.4	2.2	2.0
MANUFACTURING, TITUS	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, UPSHUR	1.2	1.1	1.1	1.0	1.2	1.1
MANUFACTURING, VAN ZANDT	1.1	1.0	1.0	1.1	1.1	1.0
MANUFACTURING, WOOD	2.0	1.9	1.8	1.7	1.6	1.5
MARSHALL	1.3	1.2	1.2	1.1	1.0	1.0
MARTIN SPRINGS WSC	1.5	1.3	1.2	1.0	1.0	1.0
MAUD	1.0	1.0	1.0	1.0	1.0	1.0
MINEOLA	1.2	1.2	1.2	1.2	1.2	1.2
MINING, CAMP	1.9	2.1	2.3	2.6	2.9	3.3
MINING, CASS	21.5	14.9	14.7	20.1	30.9	47.6
MINING, FRANKLIN	208.0	203.2	248.5	243.5	318.0	477.0
MINING, GREGG	1.3	1.1	1.1	1.5	2.0	2.8
MINING, HARRISON	1.0	1.3	1.5	1.9	2.2	2.7
MINING, HOPKINS	0.8	0.7	0.7	0.7	0.6	0.6
MINING, HUNT	1.0	1.1	1.5	1.8	1.0	1.1
MINING, MARION	1.1	1.0	1.1	1.3	1.6	2.0
MINING, RED RIVER	1.0	1.0	1.0	1.0	1.0	1.0
MINING, SMITH	1.1	1.1	1.1	1.0	1.2	1.1
MINING, TITUS	2.8	2.7	2.6	2.6	2.3	1.9
MINING, UPSHUR	1.1	1.2	1.1	1.4	1.9	2.6
MINING, VAN ZANDT	7.2	7.3	7.0	6.8	6.5	6.3
MINING, WOOD	12.4	12.5	13.8	15.3	16.2	17.3

Water User Group (WUG) Management Supply Factor

REGION D	WUG MANAGEMENT SUPPLY FACTOR					
	2020	2030	2040	2050	2060	2070
MOUNT PLEASANT	1.6	1.4	1.2	1.0	1.0	1.0
MOUNT VERNON	2.4	2.3	2.3	2.2	2.2	2.2
NAPLES	1.4	1.4	1.4	1.4	1.4	1.3
NASH	1.0	1.0	1.0	1.0	1.0	1.0
NEW BOSTON	1.0	1.0	1.0	1.0	1.0	1.0
NEW HOPE SUD	1.1	1.1	1.1	1.1	1.1	1.1
NORTH HOPKINS WSC	2.0	1.9	1.8	1.7	1.6	1.5
NORTH HUNT SUD	1.3	1.1	1.1	1.1	1.0	1.0
OMAHA	1.6	1.6	1.6	1.6	1.5	1.5
ORE CITY	11.6	11.2	10.8	10.3	9.8	9.4
PARIS	3.2	3.2	3.1	3.0	2.8	1.9
PITTSBURG	2.1	2.1	2.1	2.0	1.9	1.9
POINT	1.0	1.1	1.1	1.1	1.1	1.1
PRITCHETT WSC	1.6	1.5	1.5	1.4	1.4	1.3
QUEEN CITY	1.2	1.2	1.2	1.2	1.3	1.3
QUINLAN	2.6	2.9	3.3	2.9	2.4	1.9
QUITMAN	1.0	3.4	3.3	3.3	3.2	3.2
RAMEY WSC	2.3	2.3	2.4	2.4	2.3	2.3
RED LICK	1.0	1.0	2.0	2.0	2.0	2.0
RED RIVER COUNTY WSC	1.4	1.4	1.4	1.3	1.3	1.2
REDWATER	1.0	1.0	1.0	1.0	1.0	1.0
RENO	1.1	1.3	1.3	1.4	1.5	1.6
ROXTON	1.6	1.7	1.8	1.8	1.8	1.8
R-P-M WSC	1.2	1.2	1.1	1.1	1.1	1.0
SHARON WSC	2.4	2.4	2.4	2.4	2.3	2.3
SMITH COUNTY MUD #1	2.5	2.2	1.9	1.7	1.5	1.3
SOUTH TAWAKONI WSC	1.0	2.4	2.3	2.1	2.0	1.9
STEAM ELECTRIC POWER, GREGG	2.3	2.0	1.7	1.4	1.2	1.1
STEAM ELECTRIC POWER, HARRISON	1.3	1.3	1.3	1.2	1.2	1.1
STEAM ELECTRIC POWER, HUNT	0.6	0.5	0.6	0.5	0.4	0.4
STEAM ELECTRIC POWER, LAMAR	1.1	1.0	1.0	1.0	1.0	1.0
STEAM ELECTRIC POWER, MARION	1.0	1.0	1.0	1.0	1.0	1.0
STEAM ELECTRIC POWER, MORRIS	19.1	16.4	13.9	11.9	10.0	9.0
STEAM ELECTRIC POWER, RED RIVER	17.4	14.9	12.6	10.7	9.0	8.9
STEAM ELECTRIC POWER, SMITH	1.0	1.0	1.0	1.0	1.0	1.0
STEAM ELECTRIC POWER, TITUS	1.1	1.1	1.5	1.2	1.0	1.0
SULPHUR SPRINGS	5.8	5.6	5.3	2.1	1.9	1.8
TALCO	6.5	6.0	5.5	5.0	4.5	4.1
TEXAMERICAS CENTER	1.0	1.0	1.0	1.0	1.0	1.0
TEXARKANA	1.0	1.0	1.0	1.0	1.2	2.4
TRI SUD	1.0	1.0	1.0	1.0	1.0	1.0
TRYON ROAD SUD	2.8	2.7	2.5	2.3	2.1	1.9
VAN	2.7	2.5	2.4	2.2	2.1	2.0
WAKE VILLAGE	1.0	1.0	1.0	1.0	1.0	1.0
WASKOM	1.1	1.1	1.0	1.1	1.1	1.1
WEST GREGG SUD	1.6	1.5	1.4	1.3	1.2	1.1
WEST TAWAKONI	1.0	5.1	1.6	1.3	1.0	1.0
WHITE OAK	1.8	1.7	1.6	1.4	1.3	1.2
WILLS POINT	3.4	3.6	3.6	3.6	3.6	3.5
WINFIELD	1.0	1.0	1.0	1.0	1.0	1.0

Water User Group (WUG) Management Supply Factor

REGION D	WUG MANAGEMENT SUPPLY FACTOR					
	2020	2030	2040	2050	2060	2070
WINNSBORO	2.6	2.5	2.6	2.5	2.5	2.5
WINONA	1.2	1.1	1.0	1.4	1.3	1.1
WOLFE CITY	1.7	1.4	1.2	1.2	1.2	1.0

*WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. To calculate the Management Supply Factor for each WUG as a whole, not split by region-county-basin the combined total of existing and future supply is divided by the total projected demand.

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APPENDIX C

CHAPTER 6

Identification, Evaluation, and Selection of Water Management Strategies Based on Needs

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APPENDIX C
CHAPTER 6

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County	Entity	Strategy	Quantity (Ac-Ft/Yr)	Start Decade	Reliability	Cost ($/Ac-Ft)	Impacts of Strategy on: Environmental Factors	Environmental Factors	Agricultural Resources/ Rural Areas	Agricultural Resources/ Rural Areas	Other Natural Resources	Key Water Quality Parameters	Political Feasibility
			#		*(1-5)	$	(Acres)	**(1-5)	(Acres)	**(1-5)	**(1-5)	**(1-5)	**(1-5)
BOWIE	DE KALB	Renew Existing Contract (Texarkana)	304	2020	1	$243	N/A	1	N/A	1	1	1	1
BOWIE	HOOKS	Renew Existing Contract (Texarkana)	265	2020	1	$242	N/A	1	N/A	1	1	1	1
BOWIE	IRRIGATION	Drill New Wells (Nacatoch, Red)	1,540	2020	1	$599	1	1	1	1	1	1	3
BOWIE	IRRIGATION	Drill New Wells (Carrizo-Wilcox, Sulphur/Red)	3,700	2020	1	$559	1	1	1	1	1	1	3
BOWIE	MACEDONIA-EYLAU MUD #1	Renew and Increase Existing Contract (Texarkana)	577	2020	1	$482	N/A	1	N/A	1	1	1	1
BOWIE	MAUD	Renew Existing Contract (Texarkana)	170	2020	1	$241	N/A	1	N/A	1	1	1	1
BOWIE	NASH	Renew Existing Contract (Texarkana)	214	2020	1	$243	N/A	1	N/A	1	1	1	1
BOWIE	NEW BOSTON	Renew Existing Contract (Texarkana)	1,104	2020	1	$243	N/A	1	N/A	1	1	1	1
BOWIE	REDWATER	Renew Existing Contract (Texarkana)	148	2020	1	$243	N/A	1	N/A	1	1	1	1
BOWIE	RED LICK	Renew Existing Contract (Texarkana)	117	2020	1	$244	N/A	1	N/A	1	1	1	1
BOWIE	TEXAMERICAS	Renew Existing Contract (Texarkana)	503	2020	1	$483	N/A	1	N/A	1	1	1	1
BOWIE	TEXARKANA	Advanced Water Conservation	6,815	2020	1	$600	N/A	1	N/A	1	1	1	1
BOWIE	TEXARKANA	Dredge Wright Patman	18,000	2050	3	$957	50,000	5	41,366	5	3	2	2
BOWIE	TEXARKANA	Riverbend Strategy	3,324	2020	1	$4,930	87	4	68	4	2	1	4
BOWIE	WAKE VILLAGE	Renew Existing Contract (Texarkana)	677	2020	1	$242	N/A	1	N/A	1	1	1	1
CAMP	BI COUNTY WSC	Drill New Wells (Queen City, Camp/Upshur Co)	860	2030	1	$520	1	1	1	1	1	1	3
CASS	MANUFACTURING	Advanced Water Conservation	15,100	2030	1	$0	N/A	1	N/A	1	1	1	1
CASS	MANUFACTURING	Drill New Wells (Carrizo-Wilcox, Cypress)	151	2020	1	$1,086	1	1	1	1	1	1	1
CASS	MANUFACTURING	Increase Existing Contract (Texarkana)	16,000	2050	1	$179	N/A	1	N/A	1	1	1	1
GREGG	MINING	Drill New Wells (Carrizo-Wilcox, Cypress/Sabine)	393	2020	1	$685	1	1	1	1	1	1	3
HARRISON	IRRIGATION	Drill New Wells (Carrizo-Wilcox, Cypress/Sabine)	290	2020	1	$685	1	1	1	1	1	1	3
HARRISON	MANUFACTURING	Advanced Water Conservation	14,039	2020	1	$0	N/A	1	N/A	1	1	1	1
HARRISON	MANUFACTURING	Toledo Bend Intake and Raw Water Pipeline (SRA)	90,000	2020	1	$354	588	5	457	5	4	1	1
HARRISON	MARSHALL	Increase Existing Contract (NETMWD)	701	2060	1	$1,552	N/A	1	N/A	1	1	1	1
HARRISON	MINING	Drill New Wells (Carrizo-Wilcox, Cypress/Sabine)	1,721	2020	1	$415	1	1	1	1	1	1	3
HARRISON	STEAM ELECTRIC POWER	Toledo Bend Intake and Raw Water Pipeline (SRA)	49,000	2020	1	$354	588	5	457	5	4	1	1
HARRISON	WASKOM	Drill New Well (Carrizo-Wilcox, Cypress)	184	2020	1	$870	1	1	1	1	1	1	3

County	Entity	Strategy	Quantity (Ac-Ft/Yr)	Start Decade	Reliability	Cost ($/Ac-Ft)	Impacts of Strategy on: Environmental Factors	Environmental Factors	Agricultural Resources/ Rural Areas	Agricultural Resources/ Rural Areas	Other Natural Resources	Key Water Quality Parameters	Political Feasibility
			#		*(1-5)	$	(Acres)	**(1-5)	(Acres)	**(1-5)	**(1-5)	**(1-5)	**(1-5)
HOPKINS	BRINKER WSC	Increase Existing Contract (Sulphur Springs)	63	2060	1	$1,176	N/A	1	N/A	1	1	1	1
HOPKINS	CUMBY	Drill New Wells (Nacatoch, Sabine)	80	2030	1	$1,600	1	1	1	1	1	1	3
HOPKINS	IRRIGATION	Lake Sulphur Springs Raw Water Pipeline	891	2020	1	$1,176	82	4	62	4	3	1	4
HOPKINS	IRRIGATION	Drill New Wells (Carrizo-Wilcox/Nacatoch, Cypress/Sabine/Sulphur)	1,235	2020	1	$667	1	1	1	1	1	1	3
HOPKINS	MARTIN SPRINGS WSC	Drill New Wells (Carrizo-Wilcox, Sabine)	120	2060	1	$1,533	1	1	1	1	1	1	3
HUNT	ABLES SPRINGS WSC	Advanced Water Conservation	17	2020	1	Not Avail	N/A	1	N/A	1	1	1	1
HUNT	ABLES SPRINGS WSC	Increase Existing Contract (NTMWD)	756	2020	1	Not Avail	N/A	1	N/A	1	1	1	1
HUNT	BLACKLAND WSC	Advanced Water Conservation	36	2020	1	Not Avail	N/A	1	N/A	1	1	1	1
HUNT	BLACKLAND WSC	Direct Connection and Additional Water from NTMWD	807	2020	1	$406	12	1	0	1	1	1	1
HUNT	CADDO BASIN SUD	New Contract (Greenville)	1,537	2020	1	$1,085	N/A	1	N/A	1	1	1	1
HUNT	CADDO MILLS	Increase Existing Contract (Greenville)	255	2030	1	$1,085	N/A	1	N/A	1	1	1	1
HUNT	CELESTE	Drill New Wells (Woodbine, Sabine)	204	2050	1	$1,603	1	1	1	1	1	1	1
HUNT	COMMERCE WD	Voluntary Reallocation of Hunt County Manufacturing Surplus for Lone Oak	388	2030	1	$0	N/A	1	N/A	1	1	1	1
HUNT	COUNTY-OTHER	Drill New Wells (Nacatoch, Sabine)	2,400	2030	1	$918	1	1	1	1	1	1	1
HUNT	COUNTY-OTHER	Poetry WSC Increase Existing Contract (SRA)	1,045	2060	1	$1,717	N/A	1	N/A	1	1	1	3
HUNT	COUNTY-OTHER	Poetry WSC Increase Existing Contract (SRA)	813	2040	1	$1,717	N/A	1	N/A	1	1	1	3
HUNT	COUNTY-OTHER	Greenville Tie-In Pipeline	3,990	2070	1	$1,504	86	4	21	3	3	1	3
HUNT	GREENVILLE	Voluntary Reallocation (Hunt Manuf)	825	2020	1	$0	N/A	1	N/A	1	1	1	3
HUNT	GREENVILLE	WTP Expansion	7,048	2020	1	$795	5	1	2	1	2	1	3
HUNT	GREENVILLE	Chapman Raw Water Pipeline and New WTP (Contract w/Sulphur Springs)	10,750	2050	1	$2,619	157	5	97	4	1	1	3
HUNT	GREENVILLE	Toledo Bend Tie-In Pipeline	5,100	2070	1	$1,014	86	4	21	3	2	1	3
HUNT	HICKORY CREEK SUD	Drill New Wells (Woodbine Aquifer, Sabine Basin)	1,138	2040	1	$818	1	1	1	1	1	1	3
HUNT	HICKORY CREEK SUD	Drill New Wells (Trinity Aquifer, Trinity Basin)	463	2050	1	$1,015	1	1	1	1	1	1	3
HUNT	IRRIGATION	Drill New Wells (Nacatoch Aquifer, Sabine)	150	2020	1	$720	1	1	1	1	1	1	1
HUNT	JOSEPHINE	Advanced Water Conservation	13	2020	1	Not Avail	N/A	1	N/A	1	1	1	1
HUNT	JOSEPHINE	Increase Existing Contract (NTMWD)	339	2020	1	Not Avail	N/A	1	N/A	1	1	1	1
HUNT	LONE OAK	increase Existing Contract (Cash SUD)	56	2070	1	$1,717	N/A	1	N/A	1	1	1	3
HUNT	MINING	Drill New Wells (Nacatoch Aquifer, Sabine)	75	2020	1	$907	1	1	1	1	1	1	1

County	Entity	Strategy	Quantity (Ac-Ft/Yr)	Start Decade	Reliability	Cost ($/Ac-Ft)	Impacts of Strategy on:					Key Water Quality Parameters	Political Feasibility
							Environmental Factors	Environmental Factors	Agricultural Resources/ Rural Areas	Agricultural Resources/ Rural Areas	Other Natural Resources		
			#		*(1-5)	$	(Acres)	**(1-5)	(Acres)	**(1-5)	**(1-5)	**(1-5)	**(1-5)
HUNT	NORTH HUNT SUD	Increase Existing Contract (Commerce WD)	388	2030	1	$1,085	N/A	1	N/A	1	1	1	3
HUNT	NORTH HUNT SUD	Delta County Pipeline (Delta County Other/Delta County MUD)	350	2060	1	$1,414	30	3	16	2	1	1	3
HUNT	ROYSE CITY	Advanced Water Conservation	61	2020	1	$0	N/A	1	N/A	1	1	1	1
HUNT	SABINE RIVER AUTHORITY	Voluntary Reallocation (Combined Consumers SUD Fork Supply to Poetry)	1,045	2060	1	$0	N/A	1	N/A	1	1	1	1
HUNT	SABINE RIVER AUTHORITY	Voluntary Reallocation (West Tawakoni Tawakoni Supply to Poetry)	813	2040	1	$0	N/A	1	N/A	1	1	1	1
HUNT	STEAM ELECTRIC POWER	Advanced Water Conservation	12,061	2020	1	$0	N/A	1	N/A	1	1	1	1
HUNT	WOLFE CITY	Drill New Wells (Woodbine, Sulphur and Trinity, Trinity)	323	2050	1	$2,279	1	1	1	1	1	1	3
LAMAR	COUNTY-OTHER	Increase Existing Contract (Lamar County WSD)	116	2020	1	$1,629	N/A	1	N/A	1	1	1	1
LAMAR	IRRIGATION	Pat Mayse Raw Water Pipeline (Paris)	18,312	2020	1	$257	10	1	8	1	2	1	1
LAMAR	MANUFACTURING	Advanced Water Conservation	834	2020	1	$0	N/A	1	N/A	1	1	1	1
LAMAR	MANUFACTURING	Drill New Wells (Blossom, Red)	120	2070	1	$567	1	1	1	1	1	1	3
LAMAR	STEAM ELECTRIC POWER	Increase Existing Contract (Paris)	10,568	2030	1	$52	N/A	1	N/A	1	1	1	1
MARION	MINING	Drill New Wells (Queen City, Cypress)	648	2020	1	$456	1	1	1	1	1	1	3
MORRIS	MANUFACTURING	Advanced Water Conservation	13,087	2070	1	$0	N/A	1	N/A	1	1	1	1
RED RIVER	CLARKSVILLE	Wright Patman Pipeline (Texarkana)	303	2040	1	$1,115	106	5	56	4	2	2	3
RED RIVER	COUNTY-OTHER	Renew Existing Contract (Texarkana)	185	2020	1	$481	N/A	1	N/A	1	1	1	1
RED RIVER	MANUFACTURING	Drill New Wells (Trinity, Sulphur)	20	2040	1	$1,100	1	1	1	1	1	3	3
SMITH	CRYSTAL SYSTEMS INC	Drill New Wells (Queen City, Sabine)	1,936	2020	1	$420	1	1	1	1	1	1	3
SMITH	HIDEAWAY	Increase Existing Contract (Crystal Systems Inc.)	117	2070	1	$1,303	N/A	1	N/A	1	1	1	1
SMITH	LINDALE	Drill New Wells (Queen City, Sabine)	2,904	2020	1	$450	1	1	1	1	1	1	1
SMITH	MANUFACTURING	Increase Existing Contract (Tyler)	2,721	2020	1	$597	N/A	1	N/A	1	1	1	2
SMITH	MINING	Drill New Wells (Queen City, Sabine)	108	2060	1	$528	1	1	1	1	1	1	3
SMITH	OVERTON	Advanced Water Conservation	31	2050	1	$914	N/A	1	N/A	1	1	1	1
SMITH	WINONA	Drill New Wells (Queen City, Sabine)	108	2050	1	$815	1	1	1	1	1	1	3
TITUS	MANUFACTURING	Advanced Water Conservation	1,126	2020	1	$0	N/A	1	N/A	1	1	1	1
TITUS	MANUFACTURING	Drill New Wells (Queen City, Cypress)	45	2020	1	$822	1	1	1	1	1	1	3
TITUS	MANUFACTURING	Increase Existing Contract (Mount Pleasant)	4,269	2020	1	$782	N/A	1	N/A	1	1	1	1

County	Entity	Strategy	Quantity (Ac-Ft/Yr)	Start Decade	Reliability	Cost ($/Ac-Ft)	Impacts of Strategy on: Environmental Factors	Environmental Factors	Agricultural Resources/ Rural Areas	Agricultural Resources/ Rural Areas	Other Natural Resources	Key Water Quality Parameters	Political Feasibility
			#		*(1-5)	$	(Acres)	**(1-5)	(Acres)	**(1-5)	**(1-5)	**(1-5)	**(1-5)
TITUS	NETMWD	Voluntary Reallocation (Harrison Steam Electric, Lake O' The Pines)	18,000	2070	1	$0	N/A	1	N/A	1	1	1	1
TITUS	NETMWD	Voluntary Reallocation (Marion Steam Electric, Lake O' The Pines)	1,592	2070	1	$0	N/A	1	N/A	1	1	1	1
TITUS	STEAM ELECTRIC POWER	Increase Existing Contract (Titus Co. FWD #1)	24,942	2020	1	$100	N/A	1	N/A	1	1	1	1
TITUS	STEAM ELECTRIC POWER	Increase Existing Contract (NETMWD, Lake O' The Pines)	41,069	2040	1	$100	N/A	1	N/A	1	1	1	1
TITUS	STEAM ELECTRIC POWER	Increase Existing Contract (NETMWD; Bob Sandlin)	9,890	2030	1	$100	N/A	1	N/A	1	1	1	1
TITUS	STEAM ELECTRIC POWER	Increase Existing Contract (Cont. NETMWD Voluntary Reallocation (Harrison SE)	18,000	2070	1	$100	N/A	1	N/A	1	1	1	1
TITUS	STEAM ELECTRIC POWER	Increase Existing Contract (Cont. NETMWD Voluntary Reallocation (Marion SE)	1,592	2070	1	$100	N/A	1	N/A	1	1	1	1
TITUS	TRI SUD	Renew and Increase Existing Contract (Mount Pleasant, Titus and Morris Co)	161	2020	1	$782	N/A	1	N/A	1	1	1	1
UPSHUR	GILMER	Drill New Wells (Queen City, Cypress)	269	2030	1	$487	1	1	1	1	1	1	3
UPSHUR	MANUFACTURING	Drill New Wells (Queen City, Cypress)	430	2020	1	$600	1	1	1	1	1	1	3
UPSHUR	MINING	Drill New Wells (Queen City, Cypress/Sabine)	1,076	2020	1	$600	1	1	1	1	1	1	3
VAN ZANDT	Canton	Drill New Wells (Carrizo-Wilcox, Sabine)	100	2020	1	$1,540	1	1	1	1	1	1	2
VAN ZANDT	Canton	Indirect Reuse	323	2020	1	$2,065	81	4	46	3	1	1	2
VAN ZANDT	IRRIGATION	Drill New Wells (Queen City, Neches)	330	2020	1	$570	1	1	1	1	1	1	3
VAN ZANDT	MANUFACTURING	Drill New Wells (Carrizo-Wilcox, Neches)	290	2020	1	$759	1	1	1	1	1	1	3
VAN ZANDT	R-P-M WSC	Advanced Water Conservation/Dem Red.	23	2020	1	$0	N/A	1	N/A	1	1	1	1
VAN ZANDT	R-P-M WSC	Drill New Wells (Carrizo-Wilcox, Neches)	285	2020	1	$842	1	1	1	1	1	1	2

Summary of Environmental Assessment of Recommended Water Management Strategies

County	Entity	Strategy	Total Acres Impacted	Environmental Factors: Total Acres Impacted	Wetland Acres	Wetland Acres	Envir Water Needs	Habitat	Threat and Endangered Species	Cultural Resources	Bays & Estuaries	Envir Water Quality	Overall Environmental Impacts
			(Acres)	(1-5)	(Acres)	(1-5)	(1-5)	(1-5)	#	(1-5)	(1-5)	(1-5)	(1-5)
BOWIE	DE KALB	Renew Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
BOWIE	HOOKS	Renew Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
BOWIE	IRRIGATION	Drill New Wells (Nacatoch, Red)	1	1	0	1	1	1	33	1	N/A	1	1
BOWIE	IRRIGATION	Drill New Wells (Carrizo-Wilcox, Sulphur/Red)	1	1	0	1	1	1	33	1	N/A	1	1
BOWIE	MACEDONIA-EYLAU MUD #1	Renew and Increase Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
BOWIE	MAUD	Renew Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
BOWIE	NASH	Renew Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
BOWIE	NEW BOSTON	Renew Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
BOWIE	REDWATER	Renew Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
BOWIE	RED LICK	Renew Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
BOWIE	TexAmericas	Renew Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
BOWIE	TEXARKANA	Advanced Water Conservation	N/A	1	N/A	1	1	1	33	1	N/A	1	1
BOWIE	TEXARKANA	Dredge Wright Patman	50,000	5	13,000	5	2	3	33	1	N/A	1	4
BOWIE	TEXARKANA	Riverbend Strategy	87	4	2	1	1	2	33	2	N/A	1	2
BOWIE	WAKE VILLAGE	Renew Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
CAMP	BI COUNTY WSC	Drill New Wells (Queen City, Camp/Upshur Co)	1	1	0	1	1	1	33	1	N/A	1	1
CASS	MANUFACTURING	Advanced Water Conservation	N/A	1	N/A	1	1	1	37	1	N/A	1	1
CASS	MANUFACTURING	Drill New Wells (Carrizo-Wilcox, Cypress)	1	1	0	1	1	1	37	1	N/A	1	1
CASS	MANUFACTURING	Increase Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	37	1	N/A	1	1
GREGG	MINING	Drill New Wells (Carrizo-Wilcox, Cypress/Sabine)	1	1	0	1	1	1	39	1	N/A	1	1
HARRISON	IRRIGATION	Drill New Wells (Carrizo-Wilcox, Cypress/Sabine)	1	1	0	1	1	1	43	1	N/A	1	1
HARRISON	MANUFACTURING	Advanced Water Conservation	N/A	1	N/A	1	1	1	43	1	N/A	1	1
HARRISON	MANUFACTURING	Toledo Bend Intake and Raw Water Pipeline (SRA)	588	5	47	3	1	2	43	2	N/A	1	3
HARRISON	MARSHALL	Increase Existing Contract (NETMWD)	N/A	1	N/A	1	1	1	43	1	N/A	1	1
HARRISON	MINING	Drill New Wells (Carrizo-Wilcox, Cypress/Sabine)	1	1	0	1	1	1	43	1	N/A	1	1
HARRISON	STEAM ELECTRIC POWER	Toledo Bend Intake and Raw Water Pipeline (SRA)	588	5	47	3	1	2	43	2	N/A	1	3
HARRISON	WASKOM	Drill New Well (Carrizo-Wilcox, Cypress)	1	1	0	1	1	1	43	1	N/A	1	1
HOPKINS	BRINKER WSC	Increase Existing Contract (Sulphur Springs)	N/A	1	N/A	1	1	1	31	1	N/A	1	1
HOPKINS	CUMBY	Drill New Wells (Nacatoch, Sabine)	1	1	0	1	1	1	31	1	N/A	1	1
HOPKINS	IRRIGATION	Lake Sulphur Springs Raw Water Pipeline	82	4	5	1	1	2	31	2	N/A	1	3
HOPKINS	IRRIGATION	Drill New Wells (Carrizo-Wilcox/Nacatoch, Cypress/Sabine/Sulphur)	1	1	0	1	1	1	31	1	N/A	1	1
HOPKINS	MARTIN SPRINGS WSC	Drill New Wells (Carrizo-Wilcox, Sabine)	1	1	0	1	1	1	31	1	N/A	1	1
HUNT	ABLES SPRINGS WSC	Advanced Water Conservation	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	ABLES SPRINGS WSC	Increase Existing Contract (NTMWD)	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	BLACKLAND WSC	Advanced Water Conservation	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	BLACKLAND WSC	Direct Connection and Additional Water from NTMWD	12	1	0	1	1	2	30	2	N/A	1	2

County	Entity	Strategy	Total Acres Impacted	Environmental Factors									
				Total Acres Impacted	Wetland Acres	Wetland Acres	Envir Water Needs	Habitat	Threat and Endangered Species	Cultural Resources	Bays & Estuaries	Envir Water Quality	Overall Environmental Impacts
			(Acres)	(1-5)	(Acres)	(1-5)	(1-5)	(1-5)	#	(1-5)	(1-5)	(1-5)	(1-5)
HUNT	CADDO BASIN SUD	New Contract (Greenville)	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	CADDO MILLS	Increase Existing Contract (Greenville)	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	CELESTE	Drill New Wells (Woodbine, Sabine)	1	1	0	1	1	1	30	1	N/A	1	1
HUNT	COMMERCE WD	Voluntary Reallocation of Hunt County Manufacturing Surplus for Lone Oak	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	COUNTY-OTHER	Drill New Wells (Nacatoch, Sabine)	1	1	0	1	1	1	30	1	N/A	1	1
HUNT	COUNTY-OTHER	Voluntary Reallocation (Combined Consumers SUD Fork Supply to Poetry)	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	COUNTY-OTHER	Voluntary Reallocation (West Tawakoni Tawakoni Supply to Poetry)	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	COUNTY-OTHER	Greenville Tie-In Pipeline	86	4	3	1	1	2	30	2	N/A	1	3
HUNT	GREENVILLE	Voluntary Reallocation (Hunt Manuf)	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	GREENVILLE	WTP Expansion	5	1	0	1	1	2	30	2	N/A	1	2
HUNT	GREENVILLE	Chapman Raw Water Pipeline and New WTP (Contract w/Sulphur Springs)	157	5	3	1	1	2	30	2	N/A	1	3
HUNT	GREENVILLE	Toledo Bend Tie-In Pipeline	86	4	3	1	1	2	30	2	N/A	1	3
HUNT	HICKORY CREEK SUD	Drill New Wells (Woodbine Aquifer, Sabine Basin)	1	1	0	1	1	1	30	1	N/A	1	1
HUNT	HICKORY CREEK SUD	Drill New Wells (Trinity Aquifer, Trinity Basin)	1	1	0	1	1	1	30	1	N/A	1	1
HUNT	IRRIGATION	Drill New Wells (Nacatoch Aquifer, Sabine)	1	1	0	1	1	1	30	1	N/A	1	1
HUNT	JOSEPHINE	Advanced Water Conservation	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	JOSEPHINE	Increase Existing Contract (NTMWD)	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	LONE OAK	increase Existing Contract (Cash SUD)	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	MINING	Drill New Wells (Nacatoch Aquifer, Sabine)	1	1	0	1	1	1	30	1	N/A	1	1
HUNT	NORTH HUNT SUD	Increase Existing Contract (Commerce WD)	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	NORTH HUNT SUD	Delta County Pipeline (Delta County Other/Delta County MUD)	30	3	0	1	1	2	30	2	N/A	1	3
HUNT	ROYSE CITY	Advanced Water Conservation	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	SABINE RIVER AUTHORITY	Voluntary Reallocation (Combined Consumers SUD Fork Supply to Poetry)	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	SABINE RIVER AUTHORITY	Voluntary Reallocation (West Tawakoni Tawakoni Supply to Poetry)	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	STEAM ELECTRIC POWER	Advanced Water Conservation	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	WOLFE CITY	Drill New Wells (Woodbine, Sulphur and Trinity, Trinity)	1	1	0	1	1	1	30	1	N/A	1	1
LAMAR	COUNTY-OTHER	Increase Existing Contract (Lamar County WSD)	N/A	1	N/A	1	1	1	36	1	N/A	1	1
LAMAR	IRRIGATION	Pat Mayse Raw Water Pipeline (Paris)	10	1	0	1	1	2	36	2	N/A	1	3
LAMAR	MANUFACTURING	Advanced Water Conservation	N/A	1	N/A	1	1	1	36	1	N/A	1	1
LAMAR	MANUFACTURING	Drill New Wells (Blossom, Red)	1	1	0	1	1	1	36	1	N/A	1	1
LAMAR	STEAM ELECTRIC POWER	Increase Existing Contract (Paris)	N/A	1	N/A	1	1	1	36	1	N/A	1	1
MARION	MINING	Drill New Wells (Queen City, Cypress)	1	1	0	1	1	1	36	1	N/A	1	1
MORRIS	MANUFACTURING	Advanced Water Conservation	N/A	1	N/A	1	1	1	35	1	N/A	1	1

County	Entity	Strategy		Environmental Factors									
			Total Acres Impacted	Total Acres Impacted	Wetland Acres	Wetland Acres	Envir Water Needs	Habitat	Threat and Endangered Species	Cultural Resources	Bays & Estuaries	Envir Water Quality	Overall Environmental Impacts
			(Acres)	(1-5)	(Acres)	(1-5)	(1-5)	(1-5)	#	(1-5)	(1-5)	(1-5)	(1-5)
RED RIVER	CLARKSVILLE	Wright Patman Pipeline (Texarkana)	106	5	1	1	1	2	33	2	N/A	1	3
RED RIVER	COUNTY-OTHER	Renew Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
RED RIVER	MANUFACTURING	Drill New Wells (Trinity, Sulphur)	1	1	0	1	1	1	33	1	N/A	1	1
SMITH	CRYSTAL SYSTEMS INC	Drill New Wells (Queen City, Neches)	1	1	0	1	1	1	40	1	N/A	1	1
SMITH	HIDEAWAY	Increase Existing Contract (Crystal Systems Inc.)	N/A	1	N/A	1	1	1	40	1	N/A	1	1
SMITH	LINDALE	Drill New Wells (Queen City, Sabine)	1	1	0	1	1	1	40	1	N/A	1	1
SMITH	MANUFACTURING	Increase Existing Contract (Tyler)	N/A	1	N/A	1	1	1	40	1	N/A	1	1
SMITH	MINING	Drill New Wells (Queen City, Sabine)	1	1	0	1	1	1	40	1	N/A	1	1
SMITH	OVERTON	Advanced Water Conservation	N/A	1	N/A	1	1	1	40	1	N/A	1	1
SMITH	WINONA	Drill New Wells (Queen City, Sabine)	1	1	0	1	1	1	40	1	N/A	1	1
TITUS	MANUFACTURING	Advanced Water Conservation	N/A	1	N/A	1	1	1	33	1	N/A	1	1
TITUS	MANUFACTURING	Drill New Wells (Queen City, Cypress)	1	1	0	1	1	1	33	1	N/A	1	1
TITUS	MANUFACTURING	Increase Existing Contract (Mount Pleasant)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
TITUS	NETMWD	Voluntary Reallocation (Harrison Steam Electric, Lake O' The Pines)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
TITUS	NETMWD	Voluntary Reallocation (Marion Steam Electric, Lake O' The Pines)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
TITUS	STEAM ELECTRIC POWER	Increase Existing Contract (Titus Co. FWD #1)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
TITUS	STEAM ELECTRIC POWER	Increase Existing Contract (NETMWD, Lake O' The Pines)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
TITUS	STEAM ELECTRIC POWER	Increase Existing Contract (NETMWD; Bob Sandlin)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
TITUS	STEAM ELECTRIC POWER	Voluntary Reallocation (Harrison SE)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
TITUS	STEAM ELECTRIC POWER	Voluntary Reallocation (Marion SE)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
TITUS	TRI SUD	Renew and Increase Existing Contract (Mount Pleasant, Titus and Morris Co)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
UPSHUR	GILMER	Drill New Wells (Queen City, Cypress)	1	1	0	1	1	1	42	1	N/A	1	1
UPSHUR	MANUFACTURING	Drill New Wells (Queen City, Cypress)	1	1	0	1	1	1	42	1	N/A	1	1
UPSHUR	MINING	Drill New Wells (Queen City, Cypress/Sabine)	1	1	0	1	1	1	42	1	N/A	1	1
VAN ZANDT	Canton	Drill New Wells (Carrizo-Wilcox, Sabine)	1	1	0	1	1	1	40	1	N/A	1	1
VAN ZANDT	Canton	Indirect Reuse	81	4	2	1	1	1	40	1	N/A	1	1
VAN ZANDT	IRRIGATION	Drill New Wells (Queen City, Neches)	1	1	0	1	1	1	40	1	N/A	1	1
VAN ZANDT	MANUFACTURING	Drill New Wells (Carrizo-Wilcox, Neches)	1	1	0	1	1	1	40	1	N/A	1	1
VAN ZANDT	R-P-M WSC	Advanced Water Conservation/Dem Red.	N/A	1	N/A	1	1	1	40	1	N/A	1	1
VAN ZANDT	R-P-M WSC	Drill New Wells (Carrizo-Wilcox, Neches)	1	1	0	1	1	1	40	1	N/A	1	1

Summary of Evaluation of Alternative Water Management Strategies

County	Entity	Strategy	Quantity (Ac-Ft/Yr)	Start Decade	Reliability	Cost ($/Ac-Ft)	Impacts of Strategy on: Environmental Factors	Environmental Factors	Agricultural Resources/ Rural Areas	Agricultural Resources/ Rural Areas	Other Natural Resources	Key Water Quality Parameters	Political Feasibility
			#		*(1-5)	$	(acres)	**(1-5)	(acres)	**(1-5)	**(1-5)	**(1-5)	**(1-5)
BOWIE	TexAmericas	New Intake and Raw Water Pipeline from Wright Patman	22,403	2020	1	$364	30	3	25	3	2	1	3
HOPKINS	BRINKER WSC	Drill New Wells (Carrizo-Wilcox, Sulphur)	65	2060	1	$1,215	1	1	1	1	1	1	1
HOPKINS	IRRIGATION	Drill New Wells (Carrizo-Wilcox, Sulphur)	354	2020	1	$610	1	1	1	1	1	1	1
HOPKINS	IRRIGATION	Drill New Wells (Carrizo-Wilcox, Sabine)	709	2020	1	$615	1	1	1	1	1	1	1
HOPKINS	IRRIGATION	Drill New Wells (Nacatoch, Sulphur)	1,063	2020	1	$710	1	1	1	1	1	1	1
HUNT	GREENVILLE	Toledo Bend Tie-In Pipeline	21,230	2050	1	$591	86	3	21	3	2	1	3
HUNT	NORTH HUNT SUD	Drill New Wells (Woodbine Aquifer, Sulphur)	394	2060	1	$1,640	1	1	1	1	1	1	1
HUNT	STEAM ELECTRIC POWER	Increase Existing Contract (Greenville)	16,152	2020	1	$228	N/A	1	N/A	1	2	1	3
RED RIVER	CLARKSVILLE	Pat Mayse Pipeline Treated Water (Contract w/ Lamar WSD)	303	2040	1	$4,993	93	4	29	3	1	1	3
RED RIVER	CLARKSVILLE	Dimple Reservoir	303	2040	1	$757	1,891	5	1,734	5	1	1	5
RED RIVER	CLARKSVILLE	Drill New Wells (Nacatoch, Sulphur)	388	2040	1	$2,058	1	1	1	1	1	3	3
RED RIVER	IRRIGATION	Drill New Wells (Woodbine, Red)	1,106	2020	1	$604	1	1	1	1	1	3	3
RED RIVER	IRRIGATION	Drill New Wells (Nacatoch, Sulphur)	2,057	2020	1	$603	1	1	1	1	1	3	3
TITUS	MANUFACTURING	Drill New Wells (Carrizo-Wilcox, Cypress)	500	2020	1	$620	1	1	1	1	1	1	3
TITUS	MANUFACTURING	Increase Existing Contract (Mount Pleasant)	4,269	2020	1	$782	N/A	1	N/A	1	1	1	3
VAN ZANDT	CANTON	Grand Saline Reservoir	1,810	2020	1	$3,087	1,935	5	1,748	5	1	1	3
VAN ZANDT	IRRIGATION	Drill New Wells (Carrizo-Wilcox Aquifer, Neches Basin)	330	2020	1	$639	1	1	1	1	1	1	3
VAN ZANDT	RPM WSC	Drill New Wells (Queen City, Neches)	285	2020	1	$842	1	1	1	1	1	1	3

Summary of Environmental Assessment of Alternative Water Management Strategies

County	Entity	Strategy	Environmental Factors										
			Total Acres Impacted	Total Acres Impacted	Wetland Acres	Wetland Acres	Envir Water Needs	Habitat	Threat and Endangered Species	Cultural Resources	Bays & Estuaries	Envir Water Quality	Overall Environmental Impacts
			(Acres)	(1-5)	(Acres)	(1-5)	(1-5)	(1-5)	#	(1-5)	(1-5)	(1-5)	(1-5)
BOWIE	TexAmericas	New Intake and Raw Water Pipeline from Wright Patman	30	3	0	1	1	3	33	3	N/A	3	3
HOPKINS	BRINKER WSC	Drill New Wells (Carrizo-Wilcox, Sulphur)	1	1	0	1	1	1	31	1	N/A	1	1
HOPKINS	IRRIGATION	Drill New Wells (Carrizo-Wilcox, Sulphur)	1	1	0	1	1	1	31	1	N/A	1	1
HOPKINS	IRRIGATION	Drill New Wells (Carrizo-Wilcox, Sabine)	1	1	0	1	1	1	31	1	N/A	1	1
HOPKINS	IRRIGATION	Drill New Wells (Nacatoch, Sulphur)	1	1	0	1	1	1	31	1	N/A	1	1
HUNT	GREENVILLE	Toledo Bend Tie-In Pipeline	86	4	3	1	1	2	30	2	N/A	1	3
HUNT	NORTH HUNT SUD	Drill New Wells (Woodbine Aquifer, Sulphur)	1	1	0	1	1	1	30	1	N/A	1	1
HUNT	STEAM ELECTRIC POWER	Increase Existing Contract (Greenville)	N/A	1	N/A	1	2	3	30	3	N/A	2	3
RED RIVER	CLARKSVILLE	Pat Mayse Pipeline Treated Water (Contract w/ Lamar WSD)	93	4	3	1	1	1	33	1	N/A	1	1
RED RIVER	CLARKSVILLE	Dimple Reservoir	1,891	5	381	5	1	1	33	1	N/A	1	1
RED RIVER	CLARKSVILLE	Drill New Wells (Nacatoch, Sulphur)	1	1	0	1	1	1	33	1	N/A	1	1
RED RIVER	IRRIGATION	Drill New Wells (Woodbine, Red)	1	1	0	1	1	1	33	1	N/A	1	1
RED RIVER	IRRIGATION	Drill New Wells (Nacatoch, Sulphur)	1	1	0	1	1	1	33	1	N/A	1	1
TITUS	MANUFACTURING	Drill New Wells (Carrizo-Wilcox, Cypress)	1	1	0	1	1	1	33	1	N/A	1	1
TITUS	MANUFACTURING	Increase Existing Contract (Mount Pleasant)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
VAN ZANDT	CANTON	Grand Saline Reservoir	1,935	5	303	5	1	1	40	1	N/A	1	5
VAN ZANDT	IRRIGATION	Drill New Wells (Carrizo-Wilcox Aquifer, Neches Basin)	1	1	0	1	1	1	40	1	N/A	1	1
VAN ZANDT	RPM WSC	Drill New Wells (Queen City, Neches)	1	1	0	1	1	1	40	1	N/A	1	1

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Socioeconomic Impacts of Projected Water Shortages

for the Region D Regional Water Planning Area

Prepared in Support of the 2016 Region D Regional Water Plan

Texas Water
Development Board

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Executive Summary

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

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

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

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

It is estimated that not meeting the identified water needs in Region D would result in an annually combined lost income impact of approximately $6.4 billion in 2020, increasing to $8.1 billion in 2070 (Table ES-1). In 2020, the region would lose approximately 49,000 jobs, and by 2070 job losses would increase to approximately 56,000.

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

Table ES-1: Region D Socioeconomic Impact Summary

Regional Economic Impacts	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$6,429	$7,108	$7,178	$6,574	$6,712	$8,089
Job losses	48,970	52,112	52,778	46,740	45,645	55,938
Financial Transfer Impacts	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Tax losses on production and imports ($ millions)*	$664	$704	$639	$466	$360	$378
Water trucking costs ($ millions)*	$17	$17	$18	$18	$19	$20
Utility revenue losses ($ millions)*	$51	$58	$70	$76	$90	$125
Utility tax revenue losses ($ millions)*	$1	$1	$1	$1	$1	$2
Social Impacts	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Consumer surplus losses ($ millions)*	$101	$105	$113	$116	$127	$156
Population losses	8,991	9,568	9,690	8,581	8,380	10,270
School enrollment losses	1,663	1,770	1,793	1,587	1,550	1,900

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

1 Introduction

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

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

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

1.1 Identified Regional Water Needs (Potential Shortages)

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

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

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

Water Use Category		2020	2030	2040	2050	2060	2070
Irrigation	Water Needs (acre-feet per year)	30,763	30,696	30,479	30,021	29,589	29,402
	% of the category's total water demand	75%	75%	75%	75%	75%	75%
Livestock	Water Needs (acre-feet per year)	-	-	-	-	-	-
	% of the category's total water demand	-	-	-	-	-	-
Manufacturing	Water Needs (acre-feet per year)	61,557	72,166	87,466	100,894	120,136	175,740
	% of the category's total water demand	19%	20%	23%	25%	28%	38%
Mining	Water Needs (acre-feet per year)	2,888	3,265	2,935	2,274	1,700	1,363
	% of the category's total water demand	41%	42%	38%	31%	25%	20%
Municipal	Water Needs (acre-feet per year)	22,341	25,306	29,850	32,424	39,003	51,390
	% of the category's total water demand	17%	18%	20%	19%	21%	25%
Steam-electric power	Water Needs (acre-feet per year)	32,643	45,291	64,237	88,459	117,157	152,800
	% of the category's total water demand	34%	40%	48%	56%	63%	69%
Total water needs (acre-feet per year)		**150,192**	**176,724**	**214,967**	**254,072**	**307,585**	**410,695**

2 Economic Impact Assessment Methodology Summary

This portion of the report provides a summary of the methodology used to estimate the potential economic impacts of future water shortages. The general approach employed in the analysis was to obtain estimates for income and job losses on the smallest geographic level that the available data would support, tie those values to their accompanying historic water use estimate (volume), and thereby determine a maximum impact per acre-foot of shortage for each of the socioeconomic measures. The calculations of economic impacts were based on the overall composition of the economy using many underlying economic "sectors." Sectors in this analysis refer to one or more of the 440 specific production sectors of the economy designated within IMPLAN (Impact for Planning Analysis), the economic impact modeling software used for this assessment. Economic impacts within this report are estimated for approximately 310 of those sectors, with the focus on the more water intense production sectors. The economic impacts for a single water use category consist of an aggregation of impacts to multiple related economic sectors.

2.1 Impact Assessment Measures

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

Table 2-1 Socioeconomic Impact Analysis Measures

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

2.1.1 Regional Economic Impacts

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

Income Losses - Value Added Losses

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

Income Losses - Electric Power Purchase Costs

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

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

Job Losses

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

2.1.2 Financial Transfer Impacts

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

Tax Losses on Production and Imports

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

Water Trucking Costs

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

Utility Revenue Losses

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

Utility Tax Losses

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

2.1.3 Social Impacts

Consumer Surplus Losses of Municipal Water Users

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

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

Population and School Enrollment Losses

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

2.2 Analysis Context

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

2.2.1 IMPLAN Model and Data

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

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

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

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

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

2.2.2 Elasticity of Economic Impacts

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

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

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

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

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

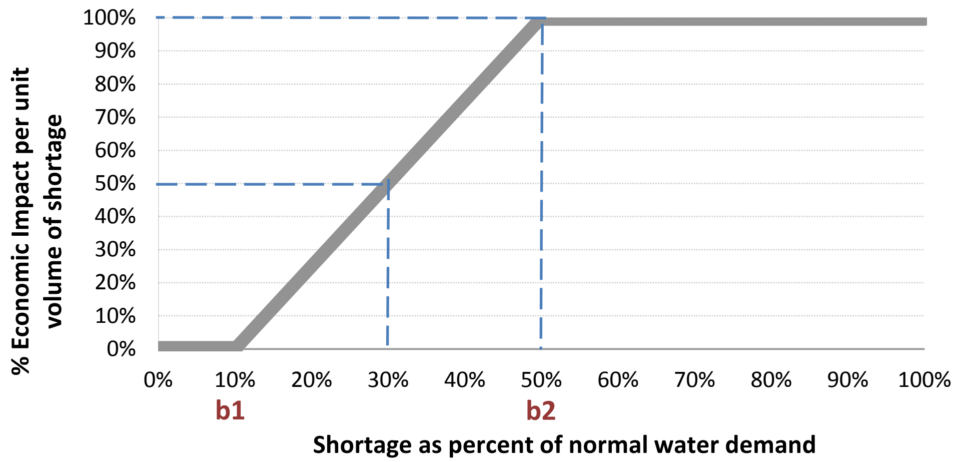

Table 2-2 Economic Impact Elasticity Function Lower and Upper Bounds

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

2.3 Analysis Assumptions and Limitations

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3 Analysis Results

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

3.1 Overview of the Regional Economy

Table 3-1 presents the 2011 economic baseline as represented by the IMPLAN model and adjusted to 2013 dollars for Region D. In year 2011, Region D generated about $32 billion in gross state product associated with 391,000 jobs based on the 2011 IMPLAN data. These values represent an approximation of the current regional economy for a reference point.

Table 3-1 Region D Economy

Income ($ millions)*	Jobs	Taxes on production and imports ($ millions)*
$31,792	**390,576**	**$2,775**

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

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

3.2 Impacts for Irrigation Water Shortages

Seven of the 19 counties in the region are projected to experience water shortages in the irrigated agriculture water use category for one or more decades within the planning horizon. Estimated impacts to this water use category appear in Table 3-2. Note that tax collection impacts were not estimated for this water use category. IMPLAN data indicates a negative tax impact (i.e., increased tax collections) for the associated production sectors, primarily due to past subsidies from the federal government. Two factors led to excluding any reported tax impacts: 1) Federal support (subsidies) has lessened greatly since the year 2011 IMPLAN data was collected, and 2) It was not considered realistic to report increasing tax revenue collections for a drought of record.

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

Impact Measure	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$8	$8	$8	$8	$8	$8
Job losses	696	695	690	679	669	665

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

3.3 Impacts for Livestock Water Shortages

None of the 19 counties in the region are projected to experience water shortages in the livestock water use category for one or more decades within the planning horizon. Estimated impacts to this water use category appear in Table 3-3. Note that tax impacts are not reported for this water use category for similar reasons that apply to the irrigation water use category described above.

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

Impact Measures	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	-	-	-	-	-	-
Jobs losses	-	-	-	-	-	-

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

3.4 Impacts for Municipal Water Shortages

Twelve of the 19 counties in the region are projected to experience water shortages in the municipal water use category for one or more decades within the planning horizon. Impact estimates were made for the two subtypes of use within municipal use: residential, and non-residential. The latter includes commercial and institutional users. Consumer surplus measures were made for both residential and non-residential demands. In addition, available data for the non-residential, water-intensive portion of municipal demand allowed use of IMPLAN and TWDB Water Use Survey data to estimate income loss, jobs, and taxes. Trucking cost estimates, calculated for shortages exceeding 80 percent, assumed a fixed cost of $20,000 per acre-foot to transport water for municipal use. The estimated impacts to this water use category appear in Table 3-4.

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

Impact Measures	2020	2030	2040	2050	2060	2070
Income losses[1] ($ millions)*	$569	$578	$677	$629	$649	$948
Job losses[1]	11,782	11,954	14,015	13,009	13,422	19,615
Tax losses on production and imports[1] ($ millions)*	$50	$51	$60	$56	$57	$84
Consumer surplus losses ($ millions)*	$101	$105	$113	$116	$127	$156
Trucking costs ($ millions)*	$17	$17	$18	$18	$19	$20
Utility revenue losses ($ millions)*	$51	$58	$70	$76	$90	$125
Utility tax revenue losses ($ millions)*	$1	$1	$1	$1	$1	$2

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

3.5 Impacts of Manufacturing Water Shortages

Manufacturing water shortages in the region are projected to occur in 10 of the 19 counties in the region for at least one decade of the planning horizon. Estimated impacts to this water use category appear in Table 3-5.

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

Impacts Measures	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$1,634	$1,846	$2,059	$2,260	$2,569	$3,329
Job losses	15,974	17,842	19,732	21,654	24,932	31,494
Tax losses on production and Imports ($ millions)*	$81	$93	$104	$115	$132	$187

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

3.6 Impacts of Mining Water Shortages

Mining water shortages in the region are projected to occur in 7 of the 19 counties in the region for at least one decade of the planning horizon. Estimated impacts to this water use type appear in Table 3-6.

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

Impact Measures	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$3,782	$3,984	$3,378	$2,097	$1,214	$759
Job losses	20,517	21,621	18,341	11,398	6,622	4,163
Tax losses on production and Imports ($ millions)*	$532	$560	$475	$295	$171	$106

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

3.7 Impacts of Steam-Electric Water Shortages

Steam-electric water shortages in the region are projected to occur in 4 of the 19 counties in the region for at least one decade of the planning horizon. Estimated impacts to this water use category appear in Table 3-7.

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

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

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

Impact Measures	2020	2030	2040	2050	2060	2070
Income Losses ($ millions)*	$436	$693	$1,055	$1,581	$2,271	$3,046

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

3.8 Regional Social Impacts

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

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

Impact Measures	2020	2030	2040	2050	2060	2070
Consumer surplus losses ($ millions)*	$101	$105	$113	$116	$127	$156
Population losses	8,991	9,568	9,690	8,581	8,380	10,270
School enrollment losses	1,663	1,770	1,793	1,587	1,550	1,900

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

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

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

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

		Income losses (Million $)*						Job losses						Consumer Surplus (Million $)*					
County	Water Use Category	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070
BOWIE	IRRIGATION	$1	$1	$1	$1	$1	$1	124	124	120	110	101	98	-	-	-	-	-	-
BOWIE	MANUFACTURING	$159	$173	$187	$198	$215	$232	1,335	1,451	1,565	1,662	1,798	1,946	-	-	-	-	-	-
BOWIE	MUNICIPAL	$564	$572	$571	$568	$567	$567	11,679	11,843	11,818	11,754	11,742	11,741	$88	$90	$90	$90	$90	$90
BOWIE Total		**$725**	**$747**	**$759**	**$767**	**$783**	**$801**	**13,138**	**13,418**	**13,503**	**13,526**	**13,641**	**13,784**	**$88**	**$90**	**$90**	**$90**	**$90**	**$90**
CAMP	MUNICIPAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$0	$0
CASS Total		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**$0**	**$0**
CASS	MANUFACTURING	-	-	-	-	$25	$471	-	-	-	-	178	3,307	-	-	-	-	-	-
CASS Total		**-**	**-**	**-**	**-**	**$25**	**$471**	**-**	**-**	**-**	**-**	**178**	**3,307**	**-**	**-**	**-**	**-**	**-**	**-**
GREGG	MINING	$335	$581	$559	$392	$228	$67	1,814	3,148	3,033	2,126	1,236	364	-	-	-	-	-	-
GREGG Total		**$335**	**$581**	**$559**	**$392**	**$228**	**$67**	**1,814**	**3,148**	**3,033**	**2,126**	**1,236**	**364**	**-**	**-**	**-**	**-**	**-**	**-**
HARRISON	IRRIGATION	$0	$0	$0	$0	$0	$0	1	1	1	1	1	1	-	-	-	-	-	-
HARRISON	MANUFACTURING	$1,046	$1,219	$1,391	$1,542	$1,719	$1,909	8,917	10,389	11,860	13,145	14,652	16,276	-	-	-	-	-	-
HARRISON	MINING	$2,679	$1,959	$1,315	$504	$82	-	14,523	10,619	7,129	2,731	447	-	-	-	-	-	-	-
HARRISON	MUNICIPAL	-	-	-	-	-	-	-	-	-	-	-	-	-	$0	$0	$0	$0	$0
HARRISON	STEAM ELECTRIC POWER	-	-	-	$18	$105	$276	-	-	-	-	-	-	-	-	-	-	-	-
HARRISON Total		**$3,725**	**$3,178**	**$2,706**	**$2,064**	**$1,907**	**$2,186**	**23,441**	**21,009**	**18,990**	**15,877**	**15,100**	**16,276**	**-**	**$0**	**$0**	**$0**	**$0**	**$0**
HOPKINS	IRRIGATION	$0	$0	$0	$0	$0	$0	32	32	32	32	32	32	-	-	-	-	-	-
HOPKINS	MINING	$6	$10	$16	$24	$34	$46	41	64	105	156	215	292	-	-	-	-	-	-
HOPKINS	MUNICIPAL	-	-	-	-	-	-	-	-	-	-	-	-	-	$0	$0	$0	$0	$0
HOPKINS Total		**$7**	**$11**	**$17**	**$25**	**$34**	**$46**	**73**	**96**	**137**	**188**	**247**	**324**	**-**	**$0**	**$0**	**$0**	**$0**	**$0**
HUNT	IRRIGATION	$0	$0	$0	$0	$0	$0	1	1	1	1	1	1	-	-	-	-	-	-

		Income losses (Million $)*						Job losses						Consumer Surplus (Million $)*					
County	Water Use Category	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070
HUNT	MINING	$0	$0	$0	$0	$0	-	3	3	1	-	-	-	-	-	-	-	-	-
HUNT	MUNICIPAL	-	-	$86	$37	$49	$338	-	-	1,786	769	1,018	6,986	$1	$2	$5	$5	$10	$35
HUNT	STEAM ELECTRIC POWER	$264	$309	$365	$434	$517	$615	-	-	-	-	-	-	-	-	-	-	-	-
HUNT Total		**$264**	**$310**	**$452**	**$471**	**$566**	**$953**	**4**	**4**	**1,787**	**770**	**1,019**	**6,987**	**$1**	**$2**	**$5**	**$5**	**$10**	**$35**
LAMAR	IRRIGATION	$5	$5	$5	$5	$5	$5	454	454	454	453	453	453	-	-	-	-	-	-
LAMAR	MANUFACTURING	-	-	-	-	-	$4	-	-	-	-	-	41	-	-	-	-	-	-
LAMAR	MUNICIPAL	-	-	-	-	-	-	-	-	-	-	-	-	$0	$0	$0	$0	$0	$0
LAMAR	STEAM ELECTRIC POWER	-	-	$4	$32	$83	$157	-	-	-	-	-	-	-	-	-	-	-	-
LAMAR Total		**$5**	**$5**	**$9**	**$37**	**$88**	**$166**	**454**	**454**	**454**	**453**	**453**	**495**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
MARION	MINING	$142	$245	$224	$179	$134	$101	774	1,339	1,225	978	731	550	-	-	-	-	-	-
MARION Total		**$142**	**$245**	**$224**	**$179**	**$134**	**$101**	**774**	**1,339**	**1,225**	**978**	**731**	**550**	**-**	**-**	**-**	**-**	**-**	**-**
MORRIS	MUNICIPAL	$1	$1	$1	$1	$1	$1	11	11	11	11	11	11	$1	$1	$1	$1	$1	$1
MORRIS Total		**$1**	**$1**	**$1**	**$1**	**$1**	**$1**	**11**	**11**	**11**	**11**	**11**	**11**	**$1**	**$1**	**$1**	**$1**	**$1**	**$1**
RED RIVER	IRRIGATION	$1	$1	$1	$1	$1	$1	84	83	82	81	80	79	-	-	-	-	-	-
RED RIVER	MANUFACTURING	-	-	$0	$0	$0	$0	-	-	5	5	6	7	-	-	-	-	-	-
RED RIVER	MUNICIPAL	-	-	$14	$14	$14	$14	-	-	283	282	282	282	-	-	$2	$2	$2	$2
RED RIVER Total		**$1**	**$1**	**$15**	**$15**	**$15**	**$15**	**84**	**83**	**369**	**368**	**367**	**367**	**-**	**-**	**$2**	**$2**	**$2**	**$2**
SMITH	MANUFACTURING	$26	$29	$32	$35	$39	$43	185	210	234	255	283	314	-	-	-	-	-	-
SMITH	MINING	-	-	-	-	$0	$1	-	-	-	-	-	4	-	-	-	-	-	-
SMITH	MUNICIPAL	-	-	$0	$3	$11	$22	-	-	9	72	236	448	$0	$0	$1	$3	$7	$9
SMITH Total		**$26**	**$29**	**$33**	**$39**	**$51**	**$66**	**185**	**210**	**243**	**327**	**520**	**767**	**$0**	**$0**	**$1**	**$3**	**$7**	**$9**
TITUS	MANUFACTURING	$174	$179	$184	$203	$266	$335	3,337	3,429	3,527	3,894	5,093	6,425	-	-	-	-	-	-
TITUS	MUNICIPAL	$4	$5	$5	$6	$6	$7	92	100	110	121	133	147	$11	$12	$13	$15	$16	$18
TITUS	STEAM ELECTRIC POWER	$172	$383	$685	$1,097	$1,566	$1,997	-	-	-	-	-	-	-	-	-	-	-	-
TITUS Total		**$351**	**$567**	**$875**	**$1,306**	**$1,839**	**$2,340**	**3,429**	**3,530**	**3,637**	**4,015**	**5,226**	**6,573**	**$11**	**$12**	**$13**	**$15**	**$16**	**$18**
UPSHUR	MANUFACTURING	$222	$238	$255	$270	$291	$314	2,153	2,307	2,477	2,622	2,825	3,043	-	-	-	-	-	-
UPSHUR	MINING	$620	$1,189	$1,263	$997	$737	$545	3,362	6,448	6,848	5,407	3,993	2,953	-	-	-	-	-	-
UPSHUR	MUNICIPAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$0	$0	$0	$0
UPSHUR Total		**$842**	**$1,427**	**$1,519**	**$1,268**	**$1,028**	**$858**	**5,515**	**8,754**	**9,324**	**8,029**	**6,818**	**5,996**	**-**	**-**	**$0**	**$0**	**$0**	**$0**

		Income losses (Million $)*						Job losses						Consumer Surplus (Million $)*					
County	Water Use Category	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070
VAN ZANDT	IRRIGATION	$0	$0	$0	$0	$0	$0	1	1	1	1	1	1	-	-	-	-	-	-
VAN ZANDT	MANUFACTURING	$7	$8	$9	$10	$14	$20	47	56	64	72	97	135	-	-	-	-	-	-
VAN ZANDT	MUNICIPAL	-	-	-	-	-	-	-	-	-	-	-	-	$0	$0	$0	$0	$0	$0
VAN ZANDT Total		**$7**	**$8**	**$9**	**$10**	**$14**	**$20**	**48**	**57**	**66**	**73**	**98**	**136**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Regional Total		**$6,429**	**$7,108**	**$7,178**	**$6,574**	**$6,712**	**$8,089**	**48,970**	**52,112**	**52,778**	**46,740**	**45,645**	**55,938**	**$101**	**$105**	**$113**	**$116**	**$127**	**$156**

APPENDIX C

CHAPTER 7

Drought Response Information

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APPENDIX C
CHAPTER 7

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TCEQ Listed Drought Affected Entities

PWS ID	PWS Name	County	Priority	TCEQ Stage	Population	Connections	Date Notified
600001	CITY OF COOPER	DELTA	W	2	2146	1060	8/19/2013
920006	CITY OF WHITE OAK	GREGG	W	2	7119	2991	8/26/2013
920028	SUN ACRES MOBILE HOME PARK	GREGG	W	2	183	61	9/4/2013
1020002	CITY OF MARSHALL	HARRISON	W	V	23409	10641	10/12/2011
1020078	WEST HARRISON WSC	HARRISON	W	1	1380	460	4/22/2013
1120001	CITY OF CUMBY	HOPKINS	W	1	777	451	7/18/2013
1120011	BRINKER WSC	HOPKINS	W	V	2508	836	9/13/2013
1120013	CORNERSVILLE WSC	HOPKINS	W	V	1089	363	8/13/2013
1120015	MARTIN SPRINGS WSC	HOPKINS	W	V	3549	1183	7/19/2013
1120018	PICKTON WSC	HOPKINS	W	V	654	218	9/13/2013
1160012	CITY OF WEST TAWAKONI	HUNT	C	3	3600	1250	3/2/2015
1160004	CITY OF GREENVILLE	HUNT	W	V	25557	9506	10/29/2013
1160005	CITY OF WOLFE CITY	HUNT	W	1	1412	620	7/25/2012
1160006	CITY OF LONE OAK	HUNT	W	V	598	286	8/26/2013
1160007	CITY OF QUINLAN	HUNT	W	1	2448	816	7/15/2013
1160017	CAMPBELL WSC	HUNT	W	V	1482	494	3/19/2012
1160018	CASH SUD	HUNT	W	1	16542	5908	4/29/2013
1160028	HOLIDAY ESTATES WATER	HUNT	W	V	216	72	4/23/2012
1160029	CADDO BASIN SUD	HUNT	W	1	10419	3473	8/19/2013
1160031	JACOBIA WSC	HUNT	W	2	972	324	8/21/2013
1160042	SHADY GROVE WSC	HUNT	W	1	1374	458	7/16/2013
1160052	COMBINED CONSUMERS SUD	HUNT	W	1	8367	2789	3/6/2015
1390001	CITY OF DEPORT	LAMAR	W	1	927	309	9/30/2011
1390012	PETTY WSC	LAMAR	W	V	132	44	11/20/2011
1900001	CITY OF EMORY	RAINS	W	1	2328	776	8/5/2013
1900009	SOUTH RAINS WSC	RAINS	W	2	2847	949	3/31/2014
1900011	CITY OF EAST TAWAKONI	RAINS	W	1	1959	945	5/1/2014
1940002	CITY OF CLARKSVILLE	RED RIVER	W	V	3237	1610	9/9/2013

Priority of Water Use

O - Outage Water service interrupted.
E - Emergency Could be out of water in 45 days or less.
P - Priority Could be out of water in 90 days or less.
C - Concern Could be out of water in 180 days or less.
W - Watch Has greater than a 180 day supply of water remaining.
R - Resolved No longer experiencing water capacity problems.

TCEQ Drought Response Stages

V - Voluntary. Customers requested to voluntarily limit water use.
1 - Mild restrictions. Use of water for non-essential uses is restricted (i.e. outdoor watering limited to no more than twice or once a week).
2 - Moderate restrictions. All outdoor water usage is prohibited except by handheld hoses with manual on/off nozzles. Water usage for livestock is exempt from this restriction.
3 - Severe restrictions. All outdoor water usage is prohibited; livestock watering may be exempted by the utility. All consumption may also be limited to each customer in specific ways.

Date Notified

The "date notified" is the most recent date that the Public Water System notified TCEQ of changes to their drought response stage.

PWS ID	PWS Name	County	Priority	TCEQ Stage	Population	Connections	Date Notified
2120004	CITY OF TYLER	SMITH	W	V	109242	36414	3/27/2012
2120005	SMITH COUNTY MUD	SMITH	W	1	2343	781	9/30/2011
2120006	CITY OF BULLARD	SMITH	W	V	2463	1015	8/20/2013
2120008	COMMUNITY WATER CO MONTGOMERY GARDEN	SMITH	W	V	861	287	6/13/2013
2120017	LINDALE RURAL WSC	SMITH	W	V	12315	4105	10/7/2011
2120063	SOUTHERN UTILITIES	SMITH	W	V	59154	19718	5/9/2013
2120064	LAKEWAY HARBOR SUBDIVISION	SMITH	W	V	1086	362	6/24/2011
2300002	CITY OF GILMER	UPSHUR	W	1	5243	2844	9/12/2011
2300008	UNION GROVE WSC	UPSHUR	W	V	2727	909	8/26/2011
2340007	CALLENDER LAKE	VAN ZANDT	W	1	1842	614	3/26/2012
2340009	EDOM WSC	VAN ZANDT	W	V	1443	481	5/2/2013
2500007	JONES WSC	WOOD	W	V	5352	1784	8/25/2013
2500015	BRIGHT STAR-SALEM SUD	WOOD	W	1	5871	1957	8/10/2011

Priority of Water Use

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Date Notified

The "date notified" is the most recent date that the Public Water System notified TCEQ of changes to their drought response stage.

1.1 MODEL DROUGHT CONTINGENCY PLAN – WHOLESALE WATER PROVIDERS

General Information

Introduction

Drought is a very real natural disaster that occurs in Texas, even in the verdant bottomlands, green pastures, and piney woods of northeast Texas. As recently as 2008, drought strained water systems in the northeast Texas region. In addition to natural drought, there are also water supply emergencies that occur from time to time in which water supply becomes contaminated. A good example of this is the MTBE spill into Lake Tawakoni in May 2000, which contaminated supply for several Hunt County water systems for multiple days.

In an effort to better respond to drought conditions than we've been able to in the past, the North East Texas Regional Water Planning Group (NETRWPG) has prepared this document, with the idea that if water providers study their water supply system before a drought or emergency occurs, then they will be better prepared to respond. In preparing this document, several references were used, including Chapters 288 and 363 of the Texas Administrative Code, the Texas Commission on Environmental Quality's (TCEQ) 'Handbook for Drought Contingency Planning for Retail Public Water Suppliers,' Texas Water Code § 11.1272, and the TCEQ and TWDB websites. All of these resources are available to you if you need further information or clarification. You may also contact the TCEQ at 512-239-4691 with questions or for information. Example wording for your plan will be found throughout in bold italics.

According to the requirements set forth in the amended Chapter 288, Subchapter C of the Texas Administrative Code, retail public water suppliers providing water service to 3,300 or more connections must submit revisions to existing drought contingency plans to the executive director not later than May 1, 2009, and every five years after that date to coincide with the regional water planning group. Any new or revised plans must be submitted to the executive director within 90 days of adoption by the community water system. Any new retail public water suppliers providing water service to 3,300 or more connections shall prepare and adopt a drought contingency plan within 180 days of commencement of operation, and submit the plan to the executive director within 90 days of adoption. If you are a retail supplier, but serve less than 3,300 connections, you are still required to develop and implement a plan, but you do not need to submit the plan unless specifically requested by TCEQ. If you provide retail supply in addition to wholesale supply, you will also need to develop a retail drought contingency plan. Please see the Northeast Texas Region's guidance for retail drought contingency plans.

The ___________________(water provider) understands that water conservation is a viable strategy for protecting water resources both now and in the future, and that adequate planning for times of drought or emergency is a necessary part of conservation. The purpose of this plan is to prepare for the possibility of a drought or emergency situation where water is in short supply. This plan will help to ensure that ________________________(water supplier) and its wholesale customers use water wisely and efficiently during periods of drought.

Though not specifically required by rule, it is helpful to the reader if you summarize your water supply and distribution systems in the introduction. This will familiarize users of the Plan with your system, and help them to make sense of the actions that you intend to take. In addition, discussing your water system here will assist those who update the plan in five years, because they will know exactly what the system looked like when the plan was created.

The ______________(water supplier) utilizes groundwater /surface water from _______________(source). Supply is secured by a (water right, water supply contract, etc.) through the year _____. Our customers include ___________________________, and their current contracted amounts are ______. Our storage and distribution systems consist of ____.

Coordination with the North East Texas Regional Water Planning Group

The drought contingency plan must document coordination with the regional water planning groups for the service area of the wholesale public water supplier to ensure consistency with the appropriate approved regional water plans. – 30 TAC Chapter 288

A copy of this adopted plan will be submitted to the NETRWPG via its administrator, Mr. Walt Sears, Northeast Texas Municipal Water District, P. O. Box 955, Hughes Springs, Texas 75656. Proof of submittal is attached hereto as Figure ___.

Informing the Public/Requesting Input

According to 30 TAC Chapter 288, Subchapter B.a.1, "Preparation of the plan shall include provisions to actively inform the public and to affirmatively provide opportunity for user input in the preparation of the plan and for informing wholesale customers about the plan. Such acts may include, but are not limited to, having a public meeting at a time and location convenient to the public and providing written notice to the public concerning the proposed plan and meeting."

The __________________________________(water supplier) gave the public and its wholesale customers an opportunity to provide input into this plan by ____________________________(public notice, public hearing, letter requesting comments, etc.). Public comments included ________________.

Efforts to inform wholesale customers and the public about each stage of the plan, and when stages are implemented or rescinded, will be through ____________________________ (certified letter, newspaper articles, radio announcements, website announcements, etc.).

Authorization/Applicability

The ________________ (mayor, president, city administrator, etc.) is hereby authorized to monitor weather conditions as well as water supply and demand conditions and to implement the Drought Contingency Plan as appropriate.

The ______________________(City Council, Board of Directors, etc.) authorizes the Plan by a ______________(resolution, ordinance), which has been included in this Plan.

Coordination with the Texas Commission on Environmental Quality

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According to 30 TAC Chapter 288, Subchapter C, "Wholesale public water suppliers shall submit a drought contingency plan meeting the requirements of Subchapter B of this chapter to the executive director not later than May 1, 2005, after adoption of the drought contingency plan by the governing body of the water supplier. Thereafter, the wholesale public water suppliers shall submit the next revision of the plan not later than May 1, 2009, and every five years after that date to coincide with the regional water planning group. Any new or revised plans must be submitted to the executive director within 90 days of adoption by the governing body of the wholesale public water supplier."

This plan was submitted to the executive director of the Texas Commission of Environmental Quality on ______________________(date).

Send your plan to the following address: TCEQ, Resource Protection Team, Mail Code 160, P.O. Box 13087, Austin, TX 78711-3087 for regular and certified mail, or 12100 Park 35 Circle, Austin, TX 78753 for express carrier deliveries (U.S. Post Office Express Mail, FedEx, UPS, etc.).

For questions to the TCEQ, see the website at www.tceq.state.tx.us, or call: 512/239-4691.

Coordination with Wholesale Water Supplier

> *This section only applies if you purchase supply from a wholesale provider. If you have a contract or agreement with a water provider, then complete this section. If you have your own water rights or otherwise own your supply, this section does not apply.*

This plan has been created with our water provider, _______________'s drought contingency plan in mind. We have included _________________'s (water provider) requirements within our plan and have created this plan to compliment ____________'s (water provider) plan. _____________(water provider) has been provided a copy of this plan.

Plan Definitions

For the purposes of this Plan**,** the following definitions, taken from TCEQ guidance, shall apply:

Aesthetic water use: water use for ornamental or decorative purposes such as fountains, reflecting pools, and water gardens.

Commercial and institutional water use: water use which is integral to the operations of commercial and non-profit establishments and governmental entities such as retail establishments, hotels and motels, restaurants, and office buildings.

Conservation: those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water or increase the recycling and reuse of water so that a supply is conserved and made available for future or alternative uses.

Customer: any person, company, or organization using water supplied by ____________________ (name of water supplier).

Domestic water use: water use for personal needs or for household or sanitary purposes such as drinking, bathing, heating, cooking, sanitation, or for cleaning a residence, business, industry, or institution.

Even number address: street addresses, box numbers, or rural postal route numbers ending in 0, 2, 4, 6, or 8 and locations without addresses.

Industrial water use: the use of water in processes designed to convert materials of lower value into forms having greater usability and value.

Landscape irrigation use: water used for the irrigation and maintenance of landscaped areas, whether publicly or privately owned, including residential and commercial lawns, gardens, golf courses, parks, rights-of-way and medians.

Non-essential water use: water uses that are not essential nor required for the protection of public, health, safety, and welfare, including:

(a) irrigation of landscape areas, including parks, athletic fields, and golf courses, except otherwise provided under this Plan;
(b) use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle;
(c) use of water to wash down any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
(d) use of water to wash down buildings or structures for purposes other than immediate fire protection;
(e) flushing gutters or permitting water to run or accumulate in any gutter or street;

(f) use of water to fill, refill, or add to any indoor or outdoor swimming pools or jacuzzi-type pools;
(g) use of water in a fountain or pond for aesthetic or scenic purposes except where necessary to support aquatic life;
(h) failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s); and
(i) use of water from hydrants for construction purposes or any other purposes other than fire fighting.

Odd numbered address: street addresses, box numbers, or rural postal route numbers ending in 1, 3, 5, 7, or 9.

RESPONSE TO A DROUGHT EVENT

In this portion of the plan, it will need to be determined whether a water constraint will more likely be caused by a shortage in water supply or by constraints in the storage and distribution system. Associated goals and water management measures should correspond to the type of constraint expected. For example, if insufficient storage is determined to be the most likely cause of water shortage during a drought, then an emergency back-up supply source would not solve the problem; reduced use during peak hours (banning lawn watering, etc.) would more likely solve the problem by giving storage tanks a better opportunity to refill.

The drought contingency plan should be designed for a drought condition at least as severe as the drought of record according to TCEQ rules. Since the drought of record in Texas occurred in the 1950's, few systems will have water use records still available to plan by. Therefore, the NETRWPG suggests using the most recent drought for the State, which occurred in 1996. If your system does not have records for 1996, use the time period in your records when your system was the most strained by dry weather conditions.

The drought contingency plan must include a minimum of three drought or emergency response stages providing for the implementation of measures in response to water supply conditions during a repeat of the drought-of-record. – 30 TAC Chapter 288

The drought contingency plan must include specific, quantified targets for water use reductions to be achieved during periods of water shortage and drought. The entity preparing the plan shall establish the targets. The goals established by the entity under this paragraph are not enforceable. – 30 TAC Chapter 288

A minimum of three drought stages is required in this plan. During each stage, it will need to be determined what will trigger initiation, what the water use reduction target goal is, what water management strategies will be put into place, and, finally, what will terminate the stage. Keep in mind that a supplier who is also a customer of its wholesale provider must comply with its provider's Drought Contingency Plan. Do not develop stages or management strategies that are in conflict with your water provider's DCP. Also note that the NETRWPG has developed water management strategies for all providers who are projected to have a water shortage within the planning period (50 years). You should review the latest version of the Regional Water Plan to determine if you have had strategies prepared for you.

Include an opening paragraph in this section that describes what information should be monitored in order to initiate the stages, and a rationale of why you chose the triggering criteria that you chose.

The drought contingency plan must include a provision in every wholesale water contract entered into or renewed after adoption of the plan, including contract extensions, that in case of a shortage of water resulting from drought, the water to be distributed shall be divided in accordance with Texas Water Code, §11.039. – 30 TAC Chapter 288

Texas Water Code, §11.039 states, "DISTRIBUTION OF WATER DURING SHORTAGE. (a) If a shortage of water in a water supply not covered by a water conservation plan prepared in compliance with Texas Natural Resource Conservation Commission or Texas Water Development Board rules results from drought, accident, or other cause, the water to be distributed shall be divided among all customers pro rata, according to the amount each may be entitled to, so that preference is given to no one and everyone suffers alike. (b) If a shortage of water in a water supply covered by a water conservation plan prepared in compliance with Texas Natural Resource Conservation Commission or Texas Water Development Board rules results from drought, accident, or other cause, the person, association of persons, or corporation owning or controlling the water shall divide the water to be distributed among all customers pro rata, according to: (1) the amount of water to which each customer may be entitled; or (2) the amount of water to which each customer may be entitled, less the amount of water the customer would have saved if the customer had operated its water system in compliance with the water conservation plan.(c) Nothing in Subsection (a) or (b) precludes the person, association of persons, or corporation owning or controlling the water from supplying water to a person who has a prior vested right to the water under the laws of this state.

Stage 1 – Mild Water Shortage

Initiation: The ________________________(name of water supplier) will consider that a mild water shortage exists when____________________________________ (i.e. water levels in the reservoir reach_____; average daily water use reaches ___% of capacity for three consecutive days; water level in elevated storage tank is at or below ____ for more than 12 hours, etc.)***, or when requested by ___________*** (entity's water provider) if applicable**.**

Target Goal: When a mild water shortage exists, the _____________________(water supplier) will implement water management strategies in an attempt to reduce daily water use to ____________________________ (i.e. 2 MGD; ___% of average daily water use, etc.) Please note that this goal must be quantifiable. Goals established in this section are not enforceable.

Termination: Stage 1 shall be rescinded when ___________________________ (i.e. water levels in the reservoir rise above ___ for 7 consecutive days; average daily water use falls below ___% of capacity for three consecutive days; storage facilities return to normal levels for 24 consecutive hours, etc.)***, or when Stage I is rescinded by ___________________________*** (entity's water provider) if applicable**.**

Water Management Strategies: During Stage 1, we will take the following steps to reduce water use:_______________.

The following are examples of strategies that are commonly used during this stage. These are not mandatory, only suggestive. When determining strategies, remember the type of constraint you expect on your system and plan accordingly.

The drought contingency plan must include the specific water supply or water demand management measures to be implemented during each stage of the plan including, but not limited to, the following: (A) pro rata curtailment of water deliveries to or diversions by wholesale water customers as provided in Texas Water Code, §11.039; and (B) utilization of alternative water sources with the prior approval of the executive director as appropriate, e.g. interconnection with another water system, temporary use of a non-municipal water supply, use of reclaimed water for non-potable purposes, etc.). – 30 TAC Chapter 288

- Request voluntary water conservation from all customers
- Recommend that customers initiate Stage 1 of their Drought Contingency Plans
- Reduce operating procedures that use water (i.e. flushing of mains) as appropriate

Stage 2 – Moderate Water Shortage

Initiation: The _______________________(water supplier) will consider that a moderate water shortage exists when__________________________________(i.e. water levels in the reservoir reach_____; average daily water use reaches ___% of capacity for three consecutive days; water level in elevated storage tank is at or below ____ for more than 12 hours, etc.)***, or when requested by __________ (entity's water provider)*** if applicable.

Target Goal: When a moderate water shortage exists, the ____________________(water supplier) will implement water management strategies in an attempt to reduce daily water use to ___________________________ (i.e. 2 MGD; ___% of average daily water use, etc.) Please note that this goal must be quantifiable. Goals established in this section are not enforceable.

Termination: Stage 2 shall be rescinded when ___________________________ (i.e. water levels in the reservoir rise above ___ for 7 consecutive days; average daily water use falls below ___% of capacity for three consecutive days; storage facilities return to normal levels for 24 consecutive hours, etc.)***, or when Stage 2 is rescinded by***

___________________________ (entity's water provider) if applicable. ***Upon termination of Stage 2, Stage 1 becomes operative.***

Water Management Strategies: During Stage 2, we will take the following steps to reduce water use:_______________.

The following are examples of strategies that are commonly used during this stage. These are not mandatory, only suggestive. When determining strategies, remember the type of constraint you expect on your system and plan accordingly.

The drought contingency plan must include the specific water supply or water demand management measures to be implemented during each stage of the plan including, but not limited to, the following: (A) pro rata curtailment of water deliveries to or diversions by wholesale water customers as provided in Texas Water Code, §11.039; and (B) utilization of alternative water sources with the prior approval of the executive director as appropriate, e.g. interconnection with another water system, temporary use of a non-municipal water supply, use of reclaimed water for non-potable purposes, etc.). – 30 TAC Chapter 288

- Recommend that customers initiate Stage 2 of their Drought Contingency Plans, which should, at a minimum, contain lawn watering restrictions
- Modify reservoir operations if applicable
- Initiate strong public awareness campaign in service area to warn of impending shortages

Stage 3 – Severe Water Shortage

Initiation: The _______________________(water supplier) will consider that a severe water shortage exists when___________________________________(i.e. water levels in the reservoir reach_____; average daily water use reaches ___% of capacity for three consecutive days; water level in elevated storage tank is at or below ____ for more than 12 hours, etc.)***, or when requested by __________*** (entity's water provider) if applicable**.**

Target Goal: When a severe water shortage exists, the _____________________(water supplier) will implement water management strategies in an attempt to reduce daily water use to ___________________________ (i.e. 2 MGD; ___% of average daily water use, etc.) Please note that this goal must be quantifiable. Goals established in this section are not enforceable.

Termination: Stage 3 shall be rescinded when ____________________________ (i.e. water levels in the reservoir rise above ___ for 7 consecutive days; average daily water use falls below ___% of capacity for three consecutive days; storage facilities return to normal levels for 24 consecutive hours, etc.)***, or when Stage 3 is rescinded by ___________________________*** (entity's water provider) if applicable***. Upon termination of Stage 3, Stage 2 becomes operative.***

Water Management Strategies: During Stage 3, we will take the following steps to reduce water use:_______________.

The following are examples of strategies that are commonly used during this stage. These are not mandatory, only suggestive. When determining strategies, remember the type of constraint you expect on your system and plan accordingly.

The drought contingency plan must include the specific water supply or water demand management measures to be implemented during each stage of the plan including, but not limited to, the following: (A) pro rata curtailment of water deliveries to or diversions by wholesale water customers as provided in Texas Water Code, §11.039; and (B) utilization of alternative water sources with the prior approval of the executive director as appropriate, e.g. interconnection with another water system, temporary use of a non-municipal water supply, use of reclaimed water for non-potable purposes, etc.). – 30 TAC Chapter 288

- Recommend that customers initiate Stage 3 of their Drought Contingency Plans, which, at a minimum, must include a ban on lawn watering
- Begin pro rata water allocation (Pro rata curtailment of water deliveries to or diversions by wholesale water customers must be considered in a wholesale DCP according to 30 TAC Chapter 288, Subchapter B. Rules for pro rata curtailment are provided in Texas Water Code, §11.039.)
- Implement water rate surcharges (i.e. a set charge for any use above average monthly use)
- Implement price adjustments (i.e. increase the price per 1,000 gallons of water used above the average monthly use)
- Utilize alternate or emergency water sources

<u>Stage 4 – Emergency Water Shortage</u>

This Stage could apply in the instance of a major water line break, a contamination of the water supply source, or other urgent water system conditions. Most likely, this stage would be initiated by decision of the authorized plan implementer (Mayor, President, Manager, etc.)

Initiation: The ______________________(water supplier) will consider that an emergency water shortage exists when_________________________________ (i.e. the water main at the water treatment plant bursts or is otherwise significantly damaged; the reservoir is contaminated by oil spill; etc.,)***, or when requested by __________*** (entity's water provider) if applicable.

Target Goal: When an emergency water shortage exists, the ____________________(water supplier) will implement water management strategies in an attempt to reduce daily water use to __________________________ (i.e. 2 MGD; ___% of average daily water use, etc.) Please note that this goal must be quantifiable. Goals established in this section are not enforceable.

Termination: Stage 4 shall be rescinded when __________________________ (i.e. the main at the water treatment plant is restored and storage tanks have been allowed to refill; analysis of the source water indicates that supply is safe to use; etc.), ***or when Stage 4 is rescinded by __________________________***(entity's water provider) if applicable.

Water Management Strategies: During Stage 4, we will take the following steps to reduce water use:_______________.

The following are examples of strategies that are commonly used during this stage. These are not mandatory, only suggestive. When determining strategies, remember the type of constraint you expect on your system and plan accordingly.

The drought contingency plan must include the specific water supply or water demand management measures to be implemented during each stage of the plan including, but not limited to, the following: (A) pro rata curtailment of water deliveries to or diversions by wholesale water customers as provided in Texas Water Code, §11.039; and (B) utilization of alternative water sources with the prior approval of the executive director as appropriate, e.g. interconnection with another water system, temporary use of a non-municipal water supply, use of reclaimed water for non-potable purposes, etc.). – 30 TAC Chapter 288

- Utilize alternative or emergency water supplies (i.e. tying into a neighboring water system, etc. This may require approval by the TCEQ Executive Director)
- Modify reservoir operations
- Strategies listed in Stage 3

PLAN EXECUTION

Public Involvement

This section should discuss the ways in which the supplier will inform its wholesale customers about the initiation and termination of drought stages, as well as management strategies that customers are expected to follow. Public involvement can be in the form of special public hearings, articles and notices in the local newspaper, radio announcements, announcements on local television stations, notices in billing statements, etc.

The ______________________ (water provider) will keep its customers apprised of initiation of the drought contingency plan, and changes in stages, by means of ___________________________.

Enforcement

The _______________ (Mayor, City Manager, President, etc.), or his/her designee, is responsible for monitoring weather conditions and water supplies, and determining when to initiate and terminate stages of the DCP.

The drought contingency plan must include procedures for the enforcement of any mandatory water use restrictions including specification of penalties (e.g., liquidated damages, water rate surcharges, discontinuation of service) for violations of such restrictions. – 30 TAC Chapter 288, Subchapter B.a.10.

The _______________ (governing body) has adopted this plan through ___________ (ordinance, resolution), and has made it an official _________ (city, Corporation, etc.) policy. The _______________ (ordinance, resolution, etc.) is attached hereto as Figure ___.

Provision for responding to wholesale provider restrictions

Any water supplier that receives all or a portion of its water supply from another water supplier shall consult with that supplier and shall include in the drought contingency plan appropriate provisions for responding to reductions in that water supply. – 30 TAC Chapter 288

If you have a wholesale provider, then add this section. If you own your own supply, please skip this section.

As stated in each water shortage stage, we intend to comply with all requirements of our wholesale provider's drought contingency plan. This plan is as stringent as our provider's plan, and in some cases may be more so.

Notification of TCEQ on mandatory provisions

A wholesale or retail water supplier shall notify the executive director within five business days of the implementation of any mandatory provisions of the drought contingency plan. – 30 TAC Chapter 288

The Executive Director at TCEQ shall be notified with 5 business days if any mandatory provisions of this plan are implemented. The Executive Director can be reached at 512-239-3900.

Variance procedures

The drought contingency plan must include procedures for granting variances to the plan. – 30 TAC Chapter 288

The _____________ (authorized representative) may, in writing, grant temporary variance for existing water uses otherwise prohibited under this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the health, sanitation, or fire protection for the public or the customer requesting such variance and if one or more of the following conditions are met:

(a) Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.

(b) Alternative methods can be implemented which will achieve the same level of reduction in water use.

Customers requesting an exemption from the provisions of this Plan shall file a petition for variance with the ______________ (water supplier) within 5 days after the Plan or a particular drought response stage has been invoked. All petitions for variances shall be reviewed by the _________ (authorized representative), and shall include the following:

- ***(a) Name and address of the petitioner(s).***
- ***(b) Purpose of water use.***
- ***(c) Specific provision(s) of the Plan from which the petitioner is requesting relief.***
- ***(d) Detailed statement as to how the specific provision of the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Ordinance.***
- ***(e) Description of the relief requested.***
- ***(f) Period of time for which the variance is sought.***
- ***(g) Alternative water use restrictions or other measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.***
- ***(h) Other pertinent information.***

Variances granted by the _______________ (water supplier) shall be subject to the following conditions, unless waived or modified:

- ***(a) Variances granted shall include a timetable for compliance.***
- ***(b) Variances granted shall expire when the Plan is no longer in effect, unless the petitioner has failed to meet specified requirements.***

No variance shall be retroactive or otherwise justify any violation of this Plan occurring prior to the issuance of the variance.

5-year updates

The retail public water supplier shall review and update, as appropriate, the drought contingency plan, at least every five years, based on new or updated information, such as the adoption or revision of the regional water plan. – 30 TAC Chapter 288

This plan shall be re-evaluated and updated every five years based on updated information; especially the latest adopted NETRWPG Regional Water Plan.

APPENDIX C

CHAPTER 8

Unique Stream Segments/Reservoir Sites/Legislative Recommendations

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APPENDIX C
CHAPTER 8

2011 Regional Water Plan reports of Ecologically Unique Stream Segments included herein for use in the 2016 Regional Water Plan.

Table of Contents

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DRAFT

Description for Designation of Pecan Bayou as an Ecologically Unique Stream Segment

Pecan Bayou originates two miles south of Woodland in northwestern Red River County, flows generally east forty miles to join the Red River approximately one mile west of the Bowie County line (Texas Historical Association, 2009). The site, including bottomland forest, encompasses approximately 613,462 acres (fig.1). It represents one of the largest undammed watersheds in northeast Texas; and supports multiple large examples of mature bottomland hardwood forest, and rare and endangered species (Zwartjes, et al, 2000).

1) **Biological function**: Extensive bottomland hardwood forest supporting multiple occurrences of rare plant life, including:
    - Arkansas meadowrue (*Thalictrum arkansanum* G2QS1) (Sanders, 1994)
    - Southern lady's slipper orchid (*Cypripedium kentuckiense* G3S1) (Sanders, 1994)
    - Old growth Shortleaf Pine-Oak forest (*Pinus echinata-Quercus sp*. G4S4) (Sanders, 1994)
    - Water oak-Willow oak association (*Quercus nigra-Q. phellos* G4S3) (Sanders, 1994)

2) **Hydrologic function**: Represents one of the largest undammed watersheds in northeast Texas, natural hydrologic regime is assumed intact. Flood attenuation, flow stabilization and impacts on groundwater recharge have not been quantified.
3) **Riparian conservation areas:** No public conservation areas however significant private conservation area[1].
4) **High water quality/exceptional aquatic life**: Insufficient data
5) **Threatened and endangered species**:
    - American Burying Beetle (*Nicrophorus americanus* G2 Federally listed Endangered) (Godwin, 2005)
    - Black Bear (*Ursus americanus* G5 State Threatened, ssp. *luteolus* Federally listed Threatened) (Garner, personal communication, 2007)
    - Timber Rattlesnake (*Crotalus horridus* G4 State Threatened)

[1]The Nature Conservancy, Texas Chapter, owns 1334 acres within a 6,960-acre site protecting examples of the preceding conservation elements although they are extensive within the watershed. The preserve, Lennox Woods, is located approximately 1.5 miles south of the community of Negley. The land protects an approximate 2.6 mile segment of Pecan Bayou.

Garner, Nathan. 2007. Personal communication regarding black bear presence within the Pecan Bayou area.
Godwin, Will 2005. Internal report to The Nature Conservancy
Handbook of Texas Online, s.v. ",” http://www.tshaonline.org/handbook/online/articles/PP/rhp4.html
Sanders. R.W. 1994. Vegetational Survey: Lennox Woods Preserve, Red River County, Texas. Unpublished report prepared for The Nature Conservancy of Texas. Botanical Research Institute of Texas. Ft. Worth, Texas
Zwartjes, Michelle, Eidson, James and Kristen Terpening, 2000. Conservation Plan for the Pecan Bayou Megasite. Report to The Nature Conservancy, Texas Chapter.

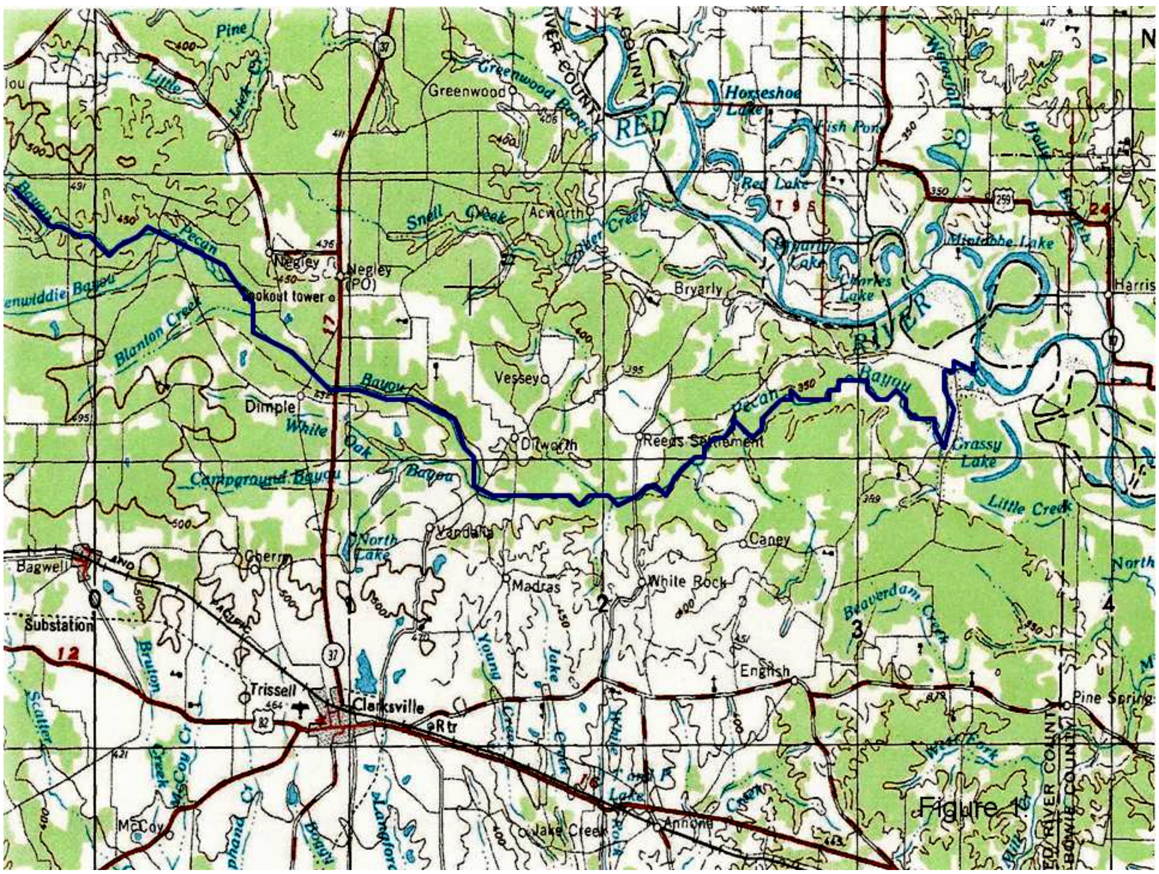
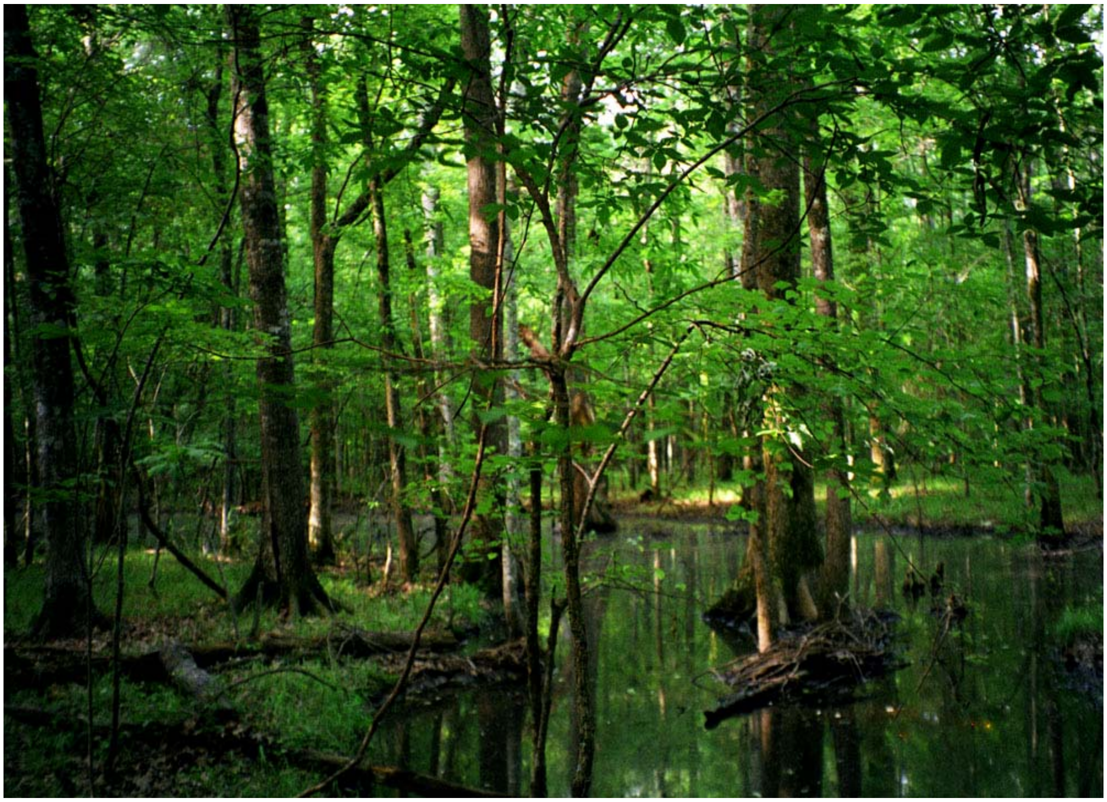
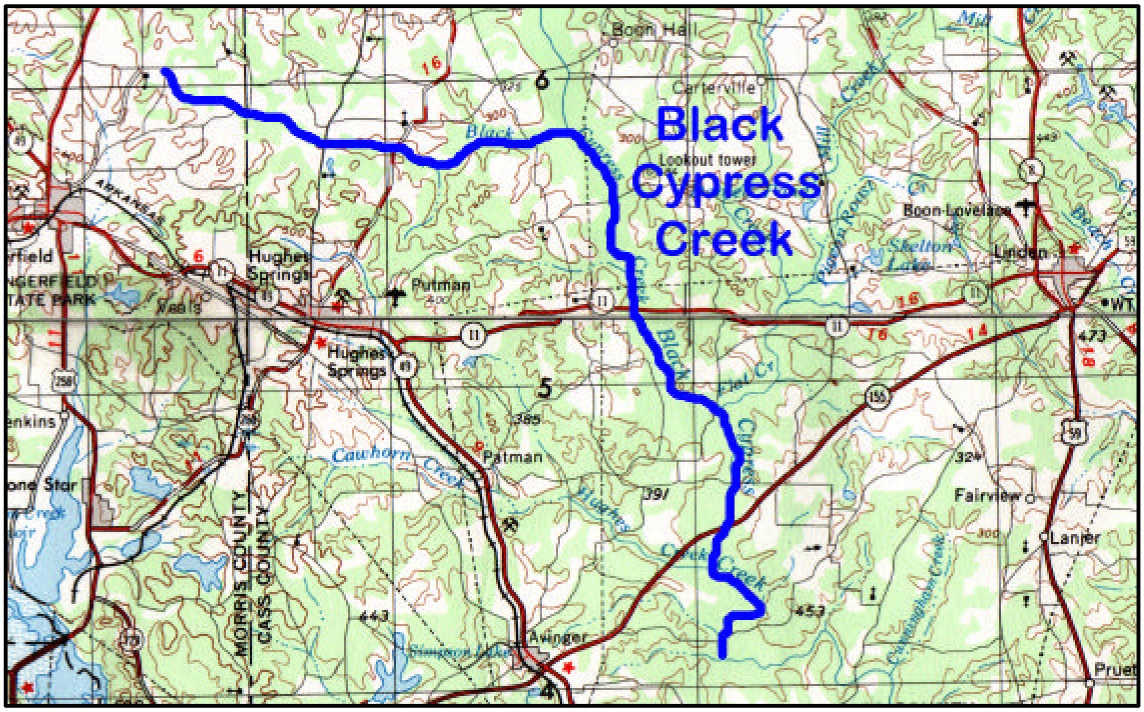


Figure 1





Adapted from USGS Tyler, Texas. Original Scale 1: 250,000.

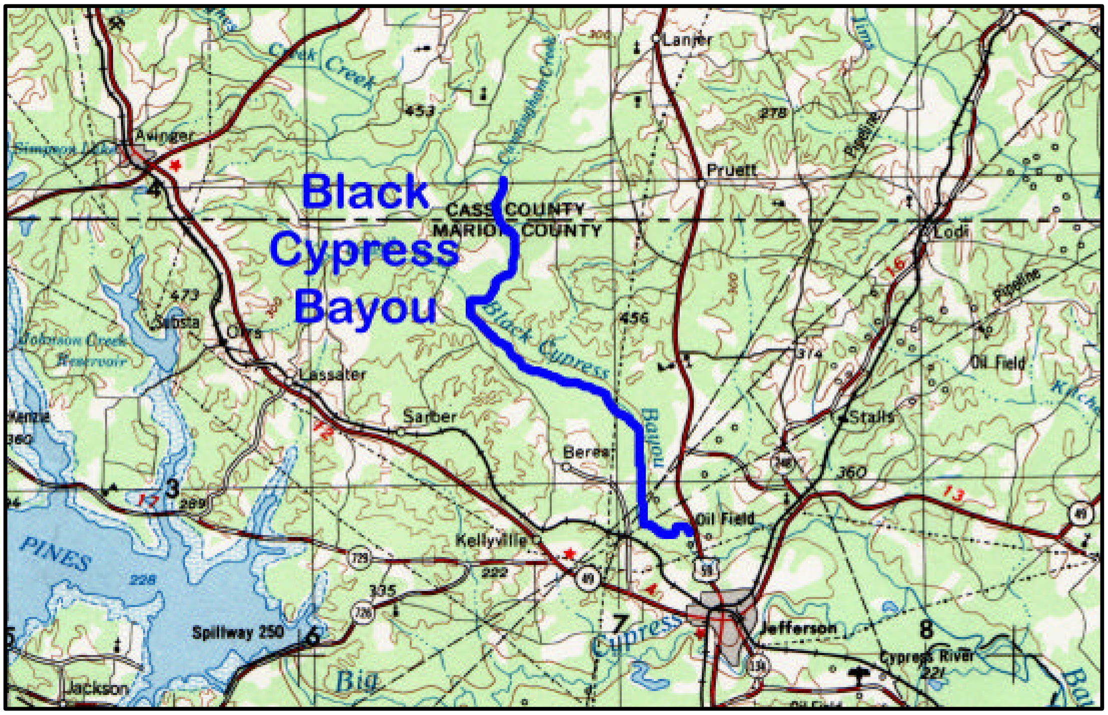
Figure 6. Map Location of Black Cypress Creek

Figure 7. Black Cypress Creek east of CR 1617

Black Cypress Creek

Black Cypress Creek begins northeast of Daingerfield in eastern Morris County and flows southeasterly about 20 miles where it becomes Black Cypress Bayou east of Avinger in southern Cass County. It has a very favorable hydrologic regime, as there are no reservoirs upstream, thus the creek floods frequently and has numerous tributaries and sloughs. The stream channel meanders extensively over a substrate that is comprised predominately of clay and decaying organic matter (Bayer et al., 1992). The lower portion of the creek is within a 12,800-acre area identified by the USFWS as containing priority bottomland hardwood. This area is very diverse with a mix of high quality water oak, willow oak, overcup oak, and red oak mixed with sweetgum, black gum, river birch, ironwood, and mayhaw, as well as several significant cypress stands (USFWS, 1985). This habitat has high species value to white-tail deer, American alligators, furbearers, squirrels, waterfowl, turkeys, raptors, colonial waterbirds, and other migratory birds (USFWS, 1985). Abundant vegetation also provides instream cover in the form of woody debris and overhanging vegetation that helps the creek support a diverse assemblage of fish and benthic macroinvertebrates. Fish species collected from Black Cypress Creek in August of 1989 include several shiner species, pugnose minnow, bullhead minnow, tadpole madtom, pirate perch, western mosquitofish, flier, largemouth bass, several darter species (slough, cypress, redfin, dusky), and several sunfish species (Bayer et al., 1992). The candidate segment is from the confluence with Black Cypress Bayou east of Avinger in South Cass County upstream to its headwaters located four miles northeast of Daingerfield in eastern Morris County.

(1) Biological Function- priority bottomland hardwood habitat displays significant overall habitat value (USFWS, 1985).
(2) Hydrologic Function- bottomland hardwood forest and associated wetlands perform valuable hydrologic function relating to water quality.
(3) Riparian Conservation Area- none identified.
(4) High Water Quality/Exceptional Aquatic Life/High Aesthetic Value- designated as a South Central Plains Ecoregion Stream by the TPWD River Studies Program due to diversity of benthic macroinvertebrates and fish (Bayer et al., 1992; Linam et al., in review).
(5) Threatened or Endangered Species/Unique Communities- none identified.



Adapted from USGS Tyler, Texas. Original Scale 1: 250,000.

Figure 8. Map Location of Black Cypress Bayou

Figure 9. Black Cypress Bayou south of CC Bridge Road

Black Cypress Bayou

Black Cypress Bayou begins at the confluence with Black Cypress Creek east of Avinger in southern Cass County and flows southeasterly about 20 miles where it empties into Big Cypress Bayou in Marion County. The upper reach of the bayou is within the same 12,800-acre area of priority bottomland hardwoods as Black Cypress Creek, thus it supports the same diverse mix of oak, sweetgum, black gum, river birch, ironwood, mayhaw, and cypress. Also like Black Cypress Creek, the bayou has high species value to white-tail deer, waterfowl, furbearers, American alligators, squirrels, turkeys, raptors, colonial waterbirds, and other migratory birds (USFWS, 1985). This section of the bayou, like much of the Big Cypress Bayou Basin, is within the target recovery area set by the TPWD for the state threatened paddlefish (Pitman, 1992). The candidate segment is from the confluence with Big Cypress Bayou in south central Marion County upstream to the confluence with Black Cypress Creek east of Avinger in south Cass County.

(1) Biological Function- priority bottomland hardwood forest displays significant overall habitat value (USFWS, 1985).
(2) Hydrologic Function- bottomland forest and associated wetlands provide valuable hydrologic function relating to water quality.
(3) Riparian Conservation Area- none identified.
(4) High Water Quality/Exceptional Aquatic Life/High Aesthetic Value- insufficient data to evaluate criteria.
(5) Threatened or Endangered Species/Unique Communities- significant due to presence of state threatened paddlefish (TPWD, 1998b).

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Memorandum

To: Jim Eidson

From: John Dugdale

Date: December 28, 2009

Subject: Legal Aspects of Recommendations by Regional Water Planning Groups to Designate Texas Stream Segment Designations as Having Unique Ecological Values and of Potentially-Associated Impacts of Such Designation

You have posed several questions regarding the impact of a Regional Water Planning Group's recommendation, ultimately to the Texas Water Development Board, to designate, in an adopted regional water plan, river and stream segments as having unique ecological values.

Background:

The statutory authority for the Texas Legislature to designate a river or stream segment of unique ecological value is Texas Water Code, Sections 16.051(e) and (f)[1] (emphasis added - full

[1] Sec. 16.051. STATE WATER PLAN: DROUGHT, CONSERVATION, DEVELOPMENT, AND MANAGEMENT; EFFECT OF PLAN. (a) Not later than January 5, 2002, and before the end of each successive five-year period after that date, the board shall prepare, develop, formulate, and adopt a comprehensive state water plan that incorporates the regional water plans approved under Section 16.053. The state water plan shall provide for the orderly development, management, and conservation of water resources and preparation for and response to drought conditions, in order that sufficient water will be available at a reasonable cost to ensure public health, safety, and welfare; further economic development; and protect the agricultural and natural resources of the entire state.
(b) The state water plan, as formally adopted by the board, shall be a guide to state water policy. The commission shall take the plan into consideration in matters coming before it.
(c) The board by rule shall define and designate river basins and watersheds.
(d) The board, in coordination with the commission, the Department of Agriculture, and the Parks and Wildlife Department, shall adopt by rule guidance principles for the state water plan which reflect the public interest of the entire state. When adopting guidance principles, due consideration shall be given to the construction and improvement of surface water resources and the application of principles that result in voluntary redistribution of water resources. The board shall review and update the guidance principles, with input from the commission, the Department of Agriculture, and the Parks and Wildlife Department, as necessary but at least every five years to coincide with the five-year cycle for adoption of a new water plan as described in Subsection (a).
(e) On adoption the board shall deliver the state water plan to the governor, the lieutenant governor, and the speaker of the house of representatives and present the plan for review to the appropriate legislative committees. The plan shall include legislative recommendations that the board believes are needed and desirable to facilitate more voluntary water transfers. The plan shall identify river and stream segments of unique ecological value and sites of unique value for the construction of reservoirs that the board recommends for protection under this section.
(f) The legislature may designate a river or stream segment of unique ecological value. This designation solely means that a state agency or political subdivision of the state may not finance the actual construction of a reservoir in a specific river or stream segment designated by the legislature under this subsection.

text of Section 16.051 included in Footnote 1 for context). The Legislature has delegated the authority for the designation of such stream segments to Regional Water Planning Groups; the regulations that define how a Regional Water Planning Group is to make such a recommendation to the Texas Water Development Board are found at 31 TAC § 357.8, Ecologically Unique River and Stream Segments[2] (emphasis added).

(g) The legislature may designate a site of unique value for the construction of a reservoir. A state agency or political subdivision of the state may not obtain a fee title or an easement that would significantly prevent the construction of a reservoir on a site designated by the legislature under this subsection.

(g-1) Notwithstanding any other provisions of law, a site is considered to be a designated site of unique value for the construction of a reservoir if the site is recommended for designation in the 2007 state water plan adopted by the board and in effect on May 1, 2007. The designation of a unique reservoir site under this subsection terminates on September 1, 2015, unless there is an affirmative vote by a proposed project sponsor to make expenditures necessary in order to construct or file applications for permits required in connection with the construction of the reservoir under federal or state law.

(h) The board, the commission, or the Parks and Wildlife Department or a political subdivision affected by an action taken in violation of Subsection (f) or (g) may bring a cause of action to remedy or prevent the violation. A cause of action brought under this subsection must be filed in a district court in Travis County or in the county in which the action is proposed or occurring.

(i) For purposes of this section, the acquisition of fee title or an easement by a political subdivision for the purpose of providing retail public utility service to property in the reservoir site or allowing an owner of property in the reservoir site to improve or develop the property may not be considered a significant impairment that prevents the construction of a reservoir site under Subsection (g). A fee title or easement acquired under this subsection may not be considered the basis for preventing the future acquisition of land needed to construct a reservoir on a designated site.

[2] 31 TAC § 357.8(a): Regional Water Planning Groups may include in adopted regional water plans recommendations for all or parts of river and stream segments of unique ecological value located within the regional water planning area by preparing a recommendation package consisting of a physical description giving the location of the stream segment, maps, and photographs of the stream segment and a site characterization of the stream segment documented by supporting literature and data. The recommendation package shall address each of the criteria for designation of river and stream segments of ecological value found in subsection (b) of this section. <u>The regional water planning group shall forward the recommendation package to the Texas Parks and Wildlife Department and allow the Texas Parks and Wildlife Department 30 days for its written evaluation of the recommendation</u>. The adopted regional water plan shall include, if available, Texas Parks and Wildlife Department's written evaluation of each river and stream segment recommended as a river or stream segment of unique ecological value.

(b) A regional water planning group may recommend a river or stream segment as being of unique ecological value based upon the following criteria:

(1) biological function--stream segments which display significant overall habitat value including both quantity and quality considering the degree of biodiversity, age, and uniqueness observed and including terrestrial, wetland, aquatic, or estuarine habitats;

(2) hydrologic function--stream segments which are fringed by habitats that perform valuable hydrologic functions relating to water quality, flood attenuation, flow stabilization, or groundwater recharge and discharge;

(3) riparian conservation areas--stream segments which are fringed by significant areas in public ownership including state and federal refuges, wildlife management areas, preserves, parks, mitigation areas, or other areas held by governmental organizations for conservation purposes, or stream segments which are fringed by other areas managed for conservation purposes under a governmentally approved conservation plan;

(4) high water quality/exceptional aquatic life/high aesthetic value--stream segments and spring resources that are significant due to unique or critical habitats and exceptional aquatic life uses dependent on or associated with high water quality; or

<u>The three questions your posed are</u>:

1. What impact may the <u>mere designation</u> as an ecologically unique stream segment pursuant to TX Water Code § 16.051(f) have on the riparian rights of a landowner whose property is adjacent to a stream segment designated as such by the Legislature?

2. Could subsequent legislation that, unlike the current scheme, imposes restrictions on the development and usage rights of such a landowner, retroactively impact a pre-existing ecologically unique stream segment designation?

3. Is there a link between the designation of a stream segment an ecologically unique stream segment and value and the potential designation of that stream segment as a Wild and Scenic River pursuant to the Wild and Scenic Rivers Act (the "Act"), 16 U.S.C. § 1271 *et seq*.

<u>Responses</u>:

1. No impact - please note that this response presupposes only that the State Water Board has adopted the designation in the State Water Plan. *See* TX Water Code § 16.051(b):

   TX Water Code § 16.051(f) unambiguously states:

   > The legislature may designate a river or stream segment of unique ecological value. This designation solely means that a state agency or political subdivision of the state may not finance the actual construction of a reservoir in a specific river or stream segment designated by the legislature under this subsection.

   Notwithstanding the response stated *supra*, the legislative history for the companion provision of TX Water Code § 16.051(g), which relates to the designation of a site having unique attributes to the construction of a reservoir, The Bill Analysis of SB 3 indicates that the Legislature considered for the interference with private landowners' property rights in violation of Section 17 of the Texas Constitution:

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(5) threatened or endangered species/unique communities--sites along streams where water development projects would have significant detrimental effects on state or federally listed threatened and endangered species, and sites along streams significant due to the presence of unique, exemplary, or unusually extensive natural communities.
(c) For every river and stream segment that has been designated as a unique river or stream segment by the legislature, during a session that ends not less than one year before the required date of submittal of an adopted regional water plan to the board, or recommended as a unique river or stream segment in the regional water plan, the regional water planning group shall assess the impact of the regional water plan on these segments. The assessment shall be a quantitative analysis of the impact of the plan on the flows important to the river or stream segment, as determined by the regional water planning group, comparing current conditions to conditions with implementation of all recommended water management strategies. The assessment shall also describe the impact of the plan on the unique features cited in the region's recommendation of that segment.

A cause of action could be bought under certain circumstances. Before bringing a cause of action against a state agency or other political subdivision that had taken an action preventing the construction of a reservoir on a designated reservoir site, a political subdivision would have to file a letter of intent to construct a reservoir on the site affected by the action and offer to pay each owner of real property in the reservoir site an encumbrance. An owner of real property could reject the encumbrance The payment would have to be paid annually until the property was either acquired for the reservoir or no longer in the reservoir site. The amount would have to be at least 2.5 times the total ad valorem taxes imposed in the preceding year…

Reservoir designation. CSSB 3 needlessly would cloud the title of landowners within a designated reservoir site, because the threat of a future reservoir negatively would affect their property value. Supporters of reservoir designation point out that many of these reservoirs may never be built. However, the cloud would remain on the title to property in a designated site from the moment the bill [for the reservoir designation] was enacted. It would be unfair to make this designation without providing immediate funds to offset the loss in value that landowners would see. Without such compensation, the state in effect would be taking private property rights without compensation.

2. No:

Pursuant to Article 1, Section 16, of the Texas Constitution, the Texas Legislature may not enact an *ex post facto* or retroactive law.

In addition, pursuant to Article 1, Section 17, of the Texas Constitution, "no person's property shall be taken, damaged, or destroyed for or applied to public use without adequate compensation being made, unless by the consent of such person…"

However, there is no constitutional prohibition against a change in law that could void an existing riparian landuse scheme and impose new restrictions (which new restrictions, of course, could be subject to challenge).

3. Possibly.

Pursuant to Section 2(a)(ii) of the Act, 16 U.S.C. § 1272(a)(ii), a condition precedent for the Secretary of the Interior to designate, through a notice and comment rulemaking, a river or stream as a Wild and Scenic River, the Secretary must receive such a request from the governor of the state or states where the river or stream is located.[3]

[3] In pertinent part, Section 2(a)(ii) of the Act states: [The national and scenic rivers system shall comprise rivers]… that are designated as wild, scenic or recreational rivers by or pursuant to an act of the legislature

> Among the determinations the Department of Interior ("DOI") must make in that process is whether there are sufficient local, state, and federal mechanisms already in place to protect the river or stream in question, and whether the state in question has the ability to implement those mechanisms.
>
> Thus, the designation by the Texas Legislature, pursuant to TX Water Code TX Water Code § 16.051(e), of a river or stream as an ecologically unique stream segment would be a condition precedent for such a river or stream's candidacy for designation as a Wild and Scenic River. That segment's designation by the Texas Legislation would necessarily follow the recommendation of a regional water planning group in a regional water plan to nominate that segment as a unique river or stream segment. *See* 31 TAC § 357.8.

Finally, we had also discussed potential concerns of individual liability exposure of members of regional planning groups for acts conducted in their capacity as a member of such a group.

TX Water Code § 16.053(m) - (o) provide the following:

> (m) A cause of action does not accrue against a regional water planning group, a representative who serves on the regional water planning group, or an employee of a political subdivision that contracts with the regional water planning group under Subsection (l) for an act or omission in the course and scope of the person's work relating to the regional water planning group.
>
> (n) A regional water planning group, a representative who serves on the regional water planning group, or an employee of a political subdivision that contracts with the regional water planning group under Subsection (l) is not liable for damages that may arise from an act or omission in the course and scope of the person's work relating to the regional water planning group.
>
> (o) The attorney general, on request, shall represent a regional water planning group, a representative who serves on the regional water planning group, or an employee of a political subdivision that contracts with the regional water planning group under Subsection (l) in a suit arising from an act or omission relating to the regional water planning group.

Please do not hesitate to call me to discuss this memorandum.

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of the State or States through which they flow, that are to be permanently administered as weld, scenic, or recreational rivers by an agency or political subdivision of the State or States concerned, that are found by the Secretary of the Interior, upon application of the Governor of the State or the Governors of the States concerned, or a person or persons thereunto duly appointed by him or them, to meet the criteria established in this Act and such critical supplementary thereto as he may prescribe, and that are approved by him for inclusion in the system.

cc: David Bezanson, TNC

APPENDIX C

CHAPTER 9

Infrastructure Financing

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APPENDIX C
CHAPTER 9

Results from Infrastructure Financing analyses will be included in the Final 2016 Region D Plan.

Table of Contents

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SponsorEntityName	Sponsor Entity Primary Region	ProjectName	WMS Project Sponsor Region	IFRElementName	IFRElementValue	YearOfNeed
BI COUNTY WSC	D	DRILL NEW WELLS (BI COUNTY WSC, QUEEN, CYPRESS, CAMP, 2060)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
BI COUNTY WSC	D	DRILL NEW WELLS (BI COUNTY WSC, QUEEN, CYPRESS, CAMP, 2060)	D	CONSTRUCTION FUNDING		
BI COUNTY WSC	D	DRILL NEW WELLS (BI COUNTY WSC, QUEEN, CYPRESS, CAMP, 2060)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
BI COUNTY WSC	D	DRILL NEW WELLS (BI COUNTY WSC, QUEEN, CYPRESS, CAMP, 2070)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
BI COUNTY WSC	D	DRILL NEW WELLS (BI COUNTY WSC, QUEEN, CYPRESS, CAMP, 2070)	D	CONSTRUCTION FUNDING		
BI COUNTY WSC	D	DRILL NEW WELLS (BI COUNTY WSC, QUEEN, CYPRESS, CAMP, 2070)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
BI COUNTY WSC	D	DRILL NEW WELLS (BI COUNTY WSC, QUEEN, CYPRESS, UPSHUR, 2060)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
BI COUNTY WSC	D	DRILL NEW WELLS (BI COUNTY WSC, QUEEN, CYPRESS, UPSHUR, 2060)	D	CONSTRUCTION FUNDING		
BI COUNTY WSC	D	DRILL NEW WELLS (BI COUNTY WSC, QUEEN, CYPRESS, UPSHUR, 2060)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
CADDO BASIN SUD	D	CONSERVATION, WATER LOSS CONTROL - CADDO BASIN SUD	C	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
CADDO BASIN SUD	D	CONSERVATION, WATER LOSS CONTROL - CADDO BASIN SUD	C	CONSTRUCTION FUNDING		
CADDO BASIN SUD	D	CONSERVATION, WATER LOSS CONTROL - CADDO BASIN SUD	C	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
CANTON	D	DRILL NEW WELLS (CANTON, CARRIZO-WILCOX, SABINE)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$202,400.00	2016
CANTON	D	DRILL NEW WELLS (CANTON, CARRIZO-WILCOX, SABINE)	D	CONSTRUCTION FUNDING	$488,000.00	2016
CANTON	D	DRILL NEW WELLS (CANTON, CARRIZO-WILCOX, SABINE)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
CASH SUD	D	CASH WSC - INCREASE DELIVERY INFRASTRUCTURE TO PURCHASE ADDITIONAL WATER FROM NTMWD Q-180	C	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$0.00	
CASH SUD	D	CASH WSC - INCREASE DELIVERY INFRASTRUCTURE TO PURCHASE ADDITIONAL WATER FROM NTMWD Q-180	C	CONSTRUCTION FUNDING	$0.00	
CASH SUD	D	CASH WSC - INCREASE DELIVERY INFRASTRUCTURE TO PURCHASE ADDITIONAL WATER FROM NTMWD Q-180	C	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
CASH SUD	D	CONSERVATION, WATER LOSS CONTROL - CASH SUD	C	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$0.00	
CASH SUD	D	CONSERVATION, WATER LOSS CONTROL - CASH SUD	C	CONSTRUCTION FUNDING	$0.00	
CASH SUD	D	CONSERVATION, WATER LOSS CONTROL - CASH SUD	C	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
CELESTE	D	DRILL NEW WELLS (CELESTE, WOODBINE, SABINE, 2050)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
CELESTE	D	DRILL NEW WELLS (CELESTE, WOODBINE, SABINE, 2050)	D	CONSTRUCTION FUNDING		
CELESTE	D	DRILL NEW WELLS (CELESTE, WOODBINE, SABINE, 2050)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
CELESTE	D	DRILL NEW WELLS (CELESTE, WOODBINE, SABINE, 2070)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
CELESTE	D	DRILL NEW WELLS (CELESTE, WOODBINE, SABINE, 2070)	D	CONSTRUCTION FUNDING		
CELESTE	D	DRILL NEW WELLS (CELESTE, WOODBINE, SABINE, 2070)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
CLARKSVILLE	D	CONTRACT WITH TEXARKANA AND TREATED WATER PIPELINE TO DEKALB (CLARKSVILLE, SULPHUR)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$1,581,000.00	2020
CLARKSVILLE	D	CONTRACT WITH TEXARKANA AND TREATED WATER PIPELINE TO DEKALB (CLARKSVILLE, SULPHUR)	D	CONSTRUCTION FUNDING	$8,472,000.00	2025
CLARKSVILLE	D	CONTRACT WITH TEXARKANA AND TREATED WATER PIPELINE TO DEKALB (CLARKSVILLE, SULPHUR)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
COUNTY-OTHER, HUNT	D	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2030)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$1,796,000.00	2020
COUNTY-OTHER, HUNT	D	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2030)	D	CONSTRUCTION FUNDING	$600,000.00	2020
COUNTY-OTHER, HUNT	D	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2030)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
COUNTY-OTHER, HUNT	D	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2040)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$1,796,000.00	2030
COUNTY-OTHER, HUNT	D	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2040)	D	CONSTRUCTION FUNDING	$600,000.00	2030
COUNTY-OTHER, HUNT	D	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2040)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
COUNTY-OTHER, HUNT	D	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2050)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$1,796,000.00	2040
COUNTY-OTHER, HUNT	D	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2050)	D	CONSTRUCTION FUNDING	$600,000.00	2040
COUNTY-OTHER, HUNT	D	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2050)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
COUNTY-OTHER, HUNT	D	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2060)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$1,796,000.00	2050

SponsorEntityName	Sponsor Entity Primary Region	ProjectName	WMS Project Sponsor Region	IFRElementName	IFRElementValue	YearOfNeed
COUNTY-OTHER, HUNT	D	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2060)	D	CONSTRUCTION FUNDING	$600,000.00	2050
COUNTY-OTHER, HUNT	D	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2060)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
COUNTY-OTHER, HUNT	D	GREENVILLE TIE-IN PIPELINE (COUNTY-OTHER HUNT, SABINE)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$6,316,000.00	2060
COUNTY-OTHER, HUNT	D	GREENVILLE TIE-IN PIPELINE (COUNTY-OTHER HUNT, SABINE)	D	CONSTRUCTION FUNDING	$19,354,000.00	2060
COUNTY-OTHER, HUNT	D	GREENVILLE TIE-IN PIPELINE (COUNTY-OTHER HUNT, SABINE)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
CRYSTAL SYSTEMS INC	D	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2020)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$0.00	
CRYSTAL SYSTEMS INC	D	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2020)	D	CONSTRUCTION FUNDING	$0.00	
CRYSTAL SYSTEMS INC	D	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2020)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
CRYSTAL SYSTEMS INC	D	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2040)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$0.00	
CRYSTAL SYSTEMS INC	D	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2040)	D	CONSTRUCTION FUNDING	$0.00	
CRYSTAL SYSTEMS INC	D	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2040)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
CRYSTAL SYSTEMS INC	D	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2050)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$0.00	
CRYSTAL SYSTEMS INC	D	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2050)	D	CONSTRUCTION FUNDING	$0.00	
CRYSTAL SYSTEMS INC	D	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2050)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
CRYSTAL SYSTEMS INC	D	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2070)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$0.00	
CRYSTAL SYSTEMS INC	D	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2070)	D	CONSTRUCTION FUNDING	$0.00	
CRYSTAL SYSTEMS INC	D	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2070)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
CRYSTAL SYSTEMS INC	D	SMTH-CYS - INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$0.00	
CRYSTAL SYSTEMS INC	D	SMTH-CYS - INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$0.00	
CRYSTAL SYSTEMS INC	D	SMTH-CYS - INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
CUMBY	D	DRILL NEW WELLS (CUMBY, NACATOCH)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
CUMBY	D	DRILL NEW WELLS (CUMBY, NACATOCH)	D	CONSTRUCTION FUNDING		
CUMBY	D	DRILL NEW WELLS (CUMBY, NACATOCH)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
GILMER	D	DRILL NEW WELLS (GILMER, QUEEN, CYPRESS)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$0.00	
GILMER	D	DRILL NEW WELLS (GILMER, QUEEN, CYPRESS)	D	CONSTRUCTION FUNDING	$0.00	
GILMER	D	DRILL NEW WELLS (GILMER, QUEEN, CYPRESS)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
GREENVILLE	D	CHAPMAN RAW WATER PIPELINE AND NEW WTP (GREENVILLE, SULPHUR)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
GREENVILLE	D	CHAPMAN RAW WATER PIPELINE AND NEW WTP (GREENVILLE, SULPHUR)	D	CONSTRUCTION FUNDING		
GREENVILLE	D	CHAPMAN RAW WATER PIPELINE AND NEW WTP (GREENVILLE, SULPHUR)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
GREENVILLE	D	TOLEDO BEND TIE-IN PIPELINE (GREENVILLE, SABINE)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
GREENVILLE	D	TOLEDO BEND TIE-IN PIPELINE (GREENVILLE, SABINE)	D	CONSTRUCTION FUNDING		
GREENVILLE	D	TOLEDO BEND TIE-IN PIPELINE (GREENVILLE, SABINE)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
GREENVILLE	D	WTP EXPANSION (GREENVILLE, SABINE)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
GREENVILLE	D	WTP EXPANSION (GREENVILLE, SABINE)	D	CONSTRUCTION FUNDING		
GREENVILLE	D	WTP EXPANSION (GREENVILLE, SABINE)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
HICKORY CREEK SUD	D	CONSERVATION, WATER LOSS CONTROL - HICKORY CREEK SUD	C	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
HICKORY CREEK SUD	D	CONSERVATION, WATER LOSS CONTROL - HICKORY CREEK SUD	C	CONSTRUCTION FUNDING		
HICKORY CREEK SUD	D	CONSERVATION, WATER LOSS CONTROL - HICKORY CREEK SUD	C	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, TRINITY, TRINITY, 2050)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, TRINITY, TRINITY, 2050)	D	CONSTRUCTION FUNDING		
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, TRINITY, TRINITY, 2050)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, TRINITY, TRINITY, 2060)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, TRINITY, TRINITY, 2060)	D	CONSTRUCTION FUNDING		
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, TRINITY, TRINITY, 2060)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, TRINITY, TRINITY, 2070)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		

SponsorEntityName	Sponsor Entity Primary Region	ProjectName	WMS Project Sponsor Region	IFRElementName	IFRElementValue	YearOfNeed
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, TRINITY, TRINITY, 2070)	D	CONSTRUCTION FUNDING		
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, TRINITY, TRINITY, 2070)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, WOODBINE, SABINE, 2040)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, WOODBINE, SABINE, 2040)	D	CONSTRUCTION FUNDING		
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, WOODBINE, SABINE, 2040)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, WOODBINE, SABINE, 2050)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, WOODBINE, SABINE, 2050)	D	CONSTRUCTION FUNDING		
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, WOODBINE, SABINE, 2050)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, WOODBINE, SABINE, 2060)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, WOODBINE, SABINE, 2060)	D	CONSTRUCTION FUNDING		
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, WOODBINE, SABINE, 2060)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, WOODBINE, SABINE, 2070)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, WOODBINE, SABINE, 2070)	D	CONSTRUCTION FUNDING		
HICKORY CREEK SUD	D	DRILL NEW WELLS (HICKORY CREEK SUD, WOODBINE, SABINE, 2070)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, BOWIE	D	DRILL NEW WELLS (BOWIE IRRIGATION, CARRIZO-WILCOX, SULPHUR)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, BOWIE	D	DRILL NEW WELLS (BOWIE IRRIGATION, CARRIZO-WILCOX, SULPHUR)	D	CONSTRUCTION FUNDING		
IRRIGATION, BOWIE	D	DRILL NEW WELLS (BOWIE IRRIGATION, CARRIZO-WILCOX, SULPHUR)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, BOWIE	D	DRILL NEW WELLS (BOWIE IRRIGATION, NACATOCH, RED)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, BOWIE	D	DRILL NEW WELLS (BOWIE IRRIGATION, NACATOCH, RED)	D	CONSTRUCTION FUNDING		
IRRIGATION, BOWIE	D	DRILL NEW WELLS (BOWIE IRRIGATION, NACATOCH, RED)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, HARRISON	D	DRILL NEW WELLS (IRRIGATION HARRISON, CARRIZO-WILCOX, CYPRESS)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, HARRISON	D	DRILL NEW WELLS (IRRIGATION HARRISON, CARRIZO-WILCOX, CYPRESS)	D	CONSTRUCTION FUNDING		
IRRIGATION, HARRISON	D	DRILL NEW WELLS (IRRIGATION HARRISON, CARRIZO-WILCOX, CYPRESS)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, HARRISON	D	DRILL NEW WELLS (IRRIGATION HARRISON, CARRIZO-WILCOX, SABINE)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, HARRISON	D	DRILL NEW WELLS (IRRIGATION HARRISON, CARRIZO-WILCOX, SABINE)	D	CONSTRUCTION FUNDING		
IRRIGATION, HARRISON	D	DRILL NEW WELLS (IRRIGATION HARRISON, CARRIZO-WILCOX, SABINE)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, HOPKINS	D	DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, CYPRESS)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, HOPKINS	D	DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, CYPRESS)	D	CONSTRUCTION FUNDING		
IRRIGATION, HOPKINS	D	DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, CYPRESS)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, HOPKINS	D	DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, SABINE)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, HOPKINS	D	DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, SABINE)	D	CONSTRUCTION FUNDING		
IRRIGATION, HOPKINS	D	DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, SABINE)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, HOPKINS	D	SULPHUR SPRINGS RAW WATER PIPELINE (IRRIGATION HOPKINS, SULPHUR)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, HOPKINS	D	SULPHUR SPRINGS RAW WATER PIPELINE (IRRIGATION HOPKINS, SULPHUR)	D	CONSTRUCTION FUNDING		
IRRIGATION, HOPKINS	D	SULPHUR SPRINGS RAW WATER PIPELINE (IRRIGATION HOPKINS, SULPHUR)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, HUNT	D	DRILL NEW WELLS (IRRIGATION HUNT, NACATOCH, SABINE)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, HUNT	D	DRILL NEW WELLS (IRRIGATION HUNT, NACATOCH, SABINE)	D	CONSTRUCTION FUNDING		
IRRIGATION, HUNT	D	DRILL NEW WELLS (IRRIGATION HUNT, NACATOCH, SABINE)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, LAMAR	D	PAT MAYSE RAW WATER PIPELINE (IRRIGATION LAMAR, RED)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, LAMAR	D	PAT MAYSE RAW WATER PIPELINE (IRRIGATION LAMAR, RED)	D	CONSTRUCTION FUNDING		
IRRIGATION, LAMAR	D	PAT MAYSE RAW WATER PIPELINE (IRRIGATION LAMAR, RED)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
IRRIGATION, VAN ZANDT	D	DRILL NEW WELLS (IRRIGATION VAN ZANDT, QUEEN, NECHES)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
IRRIGATION, VAN ZANDT	D	DRILL NEW WELLS (IRRIGATION VAN ZANDT, QUEEN, NECHES)	D	CONSTRUCTION FUNDING		

SponsorEntityName	Sponsor Entity Primary Region	ProjectName	WMS Project Sponsor Region	IFRElementName	IFRElementValue	YearOfNeed
IRRIGATION, VAN ZANDT	D	DRILL NEW WELLS (IRRIGATION VAN ZANDT, QUEEN, NECHES)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
LINDALE	D	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2020)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$507,500.00	2018
LINDALE	D	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2020)	D	CONSTRUCTION FUNDING	$1,227,500.00	2018
LINDALE	D	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2020)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
LINDALE	D	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2030)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$231,500.00	2028
LINDALE	D	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2030)	D	CONSTRUCTION FUNDING	$407,500.00	2028
LINDALE	D	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2030)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
LINDALE	D	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2040)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$231,500.00	2038
LINDALE	D	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2040)	D	CONSTRUCTION FUNDING	$407,500.00	2038
LINDALE	D	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2040)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
LINDALE	D	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2050)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$231,500.00	2050
LINDALE	D	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2050)	D	CONSTRUCTION FUNDING	$407,500.00	2050
LINDALE	D	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2050)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
LINDALE	D	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2060)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$463,000.00	2060
LINDALE	D	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2060)	D	CONSTRUCTION FUNDING	$815,000.00	2060
LINDALE	D	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2060)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
LINDALE	D	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2070)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$231,500.00	2070
LINDALE	D	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2070)	D	CONSTRUCTION FUNDING	$407,500.00	2070
LINDALE	D	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2070)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
LINDALE	D	SMTH-LDL-INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
LINDALE	D	SMTH-LDL-INFRASTRUCTURE	I	CONSTRUCTION FUNDING		
LINDALE	D	SMTH-LDL-INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MACBEE SUD	D	CONSERVATION, WATER LOSS CONTROL - MACBEE SUD	C	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$0.00	
MACBEE SUD	D	CONSERVATION, WATER LOSS CONTROL - MACBEE SUD	C	CONSTRUCTION FUNDING	$0.00	
MACBEE SUD	D	CONSERVATION, WATER LOSS CONTROL - MACBEE SUD	C	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
MANUFACTURING, CASS	D	DRILL NEW WELLS (MANUFACTURING CASS, CARRIZO-WILCOX , CYPRESS)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MANUFACTURING, CASS	D	DRILL NEW WELLS (MANUFACTURING CASS, CARRIZO-WILCOX , CYPRESS)	D	CONSTRUCTION FUNDING		
MANUFACTURING, CASS	D	DRILL NEW WELLS (MANUFACTURING CASS, CARRIZO-WILCOX , CYPRESS)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MANUFACTURING, HARRISON	D	TOLEDO BEND INTAKE AND RAW WATER PIPELINE (MANUFACTURING HARRISON, SABINE)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MANUFACTURING, HARRISON	D	TOLEDO BEND INTAKE AND RAW WATER PIPELINE (MANUFACTURING HARRISON, SABINE)	D	CONSTRUCTION FUNDING		
MANUFACTURING, HARRISON	D	TOLEDO BEND INTAKE AND RAW WATER PIPELINE (MANUFACTURING HARRISON, SABINE)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MANUFACTURING, LAMAR	D	DRILL NEW WELLS (MANUFACTURING LAMAR, BLOSSOM, RED)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MANUFACTURING, LAMAR	D	DRILL NEW WELLS (MANUFACTURING LAMAR, BLOSSOM, RED)	D	CONSTRUCTION FUNDING		
MANUFACTURING, LAMAR	D	DRILL NEW WELLS (MANUFACTURING LAMAR, BLOSSOM, RED)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MANUFACTURING, RED RIVER	D	DRILL NEW WELLS (MANUFACTURING RED RIVER, TRINITY, SULPHUR)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MANUFACTURING, RED RIVER	D	DRILL NEW WELLS (MANUFACTURING RED RIVER, TRINITY, SULPHUR)	D	CONSTRUCTION FUNDING		
MANUFACTURING, RED RIVER	D	DRILL NEW WELLS (MANUFACTURING RED RIVER, TRINITY, SULPHUR)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MANUFACTURING, TITUS	D	DRILL NEW WELLS (MANUFACTURING TITUS, QUEEN, CYPRESS)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MANUFACTURING, TITUS	D	DRILL NEW WELLS (MANUFACTURING TITUS, QUEEN, CYPRESS)	D	CONSTRUCTION FUNDING		
MANUFACTURING, TITUS	D	DRILL NEW WELLS (MANUFACTURING TITUS, QUEEN, CYPRESS)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MANUFACTURING, UPSHUR	D	DRILL NEW WELLS (MANUFACTURING UPSHUR, QUEEN, CYPRESS, 2020)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MANUFACTURING, UPSHUR	D	DRILL NEW WELLS (MANUFACTURING UPSHUR, QUEEN, CYPRESS, 2020)	D	CONSTRUCTION FUNDING		

SponsorEntityName	Sponsor Entity Primary Region	ProjectName	WMS Project Sponsor Region	IFRElementName	IFRElementValue	YearOfNeed
MANUFACTURING, UPSHUR	D	DRILL NEW WELLS (MANUFACTURING UPSHUR, QUEEN, CYPRESS, 2020)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MANUFACTURING, UPSHUR	D	DRILL NEW WELLS (MANUFACTURING UPSHUR, QUEEN, CYPRESS, 2060)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MANUFACTURING, UPSHUR	D	DRILL NEW WELLS (MANUFACTURING UPSHUR, QUEEN, CYPRESS, 2060)	D	CONSTRUCTION FUNDING		
MANUFACTURING, UPSHUR	D	DRILL NEW WELLS (MANUFACTURING UPSHUR, QUEEN, CYPRESS, 2060)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MANUFACTURING, VAN ZANDT	D	DRILL NEW WELLS (MANUFACTURING VAN ZANDT, CARRIZO-WILCOX, NECHES, 2020)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MANUFACTURING, VAN ZANDT	D	DRILL NEW WELLS (MANUFACTURING VAN ZANDT, CARRIZO-WILCOX, NECHES, 2020)	D	CONSTRUCTION FUNDING		
MANUFACTURING, VAN ZANDT	D	DRILL NEW WELLS (MANUFACTURING VAN ZANDT, CARRIZO-WILCOX, NECHES, 2020)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MANUFACTURING, VAN ZANDT	D	DRILL NEW WELLS (MANUFACTURING VAN ZANDT, CARRIZO-WILCOX, NECHES, 2050)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MANUFACTURING, VAN ZANDT	D	DRILL NEW WELLS (MANUFACTURING VAN ZANDT, CARRIZO-WILCOX, NECHES, 2050)	D	CONSTRUCTION FUNDING		
MANUFACTURING, VAN ZANDT	D	DRILL NEW WELLS (MANUFACTURING VAN ZANDT, CARRIZO-WILCOX, NECHES, 2050)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MARSHALL	D	INCREASE EXISTING CONTRACT (MARSHALL, CYPRESS)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$1,187,000.00	2055
MARSHALL	D	INCREASE EXISTING CONTRACT (MARSHALL, CYPRESS)	D	CONSTRUCTION FUNDING	$3,551,000.00	2055
MARSHALL	D	INCREASE EXISTING CONTRACT (MARSHALL, CYPRESS)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
MARTIN SPRINGS WSC	D	DRILL NEW WELLS (MARTIN SPRINGS WSC, CARRIZO-WILCOX, SABINE, 2060)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$0.00	
MARTIN SPRINGS WSC	D	DRILL NEW WELLS (MARTIN SPRINGS WSC, CARRIZO-WILCOX, SABINE, 2060)	D	CONSTRUCTION FUNDING	$0.00	
MARTIN SPRINGS WSC	D	DRILL NEW WELLS (MARTIN SPRINGS WSC, CARRIZO-WILCOX, SABINE, 2060)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
MARTIN SPRINGS WSC	D	DRILL NEW WELLS (MARTIN SPRINGS WSC, CARRIZO-WILCOX, SABINE, 2070)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$0.00	
MARTIN SPRINGS WSC	D	DRILL NEW WELLS (MARTIN SPRINGS WSC, CARRIZO-WILCOX, SABINE, 2070)	D	CONSTRUCTION FUNDING	$0.00	
MARTIN SPRINGS WSC	D	DRILL NEW WELLS (MARTIN SPRINGS WSC, CARRIZO-WILCOX, SABINE, 2070)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
MINING, GREGG	D	DRILL NEW WELLS (MINING GREGG, CARRIZO-WILCOX, CYPRESS)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, GREGG	D	DRILL NEW WELLS (MINING GREGG, CARRIZO-WILCOX, CYPRESS)	D	CONSTRUCTION FUNDING		
MINING, GREGG	D	DRILL NEW WELLS (MINING GREGG, CARRIZO-WILCOX, CYPRESS)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, GREGG	D	DRILL NEW WELLS (MINING GREGG, CARRIZO-WILCOX, SABINE, 2020)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, GREGG	D	DRILL NEW WELLS (MINING GREGG, CARRIZO-WILCOX, SABINE, 2020)	D	CONSTRUCTION FUNDING		
MINING, GREGG	D	DRILL NEW WELLS (MINING GREGG, CARRIZO-WILCOX, SABINE, 2020)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, GREGG	D	DRILL NEW WELLS (MINING GREGG, CARRIZO-WILCOX, SABINE, 2030)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, GREGG	D	DRILL NEW WELLS (MINING GREGG, CARRIZO-WILCOX, SABINE, 2030)	D	CONSTRUCTION FUNDING		
MINING, GREGG	D	DRILL NEW WELLS (MINING GREGG, CARRIZO-WILCOX, SABINE, 2030)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, HARRISON	D	DRILL NEW WELLS (MINING HARRISON, CARRIZO-WILCOX, CYPRESS, 2020)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, HARRISON	D	DRILL NEW WELLS (MINING HARRISON, CARRIZO-WILCOX, CYPRESS, 2020)	D	CONSTRUCTION FUNDING		
MINING, HARRISON	D	DRILL NEW WELLS (MINING HARRISON, CARRIZO-WILCOX, CYPRESS, 2020)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, HARRISON	D	DRILL NEW WELLS (MINING HARRISON, CARRIZO-WILCOX, CYPRESS, 2030)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, HARRISON	D	DRILL NEW WELLS (MINING HARRISON, CARRIZO-WILCOX, CYPRESS, 2030)	D	CONSTRUCTION FUNDING		
MINING, HARRISON	D	DRILL NEW WELLS (MINING HARRISON, CARRIZO-WILCOX, CYPRESS, 2030)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, HARRISON	D	DRILL NEW WELLS (MINING HARRISON, CARRIZO-WILCOX, CYPRESS, 2040)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, HARRISON	D	DRILL NEW WELLS (MINING HARRISON, CARRIZO-WILCOX, CYPRESS, 2040)	D	CONSTRUCTION FUNDING		
MINING, HARRISON	D	DRILL NEW WELLS (MINING HARRISON, CARRIZO-WILCOX, CYPRESS, 2040)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, HARRISON	D	DRILL NEW WELLS (MINING HARRISON, CARRIZO-WILCOX, SABINE)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, HARRISON	D	DRILL NEW WELLS (MINING HARRISON, CARRIZO-WILCOX, SABINE)	D	CONSTRUCTION FUNDING		
MINING, HARRISON	D	DRILL NEW WELLS (MINING HARRISON, CARRIZO-WILCOX, SABINE)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, HUNT	D	DRILL NEW WELLS (MINING HUNT, NACATOCH , SABINE)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, HUNT	D	DRILL NEW WELLS (MINING HUNT, NACATOCH , SABINE)	D	CONSTRUCTION FUNDING		
MINING, HUNT	D	DRILL NEW WELLS (MINING HUNT, NACATOCH , SABINE)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		

SponsorEntityName	Sponsor Entity Primary Region	ProjectName	WMS Project Sponsor Region	IFRElementName	IFRElementValue	YearOfNeed
MINING, MARION	D	DRILL NEW WELLS (MINING MARION, CARRIZO-WILCOX, CYPRESS, 2020)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, MARION	D	DRILL NEW WELLS (MINING MARION, CARRIZO-WILCOX, CYPRESS, 2020)	D	CONSTRUCTION FUNDING		
MINING, MARION	D	DRILL NEW WELLS (MINING MARION, CARRIZO-WILCOX, CYPRESS, 2020)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, MARION	D	DRILL NEW WELLS (MINING MARION, CARRIZO-WILCOX, CYPRESS, 2030)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, MARION	D	DRILL NEW WELLS (MINING MARION, CARRIZO-WILCOX, CYPRESS, 2030)	D	CONSTRUCTION FUNDING		
MINING, MARION	D	DRILL NEW WELLS (MINING MARION, CARRIZO-WILCOX, CYPRESS, 2030)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, SMITH	D	DRILL NEW WELLS (MINING SMITH, QUEEN, SABINE)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, SMITH	D	DRILL NEW WELLS (MINING SMITH, QUEEN, SABINE)	D	CONSTRUCTION FUNDING		
MINING, SMITH	D	DRILL NEW WELLS (MINING SMITH, QUEEN, SABINE)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, SMITH	D	SMTH-MIN-INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, SMITH	D	SMTH-MIN-INFRASTRUCTURE	I	CONSTRUCTION FUNDING		
MINING, SMITH	D	SMTH-MIN-INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, UPSHUR	D	DRILL NEW WELLS (MINING UPSHUR, QUEEN , CYPRESS/SABINE, 2020)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, UPSHUR	D	DRILL NEW WELLS (MINING UPSHUR, QUEEN , CYPRESS/SABINE, 2020)	D	CONSTRUCTION FUNDING		
MINING, UPSHUR	D	DRILL NEW WELLS (MINING UPSHUR, QUEEN , CYPRESS/SABINE, 2020)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
MINING, UPSHUR	D	DRILL NEW WELLS (MINING UPSHUR, QUEEN , CYPRESS/SABINE, 2030)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
MINING, UPSHUR	D	DRILL NEW WELLS (MINING UPSHUR, QUEEN , CYPRESS/SABINE, 2030)	D	CONSTRUCTION FUNDING		
MINING, UPSHUR	D	DRILL NEW WELLS (MINING UPSHUR, QUEEN , CYPRESS/SABINE, 2030)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
NORTH HUNT SUD	D	CONSERVATION, WATER LOSS CONTROL - NORTH HUNT SUD	C	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$0.00	
NORTH HUNT SUD	D	CONSERVATION, WATER LOSS CONTROL - NORTH HUNT SUD	C	CONSTRUCTION FUNDING	$0.00	
NORTH HUNT SUD	D	CONSERVATION, WATER LOSS CONTROL - NORTH HUNT SUD	C	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
NORTH HUNT SUD	D	DELTA COUNTY PIPELINE (NORTH HUNT SUD, SULPHUR)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$1,175,000.00	2060
NORTH HUNT SUD	D	DELTA COUNTY PIPELINE (NORTH HUNT SUD, SULPHUR)	D	CONSTRUCTION FUNDING	$599,000.00	2060
NORTH HUNT SUD	D	DELTA COUNTY PIPELINE (NORTH HUNT SUD, SULPHUR)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
R-P-M WSC	D	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2020)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
R-P-M WSC	D	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2020)	D	CONSTRUCTION FUNDING		
R-P-M WSC	D	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2020)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
R-P-M WSC	D	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2030)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
R-P-M WSC	D	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2030)	D	CONSTRUCTION FUNDING		
R-P-M WSC	D	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2030)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
R-P-M WSC	D	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2050)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
R-P-M WSC	D	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2050)	D	CONSTRUCTION FUNDING		
R-P-M WSC	D	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2050)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
R-P-M WSC	D	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2060)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
R-P-M WSC	D	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2060)	D	CONSTRUCTION FUNDING		
R-P-M WSC	D	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2060)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
TEXARKANA	D	DREDGE WRIGHT PATMAN (TEXARKANA)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$31,395,000.00	2050
TEXARKANA	D	DREDGE WRIGHT PATMAN (TEXARKANA)	D	CONSTRUCTION FUNDING	$174,467,000.00	2050
TEXARKANA	D	DREDGE WRIGHT PATMAN (TEXARKANA)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
TEXARKANA	D	RIVERBEND STRATEGY (TEXARKANA)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$10,787,000.00	2016
TEXARKANA	D	RIVERBEND STRATEGY (TEXARKANA)	D	CONSTRUCTION FUNDING	$106,329,000.00	2019
TEXARKANA	D	RIVERBEND STRATEGY (TEXARKANA)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
TEXARKANA	D	WTP REPLACEMENT AND NEW RAW WATER INTAKE (TEXARKANA)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	n/a	
TEXARKANA	D	WTP REPLACEMENT AND NEW RAW WATER INTAKE (TEXARKANA)	D	CONSTRUCTION FUNDING	n/a	
TEXARKANA	D	WTP REPLACEMENT AND NEW RAW WATER INTAKE (TEXARKANA)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	n/a	

SponsorEntityName	Sponsor Entity Primary Region	ProjectName	WMS Project Sponsor Region	IFRElementName	IFRElementValue	YearOfNeed
WASKOM	D	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2020)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$176,000.00	2018
WASKOM	D	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2020)	D	CONSTRUCTION FUNDING	$269,000.00	2019
WASKOM	D	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2020)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
WASKOM	D	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2050)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$176,000.00	2048
WASKOM	D	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2050)	D	CONSTRUCTION FUNDING	$269,000.00	2049
WASKOM	D	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2050)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
WASKOM	D	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2060)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$176,000.00	2058
WASKOM	D	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2060)	D	CONSTRUCTION FUNDING	$269,000.00	2059
WASKOM	D	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2060)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
WASKOM	D	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2070)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$176,000.00	2068
WASKOM	D	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2070)	D	CONSTRUCTION FUNDING	$269,000.00	2069
WASKOM	D	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2070)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
WINONA	D	DRILL NEW WELLS (WINONA, QUEEN, SABINE)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$192,000.00	2048
WINONA	D	DRILL NEW WELLS (WINONA, QUEEN, SABINE)	D	CONSTRUCTION FUNDING	$503,000.00	2049
WINONA	D	DRILL NEW WELLS (WINONA, QUEEN, SABINE)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	
WOLFE CITY	D	DRILL NEW WELLS (WOLFE CITY, WOODBINE, SULPHUR, 2050)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
WOLFE CITY	D	DRILL NEW WELLS (WOLFE CITY, WOODBINE, SULPHUR, 2050)	D	CONSTRUCTION FUNDING		
WOLFE CITY	D	DRILL NEW WELLS (WOLFE CITY, WOODBINE, SULPHUR, 2050)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
WOLFE CITY	D	DRILL NEW WELLS (WOLFE CITY, WOODBINE, SULPHUR, 2060)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
WOLFE CITY	D	DRILL NEW WELLS (WOLFE CITY, WOODBINE, SULPHUR, 2060)	D	CONSTRUCTION FUNDING		
WOLFE CITY	D	DRILL NEW WELLS (WOLFE CITY, WOODBINE, SULPHUR, 2060)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
WOLFE CITY	D	DRILL NEW WELLS (WOLFE CITY, WOODBINE, SULPHUR, 2070)	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING		
WOLFE CITY	D	DRILL NEW WELLS (WOLFE CITY, WOODBINE, SULPHUR, 2070)	D	CONSTRUCTION FUNDING		
WOLFE CITY	D	DRILL NEW WELLS (WOLFE CITY, WOODBINE, SULPHUR, 2070)	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY		
CANTON	D	INDIRECT REUSE	D	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$1,344,000.00	2016
CANTON	D	INDIRECT REUSE	D	CONSTRUCTION FUNDING	$3,643,200.00	2016
CANTON	D	INDIRECT REUSE	D	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0%	

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Infrastructure Financing Survey Report

Entity Name:	CANTON
Primary Planning Region:	D

Contact Information:

Name:	Mr. Lonny Cluck
Phone Number:	903-567-2826
Email:	info@visitcantontx.com
Comments:	

As part of the state water planning process, regional water planning groups recommend water supply projects for each of their respective regions. The Texas Water Development Board (TWDB) has several funding programs for water projects that support the planning, design, and construction of water supply projects with several financing options including low-interest loans and deferral of principal and interest. Texas Water Code (TAC 16.053 (q)) requires the regional water planning groups to examine the financing needed to implement the water management strategies and projects recommended in their regional plan.

This Infrastructure Financing Survey is a tool to gather information regarding how you, as a project sponsor, anticipate financing the water supply projects recommended to meet your needs in the 2016 regional water plan, including whether you, as a sponsor, intend to use financial assistance programs offered by the State of Texas and administered by the TWDB.

More information on these financial assistance programs can be found at the TWDB website at:
http://www.twdb.texas.gov/financial/index.asp

Your cooperation and responses to these questions are crucial to assisting the state in providing ongoing funding opportunities to ensure that our communities and our citizens have adequate water supplies. Note that a response to this survey is required for any entity seeking SWIFT funding for state water plan projects.

Please enter only the share of total project costs that you wish to receive through a TWDB program in the "Share of Costs" fields and do not enter a specific portion of a project cost more than once.

Projects you are designated as sponsoring in the Regional Water Plan

For each of the project(s) listed below **for which you are designated as sponsor**, please enter only the funding amounts you anticipate requesting from TWDB categories in the '**Amount**' field; enter the earliest '**Year Needed**' date that you anticipate requiring these amounts; and, enter in the '**State Ownership**' field the percent share of the overall project capacity that you anticipate the state taking initial ownership of. Note that the total amount entered into the separate funding categories may not exceed the **Project Total Capital Cost**. **Only enter the amount of funding that you expect to request from state funding programs.**

Data descriptions:

1) Planning, Design, Permitting, and Acquisition Funding: Enter portion of total costs into the 'Planning and Acquisition' category for which you anticipate applying for a low interest loan from TWDB for development efforts leading up to construction. This option includes providing funding for all pre-construction stages of the project.

2) Construction Funding: Enter portion of total costs into the 'Construction' category for which you anticipate applying for state funding to construct your project using a low interest loan from TWDB.

3) Percent State Participation in Excess Capacity of the Project: Enter the percent share of the total project capacity that will not be needed within the first 10 years of the project life. For some larger projects that qualify, the state may acquire a temporary ownership interest in some percentage portion of the project which allows entities to optimally size a regional project with excess capacity that won't be needed until the future. The entity buys back the state's portion of the facility over time. Principal and interest are deferred on the state-owned portion of project.

Water Management Strategy-Project Name:	DRILL NEW WELLS (CANTON, CARRIZO-WILCOX, SABINE)	**Project Total Capital Cost:**	$ 863,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 202,400	Year Needed:	2016
2) Construction Funding	Amount: $ 488,000	Year Needed:	2016
Total Anticipated State Funding Assistance:	$ 690,400 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

WMS Strategy Name: INDIRECT REUSE
Project Total Capital Cost: $6,234,000
1. Amount: $1,344,000 Year: 2016
2. Amount: $3,643,200 Year: 2016
Total Anticipated State Funding Assistance: $4,987,200
3. State Ownership: 0%

Infrastructure Financing Survey Report

Entity Name:	CASH SUD
Primary Planning Region:	D

Contact Information:

Name:	Clay Hodges
Phone Number:	
Email:	chodges@cashwater.org
Comments:	No use of TWDB funding anticipated.

As part of the state water planning process, regional water planning groups recommend water supply projects for each of their respective regions. The Texas Water Development Board (TWDB) has several funding programs for water projects that support the planning, design, and construction of water supply projects with several financing options including low-interest loans and deferral of principal and interest. Texas Water Code (TAC 16.053 (q)) requires the regional water planning groups to examine the financing needed to implement the water management strategies and projects recommended in their regional plan.

This Infrastructure Financing Survey is a tool to gather information regarding how you, as a project sponsor, anticipate financing the water supply projects recommended to meet your needs in the 2016 regional water plan, including whether you, as a sponsor, intend to use financial assistance programs offered by the State of Texas and administered by the TWDB.

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Please enter only the share of total project costs that you wish to receive through a TWDB program in the "Share of Costs" fields and do not enter a specific portion of a project cost more than once.

Projects you are designated as sponsoring in the Regional Water Plan

For each of the project(s) listed below **for which you are designated as sponsor**, please enter only the funding amounts you anticipate requesting from TWDB categories in the '**Amount**' field; enter the earliest '**Year Needed**' date that you anticipate requiring these amounts; and, enter in the '**State Ownership**' field the percent share of the overall project capacity that you anticipate the state taking initial ownership of. Note that the total amount entered into the separate funding categories may not exceed the **Project Total Capital Cost**. **Only enter the amount of funding that you expect to request from state funding programs.**

Data descriptions:

1) Planning, Design, Permitting, and Acquisition Funding: Enter portion of total costs into the 'Planning and Acquisition' category for which you anticipate applying for a low interest loan from TWDB for development efforts leading up to construction. This option includes providing funding for all pre-construction stages of the project.

2) Construction Funding: Enter portion of total costs into the 'Construction' category for which you anticipate applying for state funding to construct your project using a low interest loan from TWDB.

3) Percent State Participation in Excess Capacity of the Project: Enter the percent share of the total project capacity that will not be needed within the first 10 years of the project life. For some larger projects that qualify, the state may acquire a temporary ownership interest in some percentage portion of the project which allows entities to optimally size a regional project with excess capacity that won't be needed until the future. The entity buys back the state's portion of the facility over time. Principal and interest are deferred on the state-owned portion of project.

Water Management Strategy-Project Name:	CASH WSC - INCREASE DELIVERY INFRASTRUCTURE TO PURCHASE ADDITIONAL WATER FROM NTMWD Q-180	**Project Total Capital Cost:**	$ 6,654,700
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 0	Year Needed:	
2) Construction Funding	Amount: $ 0	Year Needed:	
Total Anticipated State Funding Assistance:	$ 0 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Water Management Strategy-Project Name:	CONSERVATION, WATER LOSS CONTROL - CASH SUD	**Project Total Capital Cost:**	$ 1,928
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 0	Year Needed:	
2) Construction Funding	Amount: $ 0	Year Needed:	
Total Anticipated State Funding Assistance:	$ 0 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Infrastructure Financing Survey Report

Entity Name:	CLARKSVILLE
Primary Planning Region:	D

Contact Information:

Name:	Wayne Dial
Phone Number:	903-427-3834
Email:	citymanager@cebridge.net
Comments:	State ownership is unknown at present, will be seeking grant assistance as well.

As part of the state water planning process, regional water planning groups recommend water supply projects for each of their respective regions. The Texas Water Development Board (TWDB) has several funding programs for water projects that support the planning, design, and construction of water supply projects with several financing options including low-interest loans and deferral of principal and interest. Texas Water Code (TAC 16.053 (q)) requires the regional water planning groups to examine the financing needed to implement the water management strategies and projects recommended in their regional plan.

This Infrastructure Financing Survey is a tool to gather information regarding how you, as a project sponsor, anticipate financing the water supply projects recommended to meet your needs in the 2016 regional water plan, including whether you, as a sponsor, intend to use financial assistance programs offered by the State of Texas and administered by the TWDB.

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Projects you are designated as sponsoring in the Regional Water Plan

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Data descriptions:

1) Planning, Design, Permitting, and Acquisition Funding: Enter portion of total costs into the 'Planning and Acquisition' category for which you anticipate applying for a low interest loan from TWDB for development efforts leading up to construction. This option includes providing funding for all pre-construction stages of the project.

2) Construction Funding: Enter portion of total costs into the 'Construction' category for which you anticipate applying for state funding to construct your project using a low interest loan from TWDB.

3) Percent State Participation in Excess Capacity of the Project: Enter the percent share of the total project capacity that will not be needed within the first 10 years of the project life. For some larger projects that qualify, the state may acquire a temporary ownership interest in some percentage portion of the project which allows entities to optimally size a regional project with excess capacity that won't be needed until the future. The entity buys back the state's portion of the facility over time. Principal and interest are deferred on the state-owned portion of project.

Water Management Strategy-Project Name:	CONTRACT WITH TEXARKANA AND TREATED WATER PIPELINE TO DEKALB (CLARKSVILLE, SULPHUR)	**Project Total Capital Cost:**	$ 10,053,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 1,581,000	Year Needed:	2020
2) Construction Funding	Amount: $ 8,472,000	Year Needed:	2025
Total Anticipated State Funding Assistance:	$ 10,053,000 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Infrastructure Financing Survey Report

Entity Name:	COUNTY-OTHER, HUNT
Primary Planning Region:	D

Contact Information:

Name:	Eddy Daniel, per Jacobia WSC
Phone Number:	972-784-7777
Email:	eddy@dbiconsultants.com
Comments:	

As part of the state water planning process, regional water planning groups recommend water supply projects for each of their respective regions. The Texas Water Development Board (TWDB) has several funding programs for water projects that support the planning, design, and construction of water supply projects with several financing options including low-interest loans and deferral of principal and interest. Texas Water Code (TAC 16.053 (q)) requires the regional water planning groups to examine the financing needed to implement the water management strategies and projects recommended in their regional plan.

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Projects you are designated as sponsoring in the Regional Water Plan

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Data descriptions:
1) Planning, Design, Permitting, and Acquisition Funding: Enter portion of total costs into the 'Planning and Acquisition' category for which you anticipate applying for a low interest loan from TWDB for development efforts leading up to construction. This option includes providing funding for all pre-construction stages of the project.

2) Construction Funding: Enter portion of total costs into the 'Construction' category for which you anticipate applying for state funding to construct your project using a low interest loan from TWDB.

3) Percent State Participation in Excess Capacity of the Project: Enter the percent share of the total project capacity that will not be needed within the first 10 years of the project life. For some larger projects that qualify, the state may acquire a temporary ownership interest in some percentage portion of the project which allows entities to optimally size a regional project with excess capacity that won't be needed until the future. The entity buys back the state's portion of the facility over time. Principal and interest are deferred on the state-owned portion of project.

Water Management Strategy-Project Name:	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2030)	**Project Total Capital Cost:**	$ 2,396,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 1,796,000	Year Needed:	2020
2) Construction Funding	Amount: $ 600,000	Year Needed:	2020
Total Anticipated State Funding Assistance:	$ 2,396,000 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Water Management Strategy-Project Name:	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2040)	**Project Total Capital Cost:**	$ 2,396,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 1,796,000	Year Needed:	2030
2) Construction Funding	Amount: $ 600,000	Year Needed:	2030
Total Anticipated State Funding Assistance:	$ 2,396,000 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Water Management Strategy-Project Name:	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2050)	**Project Total Capital Cost:**	$ 2,396,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 1,796,000	Year Needed:	2040
2) Construction Funding	Amount: $ 600,000	Year Needed:	2040
Total Anticipated State Funding Assistance:	$ 2,396,000 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Water Management Strategy-Project Name:	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2060)	**Project Total Capital Cost:**	$ 2,396,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 1,796,000	Year Needed:	2050
2) Construction Funding	Amount: $ 600,000	Year Needed:	2050
Total Anticipated State Funding Assistance:	$ 2,396,000 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Water Management Strategy-Project Name:	GREENVILLE TIE-IN PIPELINE (COUNTY-OTHER HUNT, SABINE)	**Project Total Capital Cost:**	$ 25,670,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $6,316,000	Year Needed:	2060
2) Construction Funding	Amount: $19,354,000	Year Needed:	2060
Total Anticipated State Funding Assistance:	$25,670,000 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

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Infrastructure Financing Survey Report

Entity Name:	CRYSTAL SYSTEMS INC
Primary Planning Region:	D

Contact Information:

Name:	Alan Fair
Phone Number:	903-592-3811
Email:	
Comments:	Private System private funding

As part of the state water planning process, regional water planning groups recommend water supply projects for each of their respective regions. The Texas Water Development Board (TWDB) has several funding programs for water projects that support the planning, design, and construction of water supply projects with several financing options including low-interest loans and deferral of principal and interest. Texas Water Code (TAC 16.053 (q)) requires the regional water planning groups to examine the financing needed to implement the water management strategies and projects recommended in their regional plan.

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Projects you are designated as sponsoring in the Regional Water Plan

For each of the project(s) listed below **for which you are designated as sponsor**, please enter only the funding amounts you anticipate requesting from TWDB categories in the '**Amount**' field; enter the earliest '**Year Needed**' date that you anticipate requiring these amounts; and, enter in the '**State Ownership**' field the percent share of the overall project capacity that you anticipate the state taking initial ownership of. Note that the total amount entered into the separate funding categories may not exceed the **Project Total Capital Cost**. **Only enter the amount of funding that you expect to request from state funding programs.**

Data descriptions:
1) Planning, Design, Permitting, and Acquisition Funding: Enter portion of total costs into the 'Planning and Acquisition' category for which you anticipate applying for a low interest loan from TWDB for development efforts leading up to construction. This option includes providing funding for all pre-construction stages of the project.

2) Construction Funding: Enter portion of total costs into the 'Construction' category for which you anticipate applying for state funding to construct your project using a low interest loan from TWDB.

3) Percent State Participation in Excess Capacity of the Project: Enter the percent share of the total project capacity that will not be needed within the first 10 years of the project life. For some larger projects that qualify, the state may acquire a temporary ownership interest in some percentage portion of the project which allows entities to optimally size a regional project with excess capacity that won't be needed until the future. The entity buys back the state's portion of the facility over time. Principal and interest are deferred on the state-owned portion of project.

Water Management Strategy-Project Name:	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2020)	**Project Total Capital Cost:**	$ 2,330,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 0	Year Needed:	
2) Construction Funding	Amount: $ 0	Year Needed:	
Total Anticipated State Funding Assistance:	$ 0 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Water Management Strategy-Project Name:	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2040)	**Project Total Capital Cost:**	$ 1,212,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 0	Year Needed:	
2) Construction Funding	Amount: $ 0	Year Needed:	
Total Anticipated State Funding Assistance:	$ 0 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Water Management Strategy-Project Name:	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2050)	**Project Total Capital Cost:**	$ 2,330,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 0	Year Needed:	
2) Construction Funding	Amount: $ 0	Year Needed:	
Total Anticipated State Funding Assistance:	$ 0 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Water Management Strategy-Project Name:	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2070)	**Project Total Capital Cost:**	$ 1,212,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 0	Year Needed:	
2) Construction Funding	Amount: $ 0	Year Needed:	
Total Anticipated State Funding Assistance:	$ 0 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Water Management Strategy-Project Name:	SMTH-CYS - INFRASTRUCTURE	**Project Total Capital Cost:**	$ 2,021,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 0	Year Needed:	
2) Construction Funding	Amount: $ 0	Year Needed:	
Total Anticipated State Funding Assistance:	$ 0 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

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Infrastructure Financing Survey Report

Entity Name:	GILMER
Primary Planning Region:	D

Contact Information:

Name:	Brian Rodgers, PW
Phone Number:	903-843-8206
Email:	brodgers@etex.net
Comments:	City has bond money for drilling new well.

As part of the state water planning process, regional water planning groups recommend water supply projects for each of their respective regions. The Texas Water Development Board (TWDB) has several funding programs for water projects that support the planning, design, and construction of water supply projects with several financing options including low-interest loans and deferral of principal and interest. Texas Water Code (TAC 16.053 (q)) requires the regional water planning groups to examine the financing needed to implement the water management strategies and projects recommended in their regional plan.

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Projects you are designated as sponsoring in the Regional Water Plan

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Data descriptions:

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Water Management Strategy-Project Name:	DRILL NEW WELLS (GILMER, QUEEN, CYPRESS)	**Project Total Capital Cost:**	$ 1,051,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 0	Year Needed:	
2) Construction Funding	Amount: $ 0	Year Needed:	
Total Anticipated State Funding Assistance:	$ 0 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Infrastructure Financing Survey Report

Entity Name:	GREENVILLE
Primary Planning Region:	D

Contact Information:

Name:	
Phone Number:	
Email:	
Comments:	

As part of the state water planning process, regional water planning groups recommend water supply projects for each of their respective regions. The Texas Water Development Board (TWDB) has several funding programs for water projects that support the planning, design, and construction of water supply projects with several financing options including low-interest loans and deferral of principal and interest. Texas Water Code (TAC 16.053 (q)) requires the regional water planning groups to examine the financing needed to implement the water management strategies and projects recommended in their regional plan.

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Data descriptions:

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3) Percent State Participation in Excess Capacity of the Project: Enter the percent share of the total project capacity that will not be needed within the first 10 years of the project life. For some larger projects that qualify, the state may acquire a temporary ownership interest in some percentage portion of the project which allows entities to optimally size a regional project with excess capacity that won't be needed until the future. The entity buys back the state’s portion of the facility over time. Principal and interest are deferred on the state-owned portion of project.

Water Management Strategy-Project Name: 2050	CHAPMAN RAW WATER PIPELINE AND NEW WTP (GREENVILLE, SULPHUR)	**Project Total Capital Cost:**	$ 193,438,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $	Year Needed:	
2) Construction Funding	Amount: $	Year Needed:	
Total Anticipated State Funding Assistance:	$ *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	%

Water Management Strategy-Project Name: 2070	TOLEDO BEND TIE-IN PIPELINE (GREENVILLE, SABINE)	**Project Total Capital Cost:**	$ 42,470,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $	Year Needed:	
2) Construction Funding	Amount: $	Year Needed:	
Total Anticipated State Funding Assistance:	$ *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	%

Water Management Strategy-Project Name: 2020	WTP EXPANSION (GREENVILLE, SABINE)	**Project Total Capital Cost:**	$ 36,074,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $	Year Needed:	
2) Construction Funding	Amount: $	Year Needed:	
Total Anticipated State Funding Assistance:	$ *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	%

Infrastructure Financing Survey Report

Entity Name:	LINDALE
Primary Planning Region:	D

Contact Information:

Name:	Craig Lindholm
Phone Number:	903-882-3422
Email:	craigl@lindaletx.gov
Comments:	Split 50% bonds, 50% state loans

As part of the state water planning process, regional water planning groups recommend water supply projects for each of their respective regions. The Texas Water Development Board (TWDB) has several funding programs for water projects that support the planning, design, and construction of water supply projects with several financing options including low-interest loans and deferral of principal and interest. Texas Water Code (TAC 16.053 (q)) requires the regional water planning groups to examine the financing needed to implement the water management strategies and projects recommended in their regional plan.

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Data descriptions:

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3) Percent State Participation in Excess Capacity of the Project: Enter the percent share of the total project capacity that will not be needed within the first 10 years of the project life. For some larger projects that qualify, the state may acquire a temporary ownership interest in some percentage portion of the project which allows entities to optimally size a regional project with excess capacity that won't be needed until the future. The entity buys back the state's portion of the facility over time. Principal and interest are deferred on the state-owned portion of project.

Water Management Strategy-Project Name:	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2020)	**Project Total Capital Cost:**	$ 3,470,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 507,500	Year Needed:	2018
2) Construction Funding	Amount: $ 1,227,500	Year Needed:	2018
Total Anticipated State Funding Assistance:	$ 1,735,000 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Water Management Strategy-Project Name:	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2030)	**Project Total Capital Cost:**	$ 1,278,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 231,500	Year Needed:	2028
2) Construction Funding	Amount: $ 407,500	Year Needed:	2028
Total Anticipated State Funding Assistance:	$ 4639,000 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Water Management Strategy-Project Name:	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2040)	**Project Total Capital Cost:**	$ 1,278,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 231,500	Year Needed:	2038
2) Construction Funding	Amount: $ 407,500	Year Needed:	2038
Total Anticipated State Funding Assistance:	$ 639,000 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Water Management Strategy- Project Name:	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2050)	**Project Total Capital Cost:**	$ 1,278,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 231,500	Year Needed:	2050
2) Construction Funding	Amount: $ 407,500	Year Needed:	2050
Total Anticipated State Funding Assistance:	$ 639,000 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Water Management Strategy- Project Name:	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2060)	**Project Total Capital Cost:**	$ 2,395,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ $463,000	Year Needed:	2060
2) Construction Funding	Amount: $ 815,000	Year Needed:	2060
Total Anticipated State Funding Assistance:	$ 1,278,000 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Water Management Strategy- Project Name:	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2070)	**Project Total Capital Cost:**	$ 1,278,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 231,500	Year Needed:	2070
2) Construction Funding	Amount: $ 407,500	Year Needed:	2070
Total Anticipated State Funding Assistance:	$ 639,000 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Water Management Strategy- Project Name:	SMTH-LDL-INFRASTRUCTURE	**Project Total Capital Cost:**	$ 5,803,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $	Year Needed:	
2) Construction Funding	Amount: $	Year Needed:	
Total Anticipated State Funding Assistance:	$ *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	%

Infrastructure Financing Survey Report

Entity Name:	MACBEE SUD
Primary Planning Region:	D

Contact Information:

Name:	John Simmons
Phone Number:	903-873-2109
Email:	
Comments:	

As part of the state water planning process, regional water planning groups recommend water supply projects for each of their respective regions. The Texas Water Development Board (TWDB) has several funding programs for water projects that support the planning, design, and construction of water supply projects with several financing options including low-interest loans and deferral of principal and interest. Texas Water Code (TAC 16.053 (q)) requires the regional water planning groups to examine the financing needed to implement the water management strategies and projects recommended in their regional plan.

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Water Management Strategy-Project Name:	CONSERVATION, WATER LOSS CONTROL - MACBEE SUD	**Project Total Capital Cost:**	$ 243
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 0	Year Needed:	
2) Construction Funding	Amount: $ 0	Year Needed:	
Total Anticipated State Funding Assistance:	$ 0 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Infrastructure Financing Survey Report

Entity Name:	MARSHALL
Primary Planning Region:	D

Contact Information:

Name:	J.C. Hughes
Phone Number:	903- 935-4485
Email:	jchughes@marshalltexas.net
Comments:	

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Data descriptions:

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Water Management Strategy-Project Name:	INCREASE EXISTING CONTRACT (MARSHALL, CYPRESS)	**Project Total Capital Cost:**	$ 4,738,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 1,187,000	Year Needed:	2055
2) Construction Funding	Amount: $ 3,551,000	Year Needed:	2055
Total Anticipated State Funding Assistance:	$ 4,738,000 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Infrastructure Financing Survey Report

Entity Name:	NORTH HUNT SUD
Primary Planning Region:	D

Contact Information:

Name:	Stacey Nicholson
Phone Number:	903-886-3458
Email:	
Comments:	

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Data descriptions:

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2) Construction Funding: Enter portion of total costs into the ‘Construction’ category for which you anticipate applying for state funding to construct your project using a low interest loan from TWDB.

3) Percent State Participation in Excess Capacity of the Project: Enter the percent share of the total project capacity that will not be needed within the first 10 years of the project life. For some larger projects that qualify, the state may acquire a temporary ownership interest in some percentage portion of the project which allows entities to optimally size a regional project with excess capacity that won't be needed until the future. The entity buys back the state’s portion of the facility over time. Principal and interest are deferred on the state-owned portion of project.

Water Management Strategy-Project Name:	CONSERVATION, WATER LOSS CONTROL - NORTH HUNT SUD	**Project Total Capital Cost:**	$ 432
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 0	Year Needed:	
2) Construction Funding	Amount: $ 0	Year Needed:	
Total Anticipated State Funding Assistance:	$ 0 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Water Management Strategy-Project Name:	DELTA COUNTY PIPELINE (NORTH HUNT SUD, SULPHUR)	**Project Total Capital Cost:**	$ 1,774,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 1,175,000	Year Needed:	2060
2) Construction Funding	Amount: $ 599,000	Year Needed:	2060
Total Anticipated State Funding Assistance:	$ 1,774,000 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Infrastructure Financing Survey Report

Entity Name:	TEXARKANA
Primary Planning Region:	D

Contact Information:

Name:	Elizabeth Fazio
Phone Number:	903-223-3905
Email:	LizFazio@outlook.com
Comments:	State ownership anticipated at this time is none.

As part of the state water planning process, regional water planning groups recommend water supply projects for each of their respective regions. The Texas Water Development Board (TWDB) has several funding programs for water projects that support the planning, design, and construction of water supply projects with several financing options including low-interest loans and deferral of principal and interest. Texas Water Code (TAC 16.053 (q)) requires the regional water planning groups to examine the financing needed to implement the water management strategies and projects recommended in their regional plan.

This Infrastructure Financing Survey is a tool to gather information regarding how you, as a project sponsor, anticipate financing the water supply projects recommended to meet your needs in the 2016 regional water plan, including whether you, as a sponsor, intend to use financial assistance programs offered by the State of Texas and administered by the TWDB.

More information on these financial assistance programs can be found at the TWDB website at:
http://www.twdb.texas.gov/financial/index.asp

Your cooperation and responses to these questions are crucial to assisting the state in providing ongoing funding opportunities to ensure that our communities and our citizens have adequate water supplies. Note that a response to this survey is required for any entity seeking SWIFT funding for state water plan projects.

Please enter only the share of total project costs that you wish to receive through a TWDB program in the "Share of Costs" fields and do not enter a specific portion of a project cost more than once.

Projects you are designated as sponsoring in the Regional Water Plan

For each of the project(s) listed below **for which you are designated as sponsor**, please enter only the funding amounts you anticipate requesting from TWDB categories in the '**Amount**' field; enter the earliest '**Year Needed**' date that you anticipate requiring these amounts; and, enter in the '**State Ownership**' field the percent share of the overall project capacity that you anticipate the state taking initial ownership of. Note that the total amount entered into the separate funding categories may not exceed the **Project Total Capital Cost**. **Only enter the amount of funding that you expect to request from state funding programs.**

Data descriptions:
1) Planning, Design, Permitting, and Acquisition Funding: Enter portion of total costs into the 'Planning and Acquisition' category for which you anticipate applying for a low interest loan from TWDB for development efforts leading up to construction. This option includes providing funding for all pre-construction stages of the project.

2) Construction Funding: Enter portion of total costs into the 'Construction' category for which you anticipate applying for state funding to construct your project using a low interest loan from TWDB.

3) Percent State Participation in Excess Capacity of the Project: Enter the percent share of the total project capacity that will not be needed within the first 10 years of the project life. For some larger projects that qualify, the state may acquire a temporary ownership interest in some percentage portion of the project which allows entities to optimally size a regional project with excess capacity that won't be needed until the future. The entity buys back the state's portion of the facility over time. Principal and interest are deferred on the state-owned portion of project.

Water Management Strategy-Project Name:	DREDGE WRIGHT PATMAN (TEXARKANA)	**Project Total Capital Cost:**	$ 205,862,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 31,395,000	Year Needed:	2050
2) Construction Funding	Amount: $ 174,467,000	Year Needed:	2050
Total Anticipated State Funding Assistance:	$ 205,862,000 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Water Management Strategy-Project Name:	RIVERBEND STRATEGY (TEXARKANA)	**Project Total Capital Cost:**	$ 117,116,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 10,787,000	Year Needed:	
2) Construction Funding	Amount: $ 106,329,000	Year Needed:	
Total Anticipated State Funding Assistance:	$ 117,116,000 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Water Management Strategy-Project Name:	WTP REPLACEMENT AND NEW RAW WATER INTAKE (TEXARKANA)	**Project Total Capital Cost:**	$ 117,116,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ n/a	Year Needed:	n/a
2) Construction Funding	Amount: $ n/a	Year Needed:	n/a
Total Anticipated State Funding Assistance:	$ n/a *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	n/a %

Infrastructure Financing Survey Report

Entity Name:	WASKOM
Primary Planning Region:	D

Contact Information:

Name:	Jesse Moore, Mayor
Phone Number:	903-687-3374
Email:	cityofwaskom@eastex.net
Comments:	

As part of the state water planning process, regional water planning groups recommend water supply projects for each of their respective regions. The Texas Water Development Board (TWDB) has several funding programs for water projects that support the planning, design, and construction of water supply projects with several financing options including low-interest loans and deferral of principal and interest. Texas Water Code (TAC 16.053 (q)) requires the regional water planning groups to examine the financing needed to implement the water management strategies and projects recommended in their regional plan.

This Infrastructure Financing Survey is a tool to gather information regarding how you, as a project sponsor, anticipate financing the water supply projects recommended to meet your needs in the 2016 regional water plan, including whether you, as a sponsor, intend to use financial assistance programs offered by the State of Texas and administered by the TWDB.

More information on these financial assistance programs can be found at the TWDB website at:
http://www.twdb.texas.gov/financial/index.asp

Your cooperation and responses to these questions are crucial to assisting the state in providing ongoing funding opportunities to ensure that our communities and our citizens have adequate water supplies. Note that a response to this survey is required for any entity seeking SWIFT funding for state water plan projects.

Please enter only the share of total project costs that you wish to receive through a TWDB program in the "Share of Costs" fields and do not enter a specific portion of a project cost more than once.

Projects you are designated as sponsoring in the Regional Water Plan

For each of the project(s) listed below **for which you are designated as sponsor**, please enter only the funding amounts you anticipate requesting from TWDB categories in the ‘**Amount**’ field; enter the earliest '**Year Needed**' date that you anticipate requiring these amounts; and, enter in the '**State Ownership**' field the percent share of the overall project capacity that you anticipate the state taking initial ownership of. Note that the total amount entered into the separate funding categories may not exceed the **Project Total Capital Cost**. **Only enter the amount of funding that you expect to request from state funding programs.**

Data descriptions:

1) Planning, Design, Permitting, and Acquisition Funding: Enter portion of total costs into the 'Planning and Acquisition' category for which you anticipate applying for a low interest loan from TWDB for development efforts leading up to construction. This option includes providing funding for all pre-construction stages of the project.

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Water Management Strategy-Project Name:	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2020)	**Project Total Capital Cost:**	$ 445,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 176,000	Year Needed:	2018
2) Construction Funding	Amount: $ 269,000	Year Needed:	2019
Total Anticipated State Funding Assistance:	$ 445,000 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Water Management Strategy-Project Name:	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2050)	**Project Total Capital Cost:**	$ 445,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 176,000	Year Needed:	2048
2) Construction Funding	Amount: $ 269,000	Year Needed:	2049
Total Anticipated State Funding Assistance:	$ 445,000 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Water Management Strategy-Project Name:	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2060)	**Project Total Capital Cost:**	$ 445,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 176,000	Year Needed:	2058
2) Construction Funding	Amount: $ 269,000	Year Needed:	2059
Total Anticipated State Funding Assistance:	$ 445,000 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

Water Management Strategy-Project Name:	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2070)	**Project Total Capital Cost:**	$ 445,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 176,000	Year Needed:	2068
2) Construction Funding	Amount: $ 269,000	Year Needed:	2069
Total Anticipated State Funding Assistance:	$ 445,000 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

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Infrastructure Financing Survey Report

Entity Name:	WINONA
Primary Planning Region:	D

Contact Information:

Name:	Randall Turner, PW
Phone Number:	903-526-9836
Email:	cityadmin@winonatexas.com
Comments:	

As part of the state water planning process, regional water planning groups recommend water supply projects for each of their respective regions. The Texas Water Development Board (TWDB) has several funding programs for water projects that support the planning, design, and construction of water supply projects with several financing options including low-interest loans and deferral of principal and interest. Texas Water Code (TAC 16.053 (q)) requires the regional water planning groups to examine the financing needed to implement the water management strategies and projects recommended in their regional plan.

This Infrastructure Financing Survey is a tool to gather information regarding how you, as a project sponsor, anticipate financing the water supply projects recommended to meet your needs in the 2016 regional water plan, including whether you, as a sponsor, intend to use financial assistance programs offered by the State of Texas and administered by the TWDB.

More information on these financial assistance programs can be found at the TWDB website at:
http://www.twdb.texas.gov/financial/index.asp

Your cooperation and responses to these questions are crucial to assisting the state in providing ongoing funding opportunities to ensure that our communities and our citizens have adequate water supplies. Note that a response to this survey is required for any entity seeking SWIFT funding for state water plan projects.

Please enter only the share of total project costs that you wish to receive through a TWDB program in the "Share of Costs" fields and do not enter a specific portion of a project cost more than once.

Projects you are designated as sponsoring in the Regional Water Plan

For each of the project(s) listed below **for which you are designated as sponsor**, please enter only the funding amounts you anticipate requesting from TWDB categories in the '**Amount**' field; enter the earliest '**Year Needed**' date that you anticipate requiring these amounts; and, enter in the '**State Ownership**' field the percent share of the overall project capacity that you anticipate the state taking initial ownership of. Note that the total amount entered into the separate funding categories may not exceed the **Project Total Capital Cost**. **Only enter the amount of funding that you expect to request from state funding programs.**

Data descriptions:

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Water Management Strategy- Project Name:	DRILL NEW WELLS (WINONA, QUEEN, SABINE)	**Project Total Capital Cost:**	$ 695,000
1) Planning, Design, Permitting & Acquisition Funding	Amount: $ 192,000	Year Needed:	2048
2) Construction Funding	Amount: $ 503,000	Year Needed:	2049
Total Anticipated State Funding Assistance:	$ 695,000 *sum above*		
3) Percent State Participation in Owning Excess Capacity		State Ownership:	0 %

APPENDIX C

CHAPTER 10

Adoption of Plan and Public Participation

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APPENDIX C
CHAPTER 10

Comments made at the public hearing will be included herein for purposes of the final 2016 Region D Plan.

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Texas Water
Development Board
P.O. Box 13231, 1700 N. Congress Ave.
Austin, TX 78711-3231, www.twdb.texas.gov
Phone (512) 463-7847, Fax (512) 475-2053

August 6, 2015

Ms. Linda Price, Chair
c/o Ward Timber
P.O. Box 350
Linden, Texas 75563

Mr. Walt Sears
Northeast Texas Municipal Water District
P.O. Box 955
Hughes Springs, Texas 75656

Re: Texas Water Development Board Comments on the North East Texas (Region D) Regional Water Planning Group Initially Prepared Plan, Contract No. 1148301315

Dear Ms. Price and Mr. Sears:

Texas Water Development Board (TWDB) staff completed a review of the Initially Prepared Plan (IPP) submitted by May 1, 2015 on behalf of the Region D Regional Water Planning Group. The attached comments follow this format:

- **Level 1:** Comments, questions, and online regional water planning database revisions that must be satisfactorily addressed in order to meet statutory, agency rule, and/or contract requirements; and,

- **Level 2:** Comments and suggestions for consideration that may improve the readability and overall understanding of the regional water plan.

The TWDB's statutory requirement for review of potential interregional conflicts under Title 31 Texas Administrative Code (TAC) §357.62 will not be completed until submittal and review of adopted regional water plans. However, as previously requested by our Executive Administrator, please inform TWDB in advance of your final plan if your planning group believes that an interregional conflict exists. Additionally, subsequent review will be performed as the planning group completes its data entry into the regional water planning database (DB17). If issues arise during our ongoing data review, they will be communicated promptly to the planning group to resolve.

Title 31 TAC§357.50(d) requires the regional water planning group to consider timely agency and public comment. Section 357.50(e) requires the final adopted plan include summaries of all timely written and oral comments received, along with a response explaining any resulting revisions or why changes are not warranted. Copies of TWDB's Level 1 and 2 written comments and the region's responses must be included in the final, adopted regional water plan. While the comments included in this letter represent TWDB's review to date, please anticipate the need to respond to additional comments regarding data integrity, including any water source overallocations, in the regional water planning database (DB17) once data entry is completed by the region.

Standard to all planning groups is the need to include certain content in the final regional water plans that was not yet available at the time that IPPs were prepared and submitted. In your final regional water plan, however please be sure to also incorporate the following:

a) Completed results from the regional planning group's infrastructure financing survey (IFR) for sponsors of recommended projects with capital costs *[31 TAC §357.44]*;
b) Completed results from the implementation survey *[31 TAC §357.45(a)]*;
c) The socioeconomic impact evaluation provided by TWDB at the request of the planning group *[31 TAC §357.33(c)]*;
d) Documentation that comments received on the IPP were considered in the development of the final plan *[31 TAC §357.50(d)]*;
e) Evidence, such as a certification, that the final, adopted regional water plan is complete and adopted by the planning group *[31 TAC §357.50(j)(1)]*; and,
f) The required DB17 reports, as made available by TWDB, in the executive summary or elsewhere in the plan as specified in the Contract *[31 TAC §357.50(e)(2)(B), Contract Scope of Work Task 4D(p), Contract Exhibit 'C', Table 2]*. Please ensure that the numerical values presented in the tables throughout the final, adopted regional water plan are consistent with the data provided in DB17. For the purpose of development of the 2017 State Water Plan, water management strategy and other data entered by the regional water group in DB17 (and as presented in the regional plan) shall take precedence over any conflicting data presented in the final regional water plan *[Contract Exhibit 'C', Sections 12.1.3. and 12.2.2]*.

The following items must accompany, separately, the submission of the final, adopted regional water plan:

- The prioritized list of all recommended projects in the regional water plan *[Texas Water Code 15.436(a), Contract Scope of Work Task 13]*; and,
- Any remaining hydrologic modeling files or GIS files that may not have been provided at the time of the submission of the IPP but that were used in developing the final plan. *[31 TAC §357.50(e)(2)(C), Contract Exhibit 'C', Section 12.2.1; Contract Scope of Work Task 3-III-13]*

Note that provision of certain content in an electronic-only form is permissible as follows: Internet links are permissible as a method for including model conservation and drought contingency plans within the final regional water plan; hydrologic modeling files may be submitted as electronic appendices, however all other regional water plan appendices should be incorporated in hard copy format within each plan *[31 TAC §357.50(e)(2)(C), Contract Scope of Work Task 5e, Contract Exhibit 'C', Section 12.2.1]*.

The following general requirements that apply to recommended water management strategies must be adhered to in all final regional water plans including:

- Regional water plans must not include any strategies or costs that are associated with simply maintaining existing water supplies or replacing existing infrastructure. Plans may include only infrastructure costs that are associated with volumetric increases of treated water supplies delivered to water user groups or that result in more efficient use of existing supplies *[31 TAC §357.10(28), §357.34(d)(3)(A), Contract Exhibit 'C", Section 5.1.2.2, Section 5.1.2.3]*; and,
- Regional water plans must not include any retail distribution-level infrastructure costs (other than those costs related to conservation strategies such as water loss reduction) *[31 TAC §357.10(28), §357.34(d)(3)(A), Contract Exhibit 'C", Section 5.1.2.3]*.

To facilitate efficient and timely completion, and Board approval, of your final regional water plan, please provide your TWDB project manager with early drafts of your responses to these IPP comments for preliminary review and feedback.

If you have any questions regarding these comments or would like to discuss your approach to addressing any of these comments, please do not hesitate to contact Temple McKinnon at (512) 475-2057. TWDB staff will be available to assist you in any way possible to ensure successful completion of your final regional water plan.

Sincerely,

Jeff Walker
Deputy Executive Administrator
Water Supply and Infrastructure

Attachments

cc w/att: Mr. Tony Smith, RPS

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TWDB Comments on the Initially Prepared 2016 North East Texas (Region D) Regional Water Plan

Level 1: Comments and questions must be satisfactorily addressed in order to meet statutory, agency rule, and/or contract requirements.

1. The plan does not appear to include projected demands associated with each wholesale water provider (WWP), by category of water use. Please include WWP demands in the final, adopted regional water plan. *[31 Texas Administrative Code (TAC) §357.31(b)]*

2. The plan does not appear to include projected needs associated with each WWP, by category of use and county and river basin splits. Please include WWP needs in the final, adopted regional water plan. *[31 TAC §357.33(b),(d)]*

3. The plan does not appear to include a listing of the water rights that are the basis for the surface water availability in the plan. Please include such a listing in the final, adopted regional water plan. *[Contract Exhibit 'C', Section 3.1]*

4. The plan does not appear to present complete information on identified potentially feasible water management strategies. Please include documentation that potentially feasible water management strategy types, as required by statute and rule, were considered for identified needs in the final, adopted regional water plan. *[Texas Water Code (TWC) §16.053(e)(5), 31 TAC §357.34(a),(c)(1-6)]*

5. Section 5.2.5, Appendix C5-1: The plan does not consolidate conservation recommendations, including model conservation plans into a subchapter. Please consolidate conservation information into a required subchapter in the final, adopted regional water plan. *[31 TAC §357.34(g)]*

6. Pages 5-6 through 5-102: The plan does not appear to consider conservation practices for all water user groups (WUGs) to which TWC §11.1271 and §13.146 apply (Cities of Marshall, Caddo Mills, Cumby, Greenville, Wolfe City, and Canton, along with Tri SUD, and Northeast Texas MWD). Please address this requirement in the final, adopted regional water plan. *[31 TAC §357.34(f)(2)(A]*

7. Pages 5-36 through 5-77: Recommended strategies for the City of Maud, City of Nash, City of New Boston, City of Redwater, TexAmericas Center, Caddo Basin SUD, Caddo Mills, Hunt County-Other, and Red River County-Other appear contingent upon other water management strategies being implemented. For example, the Texarkana (Riverbend) Water Treatment Plant (WTP) Expansion Strategy and the Texarkana WTP Replacement Strategy. Please clearly summarize which, if any, recommended water management strategies rely on or mutually exclude other recommended strategies. If such relationships exist, please ensure that the strategy interactions are reflected in DB17 and the estimated water availability and yield associated with each impacted water management strategy in the final, adopted regional water plan. *[31 TAC §357.34(e), Contract Exhibit 'C', Section 3.4.2]*

8. Table 6.14: The plan in some instances, does not appear to include a quantitative reporting of impacts to agricultural resources. For example, the Texarkana Sediment Reduction strategy provides a qualitative description of "concerns with implementation" regarding conversion of crop land, but does not appear to include quantification of the non-zero impact. Additionally, Tables 6.14 and 6.15 present a qualitative scoring system but it is unclear if the scoring system is based upon quantitative data. Please include quantitative reporting of impacts to agricultural resources in the final, adopted regional water plan. *[31 TAC §357.34(d)(3)(C)]*

9. Tables 6.14 and 6.15; Vol. II, C5: The plan in some instances, does not appear to include a quantitative reporting of environmental factors. For example, the Texarkana Dredging strategy provides a qualitative description as "significant" impact but the plan does not appear to include quantification of the non-zero impact. Also, the strategy evaluation for Canton's New Reservoir on Mill Creek include qualitative evaluations of the impact on the environment as "moderate/significant", however no quantititative information is provided for the New Reservoir on Mill Creek. Additionally, Tables 6.14 and 6.15 present a qualitative scoring system but it is unclear if the scoring system is based upon quantitative data. Please include quantitative reporting in the final, adopted regional water plan. *[31 TAC §357.34(d)(3)(B)]*

10. Please indicate how the planning group considered relevant recommendations from the Drought Preparedness Council (a letter was provided to planning groups with relevant recommendations in November 2014) in the final, adopted regional water plan. *[31 TAC §357.42(h)]*

11. Page 7-30: The plan states why the planning group does not consider drought management to be a potentially feasible strategy, however, the plan does not appear to include an evaluation of drought management as a water management strategy as described in the contract scope of work. Please include this strategy evaluation information in the final, adopted regional water plan. *[Contract Scope of Work, Task 4D Subtask (u)(2)]*

12. Please clarify in the final, adopted regional water plan whether plan development was guided by the principal that the designated water quality and related water uses as shown in the state water quality management plan shall be improved or maintained. *[31 TAC §358.3(19)]*

13. The technical evaluations of the water management strategies do not appear to estimate water losses from the associated strategies. Please include an estimate of water losses in the final, adopted regional water plan, for example in a format of an estimated percent loss. *[31 TAC §357.34(d)(3)(A); Contract Exhibit 'C', Section 5.1.1]*

Level 2: Comments and suggestions for consideration that may improve the readability and overall understanding of the regional water plan.

1. Suggest including page numbers in Volume II of the plan.

2. Pages 3-9 through 3-18, Table 3.6: Please confirm references for the analyses used to determine MAG in the plan. For example, the correct references for the Carrizo-Wilcox Aquifer should be "GAM Run 10-016 MAG (ver. 2)" and for the Blossom Aquifer "GTA Aquifer Assessment 10-19 MAG." Also, please identify the methodology for determining the groundwater availabilities in Table 3.6 that were not developed with a GAM (Blossom Aquifer). Consider correcting the references for the Nacatoch Aquifer and the Queen City Aquifer. Please consider identifying the methodology utilized to deterermine groundwater availability for aquifers without a GAM in the final, adopted regional water plan.

3. Page 3-27: Please consider revising the citation for 'Other Aquifer' availability to "GAM Run 10-016 MAG (ver. 2)." Water availability for other aquifers are not included in GAM Run 10-016. Additionally, please consider providing a more complete description of the groundwater availability methodology employed for non-relevant aquifer sources in the plan final, adopted regional water plan.

4. Pages 5-56 through 5-82: The plan references draft information in the Region C and Region I IPPs. Please confirm that referenced information from Region C and Region I plans is reflective of information to be included in their final, adopted regional water plans.

5. Page 5-3: Please consider revising the statement that all water suppliers are required to have a water conservation plan to reflect the specific TCEQ requirements for certain providers to have conservation plans (e.g., those with 3,000 connections or more, etc.)

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Response to TWDB Comments for Inclusion in Region D 2016 Water Plan

TWDB Comments on Initially Prepared 2016 Region D Regional Water Plan

Level 1. Comments and questions must be satisfactorily addressed in order to meet statutory, agency rule, and/or contract requirements.

1. The plan does not appear to include projected demands associated with each wholesale water provider (WWP), by category of water use. Please include WWP demands in the final, adopted regional water plan. [31 Texas Administrative Code (TAC) §357.31(b)]

> **Response: A new section 2.3.6 related to projected demands associated with each WWP has been added to the plan, along with a new Table 2.19 providing projected demands associated with each wholesale water provider by category of water use.**

2. The plan does not appear to include projected needs associated with each WWP, by category of use and county and river basin splits. Please include WWP needs in the final, adopted regional water plan. [31 TAC §357.33(b),(d)]

> **Response: Projected needs associated with each WWP have been included within the plan as Table 4.27.**

3. The plan does not appear to include a listing of the water rights that are the basis for the surface water availability in the plan. Please include such a listing in the final, adopted regional water plan. [Contract Exhibit 'C', Section 3.1]

> **Response: A list of water rights that were used for the development of surface water availabilities in the 2016 Plan has been included as Table 3.2.**

4. The plan does not appear to present complete information on identified potentially feasible water management strategies. Please include documentation that potentially feasible water management strategy types, as required by statute and rule, were considered for identified needs in the final, adopted regional water plan. [Texas Water Code (TWC) §16.053(e)(5), 31 TAC §357.34(a),(c)(1-6)]

> **Response: A new Section 5.2.9 has been added to present more complete information on identified potentially feasible water management strategies, as follows:**

5.2.9 Other Potentially Feasible Strategies

Identified, potentially feasible water management strategies as required by rule and statute [TWC §16.053(e)(5) and 31 TAC §357.34(a),(c)(1-6)], and listed in Section 5.2 herein, have been considered in terms of feasibility for each WUG/WWP in the North East Texas Region. Unless specifically addressed in the below discussion for each WUG/WWP in the Region, such strategies were considered for each water user and found not to be feasible in the North East Texas Region and were therefore not further evaluated.

Brush control, rainwater harvesting, and precipitation enhancement are approaches to increasing water supply that do not provide the degree of reliability during drought conditions that is required for municipal, manufacturing, and steam electric uses in the Region. Similarly, seawater desalinization, conjunctive use, aquifer storage and recovery, water rights cancellations, and control of naturally occurring chlorides are not feasible to address the needs of water users in the North East Texas Region.

5. Section 5.2.5, Appendix C5-1: The plan does not consolidate conservation recommendations, including model conservation plans into a subchapter. Please consolidate conservation information into a required subchapter in the final, adopted regional water plan. [31 TAC §357.34(g)]

Response: Section 5.2.5 has been modified to consolidate conservation recommendations along with the model Water Conservation Plan (that has been moved from Appendix C, Chapter 5) into this subchapter of Chapter 5.

6. Pages 5-6 through 5-102: The plan does not appear to consider conservation practices for all water user groups (WUGs) to which TWC §11.1271 and §13.146 apply (Cities of Marshall, Caddo Mills, Cumby, Greenville, Wolfe City, and Canton, along with Tri SUD, and Northeast Texas MWD). Please address this requirement in the final, adopted regional water plan. [31 TAC §357.34(f)(2)(A)]

Response: The first paragraph on Page 5-10 of the 2016 Region D IPP (now the 3rd paragraph on Page 5-10 in the Final Plan) has been modified as follows:

The NETRWPG established a goal of 140 gallons/person/day in the approved water demand projections. Advanced water conservation practices were considered and quantitatively evaluated for all water user groups to which TWC §11.1271 and §13.146 apply. After a quantitative evaluation of reported 2011 usage for WUGs' lying primarily within the

North East Texas Region using the aforementioned 140 gpcpd threshold, the advanced water conservation scenario was only identified as a feasible strategy by the NETRWPG for a single municipality, the City of Texarkana, which has projected per capita amounts in exceedance of the aforementioned goal of 140 gpcd. The established goals are based upon goals established in the City's Water Conservation and Drought Contingency Plan, projected to the year 2070 with 140 gpcpd used as a threshold per capita usage. Several entities serving populations primarily in other regional water planning areas, but serving small portions of WUGs with populations within the Region D planning area, have been identified by other RWPG's, namely Region C and Region I. The City of Overton has been preliminarily identified by the East Texas Regional Water Planning Group (ETRWPG; Region I) as an entity for which an Advanced Conservation would be a recommended strategy. Region C has preliminarily identified Advanced Water Conservation as a strategy for Ables Springs WSC, Blackland WSC, the City of Josephine, and Royse City, with populations in the Region D planning area located in Hunt County.

7. Pages 5-36 through 5-77: Recommended strategies for the City of Maud, City of Nash, City of New Boston, City of Redwater, TexAmericas Center, Caddo Basin SUD, Caddo Mills, Hunt County-Other, and Red River County-Other appear contingent upon other water management strategies being implemented. For example, the Texarkana (Riverbend) Water Treatment Plant (WTP) Expansion Strategy and the Texarkana WTP Replacement Strategy. Please clearly summarize which, if any, recommended water management strategies rely on or mutually exclude other recommended strategies. If such relationships exist, please ensure that the strategy interactions are reflected in DB17 and the estimated water availability and yield associated with each impacted water management strategy in the final, adopted regional water plan. [31 TAC §357.34(e), Contract Exhibit 'C', Section 3.4.2]

Response: Contingencies for each WMS are identified in the discussion for each recommended and alternative WMS, as summarized in Chapter 5 and Appendix C, Chapter 5, and are further identified in Table 5.12 (starting on Pg. 5-39) and Table 5.14 (starting on Pg. 5-51) of the Region D IPP. Text has been added to Chapter 5 more clearly addressing the identification of those instances where a WMS is contingent upon another identified WMS, including the name of the WMS upon which a strategy is contingent.

The strategies noted by TWDB above related to the City of Texarkana have been substantially revised, as the City of Texarkana and Riverbend Water Resources District have presented the region a unified strategy recommendation for the development of a new Water Treatment Plant by 2020, thus greatly simplifying the strategies for the users of Lake Wright Patman water supplies. This unified WMS (i.e., construction of a new intake, pipeline, and water treatment facility) and all associated contingent

strategies, has been revised throughout the related text of Chapter 5 and associated appendices. These changes have further been appropriately input within DB17 per statutory and contractual requirements.

8. Table 6.14: The plan in some instances, does not appear to include a quantitative reporting of impacts to agricultural resources. For example, the Texarkana Sediment Reduction strategy provides a qualitative description of "concerns with implementation" regarding conversion of crop land, but does not appear to include quantification of the non-zero impact. Additionally, Tables 6.14 and 6.15 present a qualitative scoring system but it is unclear if the scoring system is based upon quantitative data. Please include quantitative reporting of impacts to agricultural resources in the final, adopted regional water plan. [31 TAC §357.34(d)(3)(C)]

Response: A table and associated text summarizing the quantitative evaluation of impacts to agricultural resources (acres impacted) and correlating the identified amounts to the index (1 - 5) of magnitude of the potential impacts utilized in the Region D IPP have been included within the Final Plan.

The index table associating the acreage impacted for a given WMS to a ranked index of impact is as follows:

Acreage	Rank
0 - 10	1
11 - 20	2
21 - 50	3
50 -100	4
> 100	5

Each WMS has been incorporated into GIS and plotted along with the most recent available data from the National Land Cover Database (NLCD 2011), providing spatial reference and descriptive, quantitative data for characteristics of the land surface in the region. These data were overlayed for each project to develop a quantified estimation of acreages of various land coverage types (e.g. developed, deciduous forest, cultivated crops, …). For wetlands, data from the National Wetlands Inventory database have been similarly employed to identify potential acreages of impacted wetlands from various strategies.

Acreages for each WMS and the respective index ranking for each WMS have been incorporated into Table 6.15 in the Final Plan, as shown below.

New well sites have a minimal environmental impact due the size and location of the sites. Texas Commission on Environmental Quality Rule

290.41(c)(1) prevents well sites from being located in an area subject to flooding therefore they are located away from environmentally sensitive flood and wetland areas. A completed well head occupies an 8'x8' space or 0.0015 acres. Most well sites are fenced at 25'x25' or 0.014 acres. Given the small size of well sites and the location, the agricultural and environmental impacts from these strategies have been assumed negligible.

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County	Entity	Strategy	Quantity (Ac-Ft/Yr)	Start Decade	Reliability	Cost ($/Ac-Ft)	Impacts of Strategy on: Environ. Factors	Environ. Factors	Agricultural Resources/ Rural Areas	Agricultural Resources/ Rural Areas	Other Natural Resources	Key Water Quality Parameters	Political Feasibility
			#		*(1-5)	$	(Acres)	**(1-5)	(Acres)	**(1-5)	**(1-5)	**(1-5)	**(1-5)
BOWIE	DE KALB	Renew Existing Contract (Texarkana)	304	2020	1	$243	N/A	1	N/A	1	1	1	1
BOWIE	HOOKS	Renew Existing Contract (Texarkana)	265	2020	1	$242	N/A	1	N/A	1	1	1	1
BOWIE	IRRIGATION	Drill New Wells (Nacatoch, Red)	1,540	2020	1	$599	1	1	1	1	1	1	3
BOWIE	IRRIGATION	Drill New Wells (Carrizo-Wilcox, Sulphur/Red)	3,700	2020	1	$559	1	1	1	1	1	1	3
BOWIE	MACEDONIA-EYLAU MUD #1	Renew and Increase Existing Contract (Texarkana)	577	2020	1	$482	N/A	1	N/A	1	1	1	1
BOWIE	MAUD	Renew Existing Contract (Texarkana)	170	2020	1	$241	N/A	1	N/A	1	1	1	1
BOWIE	NASH	Renew Existing Contract (Texarkana)	214	2020	1	$243	N/A	1	N/A	1	1	1	1
BOWIE	NEW BOSTON	Renew Existing Contract (Texarkana)	1,104	2020	1	$243	N/A	1	N/A	1	1	1	1
BOWIE	REDWATER	Renew Existing Contract (Texarkana)	148	2020	1	$243	N/A	1	N/A	1	1	1	1
BOWIE	RED LICK	Renew Existing Contract (Texarkana)	117	2020	1	$244	N/A	1	N/A	1	1	1	1
BOWIE	TEXAMERICAS	Renew Existing Contract (Texarkana)	503	2020	1	$483	N/A	1	N/A	1	1	1	1
BOWIE	TEXARKANA	Advanced Water Conservation	6,815	2020	1	$600	N/A	1	N/A	1	1	1	1
BOWIE	TEXARKANA	Dredge Wright Patman	18,000	2050	3	$957	50,000	5	41,366	5	3	2	2
BOWIE	TEXARKANA	Riverbend Strategy	3,324	2020	1	$4,930	87	4	68	4	2	1	4
BOWIE	WAKE VILLAGE	Renew Existing Contract (Texarkana)	677	2020	1	$242	N/A	1	N/A	1	1	1	1
CAMP	BI COUNTY WSC	Drill New Wells (Queen City, Camp/Upshur Co)	860	2030	1	$520	1	1	1	1	1	1	3
CASS	MANUFACTURING	Advanced Water Conservation	15,100	2030	1	$0	N/A	1	N/A	1	1	1	1
CASS	MANUFACTURING	Drill New Wells (Carrizo-Wilcox, Cypress)	151	2020	1	$1,086	1	1	1	1	1	1	1
CASS	MANUFACTURING	Increase Existing Contract (Texarkana)	16,000	2050	1	$179	N/A	1	N/A	1	1	1	1
GREGG	MINING	Drill New Wells (Carrizo-Wilcox, Cypress/Sabine)	393	2020	1	$685	1	1	1	1	1	1	3
HARRISON	IRRIGATION	Drill New Wells (Carrizo-Wilcox, Cypress/Sabine)	290	2020	1	$685	1	1	1	1	1	1	3
HARRISON	MANUFACTURING	Advanced Water Conservation	14,039	2020	1	$0	N/A	1	N/A	1	1	1	1
HARRISON	MANUFACTURING	Toledo Bend Intake and Raw Water Pipeline (SRA)	90,000	2020	1	$354	588	5	457	5	4	1	1
HARRISON	MARSHALL	Increase Existing Contract (NETMWD)	701	2060	1	$1,552	N/A	1	N/A	1	1	1	1

County	Entity	Strategy	Quantity (Ac-Ft/Yr)	Start Decade	Reliability	Cost ($/Ac-Ft)	Impacts of Strategy on: Environ. Factors	Environ. Factors	Agricultural Resources/ Rural Areas	Agricultural Resources/ Rural Areas	Other Natural Resources	Key Water Quality Parameters	Political Feasibility
			#		*(1-5)	$	(Acres)	**(1-5)	(Acres)	**(1-5)	**(1-5)	**(1-5)	**(1-5)
HARRISON	MINING	Drill New Wells (Carrizo-Wilcox, Cypress/Sabine)	1,721	2020	1	$415	1	1	1	1	1	1	3
HARRISON	STEAM ELECTRIC POWER	Toledo Bend Intake and Raw Water Pipeline (SRA)	49,000	2020	1	$354	588	5	457	5	4	1	1
HARRISON	WASKOM	Drill New Well (Carrizo-Wilcox, Cypress)	184	2020	1	$870	1	1	1	1	1	1	3
HOPKINS	BRINKER WSC	Increase Existing Contract (Sulphur Springs)	63	2060	1	$1,176	N/A	1	N/A	1	1	1	1
HOPKINS	CUMBY	Drill New Wells (Nacatoch, Sabine)	80	2030	1	$1,600	1	1	1	1	1	1	3
HOPKINS	IRRIGATION	Lake Sulphur Springs Raw Water Pipeline	891	2020	1	$1,176	82	4	62	4	3	1	4
HOPKINS	IRRIGATION	Drill New Wells (Carrizo-Wilcox/Nacatoch, Cypress/Sabine/Sulphur)	1,235	2020	1	$667	1	1	1	1	1	1	3
HOPKINS	MARTIN SPRINGS WSC	Drill New Wells (Carrizo-Wilcox, Sabine)	120	2060	1	$1,533	1	1	1	1	1	1	3
HUNT	ABLES SPRINGS WSC	Advanced Water Conservation	17	2020	1	Not Avail	N/A	1	N/A	1	1	1	1
HUNT	ABLES SPRINGS WSC	Increase Existing Contract (NTMWD)	756	2020	1	Not Avail	N/A	1	N/A	1	1	1	1
HUNT	BLACKLAND WSC	Advanced Water Conservation	36	2020	1	Not Avail	N/A	1	N/A	1	1	1	1
HUNT	BLACKLAND WSC	Direct Connection and Additional Water from NTMWD	807	2020	1	$406	12	1	0	1	1	1	1
HUNT	CADDO BASIN SUD	New Contract (Greenville)	1,537	2020	1	$1,085	N/A	1	N/A	1	1	1	1
HUNT	CADDO MILLS	Increase Existing Contract (Greenville)	255	2030	1	$1,085	N/A	1	N/A	1	1	1	1
HUNT	CELESTE	Drill New Wells (Woodbine, Sabine)	204	2050	1	$1,603	1	1	1	1	1	1	1
HUNT	COMMERCE WD	Voluntary Reallocation of Hunt County Manufacturing Surplus for Lone Oak	388	2030	1	$0	N/A	1	N/A	1	1	1	1
HUNT	COUNTY-OTHER	Drill New Wells (Nacatoch, Sabine)	2,400	2030	1	$918	1	1	1	1	1	1	1
HUNT	COUNTY-OTHER	Poetry WSC Increase Existing Contract (SRA)	1,045	2060	1	$1,717	N/A	1	N/A	1	1	1	3
HUNT	COUNTY-OTHER	Poetry WSC Increase Existing Contract (SRA)	813	2040	1	$1,717	N/A	1	N/A	1	1	1	3
HUNT	COUNTY-OTHER	Greenville Tie-In Pipeline	3,990	2070	1	$1,504	86	4	21	3	3	1	3

County	Entity	Strategy	Quantity (Ac-Ft/Yr)	Start Decade	Reliability	Cost ($/Ac-Ft)	Impacts of Strategy on: Environ. Factors	Environ. Factors	Agricultural Resources/ Rural Areas	Agricultural Resources/ Rural Areas	Other Natural Resources	Key Water Quality Parameters	Political Feasibility
			#		*(1-5)	$	(Acres)	**(1-5)	(Acres)	**(1-5)	**(1-5)	**(1-5)	**(1-5)
HUNT	GREENVILLE	Voluntary Reallocation (Hunt Manuf)	825	2020	1	$0	N/A	1	N/A	1	1	1	3
HUNT	GREENVILLE	WTP Expansion	7,048	2020	1	$795	5	1	2	1	2	1	3
HUNT	GREENVILLE	Chapman Raw Water Pipeline and New WTP (Contract w/Sulphur Springs)	10,750	2050	1	$2,619	157	5	97	4	1	1	3
HUNT	GREENVILLE	Toledo Bend Tie-In Pipeline	5,100	2070	1	$1,014	86	4	21	3	2	1	3
HUNT	HICKORY CREEK SUD	Drill New Wells (Woodbine Aquifer, Sabine Basin)	1,138	2040	1	$818	1	1	1	1	1	1	3
HUNT	HICKORY CREEK SUD	Drill New Wells (Trinity Aquifer, Trinity Basin)	463	2050	1	$1,015	1	1	1	1	1	1	3
HUNT	IRRIGATION	Drill New Wells (Nacatoch Aquifer, Sabine)	150	2020	1	$720	1	1	1	1	1	1	1
HUNT	JOSEPHINE	Advanced Water Conservation	13	2020	1	Not Avail	N/A	1	N/A	1	1	1	1
HUNT	JOSEPHINE	Increase Existing Contract (NTMWD)	339	2020	1	Not Avail	N/A	1	N/A	1	1	1	1
HUNT	LONE OAK	increase Existing Contract (Cash SUD)	56	2070	1	$1,717	N/A	1	N/A	1	1	1	3
HUNT	MINING	Drill New Wells (Nacatoch Aquifer, Sabine)	75	2020	1	$907	1	1	1	1	1	1	1
HUNT	NORTH HUNT SUD	Increase Existing Contract (Commerce WD)	388	2030	1	$1,085	N/A	1	N/A	1	1	1	3
HUNT	NORTH HUNT SUD	Delta County Pipeline (Delta County Other/Delta County MUD)	350	2060	1	$1,414	30	3	16	2	1	1	3
HUNT	ROYSE CITY	Advanced Water Conservation	61	2020	1	$0	N/A	1	N/A	1	1	1	1
HUNT	SABINE RIVER AUTHORITY	Voluntary Reallocation (Combined Consumers SUD Fork Supply to Poetry)	1,045	2060	1	$0	N/A	1	N/A	1	1	1	1
HUNT	SABINE RIVER AUTHORITY	Voluntary Reallocation (West Tawakoni Tawakoni Supply to Poetry)	813	2040	1	$0	N/A	1	N/A	1	1	1	1
HUNT	STEAM ELECTRIC POWER	Advanced Water Conservation	12,061	2020	1	$0	N/A	1	N/A	1	1	1	1
HUNT	WOLFE CITY	Drill New Wells (Woodbine, Sulphur and Trinity, Trinity)	323	2050	1	$2,279	1	1	1	1	1	1	3
LAMAR	COUNTY-OTHER	Increase Existing Contract (Lamar County WSD)	116	2020	1	$1,629	N/A	1	N/A	1	1	1	1

County	Entity	Strategy	Quantity (Ac-Ft/Yr)	Start Decade	Reliability	Cost ($/Ac-Ft)	Impacts of Strategy on: Environ. Factors	Environ. Factors	Agricultural Resources/ Rural Areas	Agricultural Resources/ Rural Areas	Other Natural Resources	Key Water Quality Parameters	Political Feasibility
			#		*(1-5)	$	(Acres)	**(1-5)	(Acres)	**(1-5)	**(1-5)	**(1-5)	**(1-5)
LAMAR	IRRIGATION	Pat Mayse Raw Water Pipeline (Paris)	18,312	2020	1	$257	10	1	8	1	2	1	1
LAMAR	MANUFACTURING	Advanced Water Conservation	834	2020	1	$0	N/A	1	N/A	1	1	1	1
LAMAR	MANUFACTURING	Drill New Wells (Blossom, Red)	120	2070	1	$567	1	1	1	1	1	1	3
LAMAR	STEAM ELECTRIC POWER	Increase Existing Contract (Paris)	10,568	2030	1	$52	N/A	1	N/A	1	1	1	1
MARION	MINING	Drill New Wells (Queen City, Cypress)	648	2020	1	$456	1	1	1	1	1	1	3
MORRIS	MANUFACTURING	Advanced Water Conservation	13,087	2070	1	$0	N/A	1	N/A	1	1	1	1
RED RIVER	CLARKSVILLE	Wright Patman Pipeline (Texarkana)	303	2040	1	$1,115	106	5	56	4	2	2	3
RED RIVER	COUNTY-OTHER	Renew Existing Contract (Texarkana)	185	2020	1	$481	N/A	1	N/A	1	1	1	1
RED RIVER	MANUFACTURING	Drill New Wells (Trinity, Sulphur)	20	2040	1	$1,100	1	1	1	1	1	3	3
SMITH	CRYSTAL SYSTEMS INC	Drill New Wells (Queen City, Sabine)	1,936	2020	1	$420	1	1	1	1	1	1	3
SMITH	HIDEAWAY	Increase Existing Contract (Crystal Systems Inc.)	117	2070	1	$1,303	N/A	1	N/A	1	1	1	1
SMITH	LINDALE	Drill New Wells (Queen City, Sabine)	2,904	2020	1	$450	1	1	1	1	1	1	1
SMITH	MANUFACTURING	Increase Existing Contract (Tyler)	2,721	2020	1	$597	N/A	1	N/A	1	1	1	2
SMITH	MINING	Drill New Wells (Queen City, Sabine)	108	2060	1	$528	1	1	1	1	1	1	3
SMITH	OVERTON	Advanced Water Conservation	31	2050	1	$914	N/A	1	N/A	1	1	1	1
SMITH	WINONA	Drill New Wells (Queen City, Sabine)	108	2050	1	$815	1	1	1	1	1	1	3
TITUS	MANUFACTURING	Advanced Water Conservation	1,126	2020	1	$0	N/A	1	N/A	1	1	1	1
TITUS	MANUFACTURING	Drill New Wells (Queen City, Cypress)	45	2020	1	$822	1	1	1	1	1	1	3
TITUS	MANUFACTURING	Increase Existing Contract (Mount Pleasant)	4,269	2020	1	$782	N/A	1	N/A	1	1	1	1
TITUS	NETMWD	Voluntary Reallocation (Harrison Steam Electric, Lake O' The Pines)	18,000	2070	1	$0	N/A	1	N/A	1	1	1	1
TITUS	NETMWD	Voluntary Reallocation (Marion Steam Electric, Lake O' The Pines)	1,592	2070	1	$0	N/A	1	N/A	1	1	1	1
TITUS	STEAM ELECTRIC POWER	Increase Existing Contract (Titus Co. FWD #1)	24,942	2020	1	$100	N/A	1	N/A	1	1	1	1

County	Entity	Strategy	Quantity (Ac-Ft/Yr)	Start Decade	Reliability	Cost ($/Ac-Ft)	Impacts of Strategy on: Environ. Factors	Environ. Factors	Agricultural Resources/ Rural Areas	Agricultural Resources/ Rural Areas	Other Natural Resources	Key Water Quality Parameters	Political Feasibility
			#		*(1-5)	$	(Acres)	**(1-5)	(Acres)	**(1-5)	**(1-5)	**(1-5)	**(1-5)
TITUS	STEAM ELECTRIC POWER	Increase Existing Contract (NETMWD, Lake O' The Pines)	41,069	2040	1	$100	N/A	1	N/A	1	1	1	1
TITUS	STEAM ELECTRIC POWER	Increase Existing Contract (NETMWD; Bob Sandlin)	9,890	2030	1	$100	N/A	1	N/A	1	1	1	1
TITUS	STEAM ELECTRIC POWER	Increase Existing Contract (Cont. NETMWD Voluntary Reallocation (Harrison SE)	18,000	2070	1	$100	N/A	1	N/A	1	1	1	1
TITUS	STEAM ELECTRIC POWER	Increase Existing Contract (Cont. NETMWD Voluntary Reallocation (Marion SE)	1,592	2070	1	$100	N/A	1	N/A	1	1	1	1
TITUS	TRI SUD	Renew and Increase Existing Contract (Mount Pleasant, Titus and Morris Co)	161	2020	1	$782	N/A	1	N/A	1	1	1	1
UPSHUR	GILMER	Drill New Wells (Queen City, Cypress)	269	2030	1	$487	1	1	1	1	1	1	3
UPSHUR	MANUFACTURING	Drill New Wells (Queen City, Cypress)	430	2020	1	$600	1	1	1	1	1	1	3
UPSHUR	MINING	Drill New Wells (Queen City, Cypress/Sabine)	1,076	2020	1	$600	1	1	1	1	1	1	3
VAN ZANDT	Canton	Drill New Wells (Carrizo-Wilcox, Sabine)	100	2020	1	$1,540	1	1	1	1	1	1	2
VAN ZANDT	Canton	Indirect Reuse	323	2020	1	$2,065	81	4	46	3	1	1	2
VAN ZANDT	IRRIGATION	Drill New Wells (Queen City, Neches)	330	2020	1	$570	1	1	1	1	1	1	3
VAN ZANDT	MANUFACTURING	Drill New Wells (Carrizo-Wilcox, Neches)	290	2020	1	$759	1	1	1	1	1	1	3
VAN ZANDT	R-P-M WSC	Drill New Wells (Carrizo-Wilcox, Neches)	285	2020	1	$842	1	1	1	1	1	1	2

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9. Tables 6.14 and 6.15; Vol. II, C5: The plan in some instances, does not appear to include a quantitative reporting of environmental factors. For example, the Texarkana Dredging strategy provides a qualitative description as "significant" impact but the plan does not appear to include quantification of the non-zero impact. Also, the strategy evaluation for Canton's New Reservoir on Mill Creek include qualitative evaluations of the impact on the environment as "moderate/significant", however no quantitative information is provided for the New Reservoir on Mill Creek. Additionally, Tables 6.14 and 6.15 present a qualitative scoring system but it is unclear if the scoring system is based upon quantitative data. Please include quantitative reporting in the final, adopted regional water plan. [31 TAC §357.34(d)(3)(B)]

Response: A table and associated text summarizing the quantitative evaluation of impacts to environmental factors (acres impacted) and correlating the identified amounts to the index (1 - 5) of magnitude of the potential impacts utilized in the 2015 Region D IPP have been included within the Final Plan. The following text was added to Section 6.7:

Each WMS has been incorporated into GIS and plotted along with the most recent available data from the National Land Cover Database (NLCD 2011), providing spatial reference and descriptive, quantitative data for characteristics of the land surface in the region. These data were overlayed for each project to develop a quantified estimation of acreages of various land coverage types (e.g. developed, deciduous forest, cultivated crops, …). For wetlands, data from the USFWS National Wetlands Inventory database have been similarly employed in GIS to identify potential acreages of impacted wetlands from various strategies. Although it is expected that wetlands would be avoided if possible in the implementation of a strategy, the estimates herein are conservative in the sense that no avoidance has been included into the calculation of potential acreage impacted. The index presented in Table 6.16 has been applied to Acreages for each WMS and the respective index ranking for each WMS impact on environmental factors have been incorporated into Table 6.17 in the Final Plan, as shown below.

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County	Entity	Strategy	Total Acres Impacted	Environmental Factors									
				Total Acres Impacted	Wetland Acres	Wetland Acres	Env Water Needs	Habitat	Threat and Endangered Species	Cultural Resources	Bays & Estuaries	Env Water Quality	Overall Env.l Impacts
			(Acres)	(1-5)	(Acres)	(1-5)	(1-5)	(1-5)	#	(1-5)	(1-5)	(1-5)	(1-5)
BOWIE	DE KALB	Renew Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
BOWIE	HOOKS	Renew Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
BOWIE	IRRIGATION	Drill New Wells (Nacatoch, Red)	1	1	0	1	1	1	33	1	N/A	1	1
BOWIE	IRRIGATION	Drill New Wells (Carrizo-Wilcox, Sulphur/Red)	1	1	0	1	1	1	33	1	N/A	1	1
BOWIE	MACEDONIA-EYLAU MUD #1	Renew and Increase Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
BOWIE	MAUD	Renew Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
BOWIE	NASH	Renew Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
BOWIE	NEW BOSTON	Renew Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
BOWIE	REDWATER	Renew Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
BOWIE	RED LICK	Renew Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
BOWIE	TexAmericas	Renew Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
BOWIE	TEXARKANA	Advanced Water Conservation	N/A	1	N/A	1	1	1	33	1	N/A	1	1
BOWIE	TEXARKANA	Dredge Wright Patman	50,000	5	13,000	5	2	3	33	1	N/A	1	4
BOWIE	TEXARKANA	Riverbend Strategy	87	4	2	1	1	2	33	2	N/A	1	2
BOWIE	WAKE VILLAGE	Renew Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
CAMP	BI COUNTY WSC	Drill New Wells (Queen City, Camp/Upshur Co)	1	1	0	1	1	1	33	1	N/A	1	1
CASS	MANUFACTURING	Advanced Water Conservation	N/A	1	N/A	1	1	1	37	1	N/A	1	1
CASS	MANUFACTURING	Drill New Wells (Carrizo-Wilcox, Cypress)	1	1	0	1	1	1	37	1	N/A	1	1
CASS	MANUFACTURING	Increase Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	37	1	N/A	1	1

County	Entity	Strategy	Total Acres Impacted	Environmental Factors Total Acres Impacted	Wetland Acres	Wetland Acres	Env Water Needs	Habitat	Threat and Endangered Species	Cultural Resources	Bays & Estuaries	Env Water Quality	Overall Env.l Impacts
			(Acres)	(1-5)	(Acres)	(1-5)	(1-5)	(1-5)	#	(1-5)	(1-5)	(1-5)	(1-5)
GREGG	MINING	Drill New Wells (Carrizo-Wilcox, Cypress/Sabine)	1	1	0	1	1	1	39	1	N/A	1	1
HARRISON	IRRIGATION	Drill New Wells (Carrizo-Wilcox, Cypress/Sabine)	1	1	0	1	1	1	43	1	N/A	1	1
HARRISON	MANUFACTURING	Advanced Water Conservation	N/A	1	N/A	1	1	1	43	1	N/A	1	1
HARRISON	MANUFACTURING	Toledo Bend Intake and Raw Water Pipeline (SRA)	588	5	47	3	1	2	43	2	N/A	1	3
HARRISON	MARSHALL	Increase Existing Contract (NETMWD)	N/A	1	N/A	1	1	1	43	1	N/A	1	1
HARRISON	MINING	Drill New Wells (Carrizo-Wilcox, Cypress/Sabine)	1	1	0	1	1	1	43	1	N/A	1	1
HARRISON	STEAM ELECTRIC POWER	Toledo Bend Intake and Raw Water Pipeline (SRA)	588	5	47	3	1	2	43	2	N/A	1	3
HARRISON	WASKOM	Drill New Well (Carrizo-Wilcox, Cypress)	1	1	0	1	1	1	43	1	N/A	1	1
HOPKINS	BRINKER WSC	Increase Existing Contract (Sulphur Springs)	N/A	1	N/A	1	1	1	31	1	N/A	1	1
HOPKINS	CUMBY	Drill New Wells (Nacatoch, Sabine)	1	1	0	1	1	1	31	1	N/A	1	1
HOPKINS	IRRIGATION	Lake Sulphur Springs Raw Water Pipeline	82	4	5	1	1	2	31	2	N/A	1	3
HOPKINS	IRRIGATION	Drill New Wells (Carrizo-Wilcox/Nacatoch, Cypress/Sabine/Sulphur)	1	1	0	1	1	1	31	1	N/A	1	1
HOPKINS	MARTIN SPRINGS WSC	Drill New Wells (Carrizo-Wilcox, Sabine)	1	1	0	1	1	1	31	1	N/A	1	1
HUNT	ABLES SPRINGS WSC	Advanced Water Conservation	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	ABLES SPRINGS WSC	Increase Existing Contract (NTMWD)	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	BLACKLAND WSC	Advanced Water Conservation	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	BLACKLAND WSC	Direct Connection and Additional Water from	12	1	0	1	1	2	30	2	N/A	1	2

County	Entity	Strategy	Total Acres Impacted	Environmental Factors										
				Total Acres Impacted	Wetland Acres	Wetland Acres	Env Water Needs	Habitat	Threat and Endangered Species	Cultural Resources	Bays & Estuaries	Env Water Quality	Overall Env.l Impacts
			(Acres)	(1-5)	(Acres)	(1-5)	(1-5)	(1-5)	#	(1-5)	(1-5)	(1-5)	(1-5)
		NTMWD											
HUNT	CADDO BASIN SUD	New Contract (Greenville)	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	CADDO MILLS	Increase Existing Contract (Greenville)	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	CELESTE	Drill New Wells (Woodbine, Sabine)	1	1	0	1	1	1	30	1	N/A	1	1
HUNT	COMMERCE WD	Voluntary Reallocation of Hunt County Manufacturing Surplus for Lone Oak	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	COUNTY-OTHER	Drill New Wells (Nacatoch, Sabine)	1	1	0	1	1	1	30	1	N/A	1	1
HUNT	COUNTY-OTHER	Voluntary Reallocation (Combined Consumers SUD Fork Supply to Poetry)	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	COUNTY-OTHER	Voluntary Reallocation (West Tawakoni Tawakoni Supply to Poetry)	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	COUNTY-OTHER	Greenville Tie-In Pipeline	86	4	3	1	1	2	30	2	N/A	1	3
HUNT	GREENVILLE	Voluntary Reallocation (Hunt Manuf)	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	GREENVILLE	WTP Expansion	5	1	0	1	1	2	30	2	N/A	1	2
HUNT	GREENVILLE	Chapman Raw Water Pipeline and New WTP (Contract w/Sulphur Springs)	157	5	3	1	1	2	30	2	N/A	1	3
HUNT	GREENVILLE	Toledo Bend Tie-In Pipeline	86	4	3	1	1	2	30	2	N/A	1	3
HUNT	HICKORY CREEK SUD	Drill New Wells (Woodbine Aquifer, Sabine Basin)	1	1	0	1	1	1	30	1	N/A	1	1
HUNT	HICKORY CREEK SUD	Drill New Wells (Trinity Aquifer, Trinity Basin)	1	1	0	1	1	1	30	1	N/A	1	1
HUNT	IRRIGATION	Drill New Wells (Nacatoch Aquifer, Sabine)	1	1	0	1	1	1	30	1	N/A	1	1
HUNT	JOSEPHINE	Advanced Water	N/A	1	N/A	1	1	1	30	1	N/A	1	1

County	Entity	Strategy	Total Acres Impacted	Environmental Factors									
				Total Acres Impacted	Wetland Acres	Wetland Acres	Env Water Needs	Habitat	Threat and Endangered Species	Cultural Resources	Bays & Estuaries	Env Water Quality	Overall Env.l Impacts
			(Acres)	(1-5)	(Acres)	(1-5)	(1-5)	(1-5)	#	(1-5)	(1-5)	(1-5)	(1-5)
		Conservation											
HUNT	JOSEPHINE	Increase Existing Contract (NTMWD)	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	LONE OAK	increase Existing Contract (Cash SUD)	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	MINING	Drill New Wells (Nacatoch Aquifer, Sabine)	1	1	0	1	1	1	30	1	N/A	1	1
HUNT	NORTH HUNT SUD	Increase Existing Contract (Commerce WD)	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	NORTH HUNT SUD	Delta County Pipeline (Delta County Other/Delta County MUD)	30	3	0	1	1	2	30	2	N/A	1	3
HUNT	ROYSE CITY	Advanced Water Conservation	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	SABINE RIVER AUTHORITY	Voluntary Reallocation (Combined Consumers SUD Fork Supply to Poetry)	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	SABINE RIVER AUTHORITY	Voluntary Reallocation (West Tawakoni Tawakoni Supply to Poetry)	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	STEAM ELECTRIC POWER	Advanced Water Conservation	N/A	1	N/A	1	1	1	30	1	N/A	1	1
HUNT	WOLFE CITY	Drill New Wells (Woodbine, Sulphur and Trinity, Trinity)	1	1	0	1	1	1	30	1	N/A	1	1
LAMAR	COUNTY-OTHER	Increase Existing Contract (Lamar County WSD)	N/A	1	N/A	1	1	1	36	1	N/A	1	1
LAMAR	IRRIGATION	Pat Mayse Raw Water Pipeline (Paris)	10	1	0	1	1	2	36	2	N/A	1	3
LAMAR	MANUFACTURING	Advanced Water Conservation	N/A	1	N/A	1	1	1	36	1	N/A	1	1
LAMAR	MANUFACTURING	Drill New Wells (Blossom, Red)	1	1	0	1	1	1	36	1	N/A	1	1
LAMAR	STEAM ELECTRIC	Increase Existing	N/A	1	N/A	1	1	1	36	1	N/A	1	1

County	Entity	Strategy	Total Acres Impacted	Environmental Factors Total Acres Impacted	Wetland Acres	Wetland Acres	Env Water Needs	Habitat	Threat and Endangered Species	Cultural Resources	Bays & Estuaries	Env Water Quality	Overall Env.l Impacts
			(Acres)	(1-5)	(Acres)	(1-5)	(1-5)	(1-5)	#	(1-5)	(1-5)	(1-5)	(1-5)
	POWER	Contract (Paris)											
MARION	MINING	Drill New Wells (Queen City, Cypress)	1	1	0	1	1	1	36	1	N/A	1	1
MORRIS	MANUFACTURING	Advanced Water Conservation	N/A	1	N/A	1	1	1	35	1	N/A	1	1
RED RIVER	CLARKSVILLE	Wright Patman Pipeline (Texarkana)	106	5	1	1	1	2	33	2	N/A	1	3
RED RIVER	COUNTY-OTHER	Renew Existing Contract (Texarkana)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
RED RIVER	MANUFACTURING	Drill New Wells (Trinity, Sulphur)	1	1	0	1	1	1	33	1	N/A	1	1
SMITH	CRYSTAL SYSTEMS INC	Drill New Wells (Queen City, Neches)	1	1	0	1	1	1	40	1	N/A	1	1
SMITH	HIDEAWAY	Increase Existing Contract (Crystal Systems Inc.)	N/A	1	N/A	1	1	1	40	1	N/A	1	1
SMITH	LINDALE	Drill New Wells (Queen City, Sabine)	1	1	0	1	1	1	40	1	N/A	1	1
SMITH	MANUFACTURING	Increase Existing Contract (Tyler)	N/A	1	N/A	1	1	1	40	1	N/A	1	1
SMITH	MINING	Drill New Wells (Queen City, Sabine)	1	1	0	1	1	1	40	1	N/A	1	1
SMITH	OVERTON	Advanced Water Conservation	N/A	1	N/A	1	1	1	40	1	N/A	1	1
SMITH	WINONA	Drill New Wells (Queen City, Sabine)	1	1	0	1	1	1	40	1	N/A	1	1
TITUS	MANUFACTURING	Advanced Water Conservation	N/A	1	N/A	1	1	1	33	1	N/A	1	1
TITUS	MANUFACTURING	Drill New Wells (Queen City, Cypress)	1	1	0	1	1	1	33	1	N/A	1	1
TITUS	MANUFACTURING	Increase Existing Contract (Mount Pleasant)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
TITUS	NETMWD	Voluntary Reallocation (Harrison Steam Electric,	N/A	1	N/A	1	1	1	33	1	N/A	1	1

County	Entity	Strategy	Total Acres Impacted	Environmental Factors									
				Total Acres Impacted	Wetland Acres	Wetland Acres	Env Water Needs	Habitat	Threat and Endangered Species	Cultural Resources	Bays & Estuaries	Env Water Quality	Overall Env.l Impacts
			(Acres)	(1-5)	(Acres)	(1-5)	(1-5)	(1-5)	#	(1-5)	(1-5)	(1-5)	(1-5)
		Lake O' The Pines)											
TITUS	NETMWD	Voluntary Reallocation (Marion Steam Electric, Lake O' The Pines)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
TITUS	STEAM ELECTRIC POWER	Increase Existing Contract (Titus Co. FWD #1)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
TITUS	STEAM ELECTRIC POWER	Increase Existing Contract (NETMWD, Lake O' The Pines)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
TITUS	STEAM ELECTRIC POWER	Increase Existing Contract (NETMWD; Bob Sandlin)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
TITUS	STEAM ELECTRIC POWER	Voluntary Reallocation (Harrison SE)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
TITUS	STEAM ELECTRIC POWER	Voluntary Reallocation (Marion SE)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
TITUS	TRI SUD	Renew and Increase Existing Contract (Mount Pleasant, Titus and Morris Co)	N/A	1	N/A	1	1	1	33	1	N/A	1	1
UPSHUR	GILMER	Drill New Wells (Queen City, Cypress)	1	1	0	1	1	1	42	1	N/A	1	1
UPSHUR	MANUFACTURING	Drill New Wells (Queen City, Cypress)	1	1	0	1	1	1	42	1	N/A	1	1
UPSHUR	MINING	Drill New Wells (Queen City, Cypress/Sabine)	1	1	0	1	1	1	42	1	N/A	1	1
VAN ZANDT	Canton	Drill New Wells (Carrizo-Wilcox, Sabine)	1	1	0	1	1	1	40	1	N/A	1	1
VAN ZANDT	Canton	Indirect Reuse	81	4	2	1	1	1	40	1	N/A	1	1
VAN ZANDT	IRRIGATION	Drill New Wells (Queen City, Neches)	1	1	0	1	1	1	40	1	N/A	1	1
VAN ZANDT	MANUFACTURING	Drill New Wells (Carrizo-Wilcox, Neches)	1	1	0	1	1	1	40	1	N/A	1	1
VAN ZANDT	R-P-M WSC	Drill New Wells (Carrizo-Wilcox, Neches)	1	1	0	1	1	1	40	1	N/A	1	1

10. Please indicate how the planning group considered relevant recommendations from the Drought Preparedness Council (a letter was provided to planning groups with relevant recommendations in November 2014) in the final, adopted regional water plan. [31 TAC §357.42(h)]

Response: Text in Section 7.11.1 Texas Drought Preparedness Council has been further revised to include the following text:

Per the recommendations of the Texas Drought Preparedness Council provided to the NETRWPG in a November 10, 2014 letter, the NETRWPG, portions of this chapter have been formulated consistent with the outline template for Chapter 7 provided by the TWDB. Considerations with regard to drought management have been proffered herein as a means of addressing unanticipated population growth and/or industrial growth within the region over the planning horizon, as recommended by the Texas Drought Preparedness Council. Additionally, water supplies developed for the 2016 Region D Plan have been based upon firm yield/100% reliability of existing supply, thus accounting for significant drought conditions experienced historically by North East Texas. Availability determinations have been based upon full utilization of existing, permitted water rights, while demand projections have been based upon per capita usage amounts from the year 2011, a period of significant drought in the region. Each of these factors allow a margin of safety when considering risks associated with droughts more significant in the drought of record.

11. Page 7-30: The plan states why the planning group does not consider drought management to be a potentially feasible strategy, however, the plan does not appear to include an evaluation of drought management as a water management strategy as described in the contract scope of work. Please include this strategy evaluation information in the final, adopted regional water plan. [Contract Scope of Work, Task 4D Subtask (u)(2)]

Response: Section 7.10 text has been revised as follows:

31 TAC 357.42(f) states that RWPGs may designate recommended and alternative drought management water management strategies and other recommended drought measures in the RWP. The list of recommended drought strategies and alternative drought strategies must include the associated WUG/ WWP and the triggers that would initiate the strategy. Potentially feasible drought strategies that were considered but not recommended must also be listed, as well as any other recommended measures included the RWP, including any applicable triggers.

The TWDB has required the consideration of a general methodology for estimating economic impacts associated with implementation of drought management as a water management strategy. Water user groups may

have some flexibility to focus on discretionary outdoor water use first to reduce water use. Commercial and manufacturing use sectors may find some degrees of drought management to be economically viable and cost-competitive with other water management strategies.

The NETRWPG does not support the provision of drought management measures as a WMS in the 2016 RWP. Drought management measures vary within the Region, and are temporary strategies intended to conserve supply and reduce impacts during drought and emergency times, and are not implemented in the Region to address long-term demands. Little to no firm supply (i.e., yield) is gained from the implementation of these measures, given their application during such specific times, particularly when considered alongside more typical WMS in the planning process. Also, the use of such measures, and their efficacy, varies greatly between entities within the North East Texas Region, creating additional uncertainty.

Although not included as a specific WMS herein, drought management is nevertheless an important component of water supply management. The NETRWPG supports implementation of DCPs under appropriate conditions by water providers in order to enhance the availability of limited supplies during emergency and drought conditions, and reduce impacts to water users and local economies. Recognizing that implementation of appropriate water management strategies is a matter of local choice, the NETRWPG supports consideration of economically viable drought management approaches as an interim strategy to meet near-term needs through demand reduction until such time as economically viable long-term water supplies can be developed. Hence, new demand reductions associated with selected 5-, 10-, and 20- percent drought management scenarios are shown at year 2020 for each municipal water user group with projected needs for additional water supply at year 2020 and where historic usage data are available. At the 5% demand reduction level, a total demand reduction of 154 acft/yr in 2020 was calculated for seven (7) WUGs at an average unit cost of $5,859/acft/yr. The results of this quantitative analysis, based upon the TWDB Unified Costing Model and historic gpcpd amounts, are presented in Table 7.8 below.

Table 7.8 Drought Management Strategy Evaluation Summary

WUG	COUNTY	BASIN	Drought Management Supply			Risk Factors		
			5%	10%	20%	5%	10%	20%
CROSS ROADS SUD	GREGG	SABINE	2	3	6	2.1783	2.2183	2.2983
CRYSTAL SYSTEMS INC	SMITH	SABINE	31	62	123	0.0013	0.0051	0.0202
LINDALE	SMITH	SABINE	46	91	183	0.0125	0.0214	0.0453
NEW BOSTON	BOWIE	SULPHUR	39	78	155	0.0772	0.1134	0.2007
NEW BOSTON	BOWIE	RED	16	32	65	0.0772	0.1134	0.2007
OVERTON	SMITH	SABINE	1	2	3	0.1297	0.1697	0.2497
ROYSE CITY	HUNT	SABINE	2	4	9	0.0012	0.0047	0.0216
WASKOM	HARRISON	CYPRESS	17	35	69	0.0718	0.1053	0.195

WUG	COUNTY	BASIN	Total Cost ($)			Average Unit Cost ($/acft/yr)		
			5%	10%	20%	5%	10%	20%
CROSS ROADS SUD	GREGG	SABINE	$ 62,124	$ 70,829	$ 91,907	$ 40,080	$ 22,848	$ 14,824
CRYSTAL SYSTEMS INC	SMITH	SABINE	$ 717	$ 3,209	$ 16,075	$ 23	$ 52	$ 130
LINDALE	SMITH	SABINE	$ 9,255	$ 18,180	$ 55,520	$ 203	$ 199	$ 304
NEW BOSTON	BOWIE	SULPHUR	$ 55,030	$ 90,509	$ 200,647	$ 1,420	$ 1,168	$ 1,294
NEW BOSTON	BOWIE	RED	$ 22,935	$ 37,722	$ 83,625	$ 1,420	$ 1,168	$ 1,294
OVERTON	SMITH	SABINE	$ 2,028	$ 2,971	$ 5,476	$ 2,386	$ 1,748	$ 1,610
ROYSE CITY	HUNT	SABINE	$ 46	$ 206	$ 1,196	$ 21	$ 48	$ 139
WASKOM	HARRISON	CYPRESS	$ 22,803	$ 37,406	$ 86,786	$ 1,322	$ 1,084	$ 1,258

12. Please clarify in the final, adopted regional water plan whether plan development was guided by the principal that the designated water quality and related water uses as shown in the state water quality management plan shall be improved or maintained. [31 TAC §358.3(19)]

> **Response: Text added to Section 6.1 stating:**
>
> **Per 31 TAC §358.3(19), the development of this plan was guided by the principal that the designated water quality and related water uses as shown in the state water quality management plan shall be improved or maintained.**

13. The technical evaluations of the water management strategies do not appear to estimate water losses from the associated strategies. Please include an estimate of water losses in the final, adopted regional water plan, for example in a format of an estimated percent loss. [31 TAC §357.34(d)(3)(A); Contract Exhibit 'C', Section 5.1.1]

> **Response: Text added to Page 5-8 (with associated table in Chapter 5 of Appendix C) stating:**
>
>> **Estimates of water loss for each entity's water management strategy have been based upon average water losses from reported water loss audit data for each entity. Where no losses have been reported for a given entity, average water losses in the region as reported by TWDB (i.e., 13.7%) have been assumed. Per 31 TAC §357.34(d)(3)(A), a table presenting these water loss estimates (as an estimated percent loss), are presented in Chapter 5 of Appendix C.**

Level 2: Comments and suggestions for consideration that may improve the readability and overall understanding of the regional water plan.

1. Suggest including page numbers in Volume II of the plan.

> **Response: Page numbers for Volume II have been included in the Final Plan.**

2. Pages 3-9 through 3-18, Table 3.6: Please confirm references for the analyses used to determine MAG in the plan. For example, the correct references for the Carrizo-Wilcox Aquifer should be "GAM Run 10-016 MAG (ver. 2)" and for the Blossom Aquifer "GTA Aquifer Assessment 10-19 MAG." Also, please identify the methodology for determining the groundwater availabilities in Table 3.6 that were not developed with a GAM (Blossom Aquifer). Consider correcting the references for the Nacatoch Aquifer and the Queen City Aquifer. Please consider identifying the methodology utilized to

determine groundwater availability for aquifers without a GAM in the final, adopted regional water plan.

Reponse: Revisions as follows:

- **A statement pertaining to the Blossom Aquifer MAG reference has been corrected in Chapter 3 Section 3.2.2.1: "Groundwater availability estimates for the Blossom Aquifer were taken from GTA Aquifer Assessment 10-19 MAG report."**
- **A statement pertaining to the Carrizo-Wilcox Aquifer MAG reference has been corrected in Chapter 3 Section 3.2.2.2: "Groundwater availability estimates for the Carrizo-Wilcox Aquifer were listed in GAM Run 10-016 MAG (Version 2) report."**
- **The GTA Aquifer Assessment 10-19 MAG report was the methodology used for determining the groundwater availabilities in Table 3.6 for the Blossom Aquifer (see page 5 of this MAG report). A statement pertaining to these methodologies was provided in the IPP in Chapter 3 Section 3.2.3 page 3-18.**
- **After further review of the two statements pertaining to the Nacatoch Aquifer MAG reference found in Chapter 3 Section 3.2.2.3, it stands true that the groundwater availability estimates for the Nacatoch Aquifer were listed in GAM Run 11-011 MAG report, and a completed series of simulations using the GAM for the Nacatoch Aquifer were used to assist GMA 8 in developing desired future conditions in draft GAM Run 10-006 (Hassan, 2011). The paragraph at the bottom of page 3-12 details this discussion.**
- **A statement pertaining to the Queen City Aquifer MAG reference has been corrected in Chapter 3 Section 3.2.2.4: "Groundwater availability estimates for the Queen City Aquifer were listed in GAM Run 10-016 MAG (Version 2) report."**
- **A statement pertaining to the methodology used for identifying groundwater availability in the Non-Relevant Aquifer for Delta County, in the Sulphur river basin of the Woodbine Aquifer has been added to the end of the 1st paragraph on page 3-20: "In Region D, one non-relevant volume of 20 acre-feet was determined for Delta County, in the Sulphur river basin of the Woodbine Aquifer. Groundwater availability estimates for this non-relevant aquifer was included in GAM Run 08-14 MAG report."**

3. Page 3-27: Please consider revising the citation for 'Other Aquifer' availability to "GAM Run 10-016 MAG (ver. 2)." Water availability for other aquifers are not included in GAM Run 10-016. Additionally, please consider providing a more complete description of the groundwater availability methodology employed for non-relevant aquifer sources in the final, adopted regional water plan.

Response: Revisions as follows:

- **A statement pertaining to the ‘Other Aquifer’ citation has been removed in Chapter 3 Section 3.2.3.1: “Some other aquifers were included in the GAM Run 10-016 MAG report, which are included within the summary of groundwater availability with the North East Texas Region in Table 3.9.”**

- **A citation pertaining to the ‘other’ aquifer groundwater availability methodology illustrated in Table 3.9 has been added to Chapter 3 Section 3.2.3.1: “Table 3.9 presents groundwater availability numbers for ‘other’ aquifers found within the North East Texas Region. These availability numbers were published by the TWDB as “DFC-compatible availability values” that align directly with 2011 regional water plan data in DB12.**

4. Pages 5-56 through 5-82: The plan references draft information in the Region C and Region I IPPs. Please confirm that referenced information from Region C and Region I plans is reflective of information to be included in their final, adopted regional water plans.

Response: Coordination has been performed to ensure that references to the Region C and Region I plans are reflective of information to be included in the final, adopted regional water plans.

5. Page 5-3: Please consider revising the statement that all water suppliers are required to have a water conservation plan to reflect the specific TCEQ requirements for certain providers to have conservation plans (e.g., those with 3,000 connections or more, etc.)

Response: Text in Section 5.2.5 "Advanced Water Conservation" has been revised as follows:

The following types of water users are required by TCEQ to develop, implement, and submit water conservation plans and implementation reports:

- **Surface water right users with 1,000 acre-feet for municipal, industrial, and other non-irrigation uses;**
- **Surface water right users with 10,000 acre-feet for irrigation uses;**
- **Retail public water suppliers providing service to ≥3,300 connections; and**
- **Applicants relating to the appropriation or use of state water.**

In accordance with the above conditions, water supply entities and some major water right holders are required by regulations to have a Drought Contingency and Water Conservation Plan. These plans feature approaches for water demand reductions when such demand threatens the water supply delivery system's total capacity or when overall supplies are low. If strong conservation measures are taken early in a drought and employed in the planning stages, little or no flexibility remains if the drought exceeds the conservation assumed during planning. The ability to adopt measures more stringent than planned could be limited in times of emergency.

Comments on 2015 Region D Initially Prepared Plan

Date	Name	Entity	Format	Subject	Level	No.
5/8/2015	Mayor Richard Lawrence	City of Canton	Written	Supports Grand Saline Reservoir, wells, and reuse	3	1
7/3/2015	Gus Metz	South Rains SUD	Written	Correct numbers and add words	2	2
7/14/2015	Wayne Dial	City of Clarksville	Oral and Written	Supports leaving all options open for City	3	3
7/14/2015	Mayor Ann Rushing	City of Clarksville	Oral and Written	Supports leaving all options open for City	3	4
7/14/2015	Eileen Collins	Self	Oral and Written	Against Marvin Nichols	1	5
7/14/2015	Baker Bledsoe	Self	Oral and Written	Against Marvin Nichols	1	6
7/14/2015	Lindy Guest	Self	Oral and Written	Against Marvin Nichols	1	7
7/14/2015	Brian Strohman	Self	Oral	Against Marvin Nichols	1	8
7/14/2015	Lawrence Greer	Self	Oral and Written	Against Canton Reservoir	3	9
7/14/2015	Jimmy Hare	Self	Oral	Against Canton Reservoir	3	10
7/14/2015	Cary Hilliard	Self	Oral	Against Canton Reservoir	3	11
7/14/2015	Nina Holt	Self	Oral	Against Marvin Nichols	1	12
7/14/2015	John Brooks	Self	Oral and Written	Against Marvin Nichols	1	13
7/14/2015	Peggy Harrison	Atlanta ISD	Oral	Against Marvin Nichols	1	14
7/14/2015	Sharon Nabors	Self	Oral	Against Marvin Nichols	1	15
7/14/2015	Mayor Lou Ann Everett	City of Canton	Oral	Supports Grand Saline Reservoir, wells, and reuse	3	16
7/14/2015	Shawn Stewart	City of Canton	Oral	Supports Grand Saline Reservoir, wells, and reuse	3	17
7/14/2015	Cynthia Malouf	City of Canton	Oral	Supports Grand Saline Reservoir, wells, and reuse	3	18
7/14/2015	Connie Odic	City of Canton	Oral	Supports Grand Saline Reservoir, wells, and reuse	3	19
7/28/2015	Cary Hilliard	Self	Written	Against Canton Reservoir	1	20
8/11/2015	Jim Davis, et. al.	Bi-County WSC	Written	Supports Marvin Nichols	1	21
				Requests update to groundwater analyses	2	22
8/12/2015	Mayor Ann Rushing, et. al.	City of Clarksville	Written	Supports Marvin Nichols	1	23
8/27/2015	Oran Caudle	Caudle Consulting	Written	Against Marvin Nichols, identifies alternative strategies	1	24
9/1/2015	Mike Russell	SRBA	Written to TWDB	Recommends designation as a WWP in the State Water Plan	3	25

Date	Name	Entity	Format	Subject	Level	No.
9/11/2015	Ross Melinchuk	TPWD	Written	Recommends quantitative reporting of environmental factors	2	26
				Recommends consideration of impacts to springs	2	27
				Supports many of the policy recommendations in the IPP	1	28
				Provides summary of potential impacts from Patman reallocation	1	29

Disappointed TWDB instructed Region D to remove "conflict" from Region D water plan.
Feasibility studies and recommendations of elevation of M N and W P
Comparison of M N and Jim Chapman Reservoir

John Brooks

Region C needs to control their flooding of Major towns by building more reservoirs in their own region.
To much land for mitigation removing private land ownership.

LINDY GUEST - I oppose the Marvin Nichols Resovoir because there are viable alternatives for the MetroPlex. I don't understand why they are not being pursued like the MNR. It doesn't seem to me like this whole issue is just about water. Our area will lose property, jobs and our lively hoods. Many school districts will suffer. We will lose property to the MNR by being flooded & mitigated. For the MetroPlex to benefit we will have to lose.

Ann Rushing
Mayor - City of Clarksville
Population approximately
3,260.

City of Clarksville is in
dire need of water.
Here to ask that all
options are considered
& added to the 2016 plan

WAYNE DIAL

FUTURE WATER NEEDS

LAWRENCE GREER

CANTON LONG TERM
WATER PLANS —
SALINE CREEK

Barker Bledsoe

Against Marvin Nichols

Eileen Collins

Building Marvin Nichols Reservoir will take private land for mitigation and is an unnecessary land grab into Northeast Texas that would take prime timber, agricultural lands, peoples, homes, family busisinesses and high-paying jobs.

Richard W. Lawrence, Mayor
Shawn R. Stewart, Mayor Pro Tem
Elisa M. Heard, City Council
Cary S. Hilliard, City Council
Cindy Malouf, City Council
Scott Perkins, City Council
Lonny Cluck, City Manager

City of Canton

24980 Hwy. 64 East, Suite 1
P.O. Box 245
Canton, Texas 75103

Administration - 903.567.1841
Water Dept. - 903.567.2826
First Monday - 903.567.6556

RECEIVED
MAY 11 2015

May 8, 2015

Mr. Walt Sears
Region D Manager
Northeast Texas Municipal Water District
P.O. Box 955
Hughes Springs, TX 75656

Re: City of Canton Water Management Strategies

Dear Mr. Sears:

This letter is submitted on behalf of the City of Canton (the "City") in response to the draft 2015 Region D Regional Water Plan (the "2015 Plan"). Specifically, this letter is submitted to request changes to the 2015 Plan to acknowledge ongoing water management strategies for the City and Van Zandt County.

The 2015 Plan does not currently include three water management strategies that the City is pursuing. First, the City has a pending indirect reuse application that it filed with TCEQ on December 15, 2008, Application 05-4675A. This water management strategy would allow the City to divert and reuse the treated effluent it currently discharges to Mill Creek. Both indirect and direct reuse are water management strategies that the City intends to employ to meet its future water demands, and this project needs to be included in the 2015 Plan to recognize the City's ongoing activities in this regard.

Secondly, the City has for a long time pursued the concept of a local regional reservoir for demands in Van Zandt County. This reservoir was identified in the 2011 Region D Regional Water Plan (the "2011 Plan") as an alternate water management strategy for the City and other water user groups in the County. Notably, the 2011 Plan stated as follows:

> The City relies on groundwater from the Carrizo-Wilcox with a total pumping capacity of 530 GPM, or 285 ac-ft/yr and from Mill Creek Lake with 706 ac-ft/yr.
>
> Groundwater and surface water alternatives were also considered because the City is currently using well water and also looking at the feasibility of constructing another lake.
>
> Recommended Strategy is groundwater (2 new wells). But the plan also includes an alternate strategy at the request of the City for a "proposed reservoir on Grand Saline Creek."
>
> Because of substantial disagreement over future population and water demands, the City has requested the following alternate strategy:
>
> The strategy to meet future needs "is with surface water from a proposed reservoir on Grand Saline Creek. The City of Canton has provided to NETRWPG resolutions from

three other cities in Van Zandt County supporting the reservoir project. This show of support indicates that a regional surface water reservoir could possibly replace the groundwater strategies for other Van Zandt County public water supplies with projected deficits. However, due to the time typically required to obtain the necessary permits to impound surface water, the City plans to construct one or two additional wells, or implement a reuse option in the interim to meet increasing demands due to population growth and the First Monday influence." This alternative wording should be considered consistent with this plan in the event that population growth in the potential service area significantly exceeds current NETRWPG projections.

Copies of resolution of support from Grand Saline, Wills Point, and Edgewood are included in the Appendix C. For information on environmental impact of reservoir, please see the City of Canton's "Long-Term Water, Study Surface Water Supply, December 2008, Prepared by: Gary Burton Engineering, Inc.

By this letter, the City requests the same language be included in the 2015 Plan. The City Council still supports the proposed reservoir as an option to meet future water demands, and there has been no Council action to remove this from our future water portfolio. Attached is a copy of the City Council resolution in support of this project, which has not been superseded. Also attached is a copy of the City's existing water supply plan, which includes these two projects.

While the first two strategies are simply continuations of strategies that were already in the 2011 plan, the third strategy is one that the City requests be added. Specifically, the City would like to include in its long-range plan the drilling of a third well (in addition to the two wells that have been completed).

As you know, it is important to have all water management strategies included in the 2015 Plan for permitting and funding. As such, we respectfully request you amend the draft 2015 Plan to include these projects. City staff is available to meet with you to discuss these projects, and craft appropriate revised language for the 2015 Plan, as needed. Please feel free to call either me or Mr. Lonny Cluck should you need anything or have questions regarding this matter.

Sincerely,

Richard W. Lawrence
Mayor

ENCLOSURES

cc: Mr. Lonny Cluck
Mr. Brad Castleberry
Mr. Ron Stutes
Mr. Tony Smith

BI-COUNTY
WATER SUPPLY CORP.

Walt Sears
Administrative Agent for Region D Water Planning Group
P.O. Box 955
Hughes Springs, TX 75656

August 11, 2015

Dear Sir,

Attached are Public Comments which locally elected public officials, water supply corporations, economic development organizations, business leaders and concerned citizens across Northeast Texas wish to submit to the Texas Water Development Board concerning the Region D Water Planning Group's Initially Prepared Plan as it is currently drafted. We believe it is a grievous error to eliminate all proposed construction of new reservoirs for the next 50 years, including but not limited to the Marvin Nichols Lake.

Elimination of the contribution of new surface waters as a contributor to meeting the future needs of Texas forces the Region D IPP to exploit the Carrizo – Wilcox aquifer at levels the long-term consequences of which are presently unknown, but potentially devastating to a huge swath of East Texas.

We respectfully request that Region D reconsider its opposition to Marvin Nichols and that thorough scientific analysis be conducted to establish a withdrawal rate which can be sustained indefinitely.

Thank you for your interest in this critical rural water issue.

Respectfully submitted,

J. Davis

Jim Davis
Director of Special Projects

P.O. Box 848 Pittsburg, TX 75686 903-856-5840

Public Comments on the 2015 Region D Initially Prepared Plan

In 2007, the TWDB commissioned "*Reservoir Site Protection Study, Report 370*" which evaluated 220 potential reservoir sites across the state using 11 screening factors common to such analyses. The 220 sites selected for study must have previously been included in planning studies conducted by state or federal government entities, river authorities, water districts or regional water plans.

In the final product published in July 2008, the authors narrowed the sites examined to 19 locations worthy of designation as unique reservoir sites and designated them for inclusion in the State Water Plan as recommended Water Management Strategies. The 80th Legislature agreed.

Of the 19 sites designated as having unique value, the proposed Marvin Nichols reservoir scored in ninth place overall on a scale which weighted the 11 screening factors by assigning a level of importance to each factor. One important item contributing to this high rating was the consideration of cost:

> *"The Marvin Nichols IA site provides firm raw water supply for the least unit cost among the reservoir sites recommended for protection. Even with potential reductions in firm yield due to prior development of upstream reservoirs, Marvin Nichols IA will still have the least unit cost for additional firm water supply".(see page 7)*

The Report adds additional context to evaluate the Region D Water Planning Group's current opposition to the Marvin Nichols Reservoir when it states on page 93 that:

> *"This* reservoir *has been previously studied at various dam locations on the Sulphur River since the 1960's. It was first included in a state water plan in 1968 and has been included in each state plan since. More recently, this site was studied by Freese and Nichols in 1990, 1996, 2000, and 2006, and it is a recommended water management strategy for the North Texas Municipal Water District, Tarrant Regional Water District and the Upper Trinity River Water District in the 2006 Region C Regional Water Plan and the 2007 State Water Plan". It is also an alternative strategy for the City of Dallas.*

In 2011, the Region D Water Planning Group elected to oppose Region C's efforts to include Marvin Nichols in the State Water Plan. There followed years of litigation regarding the conflict between the two Regional Plans with the Court ultimately directing the TWDB to resolve the issue. An attempt to mediate the matter was a dismal failure. Ultimately, the Executive Director of the TWDB directed Region D to remove all references from their plan of "conflict" with the Region C plan. Region C downgraded Marvin Nichols from a Water Management Strategy to an Alternative Strategy.

As the fourth planning cycle nears its conclusion, Region D has approved an Initially Prepared Plan which excludes all proposed construction of new reservoirs – even small ones proposed by the cities of Canton and Clarksville. Their favored solution is to resolve future water shortages by drilling water wells into the Carrizo – Wilcox or Queen City aquifers. The predominate recommendation for rural water districts to meet their forecasted shortages is to drill one new well every 10 years. Even should we accept that such a repetitive solution indeed would solve the projected shortages of so many despairingly different producers, the IPP fails to aggregate all the demands on the groundwater supply and to demonstrate its ability to continue to supply sufficient water beyond the terminal time horizon of this analysis.

At the very least an update should be performed based on the *Carrizo – Wilcox Aquifer Study, Final Contract Report,* submitted to the Texas Commission on Environmental Quality by the Bureau of Economic Geology in March 2011. This update would at a minimum consider these additional elements:

- ❖ Include more data on wells currently producing from the aquifer. The report itself notes the lack of co-operation in obtaining survey responses from active producers. There is a complete absence of data from Region D.
- ❖ Quantify the total recommended additional demand placed on the aquifer by the Region D IPP.
- ❖ Estimate the additional demand from private wells drilled into the aquifer during the forecast period
- ❖ Estimate the withdrawals from outside Region D. For example, the Region C IPP calls for the Athens Municipal Authority to drill eight wells pumping 750 gallons per minute from the Carrizo - Wilcox. According to the Region C plan this level of production exceeds the Modeled Available Groundwater in Henderson County. Dallas Water Utilities has also purchased 30,267 acre / feet / year to be drawn from the Carrizo – Wilcox aquifer.
- ❖ Address the additional improvements and research suggested on pages 41 – 43 of the March 2011 Report to increase the overall confidence in its conclusions.
- ❖ Determine whether the 2015 Region D model assumes producing wells continue to produce at a static rate throughout the forecast period. *A Comprehensive Sabine Watershed Management Report* prepared for the Sabine River authority and the Texas Water Development Board estimates a 3% per year average depletion for production by its existing wells. This is an important factor to consider in calculating future production from existing wells and the number of new wells required to compensate for the lost production.
- ❖ Integrate all the above factors into an updated comparison of the total demand from all users to the ability of the aquifer to meet that demand without long-term negative consequences, i.e. deterioration of water quality or level of the aquifer.

The Region D IPP is based on a mindset that each region has one vote in assembling the State Plan. In actuality, Region C has a 2010 population 8.5 times the Region D population.

Projections to the year 2060 are even more disparate with 10.5 Region C residents for each one in Region D. State leaders are unlikely to allow insufficient water supplies to undermine the economic benefits of an additional 6.2 million residents forecast for Region C by 2060. This error by Region D in incorrectly assessing the respective political strengths of the two regions has led to a combative rather than collaborative approach to resolution of the conflict at hand. With the ultimate outcome of the conflict virtually assured, we urge Region D to negotiate the best deal they can for themselves and for Northeast Texas, but cease the obstructionist path which has been followed over the last several years.

In reviewing the recently published Proposed Interregional Conflict Rule, two items indicate that the TWDB has no intention of continuing to expend its limited resources litigating differences between regions:

- The compressed time frame for two conflicting regions to resolve their differences is limited to the 4 to 5 months between submission of the IPP and submission of the final regional plan.
- Should the parties be unable to resolve their conflict within that time frame, the State Plan will proceed with the matter in dispute removed, pending an ultimate ruling by the Executive Administrator of the TWDB.

Opponents of the Marvin Nichols Reservoir center their arguments on the economic damage inflicted upon the region's hardwood timber industry. To the contrary, two credible studies demonstrate that the impact on the region will be overwhelmingly positive:

- The construction of 12,400 new homes is forecast over a 30 year period by Bernard Weinstein, Ph. D. in a study prepared for the Sulphur River Basin Authority entitled "*The Economic, Fiscal, and Developmental Impacts of the Proposed Marvin Nichols Reservoir Project*". A drive around the waterfront of local lakes built decades ago provides empirical confirmation of the market support for undeveloped lakefront property selling as high as $100,000 per lot for deep water access and subdivisions brimming with homes costing $250,000 to $1 million or more. A new subdivision for 250 homes is currently under construction on the south shores of Bob Sandlin Lake, with several lots having sold prior to the streets being paved or utilities installed.
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The second study referenced above came as a result of the August 8, 2014, Interim Order of the TWDB for Region C to "conduct an analysis and quantification of the impacts of the Marvin Nichols Reservoir Water Management Strategy on the agriculture and natural resources of Region D and the State …..". The resulting report authored by Freese and Nichols is appropriately entitled "*Analysis and Quantification of the Impacts of the Marvin Nichols Reservoir Water Management Strategy on the Agricultural and Natural Resources of Region D and the State*". The conclusions drawn from the report include:

- *"Marvin Nichols Reservoir would inundate 0.76 percent of the prime farmland in Region D and 0.04 percent of the prime farmland in Texas." (page 19)*
- *"The estimated stumpage value of the timber harvests in the Marvin Nichols Reservoir pool is less than one percent of the total for Region D and less than 0.2 percent of the total for East Texas.(page 23)*
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- The 42,823 acres of all timber types included in the reservoir's footprint is 1.6% of the total timberland in Region D and .4% of the total timberland in the 23 East Texas counties. (page 22)

We, the undersigned, respectfully request that decisions made by the TWDB in evaluating the merits of the Region D Water Management Strategies recognize that science must trump emotion and that the future water needs of the many will require some sacrifice by a few. In deference to our friends and neighbors, we ask that fair market values be paid for all lands necessary to the project and that eminent domain proceedings be used only when all other reasonable options have failed.

At its best Marvin Nichols would be the largest outside capital investment and job creator we will see in this area in a generation. At its worst it is a necessary evil. We choose to believe the facts are well documented in the several analyses quoted in these pages and that the construction of the Marvin Nichols Reservoir should be included in the 2017 State Water Plan.

Respectfully submitted,

David Hamblin	President - Board of Directors Bi-County WSC
[illegible]	General MANGER / Bi-County W.S.C.
[illegible] Paul Davis	DIRECTOR OF SPECIAL PROJECTS Bi-County Water Supply Corp.

[signature]	Retired USAF(DV)
Brian P. Lee	Titus County Judge
Randall R. Kucera	General Counsel, Guaranty Bank & Trust
Wayne Dial	CLARKSVILLE CITY MANAGER
[signature]	Clarksville Mayor
Tommy Sparrill	
Charles L. Smith	MOUNT PLEASANT E.D.C.
Jaunstine E Curry	Mount Pleasant/Titus County Chamber of Comm
[signature]	Senior Vice President FNB Gilmer
[signature]	Bi-County Director

Brent Woodruff
CFO, Pres. Pilgrim Bank
Director

Paula D Duggan

Charlotte Brewer
SR Exec VP - Pilgrim Bank
Director

L R Brewer
CEO Pilgrim Bank
Director

Director - GM Pilgrim Enterprises

VP Pilgrim Bank

Rick Studdhoff
Pres, Chief Lending Officer Pilgrim Bank
Director

Brad Lowry
SVP Pilgrim Bank

Eva
SVP - SR Audit & Compliance Pilgrim Bank

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Respectfully submitted,

[signature] Janie Setty

[signature] Robert White

[signature] James McCormack

This petition Keep Dallas from tapping into our water source!

Keep Dallas from taking our water!

Cathy Pegues	903-768-2087
[illegible]	903 768 2660
Cindy [illegible]	903-768-2421
Traci Godire	903-292-3343
Jim DAKER	903-765-3006
Jacqueline Sadler	903-768-2754
Dwayne Stockton	903-768-2026
Olivia Thompson	903-768-2322
Billy Hilbers	903-765-2059
Mellissa Hilbers	903-765-2059
Justin Hunter	903-340-6257
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Harold [illegible]	972-4[illegible]-37
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Mary Bass	903-768-2214

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Nichole Green   Marjorie Ferguson

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Agustin [illegible] Sue Harris

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Danny Gamboa   Kyle Pugh

Rebecca Pugh   Sara Gary

Petition to keep Dallas from tapping into our water source

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Kasie Hart

Brandon Lundy

Olivia Shoaf

Carol Daniel

Carroll Boffey

James L Reed

Tyler Trascol

Paula Bradshaw

Ashley Green

Debra Reed

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Bonnie Terrell
Keith Brown
Billy Hill
Mike Stewart
JAMES Wycough
Nathan Walker
Darrell Dalyean
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Edna Alexander

Deana Norvell

Matthew A. Williams

Jerry A. Norvell

Mamie H Norvell

Mark Williams

Megan Abernathy

Scott Monroe

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Richard Tucker

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Public Comments on the 2015 Region D Initially Prepared Plan

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Pritchett WSC

Public Comments on the 2015 Region D Initial

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Peggy Bledsoe

Sheila Bledsoe

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[illegible]	[illegible]
Frances Kendall	Patti Coppedge
Elliott Dean	Betty Butler
[illegible] Hill	Nancy Hill
Richard Coppedge	[illegible]
Jack Barnes	Ann Barnes

City of Clarksville

Established 1833

800 WEST MAIN • CLARKSVILLE, TEXAS 75426 • (903) 427-3834

August 12, 2015

Northeast Texas Regional Water Planning Group- Region D
Mr. Walt Sears- General Manager of NETMWD
P.O. Box 955
Hughes Springs, Texas 75656

Ref: Additional written comment pertaining to the 2016 Initially Prepared Plan for Region D

Mr. Walt Sears and Region D Planning Group:

Please add the following additional comments, or addendum, to the City of Clarksville's original comments which were presented on July 14, 2015 at the Region D public hearing pertaining to the IPP for Region D. Comments were presented by Mayor Ann Rushing and City Manager, Wayne Dial, in both oral and written form.

The addendum, to the previous written comments, entitled Public Comments on the 2015 Region D Initially Prepared Plan is attached. The Clarksville City Council approved the written comments by Mayor Rushing and City Manger Dial presented to Region D and also signed the addendum being added for comment. Also, attached, you will find the signature of Ben Black, President of the Industrial Board, approving the addendum being submitted.

Thank you and if any more information is needed, please feel free to contact me.

Sincerely,

Ann Rushing

Mayor Ann Rushing

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- ❖ Integrate all the above factors into an updated comparison of the total demand from all users to the ability of the aquifer to meet that demand without long-term negative consequences, i.e. deterioration of water quality or level of the aquifer.

The Region D IPP is based on a mindset that each region has one vote in assembling the State Plan. In actuality, Region C has a 2010 population 8.5 times the Region D population.

Projections to the year 2060 are even more disparate with 10.5 Region C residents for each one in Region D. State leaders are unlikely to allow insufficient water supplies to undermine the economic benefits of an additional 6.2 million residents forecast for Region C by 2060. This error by Region D in incorrectly assessing the respective political strengths of the two regions has led to a combative rather than collaborative approach to resolution of the conflict at hand. With the ultimate outcome of the conflict virtually assured, we urge Region D to negotiate the best deal they can for themselves and for Northeast Texas, but cease the obstructionist path which has been followed over the last several years.

In reviewing the recently published Proposed Interregional Conflict Rule, two items indicate that the TWDB has no intention of continuing to expend its limited resources litigating differences between regions:

- The compressed time frame for two conflicting regions to resolve their differences is limited to the 4 to 5 months between submission of the IPP and submission of the final regional plan.
- Should the parties be unable to resolve their conflict within that time frame, the State Plan will proceed with the matter in dispute removed, pending an ultimate ruling by the Executive Administrator of the TWDB.

Opponents of the Marvin Nichols Reservoir center their arguments on the economic damage inflicted upon the region's hardwood timber industry. To the contrary, two credible studies demonstrate that the impact on the region will be overwhelmingly positive:

- The construction of 12,400 new homes is forecast over a 30 year period by Bernard Weinstein, Ph. D. in a study prepared for the Sulphur River Basin Authority entitled "*The Economic, Fiscal, and Developmental Impacts of the Proposed Marvin Nichols Reservoir Project*". A drive around the waterfront of local lakes built decades ago provides empirical confirmation of the market support for undeveloped lakefront property selling as high as $100,000 per lot for deep water access and subdivisions brimming with homes costing $250,000 to $1 million or more. A new subdivision for 250 homes is currently under construction on the south shores of Bob Sandlin Lake, with several lots having sold prior to the streets being paved or utilities installed.
- Dr. Weinstein calculates the total gain in local economic activity due to the reservoir and required infrastructure construction will exceed $2 billion, including as many as 16,000 person years of employment.
- Dr. Weinstein estimates local tax receipts when fully developed will increase $25 million per year over current levels.
- Dr. Weinstein uses Texas Forest Service data to demonstrate that the total timber loss due to impoundment and mitigation is markedly less than a single years' growth of the area's unaffected forests.

The second study referenced above came as a result of the August 8, 2014, Interim Order of the TWDB for Region C to "conduct an analysis and quantification of the impacts of the Marvin Nichols Reservoir Water Management Strategy on the agriculture and natural resources of Region D and the State .....". The resulting report authored by Freese and Nichols is appropriately entitled "*Analysis and Quantification of the Impacts of the Marvin Nichols Reservoir Water Management Strategy on the Agricultural and Natural Resources of Region D and the State*". The conclusions drawn from the report include:

- *"Marvin Nichols Reservoir would inundate 0.76 percent of the prime farmland in Region D and 0.04 percent of the prime farmland in Texas." (page 19)*
- *"The estimated stumpage value of the timber harvests in the Marvin Nichols Reservoir pool is less than one percent of the total for Region D and less than 0.2 percent of the total for East Texas.(page 23)*
- The 10,156 acres of bottomland hardwood forest included in the 66,103 acre reservoir footprint is 2.4% of the bottomland hardwood forest acreage in Region D. (page 18)
- The 42,823 acres of all timber types included in the reservoir's footprint is 1.6% of the total timberland in Region D and .4% of the total timberland in the 23 East Texas counties. (page 22)

We, the undersigned, respectfully request that decisions made by the TWDB in evaluating the merits of the Region D Water Management Strategies recognize that science must trump emotion and that the future water needs of the many will require some sacrifice by a few. In deference to our friends and neighbors, we ask that fair market values be paid for all lands necessary to the project and that eminent domain proceedings be used only when all other reasonable options have failed.

At its best Marvin Nichols would be the largest outside capital investment and job creator we will see in this area in a generation. At its worst it is a necessary evil. We choose to believe the facts are well documented in the several analyses quoted in these pages and that the construction of the Marvin Nichols Reservoir should be included in the 2017 State Water Plan.

Respectfully submitted,

PRESIDENT, RED RIVER CO
INDUSTRIAL FOUNDATION

Tony L. Smith July 28, 2015
8911 N Capital of TX Hwy
Suite 2200
Austin, TX 78759

Mr. Smith,

I would like to offer my opinion about the new 5 year water plan being prepared by the Region D Water Planning Group. I have been at several of the recent meetings in Mt Pleasant and spoke several times against adding a lake for the City of Canton. I was on the city council for the last 4 years and the lake was a very intense topic of conversation. Originally the justification for a large lake was the long range water study prepared by Gary Burton. That study used incorrect population figures then inflated the growth rate by 3 times to come up with a much larger population estimate. In addition, Mr Burton used the inflated, self generated city population estimate of 5,147 which called for a ETJ of 1 mile outside the city limits. I was in the audience when he said he assumed homes would be built in the ETJ by 2060 and came up with a population estimate of 35,000. All of this was done to justify a new 1,500 city lake. Of course the 2010 population of Canton turned out to be 3,587 and a growth rate of 1% instead of 3%. During my tenure we drilled another deep water well which provides an additional 180 gallons per minute. We also constructed a new water tower, doubling our water capacity, which will more than take care of any First Monday surge. By the way our water consumption has maintained steady for the last 10 years at approximately 1 million gallons per day on average.

I offer this short version to explain why Canton does not need a lake, some powerful special interests want a lake. Local real estate firms want rooftops in Canton and several land owners want to develop their large land holdings. Most of the citizens of Canton like the slow, steady growth we have experienced for the last 40 years. They certainly do not like the prospect of a 150 million dollar or more lake 4 miles from town.

I appreciate your professional approach to the new 5 year plan. I believe you know as well as most of us that the justification for a new city lake does not exist. Canton does need some things, a new lake just is not of of them.

Thank you for your efforts on behalf of citizens of Canton and Van Zandt County.

Cary S Hilliard Former County Commissioner, Canton Mayor and Council Member

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Sulphur River Basin Authority

September 01, 2015

Office of General Counsel
Attn: Les Trobman
Texas Water Development Board
P. O. Box 13231
Austin, Texas 78711-3231

RE: SULPHUR RIVER BASIN AUTHORITY
Potential Interregional Conflict between Regional Water Plans for Region C & D

Dear Mr. Trobman:

The Sulphur River Basin neighbors in Region C have established purpose and need for additional water supply by 2070. These agencies and cities are seeking approximately 50% of the unappropriated water in the Sulphur River Watershed. This will require an interbasin transfer. The out of basin cities and agencies providing purpose and need could pursue the unappropriated water without the Sulphur River Basin Authority (SRBA). In view of the fact that SRBA was authorized by the state of Texas to provide for the conservation and development of the state's natural resources within the basin, these cities and agencies partnered with SRBA to facilitate prudent planning, selection, and development. The North Texas Municipal Water District, Upper Trinity Regional Water District, Tarrant Regional Water District, City of Dallas, and City of Irving entered into an "Advanced Funding Agreement for Water Resources Planning in the Sulphur River" to allow SRBA to facilitate water planning and the studies needed to determine the water supply strategy that is best for the basin and its inhabitants. SRBA and the Corps of Engineers entered into a Feasibility Cost Share Agreement to have the Corps participate in the Feasibility Study.

911 N. Bishop St., Suite C 104
Wake Village, TX 75501
Web Pages: www.sulphurr.org
www.sulphurriverbasinauthority.org
(903) 223-7887
Fax: (903) 223-7988
Email: nrsrba@cableone.net

SRBA administers a prudent planning process. SRBA's objectives are to protect the basin, provide a water supply that will meet purpose and need with the least environmental impact, and ensure a benefit to the basin equal to the diversion of its natural resource. These objectives are in accordance with the Sulphur River Basin Authority's enabling legislative law to provide for the conservation and development of the state's natural resources within the basin of Sulphur River.

To select a water strategy with the least environmental, social, and economic impacts, the Sulphur River Basin Authority continues to develop a vast data base of information involving the entire Sulphur River Watershed. Studies continue to be developed (e.g. hydrological, geological, environmental, social, and economic). This process is essential to protect and develop a river basin and to comply with regulatory requirements needed to permit projects.

Planning, executing, and completing tasks during 2011 and 2013 were recognized by the Corps of Engineers (COE) administration. In August of 2013, the study was re-scoped to be 3x3x3 compliant, taking into consideration a water supply approach for the SMART Planning feasibility study. In 2014, 2015 and 2016 the US President's budget included money for the Sulphur River Basin Feasibility Study totaling $1,500,000.

Water supply strategies within the Sulphur River Basin Feasibility Study include reallocation of Lake Wright Patman, reallocation of Lake Jim Chapman, Marvin Nichols Reservoir, Talco Reservoir, George Parkhouse I Reservoir, George Parkhouse II Reservoir, and combinations of each to total 60 possible water supply strategies.

In 2014 the compiled data was synthesized to narrow the focus. A combination of reallocation at Lake Wright Patman and Marvin Nichols Reservoir is now being studied in-depth. Augmenting hydrologic, environmental and socioeconomic categories are of priority. These in-depth studies combined with previous data will provide the tools to determine a project that meets the objectives of SRBA and provide the data required for NEPA documents. SRBA will only recommend a project with data compliant with regulatory guidelines.

It is crucial that all the water supply strategies in the Sulphur River Basin Feasibility Study that are listed in the Texas State Water Plan remain in the plan. Not one single water supply strategy has been studied to the extent needed to be permitted. The planning activities for needs analysis and strategy recommendations that The Texas Water Development Board supports are analogous to regulatory requirements needed for permitting. It is in SRBA's view that TWDB's intent is to help provide and encourage extensive studies needed to permit water supply strategies. The permitting process is the judge and jury of a water supply strategy. Due to RWPGs limited funds, it is up to the Water User Groups (WUGs) and Wholesale Water Providers (WWPs) to spend the time and money to develop the data needed.

SRBA's current contracts and functions clearly indicate that SRBA expects to be a Wholesale Water Provider (WWP) as defined in the (*Texas Administrative Code, Title 31 Part 10, Chapter 357 Subchapter A, Rule 357.10)*

(30) Wholesale Water Provider (WWP)--Any person or entity, including river authorities and irrigation districts, that has contracts to sell more than 1,000 acre-feet of water wholesale in any one year during the five years immediately preceding the adoption of the last regional water plan. The regional water planning groups shall include as wholesale water providers other persons and entities that enter or that the regional water planning group expects or recommends to enter contracts to sell more than 1,000 acre-feet of water wholesale during the period covered by the plan.

SRBA should be designated as a WWP in the State Water Plan.

Regional Water Planning Groups are required to follow *(Texas Administrative Code, Title 31 Part 10, Chapter 357 Subchapter C, Rule 357.34)* for all WUGs and WWPs.

SRBA continues to support TWDB and looks forward to the next round of planning.

Sincerely,

SULPHUR RIVER BASIN AUTHORITY

B Russell

Michael Russell, President

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South Rains
Special Utility District
121 N. Dunbar Lane – P.O. Box 95 – Emory, Texas 75440-0095
Phone (903) 473-2122 Fax (903) 474-1302

July 3 2015

Mr. Walt Sears, Jr
NETRWPG – Region D Administrative Office
% Northeast Texas Municipal Water District
P.O. Box 955
Hughes Springs, TX 75656

RECEIVED
AUG 05 2015
BY:

Dear Walt,

We received your Public Notice regarding the July 14th meeting in Mt Pleasant, and have perused the 2016 Region D Plan.

In Section 4.3.4 under the City of Emory, there is no mention of the approximately 3,500,000 gallons per month of treated water purchased by South Rain Special Utility District in Emory to service about 968 rural customers in Rains County, nor is there any mention of our District, in the report. South Rains SUD also purchased an average 745,000 gallons per month of treated water from Bright Star-Salem SUD. These numbers could skew your number for Rains County.

Sorry to be so late in responding. I started this letter on June 8th but was interrupted by more pressing issues. See you in Mt Pleasant.

Sincerely,

Gus Metz
General Manager

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August 2016

New Water Supply and Delivery Strategies for Region C

Prepared for:

Region C Water Planning Group
Region D Water Planning Group
Texas Water Development Board

Prepared by:
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Table of Contents

New Water Supply and Delivery Strategies for Region C

Introduction

This study introduces five new water supply and delivery strategies for consideration by the Region C Water Planning Group. All five strategy options provide better cost versus yield ratios for Region C than Marvin Nichols 1a does, or any other published strategy that includes the building of any new reservoirs within the Sulphur River Basin.

The first two options are newly updated versions of the Patman/Chapman System of Reservoirs using pipeline strategies. These two options provide more water from the Sulphur River Basin than MN 1a would provide for Region C. The study of these two options uses information from the 2003 US Army Corps of Engineer's "System Operation Assessment of Jim Chapman and Wright Patman Lakes," the 2016 Region C Water Plan, and the December 2014 Sulphur River Basin Feasibility Study.

The last three options are canals based on a January 2015 US Army Corps of Engineer report that studied moving large quantities of water from the Missouri River to Western Kansas. That COE study has been adapted to fit the needs of Region C. These options provide a path to provide more water for Region C than any strategy that has ever been published by Region C.

The five main options in this study are as follows:

Patman/Chapman System of Reservoirs Option A.
Replacement for the Marvin Nichols (MN) 1a strategy. This option would provide 27 percent more water than MN 1a while costing the same as MN 1a is published to cost in the 2016 Region C Water Plan, even when the costs for raising Lake Wright Patman are added. Option A would be able to proceed to construction soon, saving both time and money for Region C.

Patman/Chapman System of Reservoirs Option B.
A larger replacement for MN 1a that supplies 60 percent more water than MN 1a would for Region C while costing only 49 percent more than what MN 1a is published to cost in the 2016 Region C Water Plan. Option B would be able to proceed to construction soon, saving both time and money for Region C.

Northeast Texas Canal (NTC) Option
The Northeast Texas Canal (NTC) Option would transport water from the Sulphur River Basin to Region C. It has provision to add water from other Northeast Texas and Arkansas sources. The NTC's initial yield from the Sulphur River is 850,000 acre-feet, with the ability to carry up to 1.4 million acre-feet to Region C. The NTC would transport more water at less cost than water strategies published in the 2016 Region C Water Plan.

East Texas Canal (ETC) Option
The East Texas Canal (ETC) would transport water from Lake Toledo Bend, Lake Sam Rayburn, Lake Steinhagen and Lake Livingston to Region C. It has a yield of 1 million acre-feet, with the ability to carry up to 1.4 million acre-feet. The ETC would transport more water at less cost than options studied for water supply from East Texas lakes that are published in the 2016 Region C Water Plan.

Arkansas-Texas Canal (ATC) Option
The Arkansas-Texas Canal (ATC) would transport Arkansas water to Region C by way of the NTC, and has the potential to add a supplementary yield of up to 700,000 acre-feet to the NTC. The ATC provides water from more diverse river basins. It would provide superior water availability during a time of long-term drought.

These options would reduce many adverse impacts over the methodologies currently considered by Region C. This study indicates that there should be a reconsideration of Region C’s recommended and proposed water supply strategies.

As this study presents new options that would provide more water for Region C, we should recall the words of a Texan who wrote a book that began the road to the 1968 Texas Water Plan. Nationally known researcher and historian Walter Prescott Webb, who wrote "More Water for Texas, the Problem and the Plan" in 1954, said this in his book...

> *“If this were a political pamphlet, designed to please everybody, we would find a way of saying that with proper management, every section of Texas could have all the water needed for municipal use, for irrigation and for industry. The only trouble with such a statement is that it would be false.”*

Patman/Chapman System of Reservoirs Option A

Both the Sulphur River Basin Feasibility Study (SRBFS) and the 2016 Region C Water Plan have published the cost of Marvin Nichols 1a as $4.3 Billion. The SRBFS states that the reason MN 1a is recommended over Lake Wright Patman is that MN 1a would cost less to build than the cost of the pipelines needed to go to Lake Patman. By using the calculations of the SRBFS and the 2016 Region C Water Plan, the math now weights to using Option A or B rather than MN 1a.

In 2003, the U.S. Army Corps of Engineers published a system reservoir study of Lakes Patman and Chapman to determine the yield from those lakes combined. The study stated that if extra pipeline capacity was added, the yield could be greater than 600,000 acre-feet. The study proposed, for its maximum pipeline, one 10-foot diameter pipeline from Lake Patman. The study goes on to state that more pipeline capacity would not be competitive with the 2001 Region C Marvin Nichols 1 cost estimate of $1.7 Billion.

With Region C now publishing that MN 1a would cost $4.3 Billion, the pipeline cost cap changes substantially. Option A would use two 10-foot diameter pipelines, just as is proposed in the MN 1a strategy. By comparison with the 2016 Region C Water Plan cost estimate of building MN 1a, Option A would cost about the same as MN 1a.

The 2003 COE System Study conducted an analysis of Lake Patman up to an elevation of just over 228 feet above sea level. However, the 2014 SRBFS has now calculated yields of Lake Patman at elevations well beyond 228 feet. A Lake Patman elevation of 231 feet will produce the additional yield needed to protect the current senior water rights of the City of Texarkana, while providing 620,000 acre-feet for Region C.

A run-of-river system would be created for some lakes in Region C. These lakes would immediately include: Lavon, Hubbard, Lewisville, Eagle Mountain and Worth. During implementation of Option A, Region C could add a discharge (to the pipeline going from Lake Lewisville to Eagle Mountain Lake) and Option A would be able to add water to Lake Grapevine for even more water storage.

There exist additional water sources that could be combined with Option A. A pipeline segment to Booster Station #1 could provide for a less expensive way to pump water from Lake O' The Pines to Region C.

The Arkansas Natural Resources Commission has corresponded that there are two lakes in Southwest Arkansas that have water available that could be available to Texas. These are Lake Erling and Lake Millwood. It is feasible that pipeline segments to these lakes could provide an additional 70,000 acre-feet per year to the water availability for Option A.

With successful negotiations with agencies in Arkansas and the granting of a Title III Interstate Water Transfer Permit by the Legislature of Arkansas, Option A could improve water availability yields far beyond 620,000 acre-feet yield stated for Option A, and could pump water at near the maximum pipeline capacity of 720,000 acre-feet.

Cost Estimates for Option A

Option A, as shown in detail in Table-1, would cost $4.1 Billion to construct, and $4.3 Billion when the costs for raising Lake Patman are added, if the added costs were actually that high. The construction cost estimates are calculated using the same data for pipeline infrastructure that is published in the 2016 Region C Water Plan for MN 1a in Table Q-18. The cost estimates of Option A and of MN 1a are an apple vs. apple comparison. Both use the same Table Q-18 cost estimates.

The SRBFS states that the additional costs associated with raising Lake Patman to elevation 232.5 feet would be $292 million. However, the land that would be additionally inundated, and the land that likely would be used to mitigate with, is under a US COE easement arrangement. That land's value is actually much lower due to numerous constraints about how the land can be used, such as no homes or permanent buildings of any kind. That land is generally valued and appraised at less than $1,000 per acre. The SRBFS used a generalized figure of $2,000 per acre in its calculations, making the costs stated in their study for land mitigation over-inflated for this strategy's mitigation requirements. While it is true that those landowners could generally not find replacement land at that value, that is nonetheless the appraised and market values that would be used under eminent-domain proceedings in Texas.

There are three caveats about the costs stated in the SRBFS as how it would apply to Option A. The first caveat is that Option A would only raise Lake Patman to an elevation of 231 feet above sea level, not the 232.5 feet studied by the SRBFS. That would reduce the number of acres inundated by about 3,000 acres, and lower the cost. The second caveat is that the cost for acreage would be 50 percent less than what is stated in the SRBFS. The third caveat is that the costs for building MN 1a, published in the SRBFS and by the 2016 Region C Water Plan, remain understated by at least $1.5 Billion (as reported in the "MN 1a Analysis" section of this study.)

Cost vs. Yield Analysis of Option A and MN 1a

As is reported in the "MN 1a Analysis" section of this study, an independent estimate contracted in 2002 for Oklahoma found that Marvin Nichols 1 would cost at least $5.1 Billion. By adjusting the Oklahoma estimate for inflation at a modest rate since the estimate was published, the current actual cost for Marvin Nichols would be at least $5.8 Billion. This means that Region C should expect at least an additional 35 percent cost increase for MN 1a over what Region C has published for 2016.

Option A would provide a 620,000 acre-foot yield to Region C. The total available yield of MN 1a for both Region C and Region D, according to the SRBFS, would be 590,000 acre-feet. Of that amount, Region C would get 489,800 acre-feet. That means that Option A would provide 27 percent more water than MN 1a would provide for Region C.

The cost of 27 percent more of MN 1a, which is currently understated as $4.3 Billion in the 2016 Region C Water Plan, would equal $5.5 Billion. That would require about $1.2 Billion more of MN 1a to statistically equal the same cost/yield ratio of Option A.

The adjusted Oklahoma estimate of building MN 1 is $5.8 Billion. The cost of 27 percent more of MN 1a, using the adjusted Oklahoma estimate, would make the cost of MN 1a to be $7.4 Billion. That would require about $3.1 Billion more of MN 1a to statistically equal the same cost/yield ratio of Option A. This analysis shows that Option A is superior in cost/yield to that of building the Marvin Nichols 1a Reservoir.

Patman/Chapman System of Reservoirs Option B

Option B is similar to Option A in that it provides for a system of reservoirs to supply water to Region C. The difference is that Option B adapts from the best reservoir strategy outlined in the December 2014 Sulphur River Basin Feasibility Study. The SRBFS published a pipeline system that proposes using Lake Patman, MN 1a and Lake Chapman. Option B removes MN 1a.

Design of Option B

Option B would start by using three 114-inch pipelines at Lake Patman, just as is used starting at MN 1a in the SRBFS. Option B would transport water to two additional important lakes, Lake Ray Roberts and Lake Bridgeport, than the stand-alone MN 1a strategy. This will enhance the system yield of Option B. Lake Grapevine could be added by providing a discharge at Denton Creek as Option B goes from Lake Ray Roberts to Lake Bridgeport, which would additionally increase the yield. That would bring the number of storage lakes available to nine: Chapman, Lavon, Hubbard, Lewisville, Grapevine, Ray Roberts, Bridgeport, Eagle Mountain and Worth.

More acre-feet could be provided if Region C would later decide to add Lake Fork and Lake Tawakoni to the system of reservoirs by adding pipelines from Option B pipelines to those lake's northern tributaries. Region C could later decide to also add off-channel and/or on-channel storage reservoirs near the pipeline in Region C to hold more water from the Sulphur River.

There exists pipeline capacity to add water from Lake Millwood and Lake Erling if an agreement can be made with those lake's controlling agencies and with the State of Arkansas, and could provide an ability to add water from Oklahoma's Little River reservoirs. Water from Lake O' The Pines could be added at Booster Pump Station #1.

Cost Estimates for Option B

Option B is an apple vs. apple comparison of cost estimates. The cost of Option B, as stated in Table-2 of this proposal, is estimated to be $6.2 Billion. When the SRBFS cost analysis for raising Lake Patman is added, the price would rise to $6.4 Billion. It would raise the elevation of Lake Wright Patman to 232.5 feet above sea level. It would provide more than 60 percent more water than MN 1a, yet would cost only 49 percent more than

MN 1a when compared to the 2016 Region C estimate. The cost of MN 1a is published in the 2016 Region C Water Plan in Table Q-18.

The SRBFS states that the additional costs associated with raising Lake Patman to elevation 232.5 feet would be $292 million. However, the land that would be additionally inundated, and the land that likely would be used to mitigate with, is under a US COE easement arrangement. That land value has been lowered due to numerous constraints about how the land can be used, such as no homes or permanent buildings of any kind. That land is generally valued and appraised at less than $1,000 per acre. The SRBFS used a generalized figure of $2,000 per acre in its calculations, making the costs stated in their study for land mitigation over-inflated for this strategy's mitigation requirements. While it is true that those landowners could generally not find replacement land at that cost, that is nonetheless the appraised and market values that would be used under eminent-domain proceedings in Texas.

The addition of the estimates for raising Lake Patman would bring the total cost to $6.4 Billion for Option B. There are two caveats. The additional costs published by the SRBFS regarding raising Lake Patman to elevation 232.5 are overstated, and the costs for building MN 1a as stated in the 2016 Region C Water Plan remain understated by about $1.5 Billion.

Cost vs. Yield Analysis of Option B and MN 1a

As is reported in the "MN 1a Analysis" section of this study, an independent estimate contracted in 2002 for Oklahoma found that Marvin Nichols 1 would cost at least $5.1 Billion. By adjusting the Oklahoma estimate for inflation at a modest rate since the estimate was published, the current actual cost for Marvin Nichols would be at least $5.8 Billion, which agrees with the "MN 1a Analysis" of this study. This means that Region C should expect at least an additional 35 percent cost increase for MN 1a over what Region C has published for 2016.

Option B would provide a 785,000 acre-foot yield for Region C. The total yield of MN 1a for Region C and for Region D, according to the SRBFS, would be 590,000 acre-feet. Of that amount, Region C would get 489,800 acre-feet according to the 2016 Region C Water Plan as stated in its Table Q-18. That means that Option B would provide more than 60 percent more water than MN 1a for Region C.

The cost of 60 percent more of the project cost of MN 1a, as currently understated in the 2016 Region C Water Plan, would be $6.9 Billion. That would require $500,000,000 more of MN 1a to statistically equal the cost/yield of Option B.

The current adjusted Oklahoma estimate of building MN 1 is $5.8 Billion. That would make the cost of 60 percent more of the cost of MN 1a to be $9.3 Billion. That would require $2.9 Billion more of MN 1a to statistically equal the cost/yield of Option B

CANAL OPTIONS

The information from this part of the study is based on a January 2015 US Army Corps of Engineer report titled "Update of 1982 Six State High Plains Aquifer Study." It studied a method for supplying large quantities of water across Kansas using water from the Missouri River. The COE Study also compared itself with a canal recently completed in Arizona using the Colorado River, and compares itself with two additional projects, which indicate that the study's estimates are credible. An adaptation has been made in this proposal to use the same constructs to supply water for Region C.

Canal options have generally not been studied as a major water transportation option for Region C. The US COE study for Kansas indicates that canals should be considered as a methodology for transporting large amounts of water for Region C.

The Northeast Texas Canal (NTC) Option

The Northeast Texas Canal (NTC) Option provides the least expensive method for transporting large quantities of water from the Sulphur River Basin. The NTC will provide a water supply of 850,000 acre-feet to Region C from the Sulphur River Basin, and could increase to carry 1.4 million acre-feet depending on additional water supply connections. The NTC would provide a run-of-river to Region C reservoirs as well as transport water stored at Lake Wright Patman and from other water supplies available and connected.

Design of the NTC

The NTC is a 2,000 cubic-foot per second canal from Lake Wright Patman to Lake Ray Roberts, then a 1,200 cfs canal from Lake Ray Roberts to Lake

Bridgeport. It would start on the south side of Lake Patman and proceed to the south side of the White Oak Creek, south of the White Oak Creek Wildlife Management Area. It would then crest to the South Sulphur River to Lake Chapman to begin its delivery of water to Region C reservoirs. The NTC would continue along the South Sulphur River to the Upper Trinity River Basin and then on to Lake Ray Roberts. The canal would then reduce in size to 1200 cfs and proceed to Lake Bridgeport.

The NTC would stay inside the northern reaches of the Trinity River Basin. There are eleven lakes that would receive water from the NTC: Chapman, Tawakoni, Fork, Lavon, Hubbard, Lewisville, Grapevine, Ray Roberts, Bridgeport, Eagle Mountain and Worth. Region C could later add more reservoirs (off-channel or otherwise) for storing additional surplus waters.

The NTC is designed so that it can provide additional water supply from sources in Arkansas and Northeast Texas to Region C. Water from the Arkansas-Texas Canal (ATC), described later in this study, could add up to 700,000 acre-feet. If the ATC is not added, there exists canal capacity to add water from Lake Millwood and Lake Erling if an agreement can be made with those lake's controlling agencies and with the State of Arkansas, and could provide an ability to add water from Oklahoma’s Little River reservoirs. Water from Lake O’ The Pines could be added with a short pipeline segment to the NTC. In addition, as a pipeline segment crosses the area of the Lower Sulphur River from Lake Erling, it might be possible to add run-of-river supply from the Sulphur River near its confluence with the Red River.

The NTC would raise the elevation of Lake Wright Patman to 231 feet above sea level. The SRBFS states that the additional costs associated with raising Lake Patman to elevation 232.5 feet would be $292 million. Since the NTC only raises Lake Patman to 231 feet, it would flood about 3,000 fewer acres. Additionally, the land that would be inundated, and the land that likely would be used to mitigate with, is under a US COE easement arrangement. That land value has been lowered due to numerous constraints about how the land can be used, such as no homes or permanent buildings of any kind. That land is generally valued and appraised at less than $1,000 per acre. The SRBFS used an overly generalized figure of $2,000 per acre in its calculations, making the costs stated in its study for land mitigation over-inflated for this scenario. While it is true that those landowners could generally not find replacement land at that cost, that is nonetheless the appraised and market values that would be used under eminent-domain proceedings in Texas.

It will be easier to add water charging and discharging sites along the way with a canal. One example would be deciding later to add water from Lake O' The Pines, or to provide water to a reservoir near Wichita Falls. It would be easier than pipeline reconstruction and design.

The NTC will be much less expensive to build per mile. It is arguable more reliable since canals are not subject to the long-term pressures and corrosions that pipelines face. The reduced friction levels of a canal make for a more economical solution over that of a pipeline. The pumps use less electricity to pump the same water in a canal system since backpressures are greatly reduced over that of a high-pressure pipeline system.

Cost Analysis of the NTC

Cost estimates are based on the published January 2015 study completed by the US Army Corps of Engineers (COE) regarding a canal project in the State of Kansas. The gain in elevation of the NTC would be less than the altitude gain required in Kansas, so fewer pumps, and the infrastructure associated with the pumps, will be necessary.

The NTC construction cost estimate is $3.9 Billion. With the cost of raising Lake Wright Patman to an elevation of 231 feet added, the cost rises to $4.1 Billion. The summary of costs for the NTC is shown in Table 4.

East Texas Canal (ETC) Option

The East Texas Canal (ETC) Option provides a less expensive method for transporting water from Lake Toledo Bend, Lake Sam Rayburn, Lake Steinhagen, and Lake Livingston. The ETC would supply 1 million acre-feet of water to Region C. It could be increased to supply 1.4 million acre-feet if that amount of water supply were made available.

For this study, the water supply scenario considered is 700,000 acre-feet from Toledo Bend, 100,000 acre-feet from Lake Sam Rayburn, 100,000 acre-feet from Lake Steinhagen, and 100,000 acre-feet from Lake Livingston. All four lakes are capable of greater yields than what are listed for this scenario; therefore, many different water supply scenarios are possible.

The Toledo Bend water availability has been stated as higher than 700,000 acre-feet by the Sabine River Authority, and could be higher still if the State of Louisiana will allow the sale of any of its share of Toledo Bend water to Texas. The 100,000 acre-feet for Lake Steinhagen and 100,000 acre-feet for Lake Sam Rayburn is based on data from the TWDB Study "Volumetric Survey of Sam Rayburn Reservoir." In addition, Region C has a run-of-river strategy for the Neches River, which could be captured instead at Lake Steinhagen. The water availability for Lake Livingston is based on the 2011 Region C Water Plan, where Tables Q-33, Q-34 and Q-35 all planned 200,000 acre-feet from Lake Livingston for different Region C water agencies.

The ETC is a superior water strategy for several reasons. It will provide more water at a lower cost. Most importantly, it will provide water from basins that are more likely to have water available during a sustained drought event in Region C. The ETC adds water originating from river basins that are further south and east and receive more rainfall. That means a more drought resistant strategy for Region C, which is what one of the primary goals should really be, at least until the price of desalination becomes more affordable.

The ETC will be less expensive to build per mile. It is arguable more reliable since canals are not subject to the long-term pressures and corrosions that pipelines face. The reduced friction levels of a canal make for a more economical solution over that of a pipeline. The pumps use less electricity to pump the same water in a canal system since backpressure is reduced over that of a high-pressure pipeline system.

Design of the ETC

The ETC would be a 2,000 cubic-foot per second concrete-lined canal transporting water from near the dam of Lake Toledo Bend to a tributary leading into Lake Sam Rayburn. From there water would be released by spillway and power generation facilities to Lake Steinhagen. From Lake Steinhagen, a canal would carry the water to Lake Livingston. From Lake Livingston, the ETC would carry the waters to Lakes Richland-Chambers and Cedar Creek.

The gain in elevation of the ETC would be a small fraction of that which was studied for the Kansas system. There would be no need to build a source or destination reservoir for the ETC, no need to build a dedicated power generation facility, or a lock and dam.

Since the ETC does not need reservoir storage in Region C, there exist numerous options for proceeding from Lakes Richland-Chambers and Cedar Creek. Much would depend on how Region C addresses obtaining water from the Sulphur River Basin, and what water agencies would participate in funding the ETC. From that determination, canals and/or pipelines could proceed to other reservoirs, or proceed directly to water treatment facilities. Therefore, the study of the ETC ends with the ETC at Lakes Richland-Chambers and Cedar Creek.

(It should be pointed out that the river basin in which the ETC travels could be changed to follow the Sabine, Angelina or Neches River Basins rather than the Trinity River Basin. However, those could be longer canals and would deprive the generation facility at Lake Sam Rayburn of using the additional water from Toledo Bend for making electricity.)

Cost Analysis

Cost estimates are based on the published January 2015 study completed by the US Army Corps of Engineers (COE) regarding a canal project in the State of Kansas. The estimated cost of building the ETC is $4.5 Billion. Table 6 shows a summary of these costs.

Getting 1 million acre-feet to Lakes Richland-Chambers and Cedar Creek is a considerable amount of water at a price much lower than the $6.3 Billion it would cost to get just 348,000 acre-feet from Toledo Bend via pipelines to Region C as is stated in the 2016 Region C Water Plan.

The Arkansas-Texas Canal (ATC) Option

First, it is important to point out that the Arkansas-Texas Canal (ATC) Option is a strategy somewhat similar to one that was published by the Texas Water Development Board in December 1976. The TWDB report, "An Assessment of Surface Water Supplies of Arkansas with Computations of Surplus Supplies and a Conceptual Plan for Import to Texas," sought to find more water for Texas after the 1968 Texas Water Plan failure at the polls. Therefore, the ATC Option is not a totally new idea or strategy. The ATC, however, is based on the analysis of the 2015 COE Kansas study.

The ATC is a supplementary option to the Northeast Texas Canal; it is not presented as a standalone option. The cost versus the potential yield available would not be as low as other options of this study if it was constructed by itself.

The ATC should be a water strategy for Region C. Rather than building a facility in the same rain shadows within Texas, the ATC can reach to water supplies that originate in Colorado, Kansas, Oklahoma, Missouri and Arkansas. That means a more drought resistant strategy for Region C, which is what one of the primary goals should really be, at least until the price of desalination becomes more affordable.

After communicating with agencies in the State of Arkansas, it was discovered that the State of Arkansas could be interested in water agreements that would assist them in meeting their domestic priority to provide its water to the people of Arkansas. Therefore, a key to obtaining water with Arkansas is to help it with its priorities.

The farmers in Eastern Arkansas are now drilling for groundwater at an increased rate to irrigate their crops, and groundwater is depleting. If trends continue, many farms may have to either change to less valuable drought-resistant crops, or to cease operation completely.

Southern Arkansas has been given a critical groundwater designation, as was published in a status report produced by the Arkansas Natural Resources Commission (ANRC) to the State of Arkansas Legislature in 2012. The report includes many Southern Arkansas counties that are classified as being in Critical Areas. Some of these include Bradley, Calhoun, Columbia, and Ouachita Counties, all of which happen to lie along the route of the ATC.

By partnering with the State of Arkansas, Region C could build the ATC with a surplus of capacity, and work with Arkansas to carry and deliver water to meet the needs of its people as the ATC passes through the State. Because canals are much less expensive to build than pipelines, this would be a win-win for both Arkansas and Region C.

The calculated excess surface water available for interbasin/interstate transfers for non-riparian use by the Arkansas and Ouachita Rivers has been published by the ANRC as 4,334,200 acre-feet per year. Near the proposed pump facility location on the Arkansas River is the White River, just before it flows into the Mississippi River. The White River is published to have 2,131,300 acre-feet per year available. The total possible available and uncommitted water in Arkansas from all three rivers is 6,465,500 acre-feet per year. It may be possible that the State of Arkansas would permit up to 700,000 acre-feet per year of its uncommitted waters from the Arkansas and Ouachita Rivers to the State of Texas. That would equal 16.2 percent of the available water yield of the Arkansas and Ouachita Rivers, and 10.8 percent of the available water yield if the Arkansas, Ouachita and White Rivers were all accessed.

Design of the ATC

The ATC provides a 2,000 cfs concrete-lined canal from the Lower Arkansas River to Bayou Bartholomew, then a 1,200 cfs concrete-lined canal to Lake Wright Patman. It could proceed to construction once a successful Title III interstate permit has been submitted to the Arkansas Natural Resources Commission and is approved by the Arkansas Legislature.

The ATC will be much less expensive to build per mile than pipelines. The ATC is arguable more reliable than pipelines since canals are not subject to the long-term pressures and corrosions that pipelines face. The reduced friction levels of a canal make for a more economical solution over that of a pipeline. The pumps use less electricity to pump the same water in a canal system since backpressure is greatly reduced over that of a high-pressure pipeline system.

The ATC would transport water from the Arkansas River (just before it enters the Mississippi River,) the Ouachita River (just before it exits to the State of Louisiana,) then on to Lake Wright Patman. The ATC would likely start at a pumping facility near the Pendleton bridge, upstream from the Wilbur Mills Dam, on the Arkansas River. The ATC begins in a Southwesterly direction and will intersect current small canals, making water available for each as it passes. It would continue to a pumping facility at Bayou Bartholomew where it would release water into the Bayou, reduce in size to 1,200 cfs, and begin its travel over to the Saline River. After reaching the Saline River Basin, the water would flow into the Saline River.

The water would flow down the Saline River until it joins with the Ouachita River. A pump station would be located on the Ouachita River south of the Calion Lock and Dam. From there the ATC would continue west across Southern Arkansas, following Smackover Creek. When the ATC is just east of the Red River, the water would be transported by pipeline under the Red River. From there the ATC would proceed to Lake Wright Patman to join with the Northeast Texas Canal.

Cost Analysis of the ATC

Cost estimates are based on the published January 2015 study completed by the US Army Corps of Engineers (COE) regarding a canal project in the State of Kansas. The gain in elevation of the ATC would be less than the altitude gain required in Kansas, so fewer pumps, and the infrastructure associated with the pumps, will be necessary. There would be no need to build a source or destination reservoir for the ATC, no need to build a dedicated power generation facility, or a lock and dam.

The estimated cost for building the ATC is $2.2 Billion. The summary of costs for the ATC, as well as the cost when the ATC is combined with the NTC, is shown in Table 5.

Marvin Nichols 1a Analysis

For background purposes, it should be considered why Marvin Nichols 1a came into being. Marvin Nichols 1a is the third mutation of a site that originally was one cog in a 1968 Texas Water Plan strategy to pump a massive volume of water from the Lower Mississippi River, across Louisiana, through Texas, and then on to Albuquerque, New Mexico. Outside of that water strategy, the Naples Reservoir site (later renamed the Marvin Nichols Reservoir site) serves no essential purpose.

In 2001, Region C published that the Marvin Nichols 1 Reservoir would cost \$1.7 billion. In the next Region C Water Plan, the cost was published as over \$2 billion. Later still, the cost was published at over \$3 billion. The 2016 Region C Water Plan states that Marvin Nichols 1a will cost \$4.3 Billion. The published costs for building Marvin Nichols have increased over 250 percent in only 14 years, even though the dam site was moved several miles closer to Region C (which made the pipelines shorter and should have made MN 1a less expensive.) These figures illustrate the trend that the Region C Water Plan's cost estimates for Marvin Nichols have "always" been wrong and unreliable. The 2016 Region C published cost estimate for MN 1a has nearly reached the 2002 Oklahoma estimate of \$5.1 Billion. That validates the 2002 Oklahoma estimate and Oklahoma's need to get an independent estimate over relying on the estimates given to Oklahoma in negotiations with Region C.

Years of inflation have increased the 2002 Oklahoma cost estimate of Marvin Nichols. When adjusted for inflation, the MN 1a cost estimate should be published as being at least \$5.8 Billion. That means that MN 1a's actual estimated cost is at least 35 percent more than what is published in the 2016 Region C Water Plan.

The actual cost of building MN 1a has been, and still is, misrepresented in the Region C Water Plans due, in part, to stipulations that have been allowed by the Texas Water Development Board. Some impacts do not even have to be fully considered in site-cost analysis due to TWDB allowances (i.e. TWDB stipulations that do not demand accurate mitigation estimations for new reservoirs.) Unfortunately, this creates cost estimates in water plans that fall far short from being truly representative as to how high the costs would actually be. That denies important information to the taxpayers of Texas. Detailed here are three examples of cost errors regarding MN 1a:

Example 1: Mitigation Underestimation

The 2014 SRBFS analysis regarding the amount of mitigation for MN 1a is vastly understated, and therefore underestimates the actual cost of building MN 1a. In Table 6-2 of the SRBFS it states that the “Approximate Acres needed for Mitigation” for the 67,000 acre MN 1a at elevation 328 feet is 47,060. That calculates a mitigation rate average of only 0.71 acres for each acre inundated. The much lower quality habitat associated with the building of Lake Gilmer had an average of 1.5 acres for every acre flooded by that lake. Lake Chapman, further upstream from the MN 1a site, had only a small segment of about 6,000 acres of Priority 3 bottomland hardwood habitat in its less than 20,000 acre footprint, and Lake Chapman’s mitigation was over 35,000 acres. That mitigation amount was only that low because the COE used superior habitat downstream to mitigate the lower quality habitat being lost at Lake Chapman; otherwise, the mitigation for Lake Chapman would have been more. MN 1a would inundate Priority 1 bottomland hardwood habitat, much higher quality than the Priority 3 bottomland hardwood habitat inundated at Lake Chapman. The SRBFS analysis fails comparisons with the lesser sized reservoir's mitigation, which had substantially lower habitat values.

It was shown in previous mitigation studies that the mitigation rate in the Sulphur River Basin, in the area of Marvin Nichols, can be 5 acres for every 1 acre inundated (and only that low if there is enough land of the same quality available to use for mitigation.) If the land quality that is used to mitigate with falls in its quality, it was shown that the ratio could advance upwards to 10 to 1. The MN site study by the U.S. Fish and Wildlife Service and the Texas Parks and Wildlife Department indicated this in their analysis of the original MN site. The SRBFS never approached these ratios in its study. Since the US FWS and the TPWD actually have seats at the table for the final mitigation determinations in Texas, their analysis must be seen as expert. The mitigation analysis of the SRBFS made a massive mitigation calculation error. The cost would be more than what is published in the 2016 Region C Water Plan.

Example 2: Underestimation of Archeological Impacts

Archeological analysis in two reports showed significant and high quality artifacts and burial locations consistent with a large and important Native-American settlement in what is now the footprint of MN 1a. A Corps of Engineer study worked between US Hwy 271 and the old Magnolia pipeline site, which is upstream of US Hwy 259. It studied from the Sulphur River up to an elevation of 320 feet. Archeological findings were cataloged and published by the COE and the Ark-Tex Council of Governments.

The COE study put actual “boots on the ground” for several weeks at what is now known as the MN 1a site. The study's investigation easily found highly significant Native-American burial sites and artifacts in the designated study area; some from tribes from the Southwestern United States not previously known to be in that area of Texas. Those artifacts were given to East Texas State University-Commerce, now known as Texas A&M University-Commerce. It is predictable that a required full investigation under the US COE 404 permit process would, at the very least, greatly extend the time and costs for construction. It is likely that the 404 permit research, by the COE, could inhibit the construction of MN 1, MN 1a (at any of its three studied water elevations,) and MN 1b.

<u>Example 3: Underestimation of Necessary Freeboard Allowance</u>
The freeboard (distance from the water to the top of the dam) design for MN 1a is too low, so the size and cost of the dam will have to be increased. In the guide "Freeboard Criteria and Guidelines for Computing Freeboard Allowances for Storage Dams" (which uses the same COE constructs as the SRBFS states that it used), it shows, in examples, that the freeboard should be 11-feet for a generic lake with a concrete soil surface on the lakeside of the dam, a fetch (open straight-line distance from the dam to where waves could begin) of 10 miles, and with 50 mph sustained winds. MN 1a would have substantially more fetch than just 10 miles at flood stage (about twice that), and it is likely to get winds greater than 50 mph for more than 1 hour during a significant encounter with the remnants of a hurricane. MN 1a's freeboard is published as being only 7-feet in the SRBFS.

The SRBFS states "*The total wave runup calculations under Normal Pool conditions assume the full design wind speed, producing large runup, while the calculations under PMF conditions* ***<u>allow</u>*** *for the use of a percentage of the design wind speed, producing lesser runup. This reduction factor ranges from 20% to 50% depending on the nature of the PMF reservoir stage hydrograph relative to the rainfall hydrograph.*"

While the COE has **<u>allowed</u>** calculations that would reduce the freeboard that a dam should have by up to 50 percent in certain situations, lowering the freeboard on a lake the size and depth of MN 1a would not be a safe consideration, and would likely be challenged.

The lakeside slope of the MN 1a dam is published in the SRBFS as being constructed using soil cement. The freeboard guide states that the freeboard, for soil cement dams, is supposed to be multiplied by a factor of 1.5. That means that MN 1a's freeboard should include a 50 percent increase in its height for wave runup (to stop the waves and to stop the run of the waves up the dam's angled and smoother concrete surface.) For MN 1a to need only 7-feet of freeboard, the largest probable waves to hit the dam, during flood conditions with maximum sustained winds, would need to be no greater than 4 feet 8 inches in height. There are flood events and wind conditions that would significantly exceed that wave height according to weather analysis and the tables from the freeboard guide.

The freeboard guide details the Choke Canyon Dam south of San Antonio, which is similar in embankment design and directional orientation as that of MN 1a. The Choke Canyon Reservoir has a fetch length of about 5.8 miles, and its freeboard's calculation was 6.6 feet. That was broken down in the example as 4 feet 7 inches for the freeboard times the factor increase for the use of soil cement on the dam.

Due to the long fetches of MN 1a and the lakeside soil cement dam surface, the graph from the freeboard guide times 50 percent indicates that the MN 1a dam should be engineered with a 15-foot freeboard for sustained 60 mph winds. That doesn't mean that MN 1a would have 15-foot waves; however, it does mean that the waves, plus conditions caused by the way the waves would interact with the design of the dam, indicates a safety zone of 15-feet of height above the probable maximum flood elevation for a prolonged 60 mph wind event.

Lake Patman, less than one-half the size that MN 1a would be, has over 26-feet between PMF and the top of the dam, and Lake Patman required no soil cement freeboard height increase. Cooper Lake, an even smaller lake, has a freeboard of over 13 feet and it has no soil cement surface on the dam. The elevation of the top of the MN 1a dam should not be lower than 350 feet above sea level instead of the published 342 feet; and really should be at least 355 feet above sea level. If MN 1a was built to an elevation of 355 feet, that would still be 20-feet lower than the freeboard of Lake Patman when adjusted to Lake Patman's lack of the smoother soil cement dam surface, as MN 1a would have. One likely probability for MN 1a needing more freeboard than only 7-feet would be a dam gate malfunction from a raft of floating trees during a flooding event (a likely fact of life if MN 1a were built.) It should be pointed out that the calculated probable maximum flood level in no way precludes the water level from getting higher than the PMF.

Given the weather events witnessed May 2015 in Texas, Lake Texoma and Lake Patman comes to mind as the examples to use in designing the freeboard for MN 1a, not the version that is published in the 2016 Region C Water Plan. The MN 1a dam would need to be longer, wider, and higher. The dam would cost more than what is estimated.

Summary of MN 1a analysis

The three examples detailed previously would increase the cost of building MN 1a, and calls into question the ability to permit a reservoir within Marvin Nichols' footprint. Some additional cost issues for the MN 1a site include: an underestimation by the SRBFS of the cost for soil stabilization for the dam, underestimation of the negative impacts from the nearby Talco-Mexia fault on MN 1a dam integrity, underestimation of the negative impacts to current and potential petroleum field activity in the vicinity by MN 1a, and that there are no meaningful measures planned to mitigate the continuing issue of floating tree masses and log jams in that area of the Sulphur River. The longtime issue of floating tree masses would not only predictably endanger the public if they would travel on the reservoir, but would also predictably threaten the operation of the outlet structures of the dam. The methods to address the negative impacts of the floating tree masses and bank erosion would likely require channel reconstruction and the building of check dams/weirs on the Sulphur River above MN 1a.

The examples and issues presented in this analysis indicate a substantial increase to the published cost for building MN 1a. Given the options to avoid MN 1a, it is likely that MN 1a would not be permitted by the U.S. Army Corps of Engineers 404 permit process.

CONCLUSION

Now is the time to diversify the water portfolio of Region C, not to choose strategies that simply trap the same rainwater just a few miles further up the same stream. Region C needs a more strategic water strategy. Options A or B should be recommended over MN 1a, and the Northeast Texas Canal, with the Arkansas-Texas Canal, and the East Texas Canal are strategies that should be pursued in the Region C Water Plan. The NTC/ATC together and the ETC each would provide much more water at less cost than the best scenarios studied in the Sulphur River Basin Feasibility Study. They would provide water from more diverse river basins.

The analysis of this study indicates that Marvin Nichols 1a would be a very large and costly "gotcha." The sponsors would predictably find themselves embroiled in a fiasco, in too deep to back out of the project, as in what happened with the Big Dig in Boston, Massachusetts. There, the taxpayers got stuck with a series of cascading gotchas, all while the designers proclaimed their surprise when the true realities of the project became obvious. It was discovered too late that many elements had been underestimated; important realities had been ignored as being "nothing to worry about." In the end, the public's piggybank got busted for Billions of dollars more with the Big Dig. Marvin Nichols 1a is a Big Dig in waiting.

During the U.S. Army Corps of Engineers 404 permitting process, Options A and B would indicate that Marvin Nichols 1a is neither essential, nor necessary, to provide water for Region C. The high negative impacts of MN 1a would not be recommended over alternative strategies that would provide substantially lower impacts as well as better cost vs. yield of water. This indicates that Marvin Nichols 1a would not be permitted by the COE. Even before the permitting process could possibly begin, there would be years of court battles. This means that Region C is likely wasting Texas taxpayer planning dollars and the time that Region C could be using to pursue doable strategies for Texans.

The options presented in this study provide more water, are less expensive, are less controversial, have fewer negative impacts, can be done, and can be done soon. They are projects that would be good legacies to leave for the people. Most of all, the options of this study are very much in the best interests of Region C, of Region D and of the whole State of Texas.

Table 1

OPTION A

Advanced Patman/Chapman System of Reservoirs

Yield 620,000 acre-feet per year yield to Region C

Costs are based on Table Q-18 from the 2016 Region C Water Plan
(By some dredging of Patman, and locating the Lake Pump Station west of Atlanta State Park, distance for Patman to Chapman pipelines could be 10 miles shorter, thus this option could be even less expensive than what is listed in this table.)

ITEM	COST
Pipeline Rural (Lake Wright Patman to Lake Chapman) 2 x 124-inch	1,285,872,000
Right of Way Easements Rural (ROW)	18,297,000
Engineering and Contingencies (30%)	391,251,000
Permitting & Mitigation	13,288,000
Pump Stations with Intake (Wright Patman to Lake Chapman)	118,700,000
Ground Storage Tanks at booster station	18,428,000
Engineering and Contingencies for pump stations (35%)	47,995,000
Permitting & Mitigation for booster station	1,263,000
Subtotal of Pipeline Infrastructure (Lake Patman to Lake Chapman)	1,895,094,000

Pipeline Rural (Lake Chapman to Lake Lavon) 2 x 124-inch	480,804,000
Pipeline Urban (Lake Chapman to Lake Lavon) 2 x 124-inch	37,340,000
Right of Way Easements Rural (ROW)	6,841,000
Right of Way Easements Urban (ROW)	927,000
Engineering and Contingencies (30%)	157,774,000
Permitting & Mitigation	5,777,000
Pump Station with Intake	61,000,000
Engineering and Contingencies for Pump Station (35%)	21,350,000
Permitting & Mitigation for pump station	1,263,000
Subtotal of Pipeline Infrastructure (Lake Chapman to Lake Lavon)	773,076,000

Pipeline Rural (Lake Lavon to Lake Lewisville) 2 x 102-inch	131,677,000
Pipeline Urban (Lake Lavon to Lake Lewisville) 2 x 102-inch	276,552,000
Right of Way Easement Rural (ROW)	5,238,000
Right of Way Easement Urban (ROW)	9,589,000
Engineering and Contingencies (30%)	122,469,000
Permitting and Mitigation	4,082,000
Pump Station	18,954,000
Ground Storage Tanks	12,285,000

Engineering and Contingencies for Pump Stations (35%)	10,934,000
Permitting and Mitigation for Pump Station	312,000
Subtotal of Pipeline Infrastructure (Lake Lavon to Lake Lewisville)	592,092,000

Pipeline Rural (Lake Lewisville to Eagle Mountain Lake) 1 x 96-inch	232,294,000
Pipeline Urban (Lake Lewisville to Eagle Mountain Lake) 1 x 96-inch	139,364,000
Right of Way Easement Rural (ROW)	5,173,000
Right of Way Easement Urban (ROW)	5,412,000
Engineering and Contingencies (30%)	111,497,000
Permitting and Mitigation	3,717,000
Pump Station	22,476,000
Ground Storage Tanks	12,285,000
Engineering and Contingencies for Pump Stations (35%)	12,166,000
Permitting and Mitigation (for Pump Station)	348,000
Subtotal of Pipeline Infrastructure (Lake Lewisville to Eagle Mountain Lake)	544,732,000
CONSTRUCTION TOTAL	3,804,994,000
Interest During Construction	292,985,000
TOTAL CAPITAL COST	**$4,097,979,000**

COMPARISON - Patman/Chapman System Option A and MN 1a	
The Patman/Chapman System acre-feet yield for Region C	620,000
Marvin Nichols 1a proposed total acre-feet yield for Region's C and D	590,000
Marvin Nichols 1a acre-feet yield for Region C according to Table Q-18	489,800

Percentage of increase of Patman/Chapman System yield over Marvin Nichols 1a yield for Region C	27%

Approx. Cost savings of Patman/Chapman System Option A over MN 1a versus 27% more water to Region C. **(using the 2016 Region C Water Plan's estimate of $4.3 Billion for MN 1a and adding the costs associated with raising Lake Patman)**	**$1,160,000,000**

TABLE 2

Option B

Advanced Patman/Chapman System of Reservoirs

Lake Wright Patman to Lake Bridgeport
Yield 785,000 acre-feet per year

Costs are based on December 2014 Sulphur River Basin Feasibility Study (By some dredging of Patman, and locating the Lake Pump Station west of Atlanta State Park, distance for Patman to Chapman pipelines could be 10 miles shorter, thus this option could be even less expensive than what is listed in this table.)

ITEM	COST
Pipeline Rural - WP/LPS to LPS/Chapman 3 x 114-inch	1,655,536,000
Right of Way Easement Rural (ROW)	2,980,000
Engineering and Contingencies (30%)	542,472,000
Permitting and Mitigation	22,656,000
Patman Intake Facility	83,710,000
Engineering and Contingencies for Intake Facility (35%)	29,299,000
Permitting and Mitigation (for Intake Facility)	1,005,000
LPS/Patman Pump Station	159,510,000
Engineering and Contingencies (35% for Pump Stations)	55,829,000
Permitting and Mitigation (for Pump Station)	1,914,000
Pump Station BPS #1	159,510,000
Engineering and Contingencies (35% for Pump Stations)	55,829,000
Permitting and Mitigation (for Pump Station)	1,914,000
BPS #1 Storage Reservoir	39,633,000
Engineering and Contingencies (35% for Storage Reservoir)	13,872,000
Permitting and Mitigation (for Storage Reservoir)	476,000
Subtotal of Pipeline Infrastructure from Wright Patman to Chapman	2,826,145,000

Pipeline Rural - LPS/Chapman to North WTP 3 x 114-inch	617,003,000
Pipeline Urban - LPS/ Chapman to North WTP 3 x 114-inch	23,564,000
Right of Way Easement Rural (ROW)	6,899,000
Right of Way Easement Urban (ROW)	1,146,000
Engineering and Contingencies (30%)	192,170,000
Permitting and Mitigation	7,687,000
Pump Station BPS #2	159,510,000
Engineering and Contingencies (35% for Pump Stations)	55,829,000

Permitting and Mitigation (for Pump Station)	1,914,000
Subtotal of Pipeline Infrastructure from LPS/Chapman to North WTP	1,065,722,000

Pipeline Rural - North WTP Split to Wylie WTP Split/BPS#3 3 x 108-inch	163,169,000
Right of Way Easement Rural (ROW)	2,007,000
Engineering and Contingencies (30%)	48,951,000
Permitting and Mitigation	1,958,000
Pump Station	76,268,000
Engineering and Contingencies (35% for Pump Stations)	26,694,000
Permitting and Mitigation (for Pump Station)	915,000
BPS#3 Storage Reservoir	28,705,000
Engineering and Contingencies (35% for Storage Reservoir)	10,047,000
Permitting and Mitigation for Storage Reservoir	344,000
Subtotal of Pipeline Infrastructure	359,058,000

Pipeline Rural - BPS #3/Wylie WTP Split to Trinity 2 x 120-inch	534,678,000
Pipeline Urban - BPS #3/Wylie WTP Split to Trinity 2 x 120-inch	23,278,000
Right of Way Easement Rural (ROW)	5,513,000
Right of Way Easement Urban (ROW)	1,029,000
Engineering and Contingencies (30%)	167,387,000
Permitting and Mitigation	6,695,000
Discharge Structure - Wylie WTP	2,885,000
Engineering and Contingencies (30%)	866,000
Permitting and Mitigation - for Discharge Structure	35,000
Subtotal of Pipeline Infrastructure	742,366,000

Pipeline Rural - Trinity River/Ray Roberts Split to BPS #4 1 x 114-inch	57,567,000
Pipeline Urban - Trinity River/Ray Roberts Split to BPS #4 1 x 114-inch	6,170,000
Right of Way Easement Rural (ROW)	795,000
Right of Way Easement Urban (ROW)	361,000
Engineering and Contingencies (30%)	19,121,000
Discharge Structure - Trinity River	13,590,000
Engineering and Contingencies (30%)	4,044,000
Permitting and Mitigation - for Discharge Structure	163,000
Subtotal of Pipeline Infrastructure	101,811,000

Pipeline Rural - BPS #4 to Lake Bridgeport 1 x 114-inch	250,595,000
Pipeline Urban - BPS #4 to Lake Bridgeport 1 x 114-inch	3,526,000
Right of Way Easement Rural (ROW)	3,461,000
Right of Way Easement Urban (ROW)	206,000
Engineering and Contingencies (30%)	76,236,000

Permitting and Mitigation	3,049,000
Pump Station #4	51,192,000
Engineering and Contingencies (35% for Pump Stations)	17,917,000
BPS#4 Storage Reservoir	14,940,000
Engineering and Contingencies (35% for Storage Reservoir)	5,229,000
Permitting and Mitigation for Storage Reservoir	179,000
Permitting and Mitigation (for Pump Station)	614,000
Discharge Structure - Bridgeport	4,356,000
Engineering and Contingencies (30%)	1,307,000
Permitting and Mitigation - for Discharge Structure	52,000
Subtotal of Pipeline Infrastructure	432,859,000

Pipeline Rural - North WTP Split to NWTP TSR 1 x 84-inch	13,498,000
Right of Way Easement Rural (ROW)	340,000
Engineering and Contingencies (30%)	4,049,000
Permitting and Mitigation	162,000
Discharge Structure	2,885,000
Engineering and Contingencies (30%)	866,000
Permitting and Mitigation - for Discharge Structure	35,000
Subtotal of Pipeline Infrastructure	21,835,000

Pipeline Rural - Wylie WTP Split/BPS#3 to Wylie WTP 1 x 96-inch	153,328,000
Pipeline Urban - Wylie WTP Split/BPS#3 to Wylie WTP 1 x 96-inch	6,507,000
Right of Way Easement Rural (ROW)	2,870,000
Right of Way Easement Urban (ROW)	516,000
Engineering and Contingencies (30%)	47,951,000
Permitting and Mitigation	1,918,000
Subtotal of Pipeline Infrastructure	213,090,000

Pump Station - Existing Chapman LPS Upgrade	10,000,000
Engineering and Contingencies (35% for Pump Stations)	3,500,000
Permitting and Mitigation (for Pump Station)	120,000
Subtotal (Existing Chapman LPS Upgrades)	13,620,000

Pump Station (Existing Irving BPS Upgrades)	5,000,000
Engineering and Contingencies (35% for Pump Stations)	1,750,000
Permitting and Mitigation (for Pump Station)	60,000
Subtotal (Existing Irving BPS Upgrades)	6,810,000

Total Pipeline Cost	5,783,316,000

Interest During Construction	445,315,000

TOTAL CAPITAL COST of OPTION B	**$ 6,228,631,000**

COMPARISON - Patman/Chapman System Option B and MN 1a	
The Patman/Chapman System acre-feet yield for Region C	785,000
Marvin Nichols 1a proposed total acre-feet yield for Region's C and D	590,000
Marvin Nichols 1a acre-feet yield for Region C according to Table Q-18	489,800

Percentage of increase of Patman/Chapman System yield over Marvin Nichols 1a yield for Region C	60%

Approx. Cost savings of Patman/Chapman System Option B vs. MN 1a times the increase of 61% more water yield to Region C **(using the 2016 Region C Water Plan's estimate of $4.3 Billion for MN 1a and adding the costs associated with raising Lake Patman)**	**$500,000,000**

Table 3

Costs of raising Lake Patman to elevation 232.5 according to Sulphur River Basin Feasibility Study (all tables from SRBFS)

Total Reallocation Costs according to Table 3-5	92,403,951
Real Estate Costs according to Table 4-3	9,400,000
Reservoir Conflicts & Relocation Costs according to Table 5-3	31,396,484
Mitigation Costs according to Table 6-2*	157,266,600
Cultural Resource Mitigation according to Table 6-4	1,550,000
Total Cost to Raise Wright Patman according to SRBFS	292,017,035

Partially Corrected Cost Analysis of Raising Wright Patman to elevation 232.5*	$ 213,383,735

*It is important to point out that during the course of eminent domain proceedings that private landowners are paid only the appraised costs of land, not what some might think they should get. The mitigation for Wright Patman at 232.5 feet is land that is under a US COE easement arrangement. The land is devalued because use is restricted and no permanent structures may be built there, i.e., no homes or barns. Therefore the cost of mitigation published in Table 5-3 of the SRBFS is stated over twice as high as the actual land mitigation cost for the scenarios studied. The land valuation should be averaged at no more than $1,000 per acre, which would still be high over what most landowners would be granted in eminent domain proceedings.

Table 4

Northeast Texas Canal
Lake Wright Patman to Lake Bridgeport, Yield 850,000 acre-feet

SECTION 1 Canal from Lake Wright Patman to Lake Ray Roberts

Item	2000 cfs costs
Pumping Stations	350,000,000
Canal	1,105,000,000
Pipeline (conduit)	283,000,000
Route Relocations	190,000,000
Subtotal Construction	1,928,000,000
Engineering and Contingencies (35%)	674,800,000
Total First Costs	2,602,800,000
Interest During Construction for 36 months	200,415,600
TOTAL CAPITAL COST FOR SECTION 1 CANAL	2,803,215,600

SECTION 2 Canal from Lake Ray Roberts to Lake Bridgeport

Item	1200 cfs costs
Pumping Stations	136,000,000
Canal	379,000,000
Pipeline (conduit)	93,000,000
Route Relocations	78,000,000
Automation & Communication	50,000,000
Subtotal Construction	736,000,000
Engineering and Contingencies (35%)	257,600,000
Total First Costs	993,600,000
Interest During Construction for 36 months	76,507,200
TOTAL CAPITAL COST FOR SECTION 2 CANAL	1,070,107,200

TOTAL CAPITAL COST FOR NTC LAKE WRIGHT PATMAN TO LAKE BRIDGEPORT	**$ 3,873,322,800**

TOTAL COST WITH RAISING OF LAKE WRIGHT PATMAN ADDED	**$ 4,086,706,535**

Table 5

Arkansas-Texas Canal

Arkansas River to Lake Wright Patman, Yield 700,000 acre-feet
2000 cfs Canal from Arkansas River to Bayou Bartholomew
1200 cfs Canal from Bayou Bartholomew to Lake Patman

Item	Cost
Pumping Stations	254,000,000
Canal	794,000,000
Pipeline (conduit)	218,000,000
Route Relocations	188,000,000
Automation & Communication	40,000,000
Total Construction Costs	1,494,000,000
Engineering and Contingencies (35%)	522,900,000
Total First Costs	2,016,900,000
Interest During Construction for 36 months	155,301,300

TOTAL CAPITAL COST FOR ATC ARKANSAS RIVER TO LAKE WRIGHT PATMAN	**$ 2,172,201,300**

TOTAL CAPITAL COST FOR COMPLETE ATC AND NTC, ARKANSAS RIVER TO LAKE BRIDGEPORT	**$ 6,045,524,100**

Table 6

East Texas Canal

Lake Toledo Bend to Lakes Richland-Chambers and Cedar Creek
Yield of 1,000,000 acre-feet
2000 cfs Canal

Item	Cost
Pumping Stations	562,000,000
Canal	1,595,000,000
Pipeline (conduit)	531,000,000
Route Relocations	339,000,000
Automation & Communication	75,000,000
Total Construction Costs	3,102,000,000
Engineering and Contingencies (35%)	1,085,700,000
Total First Costs	4,187,700,000
Interest During Construction for 36 months	322,452,900
TOTAL CAPITAL COST FOR ETC	**$ 4,510,152,900**

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September 11, 2015

Mr. Walt Sears, Jr.
NETRWPG – Region D Administrative Office
C/O Northeast Texas Municipal Water District
P.O. Box 955
Hughes Springs, TX 75656

Re: Review of Region D North East Texas Region Initially Prepared Water Plan

Dear Mr. Sears:

Thank you for seeking review and comment from the Texas Parks and Wildlife Department (TPWD) on the 2016 Initially Prepared Regional Water Plan (IPP) for Region D North East Texas. As you know, water impacts every aspect of TPWD's mission to manage and conserve the natural and cultural resources of Texas. As the agency charged with primary responsibility for protecting the state's fish and wildlife resources, TPWD is positioned to provide technical assistance during the water planning process. Although TPWD has limited regulatory authority over the use of state waters, TPWD is committed to working with stakeholders and others to provide science-based information during the water planning process intended to avoid or minimize impacts to state fish and wildlife resources.

TPWD understands that regional water planning groups are guided by 31 TAC §357 when preparing regional water plans. These water planning rules spell out requirements related to natural resource and environmental protection. Accordingly, TPWD staff reviewed the IPP with a focus on the following questions:

- Does the IPP include a quantitative reporting of environmental factors including the effects on environmental water needs and habitat?
- Does the IPP include a description of natural resources and threats to natural resources due to water quantity or quality problems?
- Does the IPP discuss how these threats will be addressed?
- Does the IPP describe how it is consistent with long-term protection of natural resources?
- Does the IPP include water conservation as a water management strategy?
- Does the IPP include Drought Contingency Plans?
- Does the IPP recommend any stream segments be nominated as ecologically unique?
- If the IPP includes strategies identified in the 2010 regional water plan, does it address concerns raised by TPWD in connection with the 2010 Water Plan.

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AUSTIN, TEXAS 78744-3291
512.389.4800
www.tpwd.texas.gov

The population of the 19 county Region D North East Texas Water Planning Region is estimated to grow from approximately 762,000 in 2010 to over 1.3 million in 2070. . Water needs are expected to grow from about 350,000 acre-feet per year in 2012 to 956,972 acre-feet per year by 2070. Manufacturing water use is the predominant use category, exceeding all others combined. The IPP also acknowledges water in the region is used for recreational and environmental demands and discusses efforts related to the identification and voluntary protection of instream flow regimes.

Recommended Water Management Strategies (WMS) for meeting future water needs include water conservation, reuse, drilling additional groundwater wells, increasing contractual supplies from existing reservoirs, expansion and/or replacement of water treatment plants, dredging of Lake Wright Patman and importation of water by pipeline from Toledo Bend Reservoir and other water bodies within the North East Texas Region.

Chapter 1 of the IPP provides a detailed description of natural resources in the region and describes threats to the natural resources. Giant salvinia is discussed as a serious threat to the region's water sources; however, additional non-native species of concern should be included as a potential detriment to the natural resources of the Region. Water hyacinth, hydrilla, zebra mussels and other exotic species could be identified and included. To prevent the transmission of invasive species TPWD recommends avoiding transport of water from basins where these species are known to occur. If this is unavoidable these transfers of water should be directly to water treatment plants.

The Region D IPP does not include a quantitative reporting of environmental factors since, according to the IPP, the recommended water management strategies for Region D will have little or no environmental impacts. Potential impacts to spring flows and spring ecosystems should be identified where additional groundwater development was identified as a water management strategy. TWDB planning rules now require that groundwater supplies not exceed the Modeled Available Groundwater (MAG) values that were determined to meet the desired future conditions (DFCs) of the groundwater source. However, adopted DFCs for aquifers in Region D do not address protection of springs or groundwater surface water interaction. Ultimately TPWD would like to see DFCs adopted to protect these features. TPWD concurs with potential environmental impacts regarding sediment dredging, namely the fate of disposed sediments and impacts to aquatic habitats and water quality.

Region D supports water conservation as a management strategy for entities with daily per capita consumption above the Texas Water Conservation Task Force goal of 140 gallons per person per day. Advanced water conservation is recommended as a water management strategy for the City of Texarkana. The IPP does not include drought management measures as a water management strategy but drought contingency plans are included for municipalities.

Marvin Nichols Reservoir is not a recommended water management strategy for Region D; however the 2016 Region C IPP includes a new Sulphur Basin Supplies strategy that combines a reconfigured Marvin Nichols Reservoir with reallocation of Wright Patman Lake storage. Marvin Nichols Reservoir is also retained as an alternate water management strategy. Since the project would be located within Region D, the Region D IPP summarizes impacts on water resources, agricultural resources and natural resources that could be expected to occur if Marvin Nichols Reservoir were to be built. Region D does acknowledge that reallocation of Wright Patman Reservoir provides a viable potential water management strategy to assist in meeting the needs for Region C. Attachment A summarizes information compiled by TPWD regarding potential impacts of raising the elevation of Wright Patman Lake.

TPWD agrees with many of the policy recommendations included in the IPP. The recommendations consistently recognize the importance of environmental flows, habitat mitigation, and giant salvinia control measures. After considering all information, Region D elected not to unconditionally recommend any stream segments from the TPWD report entitled *Ecologically Significant River and Stream Segments of Region D, Regional Water Planning Area.* Region D also chose not to nominate White Oak Creek as ecologically unique. However, Region D did elect to conditionally recommend the following segments for consideration as ecologically unique stream segments: Pecan Bayou in the Red River Basin and Black Cypress Bayou and Black Cypress Creek in the Cypress Creek Basin. TPWD staff applauds the planning group for making this recommendation.

Thank you for your consideration of these comments. TPWD looks forward to continuing to work with the planning group to develop water supply strategies that not only meet the future water supply needs of the region but also preserve the ecological health of the region's aquatic resources. Please contact Cindy Loeffler at (512) 389-8715 if you have any questions or comments.

Sincerely,

Ross Melinchuk,
Deputy Executive Director, Natural Resources

RM:CL:ms

cc: Clayton Wolf, Division Director, Wildlife Division, TPWD
Craig Bonds, Division Director, Inland Fisheries Division, TPWD
Larry Lebeau, Wildlife Division, TPWD

Attachment

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RECEIVED
MAR 23 2010
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March 22, 2010

David Harkins, Ph.D., P.E.
Vice President
Espey Consultants, Inc.
4801 Southwest Parkway
Parkway 2, Suite 150
Austin, Texas 78735

Dear Dr. Harkins:

Enclosed is the information on Wright Patman Lake and White Oak Creek Wildlife Management Area you requested in your letter dated January 28, 2010. We believe we have addressed each of the areas you outlined in your letter. Enclosed you will also find a CD containing additional data including the shape files for the maps included in this packet.

We appreciate the opportunity to provide input on this critical resource issue. If you have any further questions, feel free to contact Nathan Garner, Region 3 Wildlife Director, at (903) 566-1626 ext 221. Thank you.

Sincerely,

Carter Smith

Carter Smith
Executive Director

CS:NG:ne

Enclosures

cc: Mr. Nathan Garner

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512.389.4800

www.tpwd.state.tx.us

To manage and conserve the natural and cultural resources of Texas and to provide hunting, fishing and outdoor recreation opportunities for the use and enjoyment of present and future generations.

Impacts of Raising the Elevation of Wright Patman Lake above 230 Feet

Texas Parks and Wildlife has been asked to provide information and data regarding the impacts of raising the pool elevation level of Wright Patman Lake to a maximum of 240 feet on White Oak Creek Wildlife Management Area (WOC WMA), Altanta State Park and the surrounding United States Army Corps of Engineers (USACE) land. In a letter from Luke Baker, Area Biologist of WOC WMA, dated August 17, 2009, he stated "while 230' could be a tolerable maximum elevation a more accurate analysis of increased flood severity must be completed before a determination can be made." Any level above a 230 feet elevation would certainly have direct impacts on the natural resources and TPWD management capabilities.

Wright Patman Lake is located on the Sulphur River near Maud, Texas. The 25,777 acres of WOC WMA is situated just west of the lake, contiguous with other USACE lands. These lands comprise one of the largest, highest rated, intact tracts of mature bottomland hardwood habitat remaining in East Texas. This large extensive tract of bottomland hardwood forest creates a critical corridor of high quality habitat for resident and migratory wildlife species. The mature bottomland hardwood forests along this portion of the Sulphur River and its associated tributaries also provide habitat to over 500 species of vertebrate animals and 1,150 plant species. These forests support over 50% of the neo-tropical migratory bird species in the United States for a portion of their life cycle. It is one of three highest rated habitats for black bear in East Texas, with the eastern most portion of this forest lying within the range of the federally listed Louisiana Black Bear. Elevating the level of Wright Patman Lake will result in fragmenting this large tract, negatively impacting the wildlife species dependent on this habitat. GIS analyses of these lands indicate that over 32,000 acres of prime bottomland habitat will be inundated at the 240' elevation. Current management practices on WOC WMA at the existing lake level provide a premium habitat for a variety of game and non-game species. As the lake level is increased, a proportionate loss in public hunting opportunities and other outdoor recreation activities that are vigorously pursued in this area will result.

Endangered and Threatened Species Potentially Impacted by Raising the Elevation of Wright Patman Reservoir

Federally Listed Species

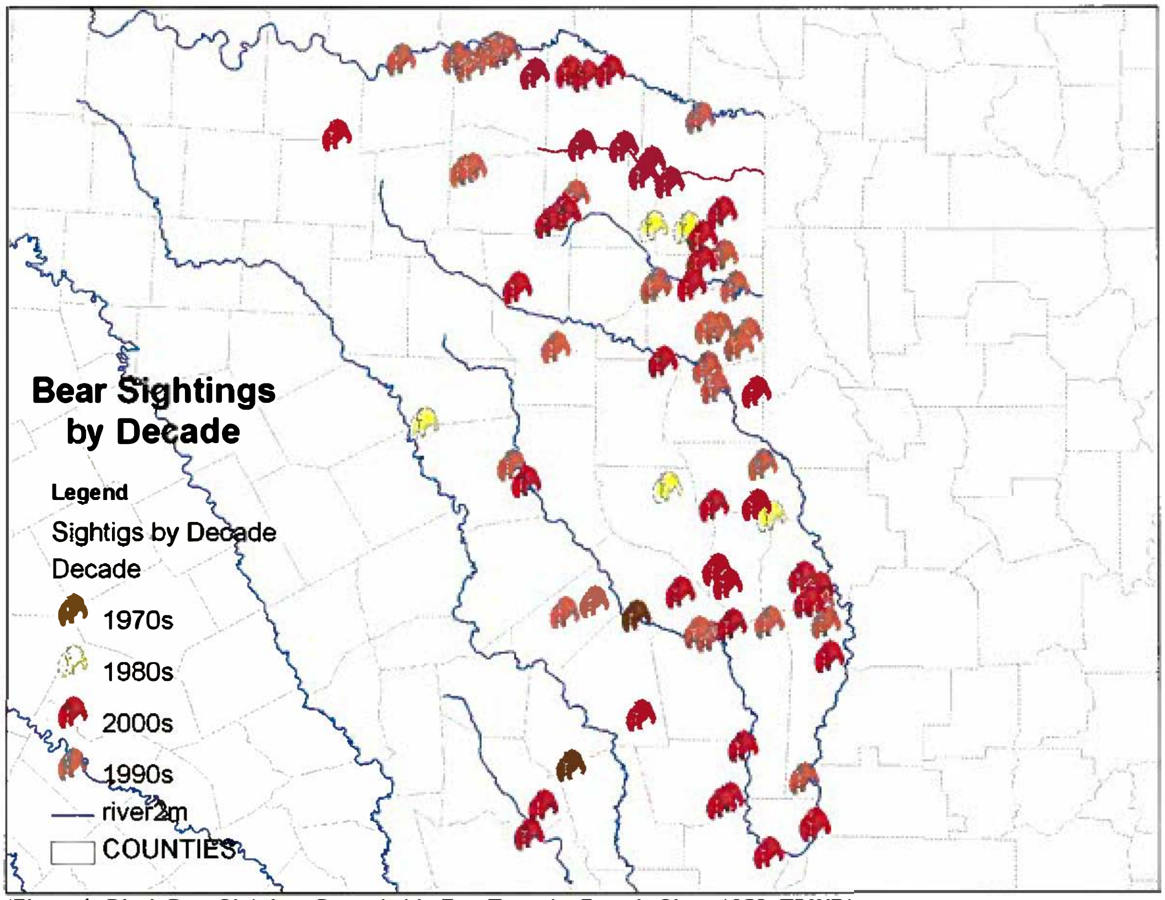
There are a number of federally listed endangered and threatened species that have been recorded as occurring, or potentially occurring within Bowie, Cass, Morris and Titus Counties, Texas, that may be adversely impacted by raising the pool elevation at Wright Patman Reservoir in northeast Texas. These species include: American Peregrine Falcon (*Falco peregrinus anatum*), Arctic Peregrine Falcon (*Falco peregrinus tundrius*), Bald Eagle (*Haliaeetus leucocephalus*), Piping plover (*Charadrius melodus*), Louisiana black bear (*Ursus americanus luteolus*), and Red Wolf (*Canis rufus*).

The American and Arctic Peregrine Falcon are both currently federally de-listed, but remain on the state's list as a threatened species, and for monitoring purposes. Both subspecies are low-altitude migrants through these counties and would utilize a wide range of habitats during their migration. They have been recorded as making stopovers at leading landscape edges such as lake shores. Though there would remain a lake shore edge regardless of the elevation of the reservoir, the adjacent bottomland hardwood forest and shallow wetland habitats would decline with the proposed change in elevation resulting in loss of quantity and quality of these habitats, and subsequent losses in prey available to these birds.

The Bald Eagle population in eastern Texas has been steadily increasing since use of DDT was outlawed. The Bald Eagle is currently federally de-listed, but remains on the state's list as a threatened species, and for federally required monitoring the first 5 years following de-listing. This part of the state has both migratory and nesting bald eagles that utilize the habitats at Wright Patman Reservoir and White Oak Creek Wildlife Management Area (WOC-WMA). Bald Eagles utilize dominant canopy trees in mature forests nearby wetland habitats and reservoirs, and there could be significant loss of these potential nest trees through inundation of adjacent bottomland hardwood and other types of forests. In addition, availability and richness of prey items for Bald Eagles is greater in bottomland hardwood forests with their associated shallow wetlands than in open, deep water areas.

The Piping Plover is currently federally and state listed as a threatened species. This species is a wintering migrant along the Texas Gulf Coast and has been recorded in this part of northeast Texas. This species utilizes shallow mud flats in this part of its range. The upper end of Wright Patman Reservoir and some larger sloughs along feeder creeks like White Oak Creek contain significant mud flat habitats that would be lost by raising the elevation of the reservoir. The amount of habitat lost would vary from year to year based upon flooding, or lack thereof during dry years.

American Black bear (*Ursus americanus*) and Louisiana black bear are on the boundary of their species and sub-species ranges within this area, both subspecies are considered as federally threatened within Cass County due to similarity of appearance, and all black bear are protected throughout Texas as a state-threatened species including Bowie, Morris and Titus Counties. The bottomland hardwood forest within this section of the Sulphur River watershed is ranked among the highest quality black bear habitat in East Texas. The Texas Parks and Wildlife Department has been recording black bear sightings since 1978. Figure 1 shows that there have been numerous black bear sightings verified in northeast Texas, including the Sulphur River Basin, over the past few decades. A large number of those sightings occurred within the past decade, including at least one fairly recent sighting within WOC WMA.



(Figure 1, Black Bear Sightings Recorded in East Texas by Decade Since 1978, TPWD)

Although black bear will utilize a variety of habitat types, their preferred habitats are bottomland hardwood forests. Inundation of significant mature bottomland hardwood forests that would occur with the raising of the pool elevation of Wright Patman Reservoir would result in a significant loss of denning, foraging and travel corridor habitat for this species.

Although the Red Wolf is still maintained on the federal and state endangered species lists as endangered, most biologists consider it to be extirpated from the wild throughout its range. Though the species no longer is known to occur here, most of the habitats to be inundated with the raising of the pool elevation of Wright Patman Reservoir would result in loss of habitat suitable for this species.

State Listed Species

There are a number of species that are listed by the state in this part of northeast Texas as threatened that are not federally listed. These species include two avian species: Bachman's Sparrow (*Aimophila aestivalis*), Wood Stork (*Mycteria americana*); one mammal species: Rafinesque's big-eared bat (*Corynorhinus rafinesquii*); two freshwater mussel species: Louisiana pigtoe (*Pleurobema riddellii*), Southern hickorynut (*Obovaria jacksoniana*); 4 reptile species: alligator snapping turtle (*Macrochelys temminckii*), Northern scarlet snake (*Cemophora coccinea copei*), timber/canebrake rattlesnake (*Crotalus horridus*), Texas horned lizard (*Phrynosoma cornutum*): and three fish species: Blackside darter (*Percina maculata*), Creek chubsucker (*Erimyzon oblongus*), and Paddlefish (*Polyodon spathula*).

Though there are relatively few acres of upland forest types that will be inundated by raising the pool elevation of Wright Patman Reservoir, there are some. One species that occupies pine savannah forests that could potentially be impacted on those habitat types is Bachman's Sparrow. Two species that occupy upland sites with sandy soils regardless of overstory forest type that could occur on some of the upland sites are Northern scarlet snake and Texas horned lizard. Though there are somewhat more acres available for these species than in pine savannah forests, there are relatively few acres of these types to be inundated. However, the sites that are to be inundated are of generally high quality with mature vegetative communities that are fairly intact. More exact information on the vegetative communities and acreages to be inundated can be found in the appendix of this document.

There are significant habitats available for Wood Stork within the upper reaches of Wright Patman Reservoir, and within the bottomland hardwood forests and associated sloughs of the reservoir and WOC WMA. Though the Wood Stork is only listed as state threatened in Texas, its status is much more drastic in areas of the eastern Gulf Coast states. Wood Storks are often seen during summer months in the upper end of the reservoir and wetland areas upstream of the reservoir and on WOC WMA. Though there are no breeding records available for this area, there are areas of suitable habitat currently available for that activity now and in the future. This bird species needs shallow wetlands for foraging. There could be significant loss of shallow wetlands that will be converted to unsuitable deeper water habitats with the proposed raising of the pool elevation of the reservoir.

Rafinesque's big-eared bat is considered by all states within its range across the southeastern United States to be in decline, and Texas certainly is no exception. This species preferred habitat across its range is mature bottomland hardwood and various other types of mature floodplain forests. Though this species will roost in abandoned man-made structures, it prefers natural caves (further east) and mature trees with natural cavities and hollows. These mature trees are a product of older, later-successional forests. So, this species has lost significant habitat across its range to inundation associated with reservoir construction, to short rotation forest management, and conversion of some drier bottoms and mesic sites to commercial pine plantations. Since most of the forests to be inundated by the raising of the pool at the reservoir are either mid- or later-successional or older forests, and the management strategy for those forests is largely aimed at producing naturally functioning bottomland hardwood forests, all of this habitat to be lost could potentially be habitat for this species.

There are significant gaps in knowledge concerning mollusk species within most areas of the state, and northeast Texas is no exception. There are a dozen or so species that are currently under study for potential listing in Texas, many of these occurring in northeast Texas. Two currently state listed threatened species that may occur within the area to be inundated with the raising of the pool elevation of Wright Patman Reservoir include Louisiana pigtoe and Southern hickorynut. There is potential loss of habitat for these species within the proposed project area; further study would be needed to ascertain the exact impacts.

The alligator snapping turtle occurs throughout the Pineywoods of East Texas, and within many portions of the Post Oak Woodlands and Prairies of East Texas. Though this species could likely survive an inundation through raising the pool elevation of Wright Patman Reservoir, it is uncertain how this will actually affect population numbers. Much literature profiles this species as occupying deep water, but "deep" is a relative term. Ricky Maxey, Wildlife Diversity Biologist with TPWD, has captured these turtles in fairly shallow creeks many miles from any deep water reservoirs. Shallow water habitats that intersect, or are nearby deeper habitats will support these turtles. Mr. Maxey observed one such resident alligator snapping turtle in about 3.5 feet depth (this was "deep" compared to the majority of this stream) of water in late summer, and it was very healthy. These shallow water habitats are generally rich in both numbers of species and quantity of prey available for foraging that may not be replicated in deeper water habitats. Therefore, considering food availability as a factor, though the species may survive the habitat loss to inundation, its populations could be reduced as a result of that inundation.

Though the timber/canebrake rattlesnake will occupy a variety of habitat types, its preferred habitat type is bottomland hardwood forest. All of the habitats to be inundated by the raising of the pool elevation of Wright Patman Reservoir are suitable habitat for this species. Therefore, all habitat lost in this inundation will be habitat lost for this species.

There are three fish species that are currently listed as threatened by Texas Parks and Wildlife Department that could occur within the Sulphur River and its tributaries above Wright Patman Reservoir and along White Oak Creek.

The blackside darter has been documented to occur within streams of the Red River Basin. The Sulphur River is a tributary of the Red River, and flows into the Red River in Arkansas approximately 20 miles east, southeast of the Wright Patman Reservoir Dam. This species prefers clear, gravelly streams, quiet pools and pools with riffles. Any feeder streams within the areas to be inundated by the proposed raising of the pool elevation of Wright Patman Reservoir that currently meet these requirements would no longer be suitable habitat for this species.

The creek chubsucker has been noted as occurring in tributaries of the Red River Basin in small rivers and creeks of various types; particularly in upstream creeks and headwater streams. The species seldom occurs within impoundments. Young of this species are known to use headwater rivulets or marshes. This species spawns in river mouths or pools, riffles, lake outlets and upstream creeks. These types of shallow water habitats would be converted to deep-water habitats within the areas to be inundated with the proposed raising of the pool elevation of Wright Patman Reservoir.

The paddlefish is in peril throughout its range in Texas, and is not doing well. This species prefers large, free-flowing rivers. It migrates to spawn in fast, shallow water over gravel bars. It has been noted to frequent impoundments with access to spawning sites. Its larvae may drift from reservoir to reservoir. Basically all of the shallow streams upstream of Wright Patman Reservoir, including White Oak Creek, where these conditions might be met could be made unsuitable if inundated and made into deepwater habitats.

Inland Fisheries

During the late 1990's and extending into the early 2000's a significant effort was made by the Texas Water Development Board and others to evaluate instream flow needs of the Sulphur River upstream of Wright Patman reservoir in response to several potential reservoir projects identified in the regional water planning process. George Parkhouse I (North), George Parkhouse II (South) and Marvin Nichols I and II. Although TPWD was not directly involved in the conduct of these studies, River Studies staff was consulted during the study design phase and reviewed drafts of reports prepared by the TWDB and their contractors. The downstream most proposed project was Marvin Nichols Reservoir; both iterations of this project would be upstream of Wright-Patman and the proposed Marvin Nichols Dam would be on the Sulphur River near the 240 foot elevation – close to the U.S. Hwy 271 Bridge near Talco. I would suggest that Espey Consulting refer to the completed study (Osting, Mathews and Austin 2004) which can be found at the following link:

http://www.twdb.state.tx.us/RWPG/rpgm_rpts/InstreamFlows_SulphurRiver.pdf

This study provides a comprehensive evaluation of the fish communities of the Sulphur River immediately upstream of Wright-Patman Reservoir. Study site two in this report is located in the area that would be inundated by an increase in the elevation of Wright-Patman. It is worth noting, however, that the elevation of Wright-Patman is frequently near 240 ft amsl; during the studies mentioned above we observed difficulty calibrating hydraulic models due to backwater effects from Wright Patman.

White Oak Creek WMA

The following is a list of infrastructure that would be affected by permanently increasing Lake Wright Patman water levels. (See map in appendix)

230'
No infrastructure should be affected.

235'
Two water control structures
Three managed wetland units (480 acres)
1 concrete bridge

240'
In addition to everything under 235'

8 water control structures
1 high water bridge
7.32 miles of levees
10 miles of equestrian trails
11.5 miles of ATV trails

1.5 miles of boundary line
3,596.2 acres of public hunting land

<u>Atlanta State Park</u>

Impacts to Atlanta State Park would include the loss of approximately 2,421 feet of trails and parts of both boat ramps. See maps in appendix for detailed information.

Contributors of data and information to this document were:

Luke Baker, Area Biologist, White Oak Creek WMA, TPWD

Kevin R. Herriman, Project Leader, Northeast Texas Ecosystem Project, TPWD

Stephen Lange, GIS Specialist, Regions 3 and 4, TPWD

Ricky W. Maxey, Wildlife Diversity Biologist, Wildlife District 6 – East Texas Pineywoods, TPWD

Doyle Mosier, Director, River Studies Program, TPWD

Kody Waters, Park Superintendent, Atlanta State Park

Appendix

Index to Digital Data

Maps

1. Water Resource Development, Sulphur River Basin – Northeast Texas
2. Proposed Elevation Raise of Wright Patman Lake
3. Estimated Habitat Impacts – Wright Patman Lake, Vegetation Map – Below 230‘ msl
4. Estimated Habitat Impacts – Wright Patman Lake, Vegetation Map – Below 240‘ msl
5. White Oak Creek WMA, Vegetation Map
6. White Oak Creek WMA - Vegetation Map, Estimated Habitat Impacts – Below 230’ msl
7. White Oak Creek WMA - Vegetation Map, Estimated Habitat Impacts – Below 240’ msl
8. Wright Patman Lake USACOE Lands, Vegetation Map
9. Lake Wright Patman USACOE Lands - Vegetation Map, Estimated Habitat Impacts – Below 230’ msl
10. Lake Wright Patman USACOE Lands - Vegetation Map, Estimated Habitat Impacts – Below 240’ msl
11. Lake Wright Patman Adjacent Private Lands - Vegetation Map, Estimated Habitat Impacts – Below 240’ msl
12. White Oak Creek WMA, Infrastructure Impacts
13. White Oak Creek WMA, Wetlands
14. Atlanta State Park, Topography Map
15. Atlanta State Park, Infrastructure Impacts

Other Documents

1. Texas Ecological Systems Phase 2 Interpretive Guide
2. Texas Ecological Systems Phase 2 Interpretive Guide Appendix 1

Data Folders

1. White Oak Creek WMA
2. Texas Ecological Systems Classification – Vegetation Clips

Map Data Disclaimer - Information

Maps compiled by: Stephen D. Lange, Regional GIS Specialist, TPWD-Tyler, TX.

Date: 03/10/2010

These maps were compiled using geographic information systems software. While care has been taken to preserve the quality of the data; transformation, geographic, mathematical, format and structure errors may have been introduced to the data. TPWD makes no representations or warranties regarding the accuracy or the completeness of the information depicted on these maps or its suitability to any particular use. The requestor must be aware of data conditions and ultimately bear responsibility for the appropriate use of the information with respect to possible errors, original map scale, collection methodology, currency of data, and other conditions specific to certain data. Unless noted all maps are UTM Zone 15, NAD 1983, NGVD29.

Question should be directed to:

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Wildlife Regions III & IV
11942 FM 848
Tyler, TX 75707
Office: 903/566-1626 x208
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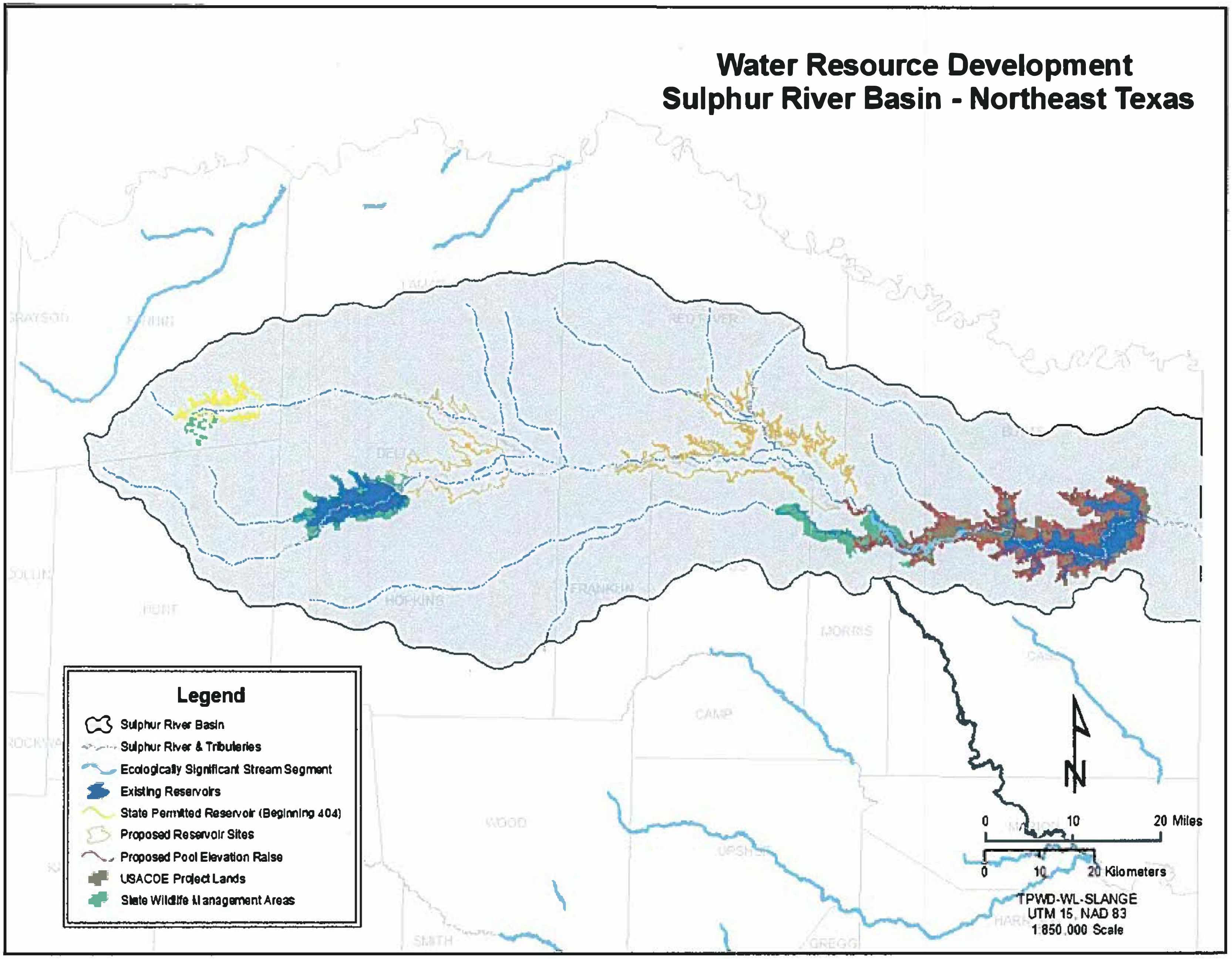
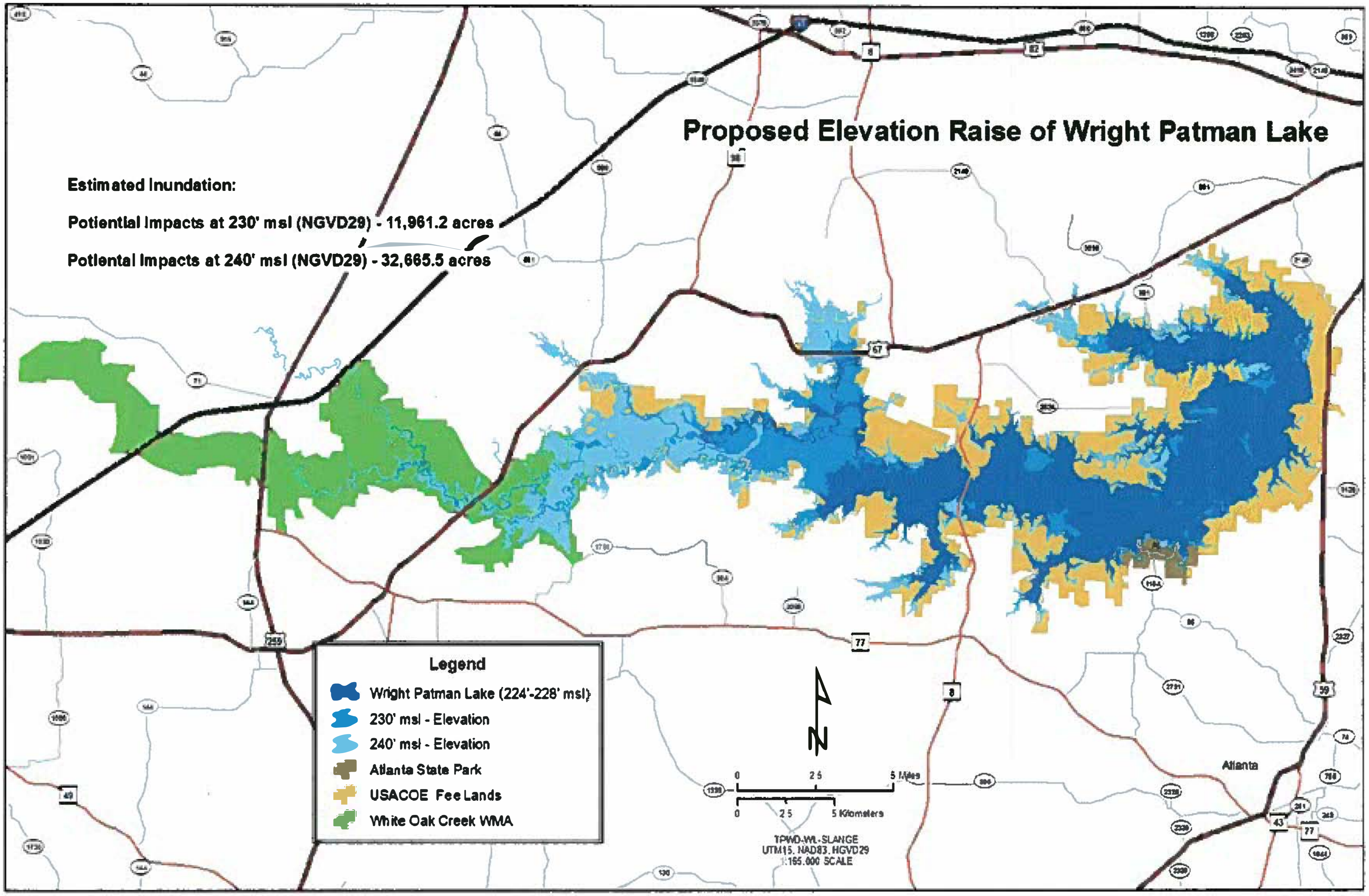
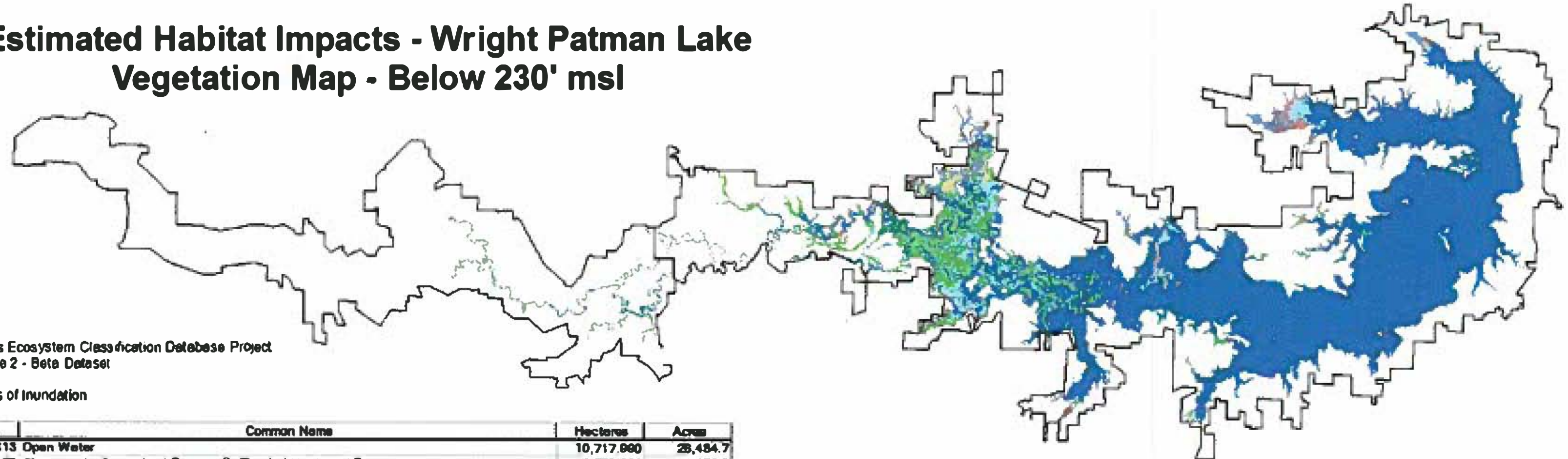
Fax: 903/566-3273


Water Resource Development
Sulphur River Basin - Northeast Texas
Legend
Sulphur River Basin
Sulphur River & Tributaries
Ecologically Significant Stream Segment
Existing Reservoirs
State Permitted Reservoir (Beginning 404)
Proposed Reservoir Sites
Proposed Pool Elevation Raise
USACOE Project Lands
State Wildlife Management Areas
0 10 20 Miles
0 10 20 Kilometers
TPWD-WL-SLANGE
UTM 15, NAD 83
1:850,000 Scale


Proposed Elevation Raise of Wright Patman Lake
Estimated Inundation:
Potiential Impacts at 230' msl (NGVD29) - 11,961.2 acres
Potiential Impacts at 240' msl (NGVD29) - 32,665.5 acres
Legend
Wright Patman Lake (224'-228' msl)
230' msl - Elevation
240' msl - Elevation
Atlanta State Park
USACOE Fee Lands
White Oak Creek WMA
N
0
2.5
5 Miles
0
2.5
5 Kilometers
TPWD-WL-SLANGE
UTM15, NAD83, HGVD29
1:165,000 SCALE
Atlanta
259
77
67
59
82
8
43
49

Estimated Habitat Impacts - Wright Patman Lake
Vegetation Map - Below 230' msl



Texas Ecosystem Classification Database Project
Phase 2 - Beta Dataset

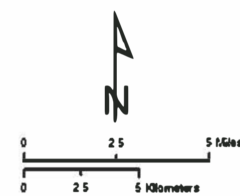
Acres of Inundation

Code	Common Name	Hectares	Acres
113	Open Water	10,717.980	26,484.7
59	Pineywoods: Bottomland Seasonally Flooded Hardwood Forest	1,679.601	4,150.9
61	Pineywoods: Bottomland Baldcypress Swamp	1,020.130	2,520.8
55	Pineywoods: Bottomland Temporarily Flooded Hardwood Forest	446.161	1,102.5
19	Pineywoods: Upland Hardwood Forest	367.440	908.0
66	Pineywoods: Small Stream and Riparian Seasonally Flooded Hardwood Forest	209.470	517.6
64	Pineywoods: Small Stream and Riparian Temporarily Flooded Hardwood Forest	203.979	504.0
4	Post Oak Savanna: Post Oak Motte and Woodland	183.377	453.1
1	Unclassified	165.379	408.7
78	Pineywoods: Hardwood Flatwoods	165.323	408.5
70	Pineywoods: Small Stream and Riparian Baldcypress Swamp	108.392	267.8
17	Pineywoods: Pine Forest or Plantation	81.553	201.5
58	Pineywoods: Bottomland Herbaceous Wetland	57.949	143.2
116	Pine Plantation > 3 meters tall	49.455	122.2
67	Pineywoods: Small Stream and Riparian Herbaceous Wetland	31.695	78.3
76	Pineywoods: Longleaf or Loblolly Pine Flatwoods or Plantation	14.118	34.9
100	Pineywoods: Disturbance or Tame Grassland	11.719	29.0
14	Pineywoods: Northern Mesic Hardwood Forest	11.246	27.8
18	Pineywoods: Pine / Hardwood Forest or Plantation	8.756	21.6
57	Pineywoods: Bottomland Deciduous Successional Shrubland	5.615	13.9
120	Urban Low Intensity	4.228	10.4
5	Post Oak Savanna: Savanna Grassland	2.987	7.4
72	Pineywoods: Herbaceous Flatwoods Pond	2.277	5.6
68	Pineywoods: Small Stream and Riparian Deciduous Successional Shrubland	1.842	4.6
69	Pineywoods: Small Stream and Riparian Wet Prairie	1.457	3.6
101	Native Invasive: Deciduous Woodland	1.450	3.6
54	Pineywoods: Bottomland Temporarily Flooded Mixed Pine / Hardwood Forest	1.272	3.1
9	Post Oak Savanna: Oak / Hardwood Slope Forest	1.066	2.6
104	Native Invasive: Mesquite Shrubland	0.992	2.5
60	Pineywoods: Bottomland Wet Prairie	0.562	1.4
119	Urban High Intensity	0.213	0.5
77	Pineywoods: Longleaf or Loblolly Pine / Hardwood Flatwoods or Plantation	0.202	0.5
13	Pineywoods: Northern Mesic Pine / Hardwood Forest	0.200	0.5
106	Native Invasive: Deciduous Shrubland	0.082	0.2
111	Barren	0.054	0.1
117	Pine Plantation 1 to 3 meters tall	0.041	0.1
20	Pineywoods: Dry Pine Forest or Plantation	0.012	0.0
22	Pineywoods: Dry Upland Hardwood Forest	0.005	0.0

Public Land Boundary

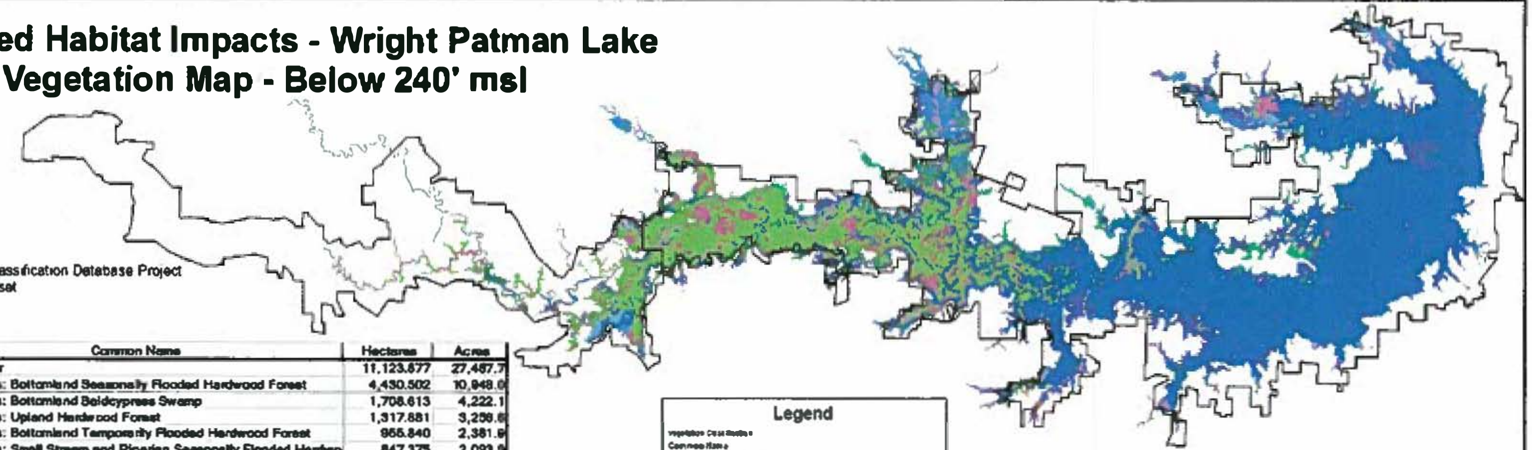
Estimated Inundation

230' msl (NGVD29) - 11,961.2 acres



TPWD-WL-SLANGE
UTM15 NAD83 NGVD29
1:175,000 SCALE
TECDP-Phase 2 Beta

Estimated Habitat Impacts - Wright Patman Lake
Vegetation Map - Below 240' msl



Texas Ecosystem Classification Database Project
Phase 2 - Beta Dataset

Acres of Inundation

Code	Common Name	Hectares	Acres
113	Open Water	11,123.877	27,487.7
59	Pineywoods: Bottomland Seasonally Flooded Hardwood Forest	4,430.502	10,948.0
61	Pineywoods: Bottomland Baldcypress Swamp	1,708.613	4,222.1
19	Pineywoods: Upland Hardwood Forest	1,317.881	3,256.6
55	Pineywoods: Bottomland Temporarily Flooded Hardwood Forest	955.840	2,381.9
68	Pineywoods: Small Stream and Riparian Seasonally Flooded Hardwo	847.375	2,093.9
64	Pineywoods: Small Stream and Riparian Temporarily Flooded Hardw	742.428	1,834.8
4	Post Oak Savanna: Post Oak Motte and Woodland	724.690	1,790.7
78	Pineywoods: Hardwood Flatwoods	596.207	1,473.3
17	Pineywoods: Pine Forest or Plantation	446.980	1,104.5
1	Unclassified	290.580	718.0
70	Pineywoods: Small Stream and Riparian Baldcypress Swamp	183.710	454.0
116	Pine Plantation > 3 meters tall	174.080	430.1
58	Pineywoods: Bottomland Herbaceous Wetland	156.883	387.6
76	Pineywoods: Longleaf or Loblolly Pine Flatwoods or Plantation	109.433	270.4
67	Pineywoods: Small Stream and Riparian Herbaceous Wetland	68.211	168.6
100	Pineywoods: Disturbance or Tame Grassland	57.226	141.4
14	Pineywoods: Northern Mesic Hardwood Forest	56.812	140.4
5	Post Oak Savanna: Savanna Grassland	40.495	100.1
69	Pineywoods: Small Stream and Riparian Wet Prairie	40.026	98.9
114	Row Crops	37.285	92.1
71	Pineywoods: Wet Hardwood Flatwoods	36.052	89.1
18	Pineywoods: Pine / Hardwood Forest or Plantation	34.401	85.0
72	Pineywoods: Herbaceous Flatwoods Pond	29.252	72.3
108	Native Invasive: Deciduous Shrubland	26.758	66.1
66	Pineywoods: Small Stream and Riparian Deciduous Successional Sh	23.585	58.3
57	Pineywoods: Bottomland Deciduous Successional Shrubland	14.806	36.6
60	Pineywoods: Bottomland Wet Prairie	10.992	27.2
120	Urban Low Intensity	10.437	25.8
77	Pineywoods: Longleaf or Loblolly Pine / Hardwood Flatwoods or Pla	9.923	24.5
110	Swamp	7.704	19.0
101	Native Invasive: Deciduous Woodland	7.680	19.0
8	Post Oak Savanna: Oak / Hardwood Slope Forest	3.902	9.6
13	Pineywoods: Northern Mesic Pine / Hardwood Forest	3.108	7.7
85	Blackland Prairie: Disturbance or Tame Grassland	2.888	7.1
104	Native Invasive: Mesquite Shrubland	2.801	6.9
73	Pineywoods: Herbaceous Seepage Bog	2.457	6.1
54	Pineywoods: Bottomland Temporarily Flooded Mixed Pine / Hardwoo	2.181	5.4
117	Pine Plantation 1 to 3 meters tall	2.026	5.0
119	Urban High Intensity	1.026	2.5
63	Pineywoods: Small Stream and Riparian Temporarily Flooded Mixed	1.020	2.5
111	Barren	0.534	1.3
22	Pineywoods: Dry Upland Hardwood Forest	0.243	0.6
20	Pineywoods: Dry Pine Forest or Plantation	0.159	0.4
21	Pineywoods: Dry Pine / Hardwood Forest or Plantation	0.115	0.3

Public Land Boundary

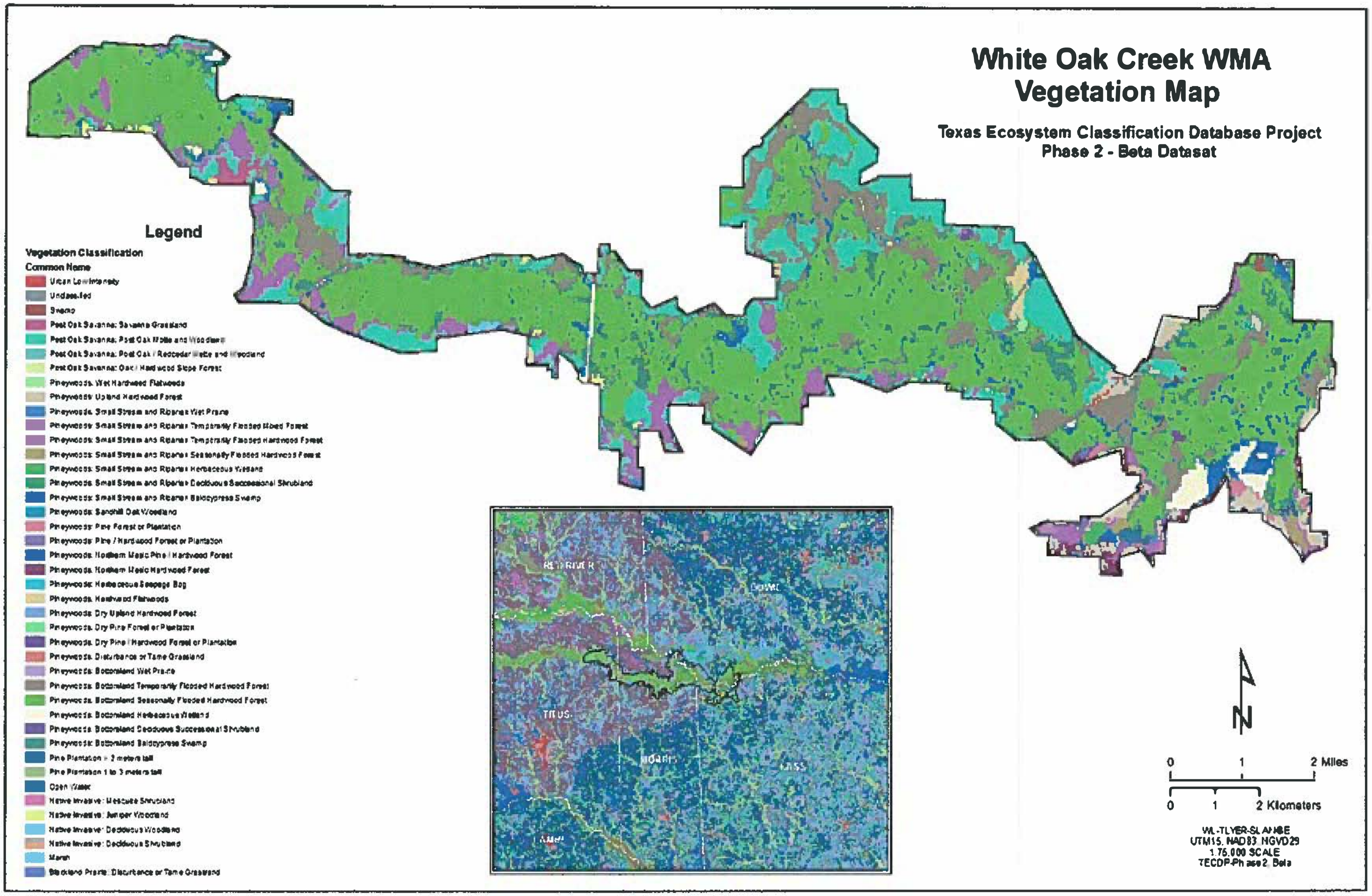
Estimated Inundation

240' msl (NGVD29) - 32,665.5 acres

0 2.5 5 Miles

0 2.5 5 Kilometers

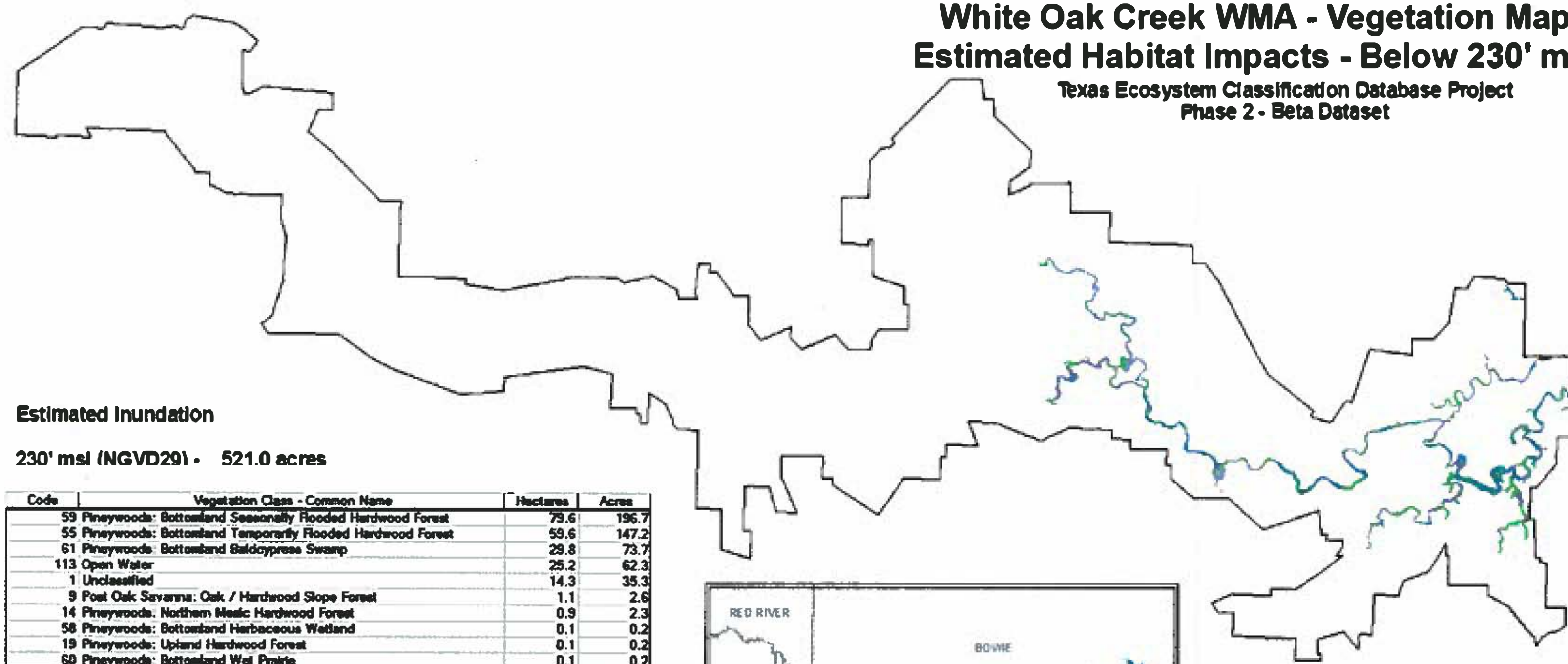
TPWD-WL-BLANCE
UTM15, NAD 83, NGVD29
1:165,000 SCALE
TECDP-Phase 2 Beta



White Oak Creek WMA
Vegetation Map
Texas Ecosystem Classification Database Project
Phase 2 - Beta Datasat
Legend
Vegetation Classification
Common Name
Urban Low Intensity
Unclassified
Swamp
Post Oak Savanna: Savanna Grassland
Post Oak Savanna: Post Oak Motte and Woodland
Post Oak Savanna: Post Oak / Redcedar Motte and Woodland
Post Oak Savanna: Oak / Hardwood Slope Forest
Pineywoods: Wet Hardwood Flatwoods
Pineywoods: Upland Hardwood Forest
Pineywoods: Small Stream and Riparian Wet Prairie
Pineywoods: Small Stream and Riparian Temporarily Flooded Mixed Forest
Pineywoods: Small Stream and Riparian Temporarily Flooded Hardwood Forest
Pineywoods: Small Stream and Riparian Seasonally Flooded Hardwood Forest
Pineywoods: Small Stream and Riparian Herbaceous Wetland
Pineywoods: Small Stream and Riparian Deciduous Successional Shrubland
Pineywoods: Small Stream and Riparian Baldcypress Swamp
Pineywoods: Sandhill Oak Woodland
Pineywoods: Pine Forest or Plantation
Pineywoods: Pine / Hardwood Forest or Plantation
Pineywoods: Northern Mesic Pine / Hardwood Forest
Pineywoods: Northern Mesic Hardwood Forest
Pineywoods: Herbaceous Seepage Bog
Pineywoods: Hardwood Flatwoods
Pineywoods: Dry Upland Hardwood Forest
Pineywoods: Dry Pine Forest or Plantation
Pineywoods: Dry Pine / Hardwood Forest or Plantation
Pineywoods: Disturbance or Tame Grassland
Pineywoods: Bottomland Wet Prairie
Pineywoods: Bottomland Temporarily Flooded Hardwood Forest
Pineywoods: Bottomland Seasonally Flooded Hardwood Forest
Pineywoods: Bottomland Herbaceous Wetland
Pineywoods: Bottomland Deciduous Successional Shrubland
Pineywoods: Bottomland Baldcypress Swamp
Pine Plantation > 3 meters tall
Pine Plantation 1 to 3 meters tall
Open Water
Native Invasive: Mesquite Shrubland
Native Invasive: Juniper Woodland
Native Invasive: Deciduous Woodland
Native Invasive: Deciduous Shrubland
Marsh
Blackland Prairie: Disturbance or Tame Grassland
RED RIVER
TITUS
MORRIS
CASS
N
0 1 2 Miles
0 1 2 Kilometers
WL-TLYER-SLANGE
UTM15, NAD83, NGVD29
1:75,000 SCALE
TECDP-Phase2 Beta

White Oak Creek WMA - Vegetation Map
Estimated Habitat Impacts - Below 230' msl

Texas Ecosystem Classification Database Project
Phase 2 - Beta Dataset



Estimated Inundation

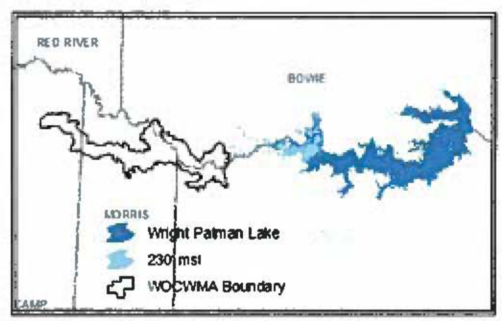
230' msl (NGVD29) - 521.0 acres

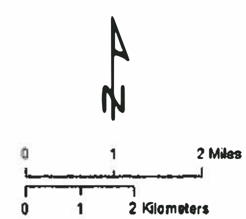
Code	Vegetation Class - Common Name	Hectares	Acres
59	Pineywoods: Bottomland Seasonally Flooded Hardwood Forest	79.6	196.7
55	Pineywoods: Bottomland Temporarily Flooded Hardwood Forest	59.6	147.2
61	Pineywoods: Bottomland Baldcypress Swamp	29.8	73.7
113	Open Water	25.2	62.3
1	Unclassified	14.3	35.3
9	Post Oak Savanna: Oak / Hardwood Slope Forest	1.1	2.6
14	Pineywoods: Northern Mesic Hardwood Forest	0.9	2.3
58	Pineywoods: Bottomland Herbaceous Wetland	0.1	0.2
19	Pineywoods: Upland Hardwood Forest	0.1	0.2
60	Pineywoods: Bottomland Wet Prairie	0.1	0.2
116	Pine Plantation > 3 meters tall	0.1	0.1
4	Post Oak Savanna: Post Oak Motte and Woodland	0.0	0.1

Legend

Vegetation Classification

Common Name

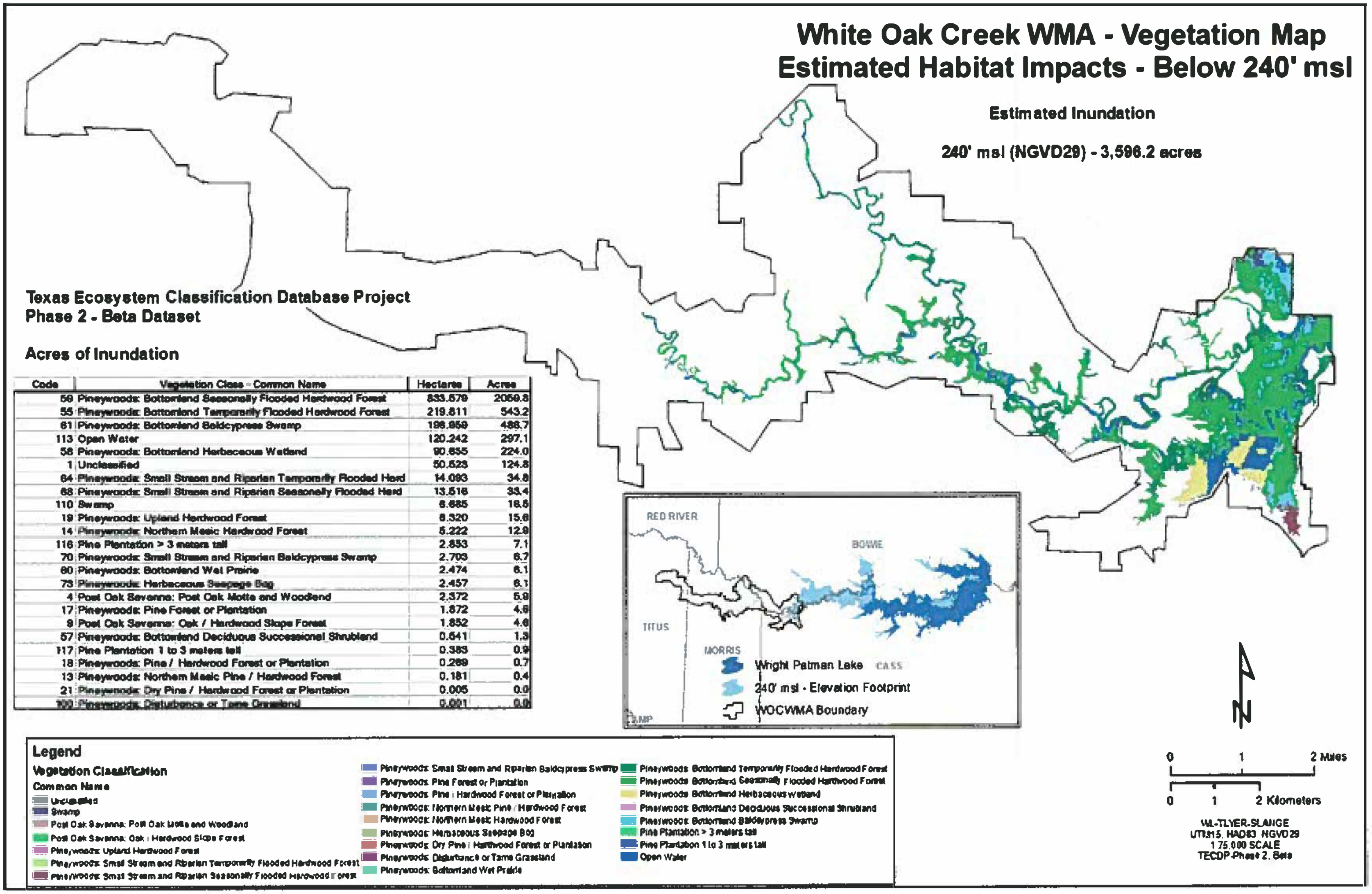




White Oak Creek WMA - Vegetation Map
Estimated Habitat Impacts - Below 240' msl

Estimated Inundation

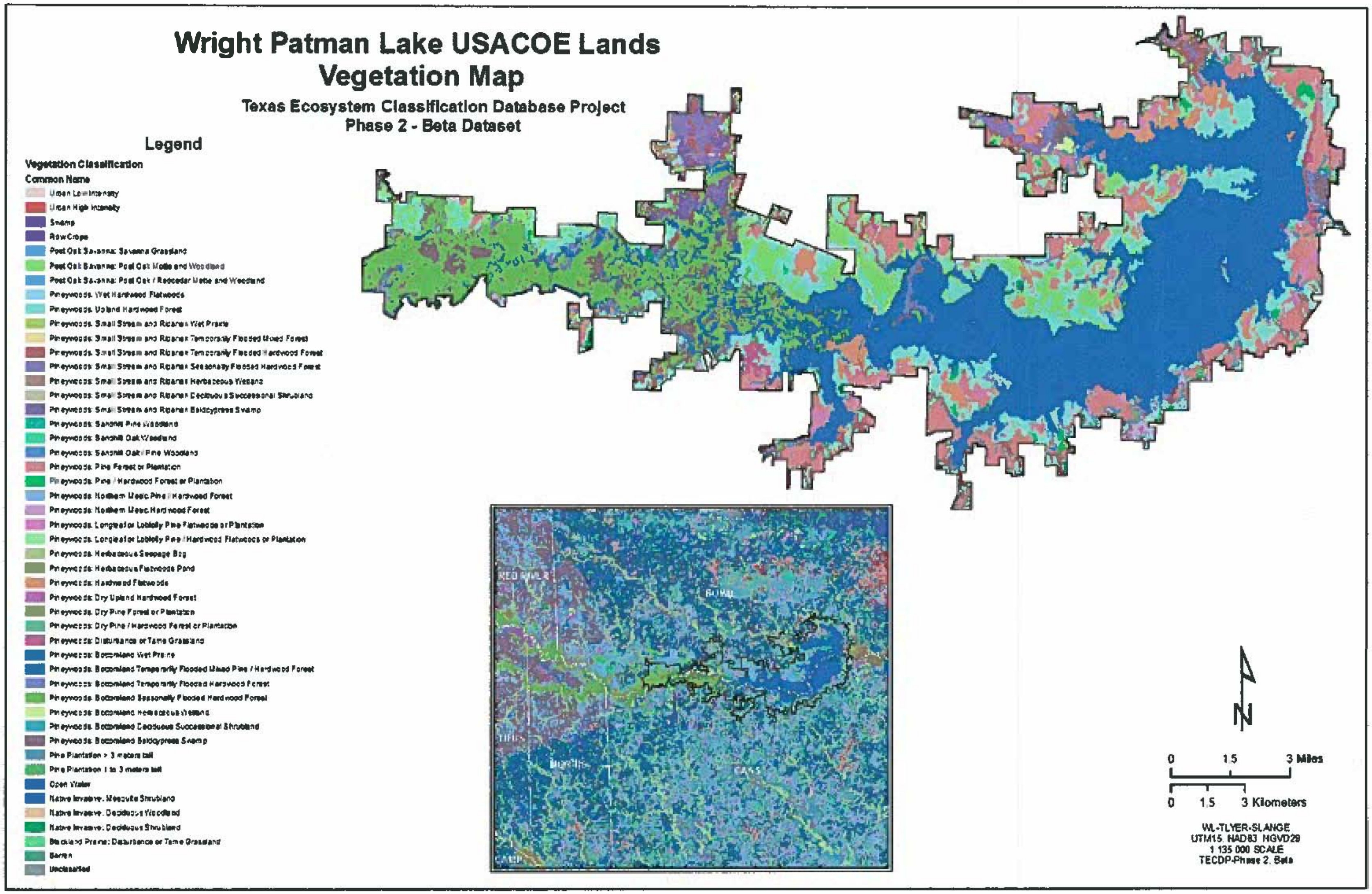
240' msl (NGVD29) - 3,596.2 acres



Texas Ecosystem Classification Database Project
Phase 2 - Beta Dataset

Acres of Inundation

Code	Vegetation Class - Common Name	Hectares	Acres
59	Pineywoods: Bottomland Seasonally Flooded Hardwood Forest	833.579	2059.8
55	Pineywoods: Bottomland Temporarily Flooded Hardwood Forest	219.811	543.2
61	Pineywoods: Bottomland Baldcypress Swamp	196.959	486.7
113	Open Water	120.242	297.1
58	Pineywoods: Bottomland Herbaceous Wetland	90.655	224.0
1	Unclassified	50.523	124.8
64	Pineywoods: Small Stream and Riparian Temporarily Flooded Hard	14.093	34.8
68	Pineywoods: Small Stream and Riparian Seasonally Flooded Hard	13.516	33.4
110	Swamp	6.685	16.5
19	Pineywoods: Upland Hardwood Forest	6.320	15.6
14	Pineywoods: Northern Mesic Hardwood Forest	5.222	12.9
116	Pine Plantation > 3 meters tall	2.853	7.1
70	Pineywoods: Small Stream and Riparian Baldcypress Swamp	2.703	6.7
60	Pineywoods: Bottomland Wet Prairie	2.474	6.1
73	Pineywoods: Herbaceous Seepage Bog	2.457	6.1
4	Post Oak Savanna: Post Oak Motte and Woodland	2.372	5.9
17	Pineywoods: Pine Forest or Plantation	1.872	4.6
9	Post Oak Savanna: Oak / Hardwood Slope Forest	1.852	4.6
57	Pineywoods: Bottomland Deciduous Successional Shrubland	0.541	1.3
117	Pine Plantation 1 to 3 meters tall	0.383	0.9
18	Pineywoods: Pine / Hardwood Forest or Plantation	0.289	0.7
13	Pineywoods: Northern Mesic Pine / Hardwood Forest	0.181	0.4
21	Pineywoods: Dry Pine / Hardwood Forest or Plantation	0.005	0.0
100	Pineywoods: Disturbance or Tame Grassland	0.001	0.0

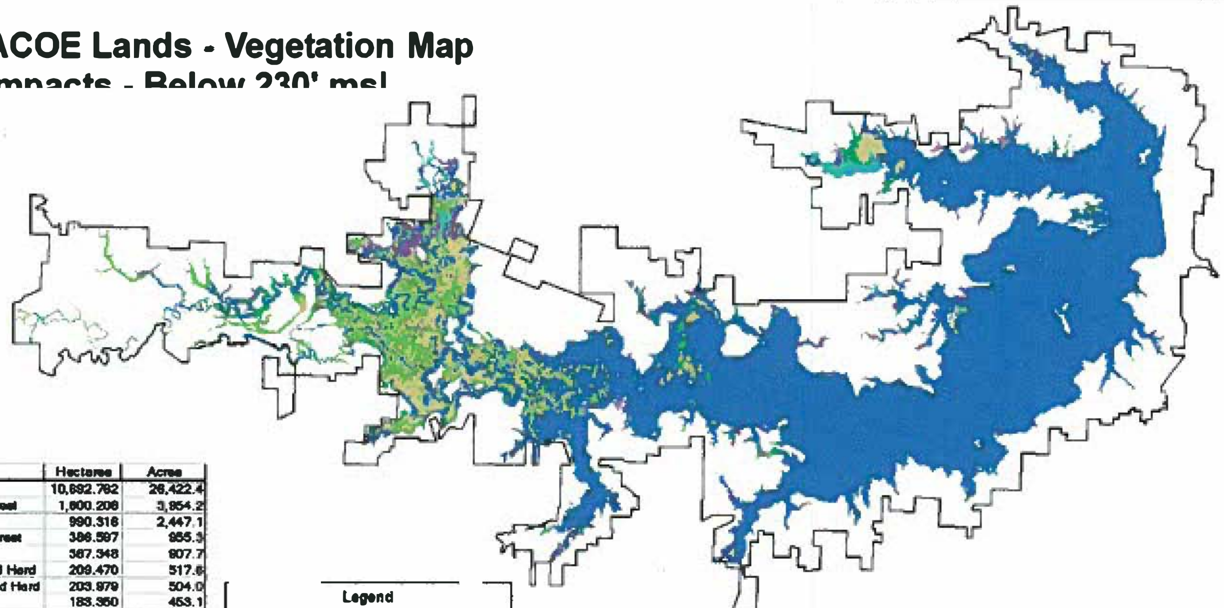


Wright Patman Lake USACOE Lands
Vegetation Map
Texas Ecosystem Classification Database Project
Phase 2 - Beta Dataset
Legend
Vegetation Classification
Common Name
Urban Low Intensity
Urban High Intensity
Swamp
Row Crops
Post Oak Savanna: Savanna Grassland
Post Oak Savanna: Post Oak Motte and Woodland
Post Oak Savanna: Post Oak / Redcedar Motte and Woodland
Pineywoods: Wet Hardwood Flatwoods
Pineywoods: Upland Hardwood Forest
Pineywoods: Small Stream and Riparian Wet Prairie
Pineywoods: Small Stream and Riparian Temporarily Flooded Mixed Forest
Pineywoods: Small Stream and Riparian Temporarily Flooded Hardwood Forest
Pineywoods: Small Stream and Riparian Seasonally Flooded Hardwood Forest
Pineywoods: Small Stream and Riparian Herbaceous Wetland
Pineywoods: Small Stream and Riparian Deciduous Successional Shrubland
Pineywoods: Small Stream and Riparian Baldcypress Swamp
Pineywoods: Sandhill Pine Woodland
Pineywoods: Sandhill Oak Woodland
Pineywoods: Sandhill Oak / Pine Woodland
Pineywoods: Pine Forest or Plantation
Pineywoods: Pine / Hardwood Forest or Plantation
Pineywoods: Northern Mesic Pine / Hardwood Forest
Pineywoods: Northern Mesic Hardwood Forest
Pineywoods: Longleaf or Loblolly Pine Flatwoods or Plantation
Pineywoods: Longleaf or Loblolly Pine / Hardwood Flatwoods or Plantation
Pineywoods: Herbaceous Seepage Bog
Pineywoods: Herbaceous Flatwoods Pond
Pineywoods: Hardwood Flatwoods
Pineywoods: Dry Upland Hardwood Forest
Pineywoods: Dry Pine Forest or Plantation
Pineywoods: Dry Pine / Hardwood Forest or Plantation
Pineywoods: Disturbance or Tame Grassland
Pineywoods: Bottomland Wet Prairie
Pineywoods: Bottomland Temporarily Flooded Mixed Pine / Hardwood Forest
Pineywoods: Bottomland Temporarily Flooded Hardwood Forest
Pineywoods: Bottomland Seasonally Flooded Hardwood Forest
Pineywoods: Bottomland Herbaceous Wetland
Pineywoods: Bottomland Deciduous Successional Shrubland
Pineywoods: Bottomland Baldcypress Swamp
Pine Plantation > 3 meters tall
Pine Plantation 1 to 3 meters tall
Open Water
Native Invasive: Mesquite Shrubland
Native Invasive: Deciduous Woodland
Native Invasive: Deciduous Shrubland
Blackland Prairie: Disturbance or Tame Grassland
Barren
Unclassified
N
0 1.5 3 Miles
0 1.5 3 Kilometers
WL-TLYER-SLANGE
UTM15 NAD83 NGVD29
1:135 000 SCALE
TECDP-Phase 2, Beta

Lake Wright Patman USACOE Lands - Vegetation Map
Estimated Habitat Impacts - Below 230' msl

Estimated Inundation

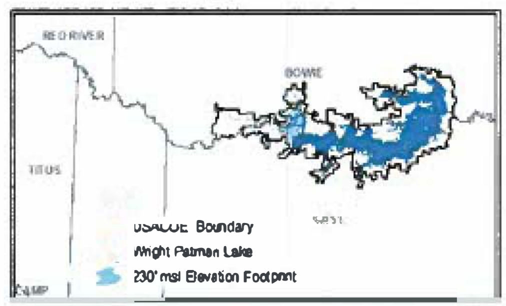
230' msl (NGVD29) - 11,502.5 acres



Texas Ecosystem Classification Database Project
Phase 2 - Beta Dataset

Acres of Inundation

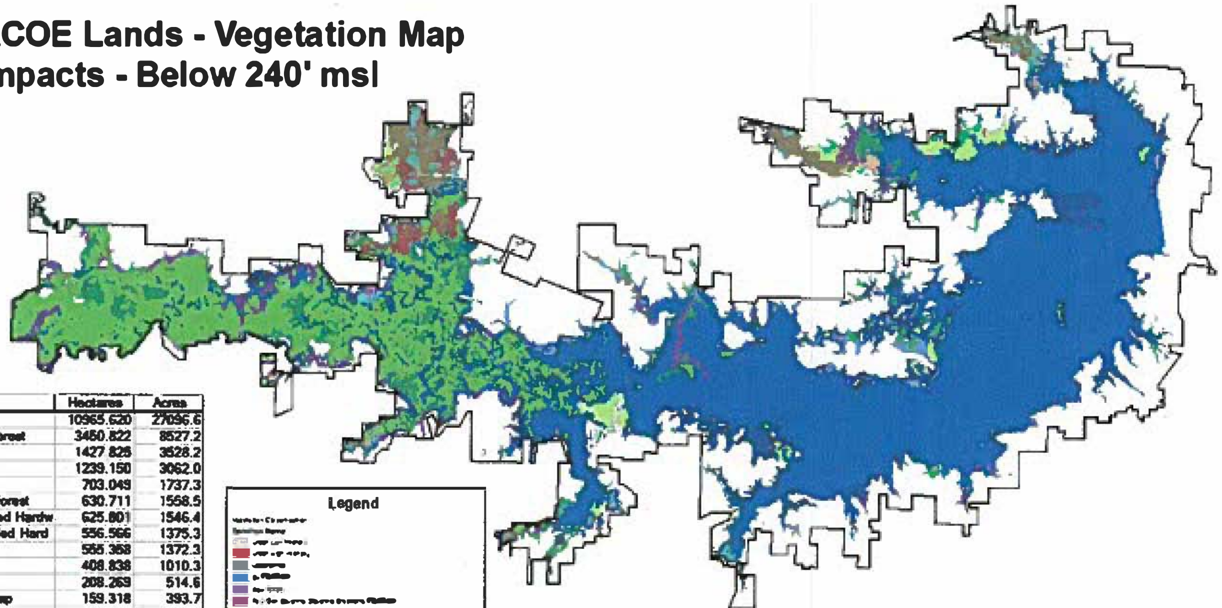
Code	Common Name	Hectares	Acres
113	Open Water	10,692.792	26,422.4
59	Pineywoods: Bottomland Seasonally Flooded Hardwood Forest	1,600.208	3,954.2
61	Pineywoods: Bottomland Baldcypress Swamp	990.316	2,447.1
55	Pineywoods: Bottomland Temporarily Flooded Hardwood Forest	386.597	955.3
19	Pineywoods: Upland Hardwood Forest	367.348	907.7
65	Pineywoods: Small Stream and Riparian Seasonally Flooded Hard	209.470	517.6
64	Pineywoods: Small Stream and Riparian Temporarily Flooded Hard	203.979	504.0
4	Post Oak Savanna: Post Oak Motte and Woodland	183.350	453.1
78	Pineywoods: Hardwood Flatwoods	165.323	408.5
1	Unclassified	151.076	373.3
70	Pineywoods: Small Stream and Riparian Baldcypress Swamp	108.392	267.8
17	Pineywoods: Pine Forest or Plantation	81.553	201.5
58	Pineywoods: Bottomland Herbaceous Wetland	57.855	143.0
116	Pine Plantation > 3 meters tall	49.404	122.1
67	Pineywoods: Small Stream and Riparian Herbaceous Wetland	31.695	78.3
76	Pineywoods: Longleaf or Loblolly Pine Flatwoods or Plantation	14.118	34.9
100	Pineywoods: Disturbance or Tame Grassland	11.719	29.0
14	Pineywoods: Northern Mesic Hardwood Forest	10.308	25.5
18	Pineywoods: Pine / Hardwood Forest or Plantation	8.756	21.6
57	Pineywoods: Bottomland Deciduous Successional Shrubland	5.615	13.9
120	Urban Low Intensity	4.228	10.4
5	Post Oak Savanna: Savanna Grassland	2.987	7.4
72	Pineywoods: Herbaceous Flatwoods Pond	2.277	5.6
66	Pineywoods: Small Stream and Riparian Deciduous Successional	1.842	4.6
69	Pineywoods: Small Stream and Riparian Wet Prairie	1.457	3.6
101	Native Invasive: Deciduous Woodland	1.450	3.6
54	Pineywoods: Bottomland Temporarily Flooded Mixed Pine / Hardw	1.272	3.1
104	Native Invasive: Mesquite Shrubland	0.992	2.5
60	Pineywoods: Bottomland Wet Prairie	0.493	1.2
119	Urban High Intensity	0.213	0.5
77	Pineywoods: Longleaf or Loblolly Pine / Hardwood Flatwoods or Pl	0.202	0.5
13	Pineywoods: Northern Mesic Pine / Hardwood Forest	0.200	0.5
108	Native Invasive: Deciduous Shrubland	0.082	0.2
111	Barren	0.054	0.1
117	Pine Plantation 1 to 3 meters tall	0.041	0.1
20	Pineywoods: Dry Pine Forest or Plantation	0.012	0.0
22	Pineywoods: Dry Upland Hardwood Forest	0.005	0.0



0 2 4 Miles
0 2 4 Kilometers

TPWD-WL-SLANGE
UTM15 NAD83 NGVD29
1:135,000 SCALE
TECDP-Phase 2 Beta

Lake Wright Patman USACOE Lands - Vegetation Map
Estimated Habitat Impacts - Below 240' msl

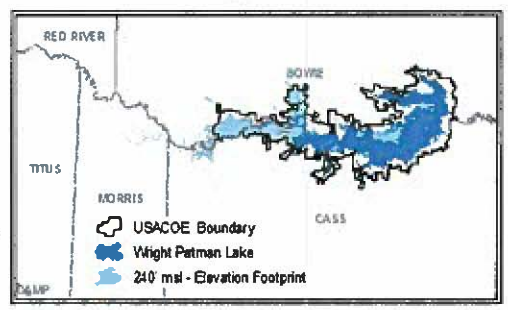


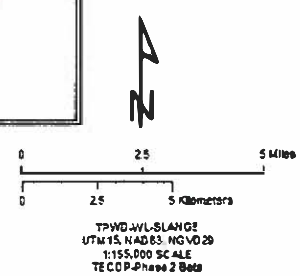
Estimated Inundation

240' msl (NGVD29) - 26,209.2 acres

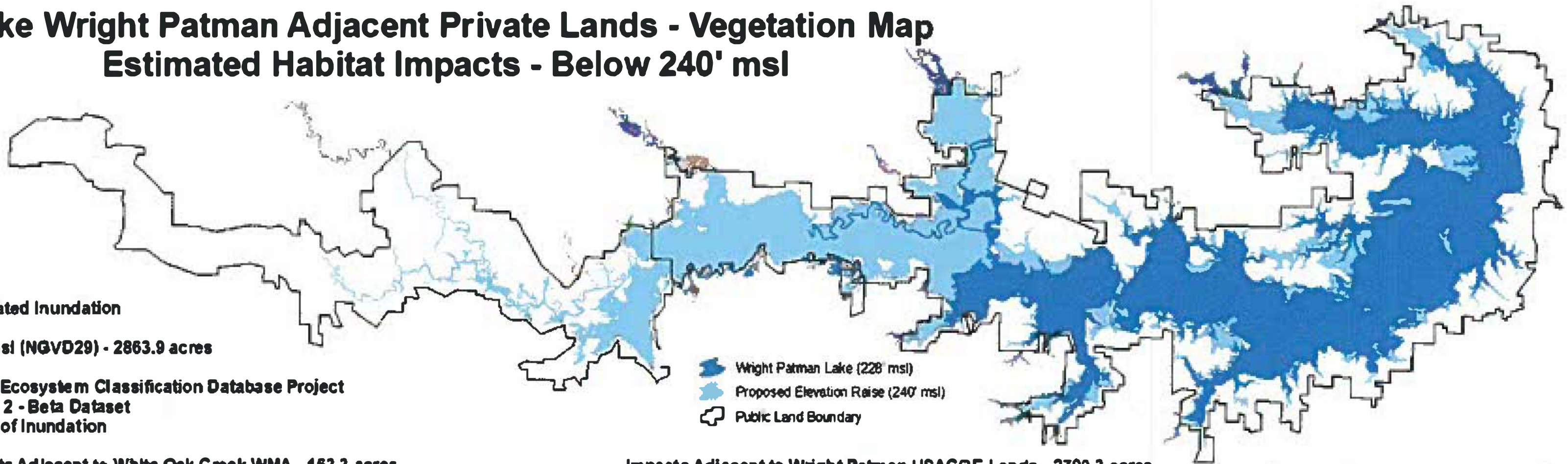
Texas Ecosystem Classification Database Project
Phase 2 - Beta Dataset
Acres of Inundation

Code	Vegetation Class - Common Name	Hectares	Acres
113	Open Water	10965.620	27096.6
59	Pineywoods: Bottomland Seasonally Flooded Hardwood Forest	3450.822	8527.2
61	Pineywoods: Bottomland Baldcypress Swamp	1427.826	3528.2
19	Pineywoods: Upland Hardwood Forest	1239.150	3062.0
4	Post Oak Savanna: Post Oak Motte and Woodland	703.049	1737.3
55	Pineywoods: Bottomland Temporarily Flooded Hardwood Forest	630.711	1558.5
68	Pineywoods: Small Stream and Riparian Seasonally Flooded Hardw	625.801	1546.4
64	Pineywoods: Small Stream and Riparian Temporarily Flooded Hard	556.566	1375.3
78	Pineywoods: Hardwood Flatwoods	555.368	1372.3
17	Pineywoods: Pine Forest or Plantation	408.838	1010.3
1	Unclassified	208.269	514.6
70	Pineywoods: Small Stream and Riparian Baldcypress Swamp	159.318	393.7
116	Pine Plantation > 3 meters tall	139.927	345.8
76	Pineywoods: Longleaf or Loblolly Pine Flatwoods or Plantation	94.146	232.6
58	Pineywoods: Bottomland Herbaceous Wetland	64.767	160.0
67	Pineywoods: Small Stream and Riparian Herbaceous Wetland	61.114	151.0
14	Pineywoods: Northern Mesic Hardwood Forest	43.404	107.3
100	Pineywoods: Disturbance or Tame Grassland	35.576	87.9
18	Pineywoods: Pine / Hardwood Forest or Plantation	32.688	80.8
71	Pineywoods: Wet Hardwood Flatwoods	31.635	78.2
72	Pineywoods: Herbaceous Flatwoods Pond	29.120	72.0
108	Native Invasive: Deciduous Shrubland	16.116	39.8
57	Pineywoods: Bottomland Deciduous Successional Shrubland	14.236	35.2
114	Row Crops	10.677	26.4
120	Urban Low Intensity	9.966	24.6
66	Pineywoods: Small Stream and Riparian Deciduous Successional S	9.675	23.9
5	Post Oak Savanna: Savanna Grassland	9.326	23.0
77	Pineywoods: Longleaf or Loblolly Pine / Hardwood Flatwoods or Pl	8.877	21.9
101	Native Invasive: Deciduous Woodland	7.600	18.8
69	Pineywoods: Small Stream and Riparian Wet Prairie	7.328	18.1
60	Pineywoods: Bottomland Wet Prairie	4.756	11.8
104	Native Invasive: Mesquite Shrubland	2.393	5.9
54	Pineywoods: Bottomland Temporarily Flooded Mixed Pine / Hardwo	1.787	4.4
13	Pineywoods: Northern Mesic Pine / Hardwood Forest	1.520	3.8
117	Pine Plantation 1 to 3 meters tall	1.339	3.3
119	Urban High Intensity	1.026	2.5
110	Swamp	0.687	1.7
111	Barren	0.534	1.3
22	Pineywoods: Dry Upland Hardwood Forest	0.230	0.6
63	Pineywoods: Small Stream and Riparian Temporarily Flooded Mixed	0.207	0.5
20	Pineywoods: Dry Pine Forest or Plantation	0.138	0.3





Lake Wright Patman Adjacent Private Lands - Vegetation Map
Estimated Habitat Impacts - Below 240' msl



Estimated Inundation

240' msl (NGVD29) - 2863.9 acres

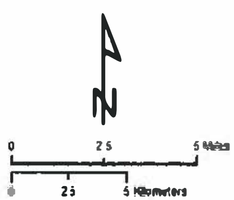
Texas Ecosystem Classification Database Project
Phase 2 - Beta Dataset
Acres of Inundation

Impacts Adjacent to White Oak Creek WMA - 163.3 acres

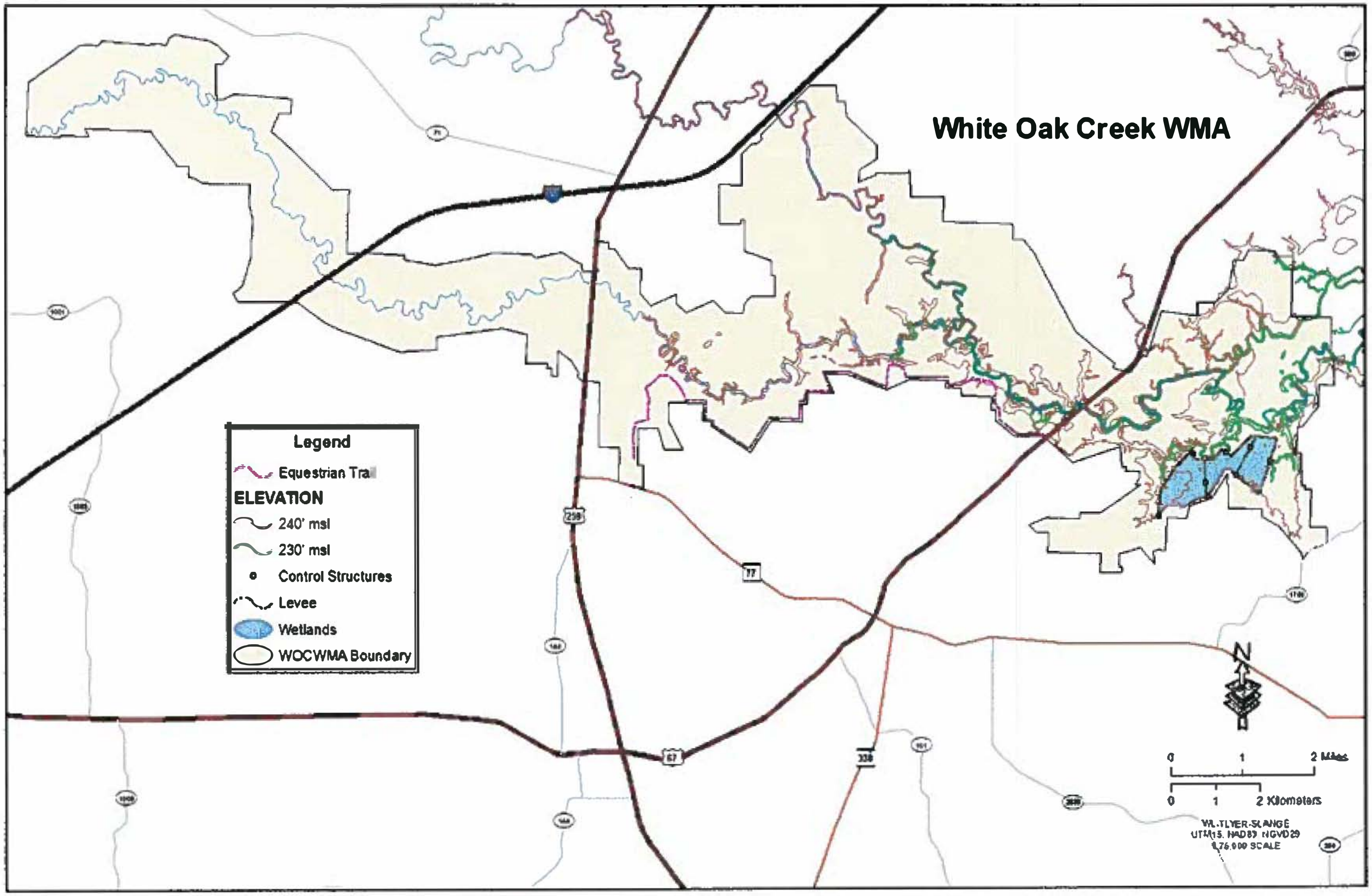
Code	Common Name	Hectares	Acres
55	Pineywoods: Bottomland Temporarily Flooded Hardwood Forest	25.093	62.0
59	Pineywoods: Bottomland Seasonally Flooded Hardwood Forest	11.103	27.4
91	Pineywoods: Bottomland Baldcypress Swamp	9.168	22.7
1	Unclassified	4.947	12.2
19	Pineywoods: Upland Hardwood Forest	2.711	6.7
113	Open Water	2.553	6.3
64	Pineywoods: Small Stream and Riparian Temporarily Flooded Hard	2.510	6.2
9	Post Oak Savanna: Oak / Hardwood Slope Forest	2.049	5.1
69	Pineywoods: Small Stream and Riparian Wet Prairie	1.818	4.5
67	Pineywoods: Small Stream and Riparian Herbaceous Wetland	1.642	4.1
100	Pineywoods: Disturbance or Tame Grassland	1.512	3.7
4	Post Oak Savanna: Post Oak Motte and Woodland	0.589	1.5
114	Row Crops	0.581	1.4
60	Pineywoods: Bottomland Wet Prairie	0.524	1.3
110	Swamp	0.332	0.8
120	Urban Low Intensity	0.128	0.3

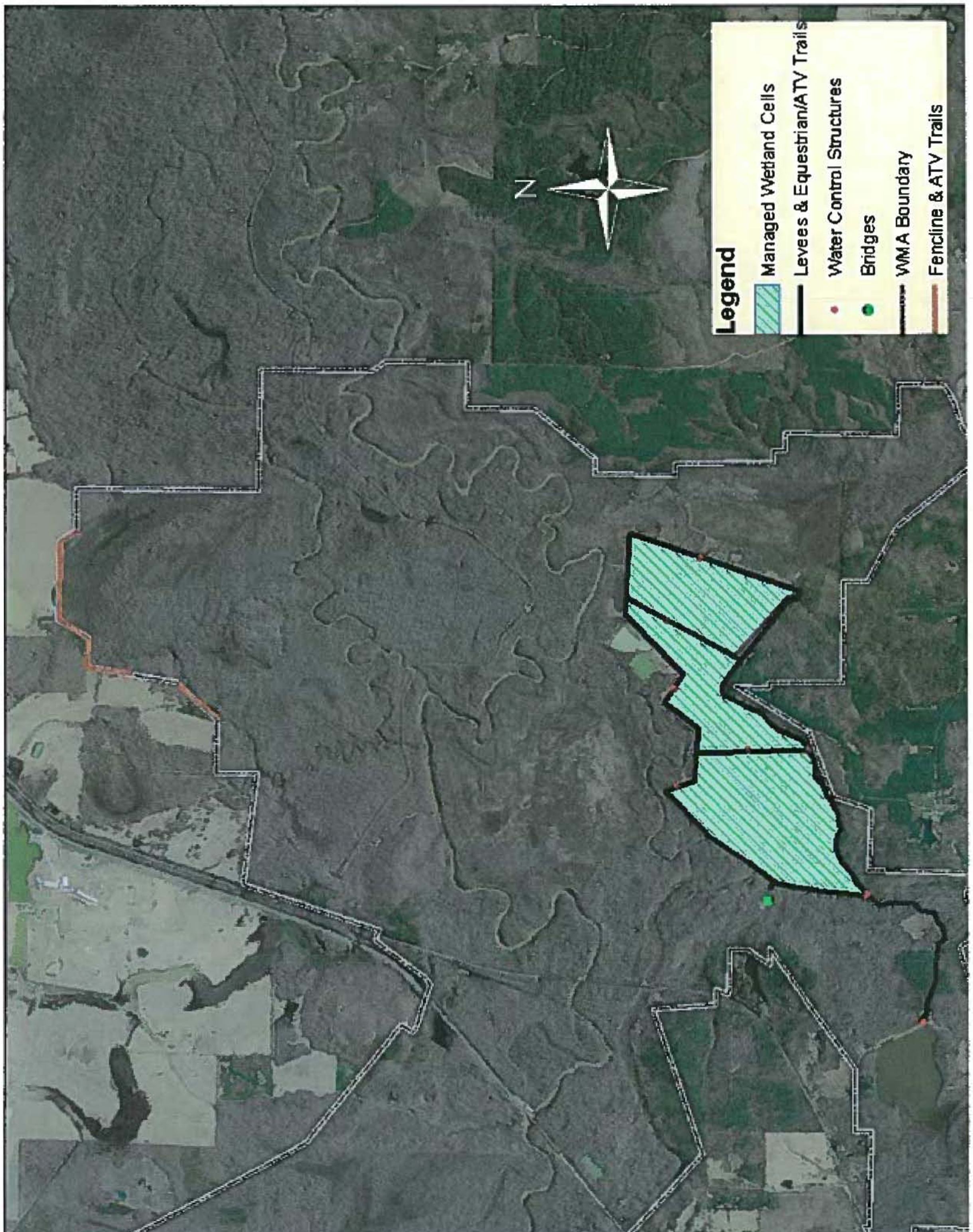
Impacts Adjacent to Wright Patman USACOE Lands - 2700.3 acres

Code	Vegetation Classification - Common Name	Hectares	Acres
19	Pineywoods: Upland Hardwood Forest	69.701	172.2
78	Pineywoods: Hardwood Flatwoods	40.849	100.9
17	Pineywoods: Pine Forest or Plantation	36.269	89.6
113	Open Water	35.462	87.6
116	Pine Plantation > 3 meters tall	31.280	77.3
5	Post Oak Savanna: Savanna Grassland	31.169	77.0
69	Pineywoods: Small Stream and Riparian Wet Prairie	30.881	76.3
1	Unclassified	26.842	66.3
114	Row Crops	26.047	64.4
70	Pineywoods: Small Stream and Riparian Baldcypress Swamp	21.689	53.6
100	Pineywoods: Disturbance or Tame Grassland	20.137	49.8
4	Post Oak Savanna: Post Oak Motte and Woodland	19.680	48.2
76	Pineywoods: Longleaf or Loblolly Pine Flatwoods or Plantation	15.287	37.8
66	Pineywoods: Small Stream and Riparian Deciduous Successional	13.910	34.4
108	Native Invasive: Deciduous Shrubland	10.640	26.3
14	Pineywoods: Northern Mesic Hardwood Forest	8.165	20.2
67	Pineywoods: Small Stream and Riparian Herbaceous Wetland	5.454	13.5
71	Pineywoods: Wet Hardwood Flatwoods	4.417	10.9
60	Pineywoods: Bottomland Wet Prairie	3.238	8.0
85	Blackland Prairie: Disturbance or Tame Grassland	2.888	7.1
18	Pineywoods: Pine / Hardwood Forest or Plantation	1.444	3.6
58	Pineywoods: Bottomland Herbaceous Wetland	1.442	3.6
13	Pineywoods: Northern Mesic Pine / Hardwood Forest	1.407	3.5
77	Pineywoods: Longleaf or Loblolly Pine / Hardwood Flatwoods or Pl	1.046	2.6
63	Pineywoods: Small Stream and Riparian Temporarily Flooded Mixe	0.813	2.0
104	Native Invasive: Mesquite Shrubland	0.407	1.0
54	Pineywoods: Bottomland Temporarily Flooded Mixed Pine / Hardw	0.385	1.0
120	Urban Low Intensity	0.345	0.9
117	Pine Plantation 1 to 3 meters tall	0.304	0.8
72	Pineywoods: Herbaceous Flatwoods Pond	0.132	0.3
21	Pineywoods: Dry Pine / Hardwood Forest or Plantation	0.110	0.3
101	Native Invasive: Deciduous Woodland	0.080	0.2
57	Pineywoods: Bottomland Deciduous Successional Shrubland	0.029	0.1
22	Pineywoods: Dry Upland Hardwood Forest	0.013	0.0

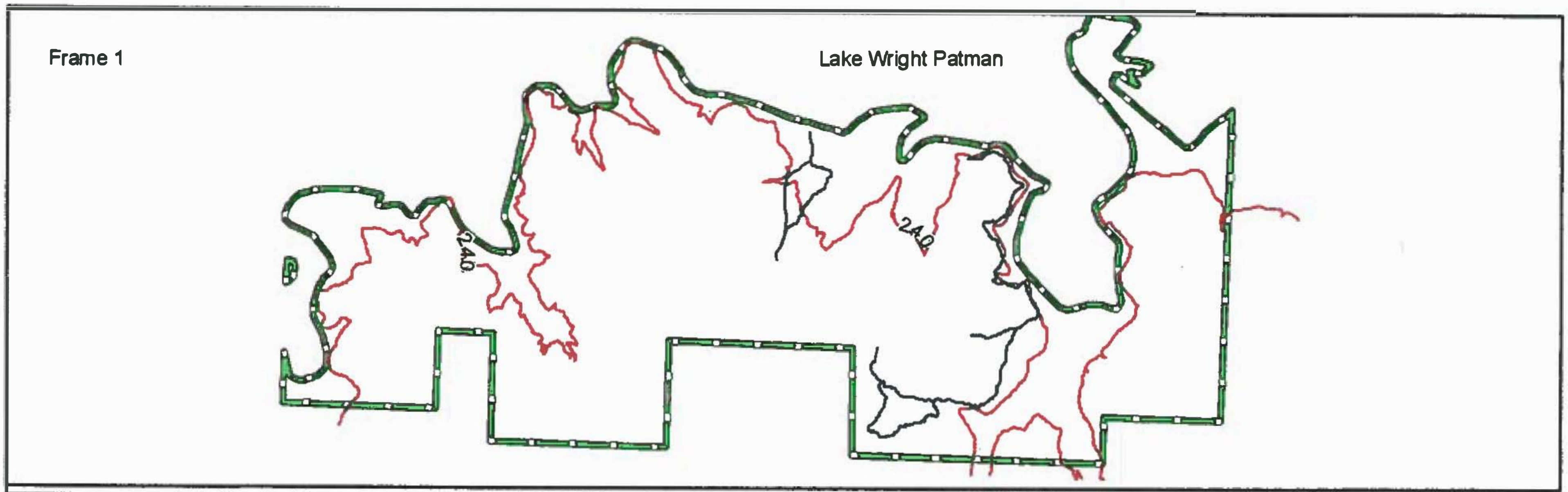


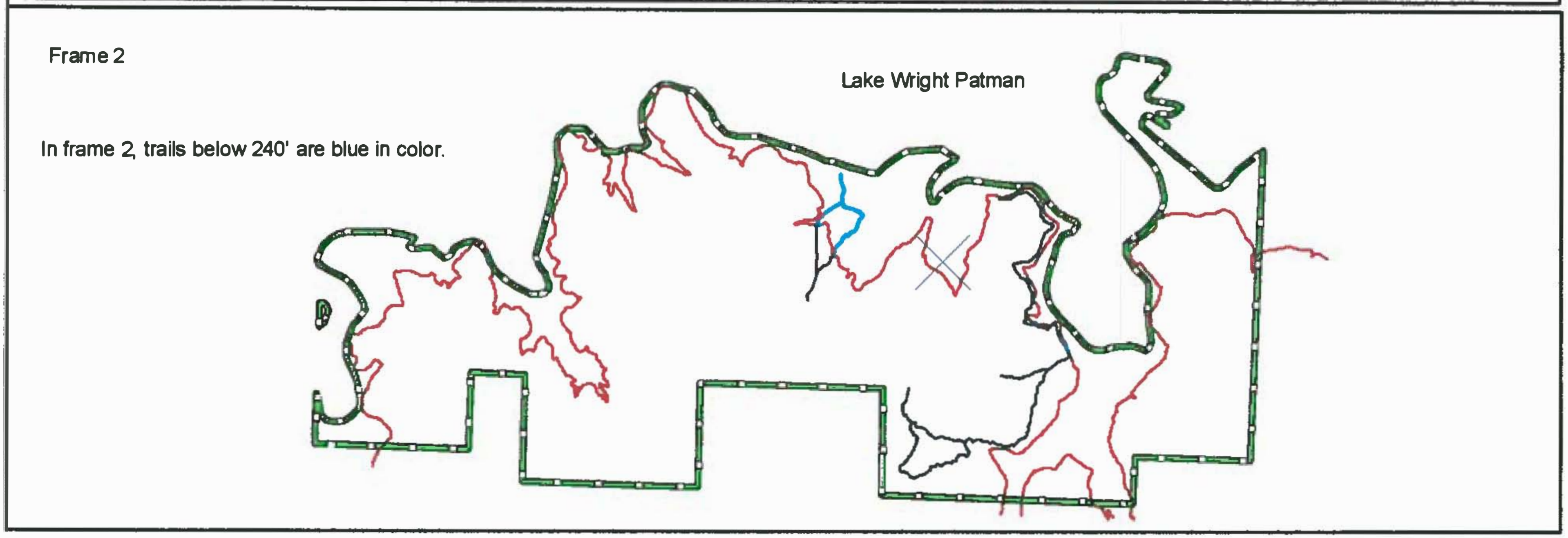
TPWD-WL-SLANGE
UTM15 NAD83 NGVD29
1:175,000 SCALE
TECDP-Phase 2 Beta


White Oak Creek WMA
Legend
Equestrian Trail
ELEVATION
240' msl
230' msl
Control Structures
Levee
Wetlands
WOCWMA Boundary
0 1 2 Miles
0 1 2 Kilometers


Legend
Managed Wetland Cells
Levees & Equestrian/ATV Trails
Water Control Structures
Bridges
WMA Boundary
Fenceline & ATV Trails
N

Atlanta State Park
Approximate Position of 240' MSL Elevation throughout Park
0
500
1,000
2,000
3,000
4,000
5,000
Feet
Elevation 240
Park Boundary
Trails
Park Roads
Contours
Index @ 50'
Intermediate @ 10'
N
Wright Patman Lake
Elev. 235'
Park Headquaters
SP | NR | PGR 10 Mar. 10





Atlanta State Park
Footage of Trail below 240'

0 900 1,800 3,600
Feet

Map Date: 3/10/2010

Legend

Atlanta SP Trails — 240' Elevation — Park Boundary

To find the footage of trail below 240', I simply split the trail lines at the elevation marker. I then merged all the line segments together and found the footage of the combination.

Linear feet of all trails in Park today: 14,872
Linear feet of trails below 240': 2,421

Response to Comments to the Initially Prepared Plan for Region D

The North East Texas Regional Water Planning Group (NETRWPG; Region D) received twenty-five (25) comments to the Initially Prepared Plan (IPP). Some letters received contained multiple comments, for a total of twenty-nine (29) comments in all. All comments, both verbal and written, must be addressed specifically. This instrument is intended to provide the necessary documentation to reflect how the comments have been addressed by the NETRWPG. The consultant team has categorized the written comments into three distinct groups as follows:

Group 1 - Comments, fourteen (14), which reflect the opinion of the commenter but do not specifically request any changes in the Initially Prepared Plan (IPP). These comments are typically thought of as being more generic in nature.

Group 2 - Comments, four (4), which represent facts which are incorrectly stated or need additional clarity to improve the quality of the IPP. These comments may necessitate changes in the document but are consistent with the intent of the IPP.

Group 3 - Comments, eleven (11), which recommend or request changes in the IPP which require more direction. These comments required more discussion and decision making by the voting members of the NETRWPG. These comments were presented in more detail for consideration of adoption or rejection by the NETRWPG, with input included from various commenters when requested.

Group 1 - Comments which reflect the opinion of the commenter.

Date	Name	Entity	Format	Subject	Level	No.
7/14/2015	Eileen Collins	Self	Oral and Written	Against Marvin Nichols	1	1
7/14/2015	Baker Bledsoe	Self	Oral and Written	Against Marvin Nichols	1	2
7/14/2015	Lindy Guest	Self	Oral and Written	Against Marvin Nichols	1	3
7/14/2015	Brian Strohman	Self	Oral	Against Marvin Nichols	1	4
7/14/2015	Nina Holt	Self	Oral	Against Marvin Nichols	1	5
7/14/2015	John Brooks	Self	Oral and Written	Against Marvin Nichols	1	6
7/14/2015	Peggy Harrison	Atlanta ISD	Oral	Against Marvin Nichols	1	7
7/14/2015	Sharon Nabors	Self	Oral	Against Marvin Nichols	1	8
7/28/2015	Cary Hilliard	Self	Written	Against Canton Reservoir	1	9
8/11/2015	Jim Davis, et. al.	Bi-County WSC	Written	Supports Marvin Nichols	1	10
8/12/2015	Mayor Ann Rushing, et. al.	City of Clarksville	Written	Supports Marvin Nichols	1	11

Date	Name	Entity	Format	Subject	Level	No.
8/27/2015	Oran Caudle	Caudle Consulting	Written	Against Marvin Nichols, identifies alternative strategies	1	12
9/11/2015	Ross Melinchuk	TPWD	Written	Supports many of the policy recommendations in the IPP	1	13
				Provides summary of potential impacts from Patman reallocation	1	14

ACTION: December 1, 2015 - accepted Items 1-14.

Group 2 - Comments which represent facts or clarifications.

Date	Name	Entity	Format	Subject	Level	No.
7/3/2015	Gus Metz	South Rains SUD	Written	Correct numbers and add words	2	15
8/11/2015	Jim Davis, et. al.	Bi-County WSC	Written	Requests update to groundwater analyses	2	16
9/11/2015	Ross Melinchuk	TPWD	Written	Recommends quantitative reporting of environmental factors	2	17
				Recommends consideration of impacts to springs	2	18

15. Mr. Gus Metz, General Manager of the South Rains Special Utility District, notes no mention of the approximately 3,500,000 gal. per month of treated water purchased by the SUD in Emory to service about 968 rural customers in Rains county, nor any mention of South Rains Special Utility District in the IPP. Further noted is the purchase of an average 745,000 gal. per month of treated water from Bright Star-Salem SUD.

The amounts noted in this comment are aggregated and represented as the Rains, County-Other WUG. Text has been added to the Final Plan explicitly identifying those WUGs comprising Rains, County-Other, including South Rains SUD.

16. Within his comments on the IPP, Mr. Jim Davis, Director of Special Projects of Bi-County WSC notes that an update should be performed based on the *Carrizo-Wilcox Aquifer Study, Final Contract Report*, submitted to the Texas Commission on Environmental Quality by the Bureau of Economic Geology in March 2011. Such an update would consider additional elements such as:

- include more data on wells currently producing from the aquifer. The report itself notes the lack of cooperation in obtaining survey responses from active producers. There is a complete absence of data from Region D.

- Quantify the total recommended additional demand placed on the aquifer by the Region D IPP.
- Estimate the additional demand from private wells drilled into the aquifer during the forecast period.
- Estimate the withdrawals from outside Region D. For example, the Region C IPP calls for the Athens Municipal Authority to drill eight wells pumping 750 gpm from the Carrizo-Wilcox. According to the Region C plan this level of production exceeds the Modeled Available Groundwater in Henderson County. Dallas Water Utilities has also purchased 30,267 acre-feet/yr to be drawn from the Carrizo-Wilcox aquifer.
- Address the additional improvements and research suggested on pages 41-43 of the March 2011 Report to increase the overall confidence in its conclusions.
- Determine whether the 2015 Region D model assumes producing wells continue to produce at a static rate throughout the forecast period. *A Comprehensive Sabine Watershed Management Report* prepared for the Sabine River Authority and the TWDB estimates a 3% per year average depletion for production by its existing wells. This is an important factor to consider in calculating future production from existing wells and the number of new wells required to compensate for the lost production.
- Integrate all the above factors into an updated comparison of the total demand from all users to the ability of the aquifer to meet that demand without long-term negative consequences, i.e. deterioration of water quality or level of the aquifer.

For the purposes of the present 2016 Plan, analyses of groundwater supplies and source availabilities have ascribed to the required methods established by the TWDB for regional planning purposes. Specifically, Modeled Available Groundwater (MAG) amounts established and required by the TWDB have been used to set firm groundwater supplies for the entirety of Region D. Subsequent analyses have been performed in a manner consistent with methods adopted and employed in the three previous rounds of planning for Region D.

However, for the fifth cycle of regional planning (i.e., for the development of the 2021 Region D Plan), the recent passage of laws pertaining to the establishment and analysis of groundwater supplies for regions containing no Groundwater Conservation Districts (GCDs) will allow the NETRWPG to more readily incorporate the aforementioned comments into its deliberations and establishment of methods consistent with TWDB guidelines for evaluating groundwater demands, supplies, and future strategies.

17. Within Mr. Ross Melinchuk's (TPWD) comments, TPWD notes that the IPP lacks a quantitative reporting of environmental factors. This comment is also consistent with one of the Level 1 comments on the 2015 Region D IPP submitted by the TWDB.

A quantitative reporting of environmental factors, based upon assumed acreages of impacted area (including specific acreages of potential impacted wetland areas) has been incorporated into Chapter 6 of the Final 2016 Region D Plan.

18. Mr. Melinchuk (TPWD) further comments that Potential impacts to spring flows and spring ecosystems should be identified where additional groundwater development was identified as a water management strategy.

TWDB guidelines require the utilization of Modeled Available Groundwater (MAG) amounts for the establishment of available groundwater supplies in the regional water planning process. These MAG amounts were adopted by the NETRWPG, and are based upon the desired future conditions (DFCs) of each groundwater source as specified during the development of each MAG, a process presently external to the regional planning process. As noted previously, in the next round of planning there exists the potential for greater flexibility for the evaluation and establishment of available groundwater supplies in Region D, given recent changes in the law regarding regions in which no GCDs presently exist. While no change has been made in the Final 2016 Region D Plan, the NETRWPG will consider this comment further during the next round of planning for the 2021 Region D Plan.

ACTION: December 1, 2015 - accepted Items 15-18. Rains, County-Other WUG text revised to reflect Item 15, and Chapter 6 modifications reflecting quantitative reporting of environmental impacts per Item 17.

Group 3 - Comments which require decisions.

Date	Name	Entity	Format	Subject	Level	No.
5/8/2015	Mayor Richard Lawrence	City of Canton	Written	Supports Grand Saline Reservoir, wells, and reuse	3	19
7/14/2015	Wayne Dial	City of Clarksville	Oral and Written	Supports leaving all options open for City	3	20
7/14/2015	Mayor Ann Rushing	City of Clarksville	Oral and Written	Supports leaving all options open for City	3	21
7/14/2015	Lawrence Greer	Self	Oral and Written	Against Canton Reservoir	3	22
7/14/2015	Jimmy Hare	Self	Oral	Against Canton Reservoir	3	23
7/14/2015	Cary Hilliard	Self	Oral	Against Canton Reservoir	3	24
7/14/2015	Mayor Lou Ann Everett	City of Canton	Oral	Supports Grand Saline Reservoir, wells, and reuse	3	25
7/14/2015	Shawn Stewart	City of Canton	Oral	Supports Grand Saline Reservoir, wells, and reuse	3	26
7/14/2015	Cynthia Malouf	City of Canton	Oral	Supports Grand Saline Reservoir, wells, and reuse	3	27
7/14/2015	Connie Odic	City of Canton	Oral	Supports Grand Saline Reservoir, wells, and reuse	3	28
9/1/2015	Mike Russell	SRBA	Written to TWDB	Recommends designation as a WWP in the State Water Plan	3	29

Group 3 comments were addressed by topic, as shown below:

A.City of Clarksville Water Management Strategy Options
B.City of Canton Water Management Strategy Options
C.Designation of Wholesale Water Provider

ACTION, TOPIC A: At its October 21, 2015 meeting, the NETRWPG took action on Topic A to adopt as a recommended WMS the Pipeline to DeKalb for the purchase of available Wright Patman supply from the City of Texarkana/Riverbend Water Resources District. Further, the NETRWPG adopted the identification of alternative water management strategies including construction of Dimple Reservoir, construction of a new well field and reverse osmosis treatment facilities, and construction of a treated water pipeline connecting to Lamar County WSD for supply from the City of Paris. Lastly, the NETRWPG adopted the following language for inclusion in the Final Plan:

> At present, considerable uncertainty exists in each of the identified feasible water management strategies for the City of Clarksville. The NETRWPG supports any efforts by the City of Clarksville to further study all potential strategies to identify the best approach for the City to meeting all of its future water supply needs, and such a study should be considered consistent with the 2016 North East Texas Regional Water Plan.

This language is included in the appropriate locations relating to the City of Clarksville within the Final 2016 Region D Plan.

ACTION, TOPIC B: At its October 21, 2015 meeting, the NETRWPG also took action on Topic B, adopting as recommended water management strategies the development of a new well and indirect reuse for the City of Canton. The NETRWPG also adopted the identification of a new reservoir on Grand Saline Creek as an alternative water management strategy, including the following language as appropriate within the Final 2016 Region D Plan:

> Because of substantial disagreement over future population and water demands, the City has requested the following alternate strategy:
>
> The strategy to meet future needs "is with surface water from a proposed reservoir on Grand Saline Creek. The City of Canton has provided to NETRWPG resolutions from three other cities in Van Zandt County supporting the reservoir project. This show of support indicates that a regional surface water reservoir could possibly replace the groundwater strategies for other Van Zandt County public water supplies with projected deficits. However, due to the time typically required to obtain the necessary permits to impound surface water, the City plans to construct one or two additional wells, or implement a reuse option in the interim to meet increasing demands due to population growth and the First Monday influence." This alternative wording should be considered consistent with this plan in the event that population growth in the potential service area significantly exceeds current NETRWPG projections.

ACTION, TOPIC C: Regarding Topic C relating to the designation of an entity as a Wholesale Water Provider, the following language was included as a legislative recommendation in the Final 2016 Region D Plan, and adopted at the November 18, 2015 meeting of the NETRWPG:

<u>Recommendation: Designation of Wholesale Water Providers</u>

The North East Texas Regional Water Planning Group supports the designation of a Wholesale Water Provider (WWP) as described in the Texas Administrative Code §357.10(30) as:

> Any person or entity, including river authorities and irrigation districts, that has contracts to sell more than 1,000 acre-feet of water wholesale in any one year during the five years immediately preceding the adoption of the last regional water plan. The regional water planning groups shall include as wholesale water providers other persons and entities that enter or that the regional water planning group expects or recommends to enter contracts to sell more than 1,000 acre-feet of water wholesale during the period covered by the plan.

The NETRWPG supports the granting of a designation of WWP for an entity within Region D depending upon a written request from that entity to the NETRWPG that demonstrates said entity has entered or the RWPG expects or recommends to enter into contracts to sell more than 1,000 acre-feet of water wholesale during the period covered by the plan, including the designation of expected demand and the expected supply. Without a request that includes sufficient identification of expected contractual demand and expected supply, the NETRWPG cannot plan for such an entity. With this noted, Region D expects that the water supply out of Lake Wright Patman will continue to be with Texarkana and Riverbend Water Resources District control as Wholesale Water Providers.

Documents Related to the 2016 Interregional Conflict Resolution

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Documents Related to the 2016 Interregional Conflict Resolution

Contained herein are documents related to the 2016 Interregional Conflict Resolution process between Region C and Region D. A more detailed discussion of the 2016 Interregional Conflict Resolution process is contained in Chapter 10, Section 10.5, of this report. The documents contained in this section are as follows:

- July 21, 2015 Letter from Region D Water Planning Group to TWDB Regarding Objection by Region D Water Planning Group to the inclusion of Marvin Nichols Reservoir in Round 4
- August 6, 2015 Memo from TWDB Regarding Potential Interregional Conflict between Regional Water Plans for Regions C & D
- August 24, 2015 Letter/Brief from Region C Water Planning Group to TWDB Regarding Potential Interregional Conflict between Regional Water Plans for Regions C & D
- September 9, 2015 Minutes from TWDB Meeting. Item 2 details the TWDB Findings that an interregional conflict exists
- October 5, 2015 Mediation Agreement between Region C and D
- October 21, 2015 Resolutions by the North East Texas Regional Water Planning Group (Region D) reflecting the terms of the Mediation Agreement

Linda Price, Chairman
Region D Water Planning Group
PO Box 360
Linden, Texas 75563
Cell: 903.720.8729 Email: l.p.linda14@gmail.com

2015 JUL 23 PM 2:40

July 21, 2015

Kevin Patteson, Executive Administrator
Texas Water Development Board
PO Box 13231
Austin, TX 78711-3231

Re: Objection by Region D Water Planning Group to the inclusion of Marvin Nichols Reservoir in Round 4

Dear Mr. Patteson:

On July 14, 2015, the Region D Water Planning Group authorized me to notify the Texas Water Development Board (TWDB) that Region D has concluded that the proposed Marvin Nichols Reservoir as described in the Region C IPP for Round 4 will have an unacceptable degree of impact on Region D's water planning area and appears to conflict with the Region D Round 4 IPP. Region D's objection is primarily based on information that indicates its inclusion is not protective of the natural and agricultural resources of Region D.

Region D continues to assert that the available information demonstrates that Region C can meet all of its projected needs for the next 50 years without resorting to constructing a new impoundment in the Sulphur River Basin.

Region D encourages the TWDB to aggressively pursue steps that will provide a more thorough vetting of this topic between Region C and D. Region D is prepared to meet and discuss this topic whenever afforded the opportunity by the TWDB.

Please feel free to contact me with any questions you may have. I look forward to working with you.

Sincerely,

Linda Price

Linda Price, Chair of Region D

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

Date: August 6, 2015

To: Persons on the Attached Mailing List (by mail and email as indicated)

Re: Potential Interregional Conflict between Regional Water Plans for Regions C & D

On July 21st, 2015, Region D Water Planning Group submitted a letter to the Texas Water Development Board ("TWDB") indicating its position that "the proposed Marvin Nichols Reservoir as described in the Region C IPP for Round 4 will have an unacceptable degree of impact on Region D's water planning area and appears to conflict with the Region D Round 4 IPP." (See Attachment A.)

Through this correspondence, the persons on the attached mailing list are hereby notified that the Board will consider whether an interregional conflict exists during its Board Meeting on **Wednesday, September 9th, 2015, beginning at 9:30 AM** in Room 170, Stephen F. Austin Building, 1700 North Congress Avenue, Austin, Texas. The Board will take oral argument on this matter. The order and time allotments for oral presentation are established as follows: 15 minutes for the Region D Representative(s); 15 minutes for the Region C Representative(s); and 15 minutes for the Executive Administrator. The parties may apportion their respective allotments as they see fit. If a party plans on apportioning time among multiple individuals, a representative of that party should contact Joyce Bourenane, Office of General Counsel at (512) 463-7686 by **5:00 p.m. on Monday, September 7th, 2015** to let her know how the time will be apportioned.

Furthermore, Regions C and D are invited to submit briefs on the issue of whether an interregional conflict exists. In the event that a brief is submitted, it must be received by the Office of General Counsel on or before **5:00 p.m.** on **Tuesday, August 25th, 2015.** Please send the submittals to the Office of General Counsel by U.S. Mail and Electronic Mail. The mailing address of the Office of General Counsel is: Office of General Counsel, ATTN: Les Trobman, Texas Water Development Board, P.O. Box 13231, Austin, Texas 78711-3231 [les.trobman@twdb.texas.gov]. On the same day a submittal is transmitted to the Office of General Counsel, a copy must also be sent by U.S. Mail and Electronic Mail to all other persons at their address/email address listed on the attached Mailing List. The Executive Administrator will submit a recommendation to the Board, with a copy to the Mailing List on or before **Tuesday, September 1st, 2015**.

If you have any questions regarding this matter, please contact me at 512-463-9105.

Very truly yours,

General Counsel

Attachments

Mailing List

Linda Price, Chairman
Region D Water Planning Group
P.O. Box 360
Linden, TX 75563
linda.price@wardtimber.com

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Northeast Texas MWD
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REGION C WATER PLANNING GROUP

Senate Bill One Fourth Round of Regional Water Planning - Texas Water Development Board

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August 24, 2015

VIA E-MAIL
les.trobman@twdb.texas.gov

Mr. Les Trobman
General Counsel
Texas Water Development Board
1700 North Congress Avenue
Austin, Texas 78701

Re: Potential Interregional Conflict between Regional Water Plans for Regions C & D

Dear Mr. Trobman,

The Region C Water Planning Group (RCWPG) submits this letter brief in response to your solicitation of briefing dated August 6, 2015. The Region D Water Planning Group has alleged by a letter of July 21 that Region C's "proposed Marvin Nichols Reservoir . . . will have an unacceptable degree of impact on Region D's water planning area and appears to conflict with the Region D Round 4 IPP." It further contends that the proposed reservoir "is not protective of the natural and agricultural resources of Region D." Those claims are without merit and do not rise to the level of an interregional conflict between the Region C and D fourth-round IPPs.

<u>Marvin Nichols in the 2015 RCWPG IPP</u>

Region C has elected to include multiple strategies for the development of Marvin Nichols in its 2015 IPP. The Sulphur Basin Supplies strategy (5C.1 Recommended Strategies for Regional Wholesale Water Providers, pp. 5C.1-4 of the RCWPG IPP) is a recommended strategy for the Tarrant Regional Water District (TRWD), the North Texas Municipal Water District (NTMWD) and the Upper Trinity Regional Water District (UTRWD), and an alternate strategy for the Cities of Dallas and Irving. The strategy consists of a combination of water from Marvin Nichols and the reallocation of conservation storage in Wright Patman Lake. The 2015 RCWPG IPP retains the 2011 configuration of Marvin Nichols as an alternate water management strategy for NTMWD, UTRWD, TRWD, and the City of Irving.

NTMWD, TRWD, Dallas, UTRWD, and Irving, along with the Sulphur River Basin Authority, formed a Joint Committee on Program Development (JCPD) in 2001. Since that time, the JCPD Region C entities have provided more than $5 million to the SRBA to further investigate the development of surface water supplies in the Sulphur River basin. Sulphur basin feasibility studies are underway, conducted by the U.S. Army Corps of Engineers, SRBA and the JCPD. Those studies include multiple potential configurations for Marvin Nichols.

<u>RCWPG has furnished extensive studies on impacts of the recommended and alternate Marvin Nichols strategies</u>

Region D's allegation of an interregional conflict is an attempt by it to use the water planning process to thwart, rather than encourage, the development of adequate water supplies for the State of Texas. The RCWPG and JCPD have studied the impacts of both the 2011 and 2015 Marvin Nichols configurations, and also concurrent reliance by Region C on other supplies available in Region D. In doing so, the RCWPG was mindful of the direction it received from the Board during the resolution of the last claimed conflict in "An Order Concerning the Interregional Conflict between the 2011 North Central Texas Regional Planning Area Regional Water Plan and the 2011 East Texas Regional Planning Area Regional Water Plan in Accordance with Texas Water Code §16.053" issued January 8, 2015 (Order).

The Board is familiar with the long history of the resolved interregional conflict in connection with the RCWPG's 2011 Regional Water Plan. As a part of the resolution process, the Board ordered the RCWPG to conduct an analysis of the impacts of Marvin Nichols (as then proposed) on the resources of Region D and the State. Region C furnished that report to the Board on October 29, 2014. In support of what is now an alternate strategy, the RCWPG furnished the data it developed as an appendix to its 2015 IPP. *See*, 2015 RCWPG IPP, Appendix Y, *Analysis and Quantification of the Impacts of the Marvin Nichols Reservoir Water Management Strategy on the Agricultural and Natural Resources of Region D and the State*.

The RCWPG has built upon and continued to study the impacts of Region D-based water supply strategies in the Region C plan. With its 2015 IPP, the RCWPG has furnished the Board with its *Analysis and Quantification of the Impacts of the Marvin Nichols Reservoir Water Management Strategy on Agricultural and Natural Resources with the Top of Conservation Storage at 313.5 Feet above Mean Sea Level*. That report includes an in-depth analysis entitled *Timberland and Agricultural Land Impact Assessment For Selected Water Resource Options in the Sulphur River Basin*. Copies of those documents are attached hereto. Those studies demonstrate that the development of the revised Marvin Nichols project is consistent with the long-term protection of the state's water resources, agricultural resources and natural resources.

Based on the RCWPG's extensive studies and the Board's resolution of the prior conflict, no interregional conflict exists with respect to either the recommended or alternate Marvin Nichols strategies, as described below.

<u>No substantial adverse effect on Region D</u>

The RCWPG has furnished extensive data regarding the impacts of both the recommended and alternate strategy implementations of Marvin Nichols, and no conflict exists with respect to either strategy. With respect to the alternate strategy, the Board resolved the conflict by directing that Marvin Nichols be included in the 2011 RCWPG Regional Water Plan and the State Water Plan, and stated that upon that inclusion, "no outstanding interregional conflicts [existed] related to the 2011 Region C RWP." Order page 8, Conclusion of Law 6. The effects of the alternate strategy Marvin Nichols have been studied extensively, and have not changed since January of this year. Likewise, no conflict exists with respect to the draft 2016 IPP's recommended Marvin Nichols strategy. As described, Region C has furnished with its IPP its *Analysis and Quantification of the Impacts of the Marvin Nichols Reservoir Water Management Strategy on Agricultural and Natural Resources with the Top of Conservation Storage at 313.5 Feet above Mean Sea Level*, including its *Timberland and Agricultural Land Impact Assessment For Selected Water Resource Options in the Sulphur River Basin*. Those documents confirm no greater impacts to Region D under the recommended strategy than those associated with the now alternate strategy for Marvin Nichols.

In general, in determining whether the recommended or alternate Marvin Nichols strategies are in conflict with Region D's IPP, the Board should differentiate between short and long-term effects on Region D. It should also consider long-term benefits to that region based on proposed Region C water management strategies. Long-term benefits may, in fact, totally offset temporary effects on economic, agricultural, and natural resources. Disrupted agricultural activities may potentially be relocated and pursued at prior or greater levels of intensity. Short-term economic effects in one sector may be offset entirely by long-term development of other businesses and industries. The Board should determine the presence or absence of an interregional conflict based upon the reasonably foreseeable, long-term and net effects on a host region's economic, agricultural and natural resources.

<u>*Ward Timber* does not mandate a finding of interregional conflict</u>

A finding of an interregional conflict on the facts presented is not required by *Texas Water Development Board v. Ward Timber, LTD, et al.*, 411 S.W.3rd 554 (Tex. App.—Eastland 2013, no pet.) (*Ward Timber*). The analyses furnished by the RCWPG of Marvin Nichol's impacts on Region D distinguish the current conflict claim from the one previously alleged by Region D. In *Ward Timber*, the Court observed that "Region D [] examined the impacts [of Marvin Nichols]" in its Regional Water Plan, and "Region C [] decided to evaluate the impacts of the Marvin Nichols Reservoir in the future as part of its planning process." *Id*. at 573. Region C has now done so and has submitted extensive analyses on that subject as a part of its fourth-round IPP.

Unlike last planning cycle, the Board has significant data before it, presented by both Regions C and D, upon which it may determine the presence or absence of an interregional conflict. In addition, the Board may look back to its findings and conclusions reached in resolving the prior conflict for guidance as to whether Region D has alleged a valid conflict in this instance. In its order, the Board correctly observed that the development of Marvin Nichols "could act as a catalyst for economic development and growth" in Region D, and that new reservoirs [] stimulate the economy through new recreational business and local improvements." Order page 5, Finding of Fact 31. Likewise, the Board found that the RCWPG's 2011 Regional Water Plan, which included the now alternate Marvin Nichols strategy, was "consistent with the long-term protection of the state's agricultural and natural resources." Order page 8, Conclusion of Law 11. Those findings apply with even greater force to the RCWPG's fourth-round IPP recommended Marvin Nichols strategy.

Conclusion

The Board has previously reviewed and resolved a conflict outlined in the Order in favor of the 2011 Region C Water Plan Marvin Nichols strategy. As recommended in the 2015 Region C IPP, the proposed Marvin Nichols strategy does not have a substantial adverse effect on the natural and agricultural resources in Region D. The Board has sufficient information before it to find that the currently proposed Region C water management strategies in Region D do not have a substantial adverse effect, and accordingly should find no conflict between the plans.

Respectfully submitted,

Jody Puckett, Chair
Region C Water Planning Group

Attachments

cc: Linda Price, Chairman
Region D Water Planning Group
linda.price@wardtimber.com

Walt Sears, General Manager
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J. Kevin Ward, RCWPG Administrator
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Joe Reynolds
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MINUTES OF THE
TEXAS WATER DEVELOPMENT BOARD
BOARD MEETING
September 9, 2015 – 9:30 A.M.

Chairman Bech K. Bruun called to order the meeting of the Texas Water Development Board at 9:31 a.m. in Room 170 of the Stephen F. Austin Building, 1700 N. Congress Avenue, Austin, Texas. In addition to Chairman Bruun, Director Kathleen Jackson was also in attendance, and a quorum was present.

The Chairman stated that the Board would move Item #2 on today's agenda to the end of the agenda and would begin the meeting with Item #3.

The General Counsel announced the first item for consideration:

3. CONSIDER APPROVING BY RESOLUTION A REQUEST FROM THE LOWER COLORADO RIVER AUTHORITY (TRAVIS COUNTY) TO AMEND TEXAS WATER DEVELOPMENT BOARD RESOLUTION NO. 14-72 TO EXTEND THE COMMITMENT PERIOD FOR A LOAN FROM THE TEXAS WATER DEVELOPMENT FUND BY SIX (6) MONTHS, TO FINANCE PLANNING, ACQUISITION, DESIGN, AND CONSTRUCTION OF AN OFF-CHANNEL RESERVOIR. Clay Schultz, Water Supply and Infrastructure, presented this item.

   Chairman Bruun moved to adopt the proposed Resolution amending Texas Water Development Board Resolution No. 14-72, to extend the commitment period for a loan from the Texas Water Development Fund until March 31st, 2016, to finance the planning, acquisition, design, and construction of an off-channel reservoir, as recommended by the Executive Administrator.

   The motion was seconded by Director Jackson; it passed unanimously.

4. CONSIDER AFFIRMING BY RESOLUTION THE COMMITMENT TO PROVIDE FINANCIAL ASSISTANCE FROM THE CLEAN WATER STATE REVOLVING FUND TO THE GREATER TEXOMA UTILITY AUTHORITY – CITY OF WHITEWRIGHT (GRAYSON COUNTY) MADE IN TWDB RESOLUTION NO. 15-070, AND CONCURRING IN THE EXECUTIVE ADMINISTRATOR'S ENVIRONMENTAL FINDING. Kathy Calnan, Water Supply and Infrastructure, presented this item.

   Director Jackson moved to affirm the commitment to provide financial assistance from the Clean Water State Revolving Fund to the Greater Texoma Utility Authority, on behalf of the City of Whitewright, made in Texas Water Development Board Resolution No. 15-070, and concurring in the Executive Administrator's environmental findings.

   The motion was seconded by Chairman Bruun; it passed unanimously.

5. CONSIDER AUTHORIZING THE EXECUTIVE ADMINISTRATOR TO PUBLISH A REQUEST FOR QUALIFICATIONS (RFQ) IN ORDER TO SELECT A QUALIFIED

ENGINEERING FIRM TO CONDUCT ADDITIONAL DRAINAGE ANALYSES AND RELATED STUDY ACTIVITIES ASSOCIATED WITH THE LOWER RIO GRANDE VALLEY COLONIA STORMWATER DRAINAGE PLANNING STUDY. Gilbert Ward, Contracting and Purchasing, presented this item.

Chairman Bruun moved to authorize the Executive Administrator to publish a Request for Qualifications in order to select a qualified engineering firm to conduct additional drainage analyses and related study activities associated with the Lower Rio Grande Valley Colonia Stormwater Drainage Planning Study.

The motion was seconded by Director Jackson; it passed unanimously.

6. BRIEFING AND DISCUSSION REGARDING THE TIMELINE FOR SOLICITATION OF THE SECOND ROUND OF FUNDING REQUESTS (2016) FOR THE STATE WATER IMPLEMENTATION FUND FOR TEXAS FINANCIAL ASSISTANCE PROGRAM. Tom Entsminger, Water Supply & Infrastructure, presented this item.

   No action was taken on this item.

   The Chairman recognized the following legislative staff members attending the meeting today:

   Michael Bullock, Office of Representative David Simpson;
   Ryan Weisemen, Office of Senator Eltife;
   Buffy Barrett, Clerk, House Natural Resources;
   Lauren Murray, Senate Committee on Agriculture, Water & Rural Affairs;
   Shannon Harmon, Senate Committee on Agriculture, Water & Rural Affairs;
   Kathi Seay, Office of Representative David Simpson; and
   Adam Leggett, Office of Senator Hancock

   The General Counsel announced the next item and introduced the first speaker.

2. CONSIDERATION OF A POTENTIAL INTERREGIONAL CONFLICT BETWEEN INITIALLY PREPARED REGIONAL WATER PLANS FOR REGIONS C AND D FOR THE FOURTH CYCLE OF REGIONAL WATER PLANNING.

   Mr. Trobman introduced Linda Price, representing Region D, who addressed the Board. Also addressing the Board on behalf of Region D were Jim Thompson and Walt Sears.

   Mr. Trobman introduced Jody Puckett, representing Region C, who addressed the Board.

   Mr. Trobman introduced Joe Reynolds, Assistant General Counsel, who presented the Executive Administrator's final recommendation.

   Director Jackson moved that the Board:

   Find that an interregional conflict exists between the 2016 Region C and Region D

Initially Prepared Plans, as set forth in Section 16.053 of the Texas Water Code, Title 31 Texas Administrative Code Chapter 357, and the precedent set by the 11th Court of Appeals in *Texas Water Development Board vs. Ward Timber, Ltd.*;

Direct the Executive Administrator to negotiate and execute a contract with the Center for Public Policy Dispute Resolution for a mediation to begin on or before Monday, October 5, 2015, in Austin, Texas, in order to attempt to resolve the interregional conflict between the 2016 Region C and Region D Initially Prepared Plans;

Encourage the Region C and Region D regional water planning groups to actively and meaningfully engage in the mediation;

Direct the Region C and Region D regional water planning groups to designate and authorize representatives to participate in the mediation and provide the Executive Administrator with the names of their representatives by September 30, 2015;

Direct the Executive Administrator to designate staff to attend and participate in the mediation as a resource; and

Direct the mediator to provide the Board a written report on the results of the mediation upon conclusion.

If Region C and Region D reach a negotiated resolution, **Direct** the Regional Water Planning Groups to follow all required processes for adopting their respective Regional Water Plans, consistent with the agreed terms.

Otherwise, **Direct** the Executive Administrator to move forward with conducting the required public hearing and comment process, and provide a final recommendation on resolution of the conflict to the Board as expeditiously as possible.

The motion was seconded by Chairman Bruun; it passed unanimously.

7. No public comments were received.

8. The Board did not meet in Executive Session.

Chairman Bruun adjourned the meeting at 10:30 a.m.

APPROVED and ordered of record this, the 9th day of September, 2015.

TEXAS WATER DEVELOPMENT BOARD

____
Bech K. Bruun, Chairman

DATE SIGNED: ________________________

ATTEST:

____
Kevin Patteson,
Executive Administrator

Agreement Resolving the Declared Conflict
Between the Region C and Region D Initially Prepared Water Plans

On September 9, 2015, the Texas Water Development Board found that an interregional conflict existed between the 2016 Region C and Region D Initially Prepared Plans, and encouraged the regional water planning groups to engage in mediation to attempt to resolve the conflict.

On October 5, 2015, the undersigned representatives of the regions met in mediation and discussed the issues related to the current conflict in their regional water plans relating to the Marvin Nichols Reservoir.

The undersigned representatives of Region C and Region D agree to resolve the conflict that the Texas Water Development Board found between their initially prepared regional water plans as follows:

1. Region C will move the Marvin Nichols Reservoir as a designated strategy to the year 2070 in its 2016 regional water plan;
2. Region C will support Region D's efforts to obtain Texas Water Development Board funding to study alternative water supplies to Marvin Nichols Reservoir for the process of the 5th cycle of regional water planning for Regions C and D, resulting in the development of the 2021 regional water plans;
3. Region C will adopt a resolution to recommend that water suppliers in Region C not submit any water rights applications for new reservoirs that would be located in Region D through the end of the 5th cycle of regional water planning; and
4. Region D agrees that it will not challenge Marvin Nichols Reservoir as a unique reservoir site through the end of the 5th cycle of regional water planning.

The undersigned representatives further agree (1) to seek ratification of this agreement by their respective regional water planning groups, and (2) to seek inclusion of the language relating to the terms of the agreement in their region's adopted 2016 regional water plans. The representatives further agree that they will seek to have their regions work more cooperatively in the next regional water planning process.

For Region C

Jody Puckett Date: 10/8/15

Wayne Owen Date: 10-8-2015

Mike Rickman Date: 10-9-15

Kevin Ward Date: 10-8-2015

For Region D

Linda Price Date: 10-8-15

Elizabeth Fazio Date: 10/09/2015

Bret McCoy Date: 10-8-2015

Jim Thompson Date: 10/8/15

Minutes of the North East Texas Regional Water Planning Group
October 21, 2015 – 1:00 P.M.
Mount Pleasant Civic Center
1800 N. Jefferson, Mount Pleasant, Texas

The North East Texas Regional Water Planning Group (NETRWPG) – Region D met in an open meeting on Wednesday, October 21, 2015, at 1:00 P.M. The meeting was held at the Mount Pleasant Civic Center, 1800 N. Jefferson, in Mount Pleasant, Texas. Notice of the meeting was legally posted.

Chair Linda Price called the meeting to order at 1:00 and welcomed everyone. David Nabors gave the invocation. Introductions were made and a quorum was present. Nineteen members of the planning group were present in person or represented by a designated alternate.

The following voting members were present:

David Nabors
Linda Price
Robert Holt
Mike McCoy
Michael Brown
George Frost
Jo Ann Duman
Larry Calvin
Kevin Spence
Bill Kirby
Bob Staton
Cheri Stuart
Danny Evans
Dennis Hilliard
Greg Carter
Mark Williams
Robert Speight
Johnny Bradley

The following alternates were present:

Elizabeth Fazio for Darrell Grubbs

The following non-voting members were present:

Temple McKinnon, representing TWDB
Sandy Cash, representing UTRWD
Larry LeBeau, representing Texas Parks & Wildlife

The following non-voting members were absent:

Curtis Campbell
Marcia Hackett
Mike Rickman
Troy Sellers
Worth Whitehead
David Montagne
Darrell Dean

The following voting members were absent:

Brice Glidewell
Jeremy Dumond
Tim Nicholson
Darrell Grubbs
Jerry Gaskill

David Nabors made a motion to approve the minutes from the September 23, 2015 meeting. Larry Calvin seconded the motion. Motion carried, all voting aye.

Gorge Frost made a motion to appoint Douglas Conner as the successor due to voting member Drew Roberts, representing Rains County and Municipalities resignation from NETRWPG. Bob Staton seconded the motion. Motion carried unanimously. Douglas Conner was then seated as a voting member and participated in the remainder of the meeting.

Elections of Officers for Regional Water Planning Group Area-D, pursuant to Article VIII, Section 2 of the Bylaws, and appointments to committees were made. David Nabors made a motion to nominate and appoint George Frost as Vice-Chair. Robert Holt seconded the motion. Motion carried by the required majority. David Nabors made a motion to nominate and appoint Bill Kirby as the Secretary. Mike Brown seconded the motion. Motion carried by the required majority. Robert Holt made a motion to nominate and appoint JoAnn Duman as an At-Large Member of the Executive Committee. David Nabors seconded the motion. Motion carried by the required majority. David Nabors made a motion to nominate and appoint Bob Staton as an At-Large Member of the Executive Committee. Greg Carter seconded the motion. Motion carried by the required majority. George Frost made a motion to appoint David Nabors as a liaison for Region C and GMA #8. Robert Holt seconded the motion. Motion carried by the required majority. Bill Kirby made a motion to appoint Bob Staton as a liaison for Region I and Linda Price as a liaison for GMA #11. Johnny Bradley seconded the motion. Motion carried by the required majority. Walt Sears mentioned that the election of officers is for the remainder of the year. New elections will be voted on in January 2016 or at the first meeting in the next calendar year if no meeting occurs in January.

David Nabors made a motion to implement the results of the mediation of the inter-regional conflict between the Initially Prepared Plans of Region C and Region D, including revisions of language proposed for the final Round 4 regional water plan and ratification of the agreement reached in mediation. Greg Carter seconded the motion. Motion carried unanimously.

David Nabors mentioned that Region C met on September 28th. Mr. Nabors commented that Region C authorized SRBA as a wholesale water provider. Temple McKinnon reported that the TWDB made no changes to the regional boundaries and mentioned that the final adopted regional plan is due December 1st.

Tony Smith gave a brief discussion on options for Water Management Strategies for the Cities of Canton and Clarksville, Texas. Bill Kirby made a motion adopt Option A with the inclusion of language consistent with the last adopted 2011 plan for the City of Canton. Danny Evans seconded the motion. Motion carried unanimously. Public comments involving the City of Clarksville included: Wayne Dial, Sharron Nabors, Ann Rushing, and Elizabeth Fazio. Bill Kirby made a motion to adopt Option C with the inclusion of the following additional language: "At present, considerable uncertainty exists in each of the identified feasible water management strategies for the City of Clarksville. The NETRWPG supports any efforts by the City of Clarksville to further study all potential strategies to identify the best approach for the City to meeting all of its future water supply needs, and such a study should be considered consistent with the 2016 North East Texas Regional Water Plan." George Frost seconded the motion. Motion carried by the required majority.

David Nabors made a motion to approve the Financial Report by the Administrator, including approval for payment of the RPS/Espey Consultant invoices. Robert Holt seconded the motion. Motion carried, all voting aye.

By consensus, the next meeting of the regional water planning group was set for November 18, 2015.

The following people addressed the planning group in the public comment section:

Stan Hayes
Jimmy Hair

The meeting was adjourned by consensus.

____
Secretary

ADDITIONAL ATTENDEES:

Walt Sears, Jr.	NETMWD
Osiris Brantley	NETMWD
Paul Prange	ATCOG
Tony Smith	Carollo Engineering
Stan Hayes	Hayes Engineering
Marcia Davis	Daily Tribune
Pat Womack	SRBA
Madison Stewart	Rep VanDeaver
Trish Conradt	Rep VanDeaver
Amanda Maloukis	PCGCD
Leah Adams	PCGCD
Richard LeTourneau	TCA
David Hutson	Red River County
Donnie Gentry	Red River County
Jim Davis	Bi County WSC
Becky Bell	Texarkana Gazette
Shawn Stewart	City of Canton
Lou Ann Everett	City of Canton
Lonny Cluck	City of Canton
Ann Rushing	Clarksville Mayor
Wayne Dial	City of Clarksville
Robert Harris	City of Talco
Elizabeth Day	Myrtle Springs WSC
Wayne Owen	TRWD
Wendell Davis	RRCWSC
State Rep. Gary VanDeaver	
State Rep. David Simpson	
Sharron Nabors	
Barbara Calvin	
Jimmy Hair	
Mary Grant	
Lawrence Greer	
Charleen Granberry	
Nancy Clements	

Mickie Greer
JoAnn Barber
Darwin Douthit
Jennifer Jones
Nina Holt
Gary Cheatwood
Dolores Cheatwood
Robert Romig
Ben Carothers
Lanny Buck
Michael Bullock
Douglas Conner

APPENDIX C

CHAPTER 11

Implementation

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APPENDIX C
CHAPTER 11

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Region*	County*	Entity(ies)*	DB12 WMS Name*	Source(s)*	Project Type (DB12)*	Project Description	Project Type	Infrastructure Type
D	Bowie	Maud	Contract	Wright Patman Reservoir	Surface water	Renew Contract (Texarkana)	SW - New/Revised Contract	No Infrastructure
D	Bowie	Nash	n/a	None	n/a	None	None	None
D	Bowie	Redwater	Contract	Wright Patman Reservoir	Surface water	Renew Contract (Texarkana)	SW - New/Revised Contract	No Infrastructure
D	Bowie	Texarkana	n/a	None	n/a	None	None	None
D	Camp	Pittsburg	None	Carrizo-Wilcox Aquifer	Groundwater	None	GW-New Wells	Wells
D	Camp	CO-CAMP, Woodland Harbor	n/a	Carrizo-Wilcox Aquifer	n/a	New Contract (Bi County WSC)	SW - New/Revised Contract	Pipeline
D	Camp	Bi County WSC	n/a	Carrizo-Wilcox Aquifer	Groundwater	1 well	GW-New Wells	Well
D	Delta	Cooper	n/a	Big Creek Lake	n/a	New Permit	SW - New Permit	Pipeline
D	Franklin	Cypress Springs SUD	n/a	None	n/a	None	None	None
D	Gregg	Liberty City WSC	Build new wells	Carrizo-Wilcox Aquifer	Groundwater	1 well	GW-New Wells	Wells
D	Gregg	West Gregg SUD	Build new wells	Carrizo-Wilcox Aquifer	Groundwater	1 well	GW-New Wells	Wells
D	Harrison	Gill WSC	n/a	None	n/a	None	None	None
D	Harrison	Hallsville	n/a	None	n/a	None	None	None
D	Harrison	Talley WSC	Build new wells	Carrizo-Wilcox Aquifer	Groundwater	1 well	GW-New Wells	Wells
D	Harrison	Tryon Road SUD	n/a	None	n/a	None	None	None
D	Harrison	Waskom	Build new wells	Carrizo-Wilcox Aquifer	Groundwater	1 well	GW-New Wells	Wells
D	Hopkins	Cumby	n/a	None	n/a	None	None	None
D	Hopkins	North Hopkins WSC	n/a	Lake Chapman/Cooper	Surface water	New/Revised Contract (Sulphur Springs)	SW-New/Revised Contract	None

Region*	County*	Entity(ies)*	DB12 WMS Name*	Source(s)*	Project Type (DB12)*	Project Description	Project Type	Infrastructure Type
D	Hunt	Cash SUD	n/a	None	n/a	None	None	None
D	Hunt	Combined Consumers SUD	n/a	None	n/a	None	None	None
D	Hunt	Josephine	n/a	None	n/a	None	None	None
D	Hunt	Lone Oak	n/a	None	n/a	None	None	None
D	Hunt	MacBee SUD	n/a	None	n/a	None	None	None
D	Lamar	Blossom	n/a	None	n/a	None	None	None
D	Lamar	Paris	n/a	None	n/a	None	None	None
D	Lamar	Reno	n/a	None	n/a	None	None	None
D	Morris	Lone Star	n/a	None	n/a	None	None	None
D	Rains	Alba	n/a	Carrizo-Wilcox Aquifer	n/a	1 well	GW-New Wells	Wells
D	Rains	Bright Star Salem	n/a	SRA Supplies	Surface water	New/Revised Contract	SW-New/Revised Contract	None
D	Rains	Golden WSC	n/a	None	n/a	None	None	None
D	Red River	Clarksville	n/a	Blossom Aquifer	Groundwater	1 well	GW-New Wells	Wells
D	Red River	Detroit	n/a	None	n/a	None	None	None
D	Smith	Crystal Systems Inc.	Build new wells	Carrizo-Wilcox Aquifer	Groundwater	1 well	GW-New Wells	Wells
D	Smith	Lindale	n/a	None	n/a	None	None	None
D	Smith	Lindale Rural WSC	Build new wells	Carrizo-Wilcox Aquifer	Groundwater	1 well	GW-New Wells	Wells
D	Smith	Smith County MUD	n/a	None	n/a	None	None	None
D	Smith	Starrville Friendship WSC	Build new wells	Carrizo-Wilcox Aquifer	Groundwater	None	GW-New Wells	Wells
D	Titus	Mount Pleasant	n/a	None	n/a	None	None	None
D	Upshur	Big Sandy	n/a	None	n/a	None	None	None

Region*	County*	Entity(ies)*	DB12 WMS Name*	Source(s)*	Project Type (DB12)*	Project Description	Project Type	Infrastructure Type
D	Upshur	East Mountain	n/a	None	n/a	None	None	None
D	Upshur	Pritchett WSC	n/a	Carrizo-Wilcox Aquifer	Groundwater	1 well	GW-New Wells	Wells
D	Van Zandt	Bethel-Ash WSC	n/a	None	n/a	None	None	None
D	Van Zandt	Canton	Build new wells	Carrizo-Wilcox Aquifer	Groundwater	1 well	GW-New Wells	Wells
D	Van Zandt	Crooked Creek WSC	Build new wells	Carrizo-Wilcox Aquifer	Groundwater	2 wells	GW-New Wells	Wells
D	Van Zandt	Edgewood	n/a	None	n/a	None	None	None
D	Van Zandt	Little-Hope Moore WSC	Build new wells	Carrizo-Wilcox Aquifer	Groundwater	2 wells	GW-New Wells	Wells
D	Van Zandt	S. Tawakoni WSC	n/a	Lake Tawakoni	Surface water	New Contract	SW-New/Revised Contract	None
D	Wood	Hawkins	n/a	None	n/a	None	None	None
D	Wood	Mineola	Build new wells	Carrizo-Wilcox Aquifer	Groundwater	1 well	GW-New Wells	Wells
D	Wood	New Hope SUD	n/a	None	n/a	None	None	None

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RPS

HAYES ENGINEERING, INC
TEXAS REGISTERED ENGINEERING FIRM F-1465

LBG GUYTON

carollo

2016 REGION D WATER PLAN
VOLUME II: APPENDICES

RPS

HAYES ENGINEERING, INC
TEXAS REGISTERED ENGINEERING FIRM F-1465

LBG GUYTON

carollo