

July 7, 2023

Mr. Jeff Walker  
Executive Administrator  
Texas Water Development Board  
1700 N. Congress Ave.  
Austin, TX 78711-3231

Subject: Brazos G – Proposed Revision Request to Draft 2026 Non-Municipal Projections

Dear Mr. Walker:

The Draft 2026 Region G Water Plan non-municipal projections prepared by the Texas Water Development Board (TWDB) have been reviewed by the Brazos G Regional Water Planning Group (Brazos G, RWPG) and its technical consultants. Attached are the required spreadsheets, documenting the proposed modifications to these projections, as well as the supporting documentation as required under the Texas Water Code.

Upon review of the Draft 2026 non-municipal projections, the technical consultant presented recommendations for modifications to these draft projections for the consideration of the RWPG. Consideration was given to each of the non-municipal water use categories utilized for regional water planning: irrigation, livestock, manufacturing, mining, and steam-electric power generation. A summary of the rationale for the recommended revisions for each category is attached.

Upon receipt of these recommendations, and review and presentation from the consulting team to the RWPG, at its' March 8, 2023 meeting the Brazos G RWPG formally provided unanimous approval authorizing the consultants to populate and distribute to the TWDB the attached recommended demand adjustments consistent with the information provided in this meeting by the consultant, and approved for the consultant to work with the Chair to submit further revisions and make responses to revision requests by TWDB.

If any additional information is necessary, please feel free to give me a call at your convenience, and we will respond as appropriate.

Sincerely,

CAROLLO ENGINEERS, INC.

Tony L. Smith, P.E.  
Project Manager

tls

Enclosures: RegionG\_IrrMin\_Aug2022.xlsx;  
May2023\_RegionG\_IrrUpdate.xlsx  
RegionG\_Non-Municipal\_Jan2022.xlsx

cc: Mr. Wayne Wilson  
Ms. Pamela Hanneman

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## **Brazos G Supporting Analyses**

The rationale and supporting analyses for the Brazos G RWPG's recommended revisions to the Draft Non-Municipal Projections are provided by use category herein. These recommendations ascribe to the contractually required criteria for adjustment identified within the *First Amended General Guidelines for Development of the 2026 Regional Water Plans (October 2022)*, referred to hereafter as the *Exhibit C Guidelines*. The Texas Administrative Code is referred to herein as TAC, for brevity. All amounts documented herein are in acre-feet, unless otherwise noted.

### **Irrigation**

As reported within the Exhibit C Guidelines, the baseline methodology for the development of the draft irrigation water demand projections is the average of the most recent five-years (2015-2019) of water use estimates held constant between 2030 and 2080. In counties where the total groundwater availability over the planning period is projected to be less than the groundwater-portion of the baseline water demand projections, the draft irrigation water demand projections will begin to decline starting in 2040, or a later decade, commensurate with the decline in the associated groundwater availability. The Brazos G RWPG confirms receipt of the updated Draft irrigation projections provided by TWDB on May 15, 2023, and have incorporated those revised Draft amounts into the below analysis.

The second criterion for adjustment identified in the Exhibit C Guidelines for irrigation water demand projections (Section 2.2.2.5, Item 2) is, "[e]vidence that recent (10 years or less) irrigation trends are more indicative of future trends than the draft water demand projections." Water demand is further defined within TAC §357.10 (39) as the, "Volume of water required to carry out the anticipated domestic, public, and/or economic activities of a Water User Group during drought conditions."

Presented in Table 1 below is a comparative analysis of the 2015-2019 draft baseline average to an extended 10-year average over the 2010-2019 period performed by the Brazos G RWPG. These extended irrigation water use data were provided by TWDB. It is observed that for numerous counties there was increased water use in the years preceding 2015, predominantly driven by severe drought in the 2010 – 2012 period.

The Brazos G RWPG agrees that the use of an average is appropriate to capture varying trends in irrigation water use. However, to have a more conservative estimate of projected water demand for irrigation uses representative of drought conditions, the Brazos G RWPG recommends utilizing the average over the extended 10-year period (2010-2019) for the identified counties in Table 2. For these counties, use of the extended 10-year period captures higher historical usage during drought conditions. The Brazos G RWPG further supports any necessary adjustment in projections for those counties where total groundwater availability over the planning period is projected to be less than the groundwater portion of the baseline water demand projections.

No change from the draft recommended irrigation projections is recommended for those counties in the Brazos G region where use of the extended 10-year period would result in a decreased baseline amount, as the increased use in the more recent 5-year period for these counties reflects a more conservative estimation of recent trends in water demand for irrigation use.

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Table 1 – Comparison of 5- and 10-year Averages of Historical Irrigation Water Use by County (2010-2019)

County	Estimated Historical Irrigation Water Use by County (Source: TWDB)										Average		Difference between Averages	
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	(over 2015-2019)	(over 2010-2019)	Diff.	%
BELL	2,860	3,132	2,709	2,909	2,605	1,841	2,833	3,470	4,181	3,214	3,108	2,975	-133	-4%
BOSQUE	3,294	3,500	4,605	3,123	3,365	2,237	1,704	2,619	2,977	2,521	2,412	2,995	583	24%
BRAZOS	35,541	42,402	37,315	46,980	33,978	18,294	32,912	36,870	41,835	32,057	32,394	35,818	3,424	11%
BURLESON	27,099	29,595	30,819	27,393	19,116	12,662	15,902	21,464	22,433	14,700	17,432	22,118	4,686	27%
CALLAHAN	649	1,400	769	540	545	282	223	244	261	308	264	522	258	98%
COMANCHE	25,201	36,030	38,603	31,443	29,309	21,186	23,473	27,626	29,400	29,684	26,274	29,196	2,922	11%
CORYELL	415	145	516	259	215	361	218	364	367	403	343	326	-17	-5%
EASTLAND	4,556	5,770	4,699	4,886	5,244	3,261	3,162	3,728	4,444	4,180	3,755	4,393	638	17%
ERATH	5,438	8,038	7,463	6,792	7,401	6,138	6,390	7,132	7,550	7,504	6,943	6,985	42	1%
FALLS	6,847	6,962	6,948	9,018	7,465	5,792	5,458	7,073	8,585	7,810	6,944	7,196	252	4%
FISHER	4,393	5,462	5,290	3,704	4,552	3,571	2,965	3,543	4,722	4,685	3,897	4,289	392	10%
GRIMES	275	1,134	709	675	546	345	376	399	1,971	443	707	687	-20	-3%
HAMILTON	661	433	848	590	936	394	909	1,288	1,905	1,246	1,148	921	-227	-20%
HASKELL	35,958	83,904	62,485	45,859	62,988	39,275	40,872	45,057	39,051	42,101	41,271	49,755	8,484	21%
HILL	750	1,835	2,391	1,651	2,124	1,464	946	1,053	825	704	998	1,374	376	38%
HOOD	8,175	11,313	8,995	8,102	8,661	7,199	6,291	7,599	6,275	5,386	6,550	7,800	1,250	19%
JOHNSON	399	318	914	663	534	525	552	612	593	305	517	542	25	5%
JONES	1,426	3,674	3,873	2,588	2,585	2,524	2,464	2,261	3,207	2,415	2,574	2,702	128	5%
KENT	900	926	1,728	966	884	630	758	756	865	861	774	927	153	20%
KNOX	29,146	66,335	50,316	29,553	44,560	28,967	28,460	34,970	28,631	29,368	30,079	37,031	6,952	23%
LAMPASAS	550	531	408	689	510	384	660	195	734	544	503	521	18	4%
LEE	1,575	1,609	1,017	837	804	519	519	692	674	1,142	709	939	230	32%
LIMESTONE	0	18	0	0	11	7	0	0	9	23	8	7	-1	-13%
MCLENNAN	4,121	6,753	5,184	3,659	5,095	4,901	4,287	5,034	8,212	3,176	5,122	5,042	-80	-2%

County	Estimated Historical Irrigation Water Use by County (Source: TWDB)										Average		Difference between Averages	
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	(over 2015-2019)	(over 2010-2019)	Diff.	%
MILAM	3,494	6,623	9,290	6,700	6,405	5,265	4,414	5,516	5,368	5,045	5,122	5,812	690	13%
NOLAN	8,122	12,243	12,551	12,492	12,412	11,043	12,238	14,076	14,120	13,263	12,948	12,256	-692	-5%
PALO PINTO	5,300	3,965	2,435	2,363	991	1,150	1,138	2,605	948	780	1,324	2,168	844	64%
ROBERTSON	79,613	97,850	64,074	88,426	65,948	46,157	63,816	76,248	89,733	60,852	67,361	73,272	5,911	9%
SHACKELFORD	75	398	350	213	212	152	145	117	117	163	139	194	55	40%
SOMERVELL	225	679	526	388	234	115	420	450	170	140	259	335	76	29%
STEPHENS	133	187	169	120	151	135	103	156	162	209	153	153	0	0%
STONEWALL	100	140	110	85	93	71	89	89	89	79	83	95	12	14%
TAYLOR	762	2,245	1,608	1,935	1,626	1,562	1,533	875	1,065	1,046	1,216	1,426	210	17%
THROCKMORTON	0	0	350	50	70	45	40	50	50	50	47	71	24	51%
WASHINGTON	300	509	287	250	200	167	200	200	200	200	193	251	58	30%
WILLIAMSON	401	376	390	278	221	263	521	563	285	364	399	366	-33	-8%
YOUNG	0	37	658	648	628	617	644	654	657	669	648	521	-127	-20%



Table 2 – Recommended Revisions to Projected Draft Irrigation Water Demands for Counties in the Brazos G Region (2030-2080)

County	RWPG Revision Requests						Comment
	2030	2040	2050	2060	2070	2080	
BELL							No revision recommended.
BOSQUE	2,995	2,995	2,995	2,995	2,995	2,995	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.
BRAZOS	35,818	35,818	35,818	35,818	35,818	35,818	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.
BURLESON	22,118	22,118	22,118	22,118	22,118	22,118	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.
CALLAHAN	522	522	522	522	522	522	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.
EASTLAND	4,393	4,393	4,393	4,393	4,393	4,393	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.
ERATH	6,985	6,985	6,985	6,985	6,985	6,985	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.
FISHER	4,289	4,289	4,289	4,289	4,289	4,289	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.
HASKELL	49,755	49,755	49,755	49,755	49,755	49,755	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.
HILL	1,374	1,374	1,374	1,374	1,374	1,374	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.
HOOD	7,800	7,800	7,800	7,800	7,800	7,800	Recommended as a more conservative estimate based

County	RWPG Revision Requests						Comment
	2030	2040	2050	2060	2070	2080	
							on greater average use over 2010-2019 period.
JOHNSON	542	542	542	542	542	542	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.
JONES	2,702	2,702	2,702	2,702	2,702	2,702	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.
KENT	927	927	927	927	927	927	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.
KNOX	37,031	37,031	37,031	37,031	37,031	37,031	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.
LAMPASAS	521	521	521	521	521	521	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.
LEE	939	939	939	939	939	939	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.
MILAM	5,812	5,812	5,812	5,812	5,812	5,812	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.
PALO PINTO	2,168	2,168	2,168	2,168	2,168	2,168	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.
ROBERTSON	73,272	73,272	73,272	73,272	73,272	73,272	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.
SHACKELFORD	194	194	194	194	194	194	Recommended as a more conservative estimate based



County	RWPG Revision Requests						Comment
	2030	2040	2050	2060	2070	2080	
							on greater average use over 2010-2019 period.
SOMERVELL	335	335	335	335	335	335	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.
STONEWALL	95	95	95	95	95	95	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.
TAYLOR	1,426	1,426	1,426	1,426	1,426	1,426	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.
THROCKMORTON	71	71	71	71	71	71	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.
WASHINGTON	251	251	251	251	251	251	Recommended as a more conservative estimate based on greater average use over 2010-2019 period.

## Livestock

For projections of water demand for livestock, annual estimates of livestock form the primary source of data. County-level annual inventory estimates are calculated for various livestock categories: cattle, equine, goats, hogs, sheep, and poultry – broiler chickens, non-broiler chickens, and turkeys. Estimations for each livestock category begin with the most recent census or survey from the U.S. Department of Agriculture (USDA) - National Agriculture Statistics Service (NASS). The agricultural census is conducted once every five years. Between these years, surveys are conducted by the USDA to update the annual inventory estimates. These annual inventory estimates are multiplied by species-specific water use per head values, then summed with surveyed water use for non-standard livestock production such as fish hatcheries.

A baseline water use was developed by TWDB using the average of five years of TWDB annual region-county-level estimates over the 2015 – 2019 period. Trend factors for projecting demands through the planning horizon are based on the percent changes from the most recently approved 2021 regional water plan, whereby draft year 2080 projections are held constant from the year 2070 projections. The fourth data requirement for adjustment identified in the Exhibit C Guidelines for livestock water demand projections (Section 2.2.2.6, Item 4) is, “[o]ther data and evidence that the RWPG considers reasonable and adequate to justify an adjustment to the livestock water demand projections.” The Brazos G RWPG again considered planning for water demands during drought conditions as specified in TAC §357.10 (39).

The Brazos G RWPG has reviewed the methodology for the development of revised statewide water use coefficients for the various categories of livestock, and recommends that efficiencies in water use for dairy cattle at facilities - such as those found in Regions A and O as cited in TWDB’s documentation - may not be applicable for use in the Brazos G region. The Brazos G RWPG recommends continued use of the 75 gal/head/day water use coefficient (as used in the 2021 Plan) for estimates of water use for dairy cattle production for counties within the Brazos G region, as a more conservative representation of facilities located within the region. Utilizing this revised water use coefficient for dairy cattle, the Brazos G RWPG performed a comparative analysis of the draft baseline water use (for all categories) to an extended 10-year average over the 2010-2019 period. The livestock inventory data over this extended period were provided by TWDB. It is observed that for numerous counties there was increased water use in the years preceding 2015, predominantly coincident with drought conditions for numerous counties observed in the 2010 – 2011 period.

The Brazos G RWPG agrees that the use of an average is appropriate to capture varying trends in livestock water use. However, to have a more conservative estimate of projected water demand for livestock uses representative of drought conditions, the Brazos G RWPG recommends utilizing the average over the extended 10-year period (2010-2019) for the identified counties in Table 4. For these counties, use of the extended 10-year period (along with the recommended revised water use coefficient for dairy cattle) as the baseline captures higher estimated uses for inventories during drought conditions. The Brazos G RWPG further recommends that adjustments for surveyed livestock facilities (e.g., Possum Kingdom Fish Hatchery in Palo Pinto County as shown in Table 5) should be averaged over the same 10-year (2010-2019) period, then applied per TWDB’s methodology. Note that the proposed revised amount for Palo Pinto County shown in Table 4 already includes this recommended adjustment.

No change from the draft recommended livestock projections is recommended for those counties in the Brazos G region where use of the extended 10-year period would result in a decreased baseline amount, as the increased use in the more recent 5-year period for these counties reflects a more conservative estimation of recent trends in water demand for livestock use.

Table 3 – Comparison of 5- and 10-year Averages of Estimated Historical Livestock Water Use by County (2010-2019)

County	Estimated Historical Water Use for Livestock (using revised water use coefficient for dairy cattle of 75 gal/head/day)										Draft Baseline	Surveyed	Revised Dairy Coeff	Revised Baseline	Difference	
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019					10-yr Average (2010-2019)	10-yr Average (2010-2019)
BELL	1,615	1,647	817	796	849	878	918	736	756	757	790		977	977	187	24%
BOSQUE	1,363	1,398	736	694	739	743	763	956	985	986	887		936	936	49	6%
BRAZOS	1,043	1,046	838	907	934	960	969	1,156	1,204	1,204	1,098		1,026	No Revision Recommended	N/A	N/A
BURLESON	1,940	1,988	1,128	1,034	1,084	1,127	1,151	1,025	1,057	1,060	1,072		1,259	1,259	187	17%
CALLAHAN	1,116	1,182	779	699	728	724	735	867	889	890	821		861	861	40	5%
COMANCHE	3,350	3,390	3,321	3,001	3,150	3,148	3,229	3,832	3,901	4,035	3,051		3,436	3,436	385	13%
CORYELL	1,166	1,182	1,001	1,141	1,149	1,167	1,189	1,007	1,044	1,044	1,090		1,109	1,109	19	2%
EASTLAND	1,505	1,577	976	743	779	787	810	795	822	822	806		962	962	156	19%
ERATH	6,059	6,189	5,979	5,286	5,028	4,960	5,163	6,844	7,063	7,264	5,135		5,984	5,984	849	17%
FALLS	2,162	2,304	1,612	1,531	1,601	1,643	1,657	2,025	2,100	2,102	1,904		1,874	No Revision Recommended	N/A	N/A
FISHER	819	875	570	358	426	362	374	341	358	358	359		484	484	125	35%
GRIMES	2,171	2,245	1,263	1,241	1,357	1,442	1,493	1,067	1,095	1,097	1,193		1,447	1,447	254	21%
HAMILTON	1,412	1,493	1,416	1,377	1,322	1,314	1,351	1,744	1,790	1,829	1,432		1,505	1,505	73	5%
HASKELL	572	617	431	292	296	304	308	459	481	481	406		424	424	18	4%
HILL	1,796	1,837	925	1,038	1,102	1,089	1,115	1,257	1,297	1,305	1,179		1,276	1,276	97	8%
HOOD	531	542	440	472	591	499	499	423	432	432	459		486	486	27	6%
JOHNSON	1,416	1,443	1,301	1,447	1,656	1,621	1,657	1,412	1,454	1,468	1,439		1,488	1,488	49	3%
JONES	622	660	579	477	557	499	510	405	421	420	451		515	515	64	14%
KENT	292	290	263	246	227	233	235	292	307	307	276		269	No Revision Recommended	N/A	N/A
KNOX	457	498	379	602	609	621	636	459	475	475	534		521	No Revision Recommended	N/A	N/A

County	Estimated Historical Water Use for Livestock (using revised water use coefficient for dairy cattle of 75 gal/head/day)										Draft Baseline	Surveyed	Revised Dairy Coeff	Revised Baseline	Difference	
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019					10-yr Average (2010-2019)	10-yr Average (2010-2019)
LAMPASAS	857	878	507	464	470	482	502	553	570	570	525		585	585	60	11%
LEE	1,406	1,394	1,181	1,014	1,047	1,073	1,085	1,319	1,368	1,368	1,242		1,226	No Revision Recommended	N/A	N/A
LIMESTONE	1,519	1,516	1,272	1,451	1,560	1,624	1,680	1,414	1,453	1,457	1,494		1,495	1,495	1	0%
MCLENNAN	1,618	1,644	1,433	1,527	1,518	1,481	1,523	1,803	1,854	1,865	1,642		1,627	No Revision Recommended	N/A	N/A
MILAM	1,736	1,749	1,495	1,254	1,291	1,326	1,340	1,615	1,667	1,671	1,524		1,514	No Revision Recommended	N/A	N/A
NOLAN	336	342	303	250	249	254	256	246	256	256	254		275	275	21	8%
PALO PINTO	865	878	726	786	815	826	840	774	805	804	1,735	1,018	1,830	1,830	95	5%
ROBERTSON	2,587	2,685	1,757	1,661	1,686	1,725	1,768	2,114	2,177	2,196	1,970		2,036	2,036	66	3%
SHACKELFORD	663	679	592	477	485	497	504	506	527	527	513		546	546	33	6%
SOMERVELL	181	184	137	145	180	132	134	136	140	139	137		151	151	14	10%
STEPHENS	589	611	382	370	361	371	375	401	414	414	396		429	429	33	8%
STONEWALL	356	365	321	316	309	315	319	418	429	429	383		358	No Revision Recommended	N/A	N/A
TAYLOR	962	1,027	858	616	620	638	644	728	758	758	705		761	761	56	8%
THROCKMORTON	537	551	494	443	443	455	459	704	725	725	614		554	No Revision Recommended	N/A	N/A
WASHINGTON	1,477	1,460	1,221	1,201	1,282	1,319	1,356	1,684	1,764	1,785	1,544		1,455	No Revision Recommended	N/A	N/A
WILLIAMSON	2,163	2,213	1,208	1,320	1,394	1,353	1,378	1,394	1,447	1,447	1,405		1,532	1,532	127	9%
YOUNG	656	672	593	456	554	520	525	619	640	641	588		588	No Revision Recommended	N/A	N/A

Table 4 – Recommended Revisions to Projected Draft Livestock Water Demands for Counties in the Brazos G Region (2030-2080)

Region	County	RWPG Revised						Comment
		2030	2040	2050	2060	2070	2080	
G	BELL	977	977	977	977	977	977	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	BOSQUE	936	936	936	936	936	936	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	BRAZOS							No revision recommended.
G	BURLESON	1,259	1,259	1,259	1,259	1,259	1,259	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	CALLAHAN	861	861	861	861	861	861	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	COMANCHE	3,436	3,436	3,436	3,436	3,436	3,436	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	CORYELL	1,109	1,109	1,109	1,109	1,109	1,109	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	EASTLAND	962	962	962	962	962	962	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	ERATH	5,984	5,984	5,984	5,984	5,984	5,984	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	FALLS							No revision recommended.
G	FISHER	484	484	484	484	484	484	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.

Region	County	RWPG Revised						Comment
		2030	2040	2050	2060	2070	2080	
G	GRIMES	1,447	1,447	1,447	1,447	1,447	1,447	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	HAMILTON	1,505	1,505	1,505	1,505	1,505	1,505	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	HASKELL	424	424	424	424	424	424	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	HILL	1,276	1,276	1,276	1,276	1,276	1,276	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	HOOD	486	486	486	486	486	486	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	JOHNSON	1,488	1,488	1,488	1,488	1,488	1,488	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	JONES	515	515	515	515	515	515	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	KENT							No revision recommended.
G	KNOX							No revision recommended.
G	LAMPASAS	585	585	585	585	585	585	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	LEE							No revision recommended.

Region	County	RWPG Revised						Comment
		2030	2040	2050	2060	2070	2080	
G	LIMESTONE	1,495	1,495	1,495	1,495	1,495	1,495	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	MCLENNAN							No revision recommended.
G	MILAM							No revision recommended.
G	NOLAN	275	275	275	275	275	275	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	PALO PINTO	1,830	1,830	1,830	1,830	1,830	1,830	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	ROBERTSON	2,036	2,036	2,036	2,036	2,036	2,036	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	SHACKELFORD	546	546	546	546	546	546	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	SOMERVELL	151	151	151	151	151	151	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	STEPHENS	429	429	429	429	429	429	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	STONEWALL							No revision recommended.

Region	County	RWPG Revised						Comment
		2030	2040	2050	2060	2070	2080	
G	TAYLOR	761	761	761	761	761	761	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	THROCKMORTON							No revision recommended.
G	WASHINGTON							No revision recommended.
G	WILLIAMSON	1,532	1,532	1,532	1,532	1,532	1,532	Recommended as a more conservative estimate based on increased dairy cattle water use coefficient to 75 gal/head/day and increased average use over 2010-2019 period.
G	YOUNG							No revision recommended.

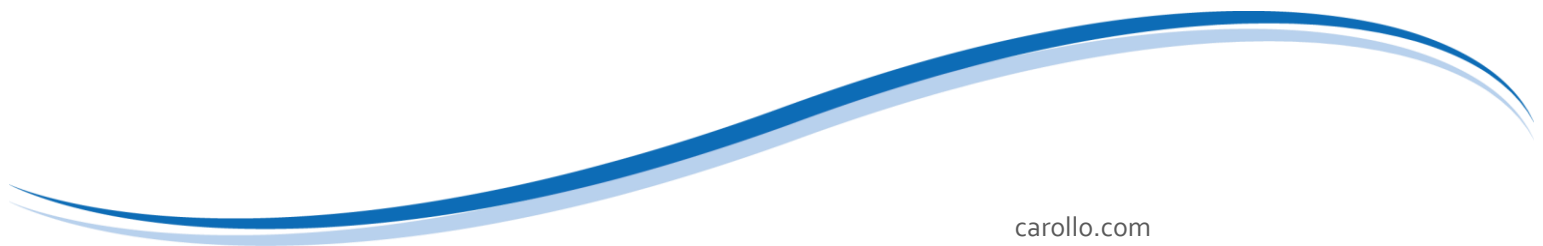




Table 5 – Comparison of Draft and Revised Adjustment based on 2010-2019 Historical Water Use Estimates (in acre-feet) | Livestock by Facility (Water Use Survey)

systemName	County	NAICS	NAICS Definition	Total Net Use (ac-ft)										DRAFT Adj. 5-yr Avg	REVISED Adj. 10yr Avg
				2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
POSSUM KINGDOM FISH HATCHERY	PALO PINTO	112511	Finfish Farming and Fish Hatcheries	1,140	1,043	1,146	1,113	1,113	964	1,010	732	876	1,042	925	1,018

## Manufacturing

Per the Exhibit C Guidelines, manufacturing water use is defined as water used to produce manufactured goods. Generally, the methodology employed in the development of the draft projections of water demand for manufacturing is to base future demands on historical water use trends and plans for closure, expansion, and/or new construction of manufacturing facilities. This begins with the development of a baseline for each county. This baseline is calculated as the highest county-aggregated manufacturing water use in the most recent five years (2015-2019), plus unaccounted water use. The source of the use data is the reported water use submitted by manufacturing facilities to the TWDB annually through the Water Use Survey (WUS). The unaccounted water use is determined using a combination of information from the U.S. Census Bureau's County Business Patterns (CBP) dataset and the TWDB's WUS data.

Once the baseline volume is established for each county, the draft projection for 2030 is estimated using a statewide production growth proxy representing consistent incremental change to ensure the accommodation of potential near-term economic and manufacturing sector production growth. For the draft projections, this statewide growth rate was determined by TWDB to be 0.96%. Since the first projected decade (2030) is more than ten years from the baseline water use data, the statewide annual historical water use rate of change from 2010-2019 was selected as the proxy to adjust the baseline value to the projected 2030 value.

For each planning decade after 2030 (i.e., 2040-2080), a statewide manufacturing growth proxy was applied annually to project increases in manufacturing water demands. This growth proxy was based on the CBP historical number of establishments in the manufacturing sector from 2010-2019. For the draft projections, this statewide growth rate was determined by TWDB to be 0.37%.

The seventh data requirement for adjustment identified in the Exhibit C Guidelines for manufacturing water demand projections (Section 2.2.2.2, Item 7) is, "[o]ther data and evidence that the RWPG considers reasonable and adequate to justify an adjustment to the manufacturing water demand projections." The Brazos G RWPG again considered planning for water demands during drought conditions as specified in TAC §357.10 (39).

The Brazos G RWPG performed a comparative analysis (presented in Table 6 below) based on the historical manufacturing water use over the 2010-2019 period, using the manufacturing use data provided by TWDB. As noted above, the baseline for the draft projections of manufacturing water use in each county were based on the maximum over the 5-year, 2015-2019 period. This analysis identifies and compares maximum manufacturing water uses by county over the longer 10-year, 2010-2019 period. Noting the importance of capturing more recent trends (particularly when the baseline will be extended another ten years to 2030), attention has been given to downward trends in these use data, such that those instances with significantly declining (or no) manufacturing use are excluded from the Brazos G RWPG's consideration of modifying the baseline value for each county. The green highlights in Table 6 below identify which counties are recommended by the Brazos G RWPG to use a revised baseline water demand based on the maximum over the 10-year period. These revised baselines function as a more conservative representation of manufacturing water demands during drought conditions, such as those experienced by numerous counties within the Brazos G region during the 2010-2012 period.

Mr. Jeff Walker  
Executive Administrator  
TWDB  
July 7, 2023

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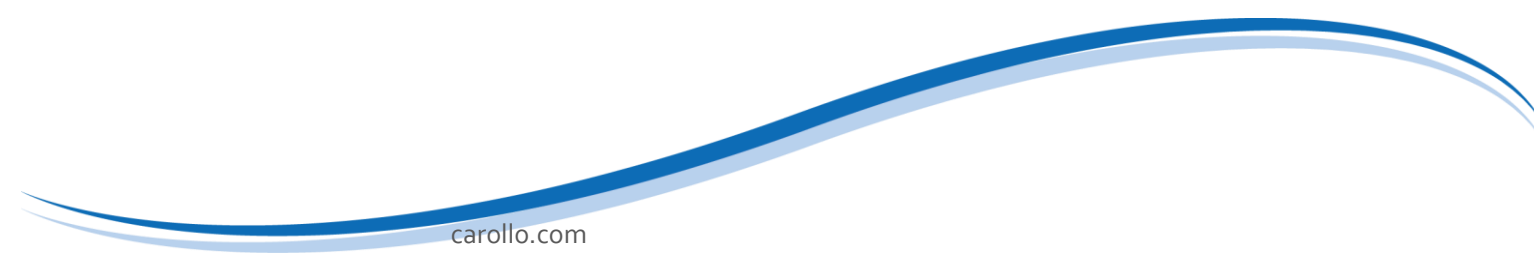
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Table 6 – Comparative Analysis of Historical Manufacturing Water Use by County in Brazos G Region utilizing 5- and 10-year Maximums (2010-2019)

County	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5-Yr Max	Year (5-yr Max)	10-Yr Max	Year (10-yr Max)	Un-accted Water Use	Draft Baseline Water Demand (5-yr)	Revised Baseline Water Demand (10-yr)	Diff.	% Diff.	Comment
BELL	523	559	600	610	640	771	618	615	576	571	771	2015	771	2015	46	817	817	0	0%	No change to baseline.
BOSQUE	1	1	2	2	3	3	3	3	3	4	4	2019	4	2019	0	4	4	0	0%	No change to baseline.
BRAZOS	1,668	1,770	1,422	1,300	1,158	1,311	1,368	1,418	1,426	1,485	1,485	2019	1,770	2011	39	1,524	1,809	285	19%	Revision to baseline recommended.
BURLESON	118	111	111	111	111	111	111	35	21	8	111	2015	118	2010	0	111	118	7	6%	Revision to baseline recommended.
CALLAHAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	No change to baseline.
COMANCHE	11	17	12	14	17	13	12	10	10	12	13	2015	17	2011	0	13	17	4	31%	Revision to baseline recommended.
CORYELL	3	4	4	2	2	2	2	2	4	3	4	2018	4	2018	0	4	4	0	0%	No change to baseline.
EASTLAND	40	40	38	42	48	46	36	38	44	51	51	2019	51	2019	0	51	51	0	0%	No change to baseline.
ERATH	60	69	75	56	53	49	60	63	66	64	66	2018	75	2012	1	67	76	9	13%	Revision to baseline recommended.
FALLS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	No change to baseline.
FISHER	105	128	149	157	154	133	157	166	149	134	166	2017	166	2017	0	166	166	0	0%	No change to baseline.
GRIMES	216	325	328	301	295	237	156	230	261	247	261	2018	328	2012	9	270	337	67	25%	Revision to baseline recommended.
HAMILTON	7	8	7	6	6	9	9	13	17	17	17	2018	17	2018	0	17	17	0	0%	No change to baseline.
HASKELL	0	0	0	0	0	0	2	2	2	2	2	2016	2	2016	0	2	2	0	0%	No change to baseline.
HILL	1	1	0	0	0	0	0	0	0	0	0	0	1	2010	6	6	7	1	17%	No use last 5 years, no change to baseline
HOOD	6	13	14	12	14	12	10	13	11	10	13	2017	14	2012	2	15	16	1	7%	Revision to baseline recommended.
JOHNSON	1,526	1,576	1,344	1,397	1,484	1,502	1,746	1,916	1,972	1,799	1,972	2018	1,972	2018	92	2,064	2,064	0	0%	No change to baseline.
JONES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	No change to baseline.
KENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	No change to baseline.
KNOX	0	0	1	4	0	0	0	0	0	0	0	0	4	2013	0	0	4	4	100%	No use last 5 years, no change to baseline.
LAMPASAS	159	58	181	198	155	149	163	172	163	180	180	2019	198	2013	0	180	198	18	10%	Revision to baseline recommended.
LEE	6	7	7	6	6	7	6	8	7	9	9	2019	9	2019	0	9	9	0	0%	No change to baseline.
LIMESTONE	30	214	41	39	27	28	23	23	25	23	28	2015	214	2011	0	28	214	186	664%	Revision to baseline recommended.
MCCLENNAN	2,208	3,979	3,698	4,792	3,256	3,284	3,830	4,062	3,918	4,100	4,100	2019	4,792	2013	68	4,168	4,860	692	17%	Revision to baseline recommended.
MILAM	12	12	12	0	0	0	0	0	0	0	0	0	12	2010	0	0	12	12	100%	No use last 5 years, no change to baseline.
NOLAN	448	388	395	398	375	352	455	439	418	427	455	2016	455	2016	1	456	456	0	0%	No change to baseline.
PALO PINTO	24	24	14	9	11	13	4	3	3	3	13	2015	24	2010	0	13	24	11	85%	Revision to baseline recommended.
ROBERTSON	51	43	39	43	45	40	35	35	37	39	40	2015	51	2010	0	40	51	11	28%	Revision to baseline recommended.
SHACKELFORD	9	13	10	9	0	0	0	0	0	0	0	0	13	2011	0	0	13	13	100%	No use last 5 years, no change to baseline.
SOMERVELL	2	2	1	2	3	4	3	3	4	4	4	2015	4	2015	0	4	4	0	0%	No change to baseline.
STEPHENS	7	5	7	6	5	4	2	7	5	5	7	2017	7	2017	0	7	7	0	0%	No change to baseline.
STONEWALL	0	0	5	0	14	0	0	0	0	0	0	0	14	2014	0	0	14	14	100%	No use last 5 years, no change to baseline.
TAYLOR	584	286	411	485	429	498	519	492	462	507	519	2016	584	2010	25	544	609	65	12%	Revision to baseline recommended.
THROCK-MORTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	No change to baseline.
WASHINGTON	513	583	553	483	566	438	246	281	235	253	438	2015	583	2011	6	444	589	145	33%	Revision to baseline recommended.

County	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	5-Yr Max	Year (5-yr Max)	10-Yr Max	Year (10-yr Max)	Un-accted Water Use	Draft Baseline Water Demand (5-yr)	Revised Baseline Water Demand (10-yr)	Diff.	% Diff.	Comment
WILLIAMSON	781	793	706	657	221	275	340	752	745	716	752	2017	793	2011	30	782	823	41	5%	Revision to baseline recommended.
YOUNG	25	26	36	10	9	18	31	50	64	83	83	2019	83	2019	0	83	83	0	0%	No change to baseline.

Note: For calculation of maximum year, WUS data for the entire county was considered per TWDB manufacturing methodology. This affects Williamson and Young Counties. Williamson County is located in Regions G and K, and Young County is located in Regions G and B.



The Brazos G RWPG performed an additional analysis investigating the use of a region-specific production growth proxy (rather than statewide). The historical manufacturing water use estimates provided by TWDB were utilized to calculate a new, region-specific growth rate (presented in Table 7).

Table 7 – Historical Manufacturing Water Use Estimates by County in Brazos G Region (2010-2019)

County	Historical Water Use Estimates (Source: TWDB)   Manufacturing by Region-County									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
BELL	523	559	600	610	640	771	618	615	576	571
BOSQUE	1	1	2	2	3	3	3	3	3	4
BRAZOS	1,668	1,770	1,422	1,300	1,158	1,311	1,368	1,418	1,426	1,485
BURLESON	118	111	111	111	111	111	111	35	21	8
CALLAHAN	0	0	0	0	0	0	0	0	0	0
COMANCHE	11	17	12	14	17	13	12	10	10	12
CORYELL	3	4	4	2	2	2	2	2	4	3
EASTLAND	40	40	38	42	48	46	36	38	44	51
ERATH	60	69	75	56	53	49	60	63	66	64
FALLS	0	0	0	0	0	0	0	0	0	0
FISHER	105	128	149	157	154	133	157	166	149	134
GRIMES	216	325	328	301	295	237	156	230	261	247
HAMILTON	7	8	7	6	6	9	9	13	17	17
HASKELL	0	0	0	0	0	0	2	2	2	2
HILL	1	1	0	0	0	0	0	0	0	0
HOOD	6	13	14	12	14	12	10	13	11	10
JOHNSON	1,526	1,576	1,344	1,397	1,484	1,502	1,746	1,916	1,972	1,799
JONES	0	0	0	0	0	0	0	0	0	0
KENT	0	0	0	0	0	0	0	0	0	0
KNOX	0	0	1	4	0	0	0	0	0	0
LAMPASAS	159	58	181	198	155	149	163	172	163	180
LEE	6	7	7	6	6	7	6	8	7	9
LIMESTONE	30	214	41	39	27	28	23	23	25	23
MCLENNAN	2,208	3,979	3,698	4,792	3,256	3,284	3,830	4,062	3,918	4,100
MILAM	12	12	12	0	0	0	0	0	0	0
NOLAN	448	388	395	398	375	352	455	439	418	427
PALO PINTO	24	24	14	9	11	13	4	3	3	3
ROBERTSON	51	43	39	43	45	40	35	35	37	39
SHACKELFORD	9	13	10	9	0	0	0	0	0	0
SOMERVELL	2	2	1	2	3	4	3	3	4	4
STEPHENS	7	5	7	6	5	4	2	7	5	5
STONEWALL	0	0	5	0	14	0	0	0	0	0
TAYLOR	584	286	411	485	429	498	519	492	462	507
THROCK-MORTON	0	0	0	0	0	0	0	0	0	0

County	Historical Water Use Estimates (Source: TWDB)   Manufacturing by Region-County									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
WASHINGTON	513	583	553	483	566	438	246	281	235	253
WILLIAMSON	773	790	702	653	202	265	328	739	732	708
YOUNG	25	26	36	10	9	18	31	50	64	83
<b>TOTAL</b>	<b>9,136</b>	<b>11,052</b>	<b>10,219</b>	<b>11,147</b>	<b>9,088</b>	<b>9,299</b>	<b>9,935</b>	<b>10,838</b>	<b>10,635</b>	<b>10,748</b>

The formula for calculating the compounded growth rate is:

$$Rate = \left[ \frac{Amount_2}{Amount_1} \right]^{\frac{1}{Year_2 - Year_1}} - 1$$

Utilizing this formula and the 2010 and 2019 totals for counties in Brazos G, the region-specific growth rate was determined to be 1.82%. The Brazos G RWPG recommends use of this region-specific growth rate to reflect manufacturing trends more accurately in counties within the Brazos G region.

While surveying municipal user groups within the region, the Brazos G RWPG received a notification from Ms. Heather Lindner, P.E. with HDR, who has assisted the City of Taylor with preparing its responses to the Brazos G survey. Mr. Jim Gray, Public Works Director for the City of Taylor, along with Mr. Jacob Walker and Mr. Cory Shockley (HDR), were copied on this response. Within this survey response, it was noted that the City of Taylor has a contract with Samsung Austin Semiconductor, LLC. The contracted potable water supply amount varies, but is anticipated to remain constant at 0.87 MGD (975 ac-ft/year) after 2026. The City anticipates additional future industrial wholesale customers, that when combined with Samsung, would total 1.5 MGD (1,680 ac-ft/year). The City of Taylor is located within Williamson County, and this amount will be included within the Brazos G RWPG’s request for revisions to municipal demand projections.

Presented in Table 8 are the recommended revisions to the projections for manufacturing water demand in the Brazos G region. These revisions reflect use of the recommended region-specific growth rate of 1.82% (identified in blue) for the estimation of 2030 projections, and for specific counties (identified in green) revised baseline amounts based on the identified maximums over the 10-year, 2010-2019 period.

No revision is recommended for modification of the statewide manufacturing growth proxy (0.37%) utilized to project increases in manufacturing water demands over the 2040-2080 period. The revised manufacturing water use projections presented in Table 8 utilize this rate per TWDB’s methodology.

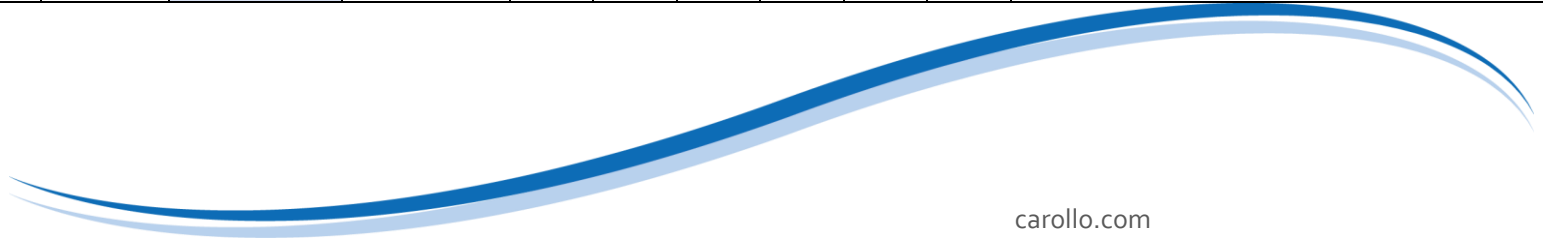
For Williamson County, 1,680 ac-ft/year (~1.5 MGD) of demand has thus been added – in addition to the previous revisions for the 2030 decade - to reflect the near-term growth in manufacturing demand identified by the City in its survey response.

Table 8 – Recommended Revisions to Projected Draft Manufacturing Water Demands for Counties in the Brazos G Region (2030-2080)

County	Baseline Water Demand (Revised in Green)	Revised Brazos G WUS Average Annual Rate of Change (production growth proxy delta)	CBP Historical Average Annual Rate of Change (economic proxy delta)	Recommended Revised Projection						Comment
				2030	2040	2050	2060	2070	2080	
BELL	817	1.82%	0.37%	966	1,002	1,039	1,078	1,118	1,160	Revision based on revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%.
BOSQUE	4	1.82%	0.37%	5	5	5	5	5	5	Revision based on revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%.
BRAZOS	1,809	1.82%	0.37%	2,139	2,219	2,302	2,388	2,477	2,569	Revision based on combination of revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%, and revised baseline.
BURLESON	118	1.82%	0.37%	139	144	149	155	161	167	Revision based on combination of revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%, and revised baseline.
CALLAHAN	0	1.82%	0.37%							No revision.
COMANCHE	17	1.82%	0.37%	20	21	22	23	24	25	Revision based on combination of revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%, and revised baseline.
CORYELL	4	1.82%	0.37%	5	5	5	5	5	5	Revision based on revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%.



County	Baseline Water Demand (Revised in Green)	Revised Brazos G WUS Average Annual Rate of Change (production growth proxy delta)	CBP Historical Average Annual Rate of Change (economic proxy delta)	Recommended Revised Projection						Comment
				2030	2040	2050	2060	2070	2080	
EASTLAND	51	1.82%	0.37%	60	62	64	66	68	71	Revision based on revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%.
ERATH	76	1.82%	0.37%	90	93	96	100	104	108	Revision based on combination of revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%, and revised baseline.
FALLS	0	1.82%	0.37%							No revision.
FISHER	166	1.82%	0.37%	196	203	211	219	227	235	Revision based on revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%.
GRIMES	337	1.82%	0.37%	398	413	428	444	461	478	Revision based on combination of revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%, and revised baseline.
HAMILTON	17	1.82%	0.37%	20	21	22	23	24	25	Revision based on revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%.



County	Baseline Water Demand (Revised in Green)	Revised Brazos G WUS Average Annual Rate of Change (production growth proxy delta)	CBP Historical Average Annual Rate of Change (economic proxy delta)	Recommended Revised Projection						Comment
				2030	2040	2050	2060	2070	2080	
HASKELL	2	1.82%	0.37%							Recommended changes result in nominal change in result due to small amounts, no revision to projections recommended.
HILL	6	1.82%	0.37%							Recommended changes result in nominal change in result due to small amounts, no revision to projections recommended.
HOOD	16	1.82%	0.37%	19	20	21	22	23	24	Revision based on combination of revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%, and revised baseline.
JOHNSON	2,064	1.82%	0.37%	2,440	2,531	2,625	2,723	2,824	2,929	Revision based on revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%.
JONES	0	1.82%	0.37%							No revision.
KENT	0	1.82%	0.37%							No revision.
KNOX	0	1.82%	0.37%							No revision.
LAMPASAS	198	1.82%	0.37%	234	243	252	261	271	281	Revision based on combination of revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%, and revised baseline.

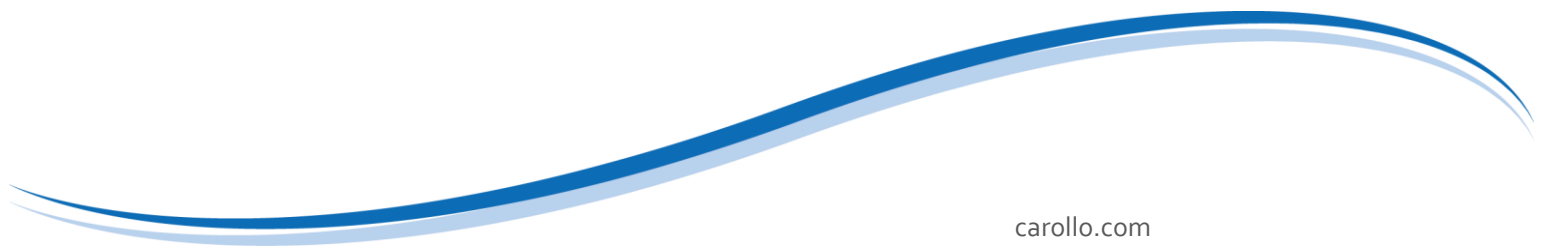
County	Baseline Water Demand (Revised in Green)	Revised Brazos G WUS Average Annual Rate of Change (production growth proxy delta)	CBP Historical Average Annual Rate of Change (economic proxy delta)	Recommended Revised Projection						Comment
				2030	2040	2050	2060	2070	2080	
LEE	9	1.82%	0.37%	11	11	11	11	11	11	Revision based on revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%.
LIMESTONE	214	1.82%	0.37%	253	262	272	282	292	303	Revision based on combination of revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%, and revised baseline.
MCLENNAN	4,860	1.82%	0.37%	5,745	5,959	6,181	6,411	6,649	6,896	Revision based on combination of revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%, and revised baseline.
MILAM	0	1.82%	0.37%							No revision.
NOLAN	456	1.82%	0.37%	539	559	580	602	624	647	Revision based on revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%.
PALO PINTO	24	1.82%	0.37%	28	29	30	31	32	33	Revision based on combination of revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%, and revised baseline.
ROBERTSON	51	1.82%	0.37%	60	62	64	66	68	71	Revision based on combination of revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%, and revised baseline.

County	Baseline Water Demand (Revised in Green)	Revised Brazos G WUS Average Annual Rate of Change (production growth proxy delta)	CBP Historical Average Annual Rate of Change (economic proxy delta)	Recommended Revised Projection						Comment
				2030	2040	2050	2060	2070	2080	
SHACKELFORD	0	1.82%	0.37%							No revision.
SOMERVELL	4	1.82%	0.37%	5	5	5	5	5	5	Revision based on revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%.
STEPHENS	7	1.82%	0.37%							Recommended changes result in nominal change in result due to small amounts, no revision to projections recommended.
STONEWALL	0	1.82%	0.37%							No revision.
TAYLOR	609	1.82%	0.37%	720	747	775	804	834	865	Revision based on combination of revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%, and revised baseline.
THROCK-MORTON	0	1.82%	0.37%							No revision.
WASHINGTON	589	1.82%	0.37%	696	722	749	777	806	836	Revision based on combination of revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%, and revised baseline.
WILLIAMSON	823	1.82%	0.37%	973	1,009	1,047	1,086	1,126	1,168	Revision based on combination of revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%, and revised baseline.

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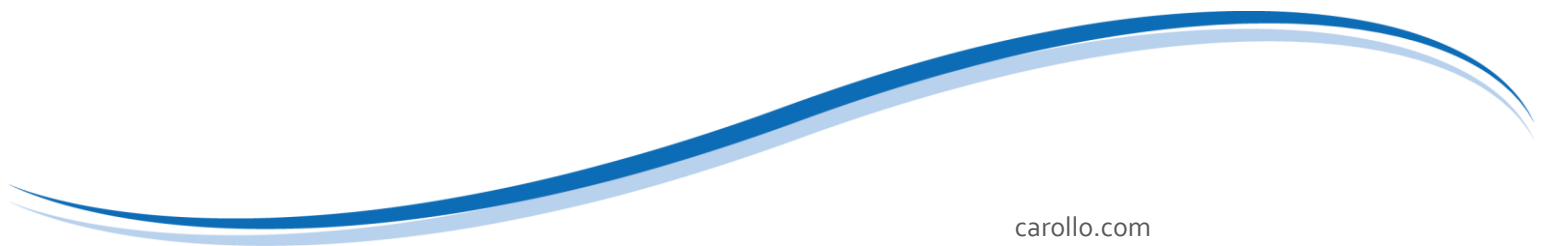
County	Baseline Water Demand (Revised in Green)	Revised Brazos G WUS Average Annual Rate of Change (production growth proxy delta)	CBP Historical Average Annual Rate of Change (economic proxy delta)	Recommended Revised Projection						Comment
				2030	2040	2050	2060	2070	2080	
YOUNG	83	1.82%	0.37%	98	102	106	110	114	118	Revision based on revised, region-specific Brazos G WUS Average Annual Rate of Change (production growth proxy delta) of 1.82%.



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## **Mining**

Per the Exhibit C Guidelines, mining water demand projections include water used for oil and gas development, as well as extraction of coal and lignite, sand aggregate, and other resources. Such projections do not include water use required for the transportation or refining of materials. Data utilized for the development of the mining use projections are derived from both surveyed and non-surveyed entities, and are based on a mining study conducted in partnership with the U.S. Geological Survey and the University of Texas Bureau of Economic Geology.

Decreases in the projections of mining water use in Brazos G appear largely driven by significantly less (~50%) coal mining in Robertson County since 2011, as well as the cessation of reported water use in 2015 by Luminant's Three Oaks mine in Lee County. As no discrepancies have been identified in the reporting and accompanying data, no revisions are recommended to the draft projections of mining water use for the purposes of the 2026 Brazos G Plan.

## **Steam-Electric Power Generation**

Per the Exhibit C Guidelines, water use for steam-electric power generation is consumptive use reported to the TWDB through the annual WUS. The projections of water use for steam-electric power generation do not include water used in cogeneration facilities (included in manufacturing projections) or facilities which do not require water for production (wind, solar, dry-cooled generation), or hydro-electric generation facilities.

The baseline for the draft water demand projections is based on the highest county-aggregated historical steam-electric power water use in the most recent five years (2015-2019). Subsequent demand projections after 2030 are held constant throughout the planning period. For the identification and characterization of facilities used to develop the draft projections, TWDB staff reviewed information from state and federal reports, as well as information developed from previous water plans. Included in this review is an annual database from the U.S. Energy Information Administration (EIA), called EIA-860, which includes data about power generating facilities and infrastructure across the nation.

For the near-term projected decade (2030), proposed or existing, non-surveyed facilities identified in the EIA-860 reports (or other sources) are added to the baseline amount. TWDB staff estimated the anticipated annual water use based upon the non-surveyed facilities' fuel type, generation capacity, average water use per fuel type, and average operational time.

Anticipated demand from future facilities is then added to the demand projections from the anticipated operation date through 2080, although in practice, no such future facilities have been identified within the Brazos G region. Water use of power generation facilities scheduled for retirement in the state and federal reports is subtracted from the baseline or the decade in which they are projected to retire.

The fifth criteria for adjustment identified in the Exhibit C Guidelines for steam-electric power generation water demand projections (Section 2.2.2.3, Item 5) is, "[e]vidence that a currently operating power generation facility has experienced a higher dry-year water use beyond the most recent five years, within the most recent 10 years." The Brazos G RWPG again considered planning for water demands during drought conditions as specified in TAC §357.10 (39).

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The Brazos G RWPG performed a comparative analysis (presented in Table 9 below) based on the historical water use for steam-electric power generation over the 2010-2019 period, employing the use data provided by TWDB. As noted above, the baseline for the draft projections of water use in each county were based on the maximum over the 5-year, 2015-2019 period. The Brazos G RWPG's analysis identifies and compares maximum steam-electric power generation water uses by county over the longer 10-year, 2010-2019 period.

Noting the importance of capturing trends in use and in the retirement of facilities, the analysis performed by the Brazos G RWPG excludes historical uses over the 2010-2019 period that were reported by facilities that are presently retired. With the retired facilities excluded, 10-year maximums have been calculated and compared (shown in green highlights in Table 9) to identify those counties recommended by the Brazos G RWPG to use a revised baseline water demand based on the maximum over the 10-year period. These revised baselines function as a more conservative representation of steam-electric power generation water demands during drought conditions.

The recommended revisions to the projections of steam-electric power generation water demand are shown in Table 10.



Table 9 – Comparative Analysis of 5- and 10-year Maximum Historical Facility Use by County within the Brazos G Region (2010-2019)

County	Facilities	Historical Facility Use by County (Source: TWDB)										Non-Surveyed Estimate	Comments	Draft Baseline	Max 5-yr (excluding retired facilities)	Max 10-yr (excluding retired facilities)	Revised 10-yr Baseline including Non-Surveyed Estimate	Diff	% Diff.
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019								
BELL	PANDA TEMPLE POWER	0	0	0	0	0	4,714	3,335	2,652	4,042	3,710	0		4,714	4,714	4,714	4,714	0	0%
BOSQUE	CALPINE CORP-BOSQUE ENERGY CENTER	0	0	0	0	0	2,880	2,715	2,294	2,435	2,426	0		2,880	2,880	2,880	2,880	0	0%
BRAZOS	CITY OF BRYAN-DANSBY POWER PLANT & POWER PLANT ATKINS STREET	235	421	422	234	392	465	502	363	496	470	98	Atkins Street Power Plant - Water use was estimated for non-surveyed plants, and active plants reporting 0 water use 2015-2019	600	502	502	600	0	0%
GRIMES	TENASKA FRONTIER GENERATION STATION	4,265	4,185	4,703	4,334	2,450	2,960	3,627	3,555	3,530	3,780	0	Gibbons Creek Power Plant confirmed retirement after 2018.	3,780	3,780	4,703	4,703	923	24%
HOOD	ETHOS ENERGY-WOLF HOLLOW 1 POWER LLC, EXELON POWER-WOLF HOLLOW 2 POWER LLC, & LUMINANT GENERATION COMPANY LLC-DECORDOVA STEAM ELECTRIC STATION	11	14	14	2,572	3,151	1,989	1,844	2,235	1,489	1,882	0		2,235	2,235	3,151	3,151	916	41%
JOHNSON	BRAZOS ELECTRIC POWER CO OP INC-JOHNSON COUNTY GENERATION FACILITY	1,915	1,685	1,273	1,120	1,070	882	679	590	743	1,283	0		1,283	1,283	1,915	1,915	632	49%
LIMESTONE	NRG TEXAS POWER LLC-LIMESTONE ELECTRIC GENERATING PLANT	21,699	22,936	20,238	22,473	20,727	15,279	15,636	15,769	17,156	15,972	0		17,156	17,156	22,936	22,936	5,780	34%
MCLENNAN	SANDY CREEK ENERGY ASSOCIATES LP-SANDY CREEK ENERGY STATION	0	0	0	0	0	0	2	2	2	15	0	Luminant Lake Creek and Tradinghouse plants retired prior to 2015. Previously proposed Lake Creek Plant was canceled.	15	15	15	15	0	0%

County	Facilities	Historical Facility Use by County (Source: TWDB)										Non-Surveyed Estimate	Comments	Draft Baseline	Max 5-yr (excluding retired facilities)	Max 10-yr (excluding retired facilities)	Revised 10-yr Baseline including Non-Surveyed Estimate	Diff	% Diff.
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019								
MILAM	N/A	0	0	0	0	0	0	0	0	0	0	0	LUMINANT GENERATION COMPANY LLC-SANDOW STATION NO 4 & 5 confirmed retirement after 2018.	0	0	0	0	0	0%
PALO PINTO	BRAZOS ELECTRIC POWER CO OP INC-R W MILLER PLANT	460	501	391	107	101	223	334	296	677	542	0		677	677	677	677	0	0%
ROBERTSON	MAJOR OAKS POWER LLC-TWIN OAKS PLANT, & LUMINANT GENERATION COMPANY LLC-OAK GROVE STEAM ELECTRIC STATION	22,400	45,867	33,279	34,945	37,029	28,238	33,578	40,133	34,312	35,344	0		40,133	40,133	45,867	45,867	5,734	14%
SOMERVELL	LUMINANT GENERATION COMPANY LLC-COMANCHE PEAK STEAM ELECTRIC STATION	21,304	19,983	70,362	65,316	52,490	60,579	65,544	66,254	65,401	68,664	0		68,664	68,664	70,362	70,362	1,698	2%
YOUNG	LUMINANT GENERATION COMPANY LLC-GRAHAM STEAM ELECTRIC STATION	680	497	453	337	378	316	368	274	768	840	0		840	840	840	840	0	0%

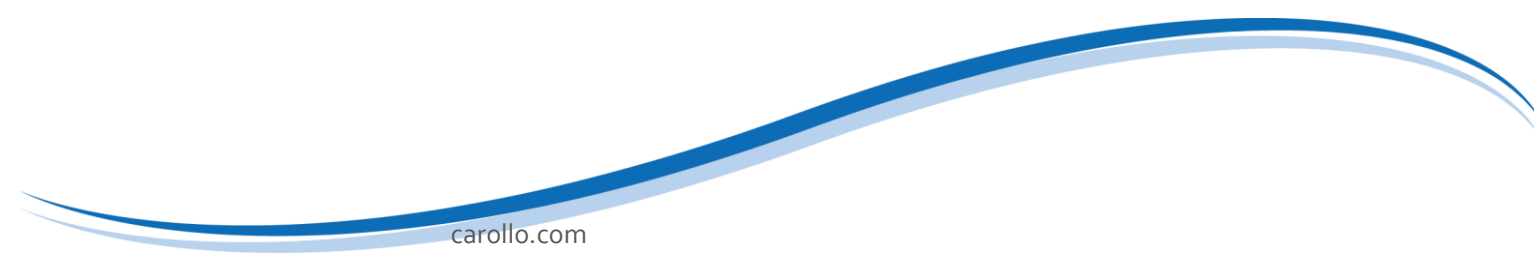


Table 10 – Recommended Revisions to Projected Draft Steam-Electric Power Generation Water Demands for Counties in the Brazos G Region (2030-2080)

County	RWPG Revision Requests						Comment
	2030	2040	2050	2060	2070	2080	
BELL							No revision.
BOSQUE							No revision.
BRAZOS							No revision.
BURLESON							No revision.
CALLAHAN							No revision.
COMANCHE							No revision.
CORYELL							No revision.
EASTLAND							No revision.
ERATH							No revision.
FALLS							No revision.
FISHER							No revision.
GRIMES	4,703	4,703	4,703	4,703	4,703	4,703	Revised using 10-yr maximum (excluding retired facilities).
HAMILTON							No revision.
HASKELL							No revision.
HILL							No revision.
HOOD	3,151	3,151	3,151	3,151	3,151	3,151	Revised using 10-yr maximum (excluding retired facilities).
JOHNSON	1,915	1,915	1,915	1,915	1,915	1,915	Revised using 10-yr maximum (excluding retired facilities).
JONES							No revision.
KENT							No revision.
KNOX							No revision.
LAMPASAS							No revision.
LEE							No revision.
LIMESTONE	22,936	22,936	22,936	22,936	22,936	22,936	Revised using 10-yr maximum (excluding retired facilities).
MCLENNAN							No revision.

County	RWPG Revision Requests						Comment
	2030	2040	2050	2060	2070	2080	
MILAM							No revision.
NOLAN							No revision.
PALO PINTO							No revision.
ROBERTSON	45,867	45,867	45,867	45,867	45,867	45,867	Revised using 10-yr maximum (excluding retired facilities).
SHACKELFORD							No revision.
SOMERVELL	70,362	70,362	70,362	70,362	70,362	70,362	Revised using 10-yr maximum (excluding retired facilities).
STEPHENS							No revision.
STONEWALL							No revision.
TAYLOR							No revision.
THROCKMORTON							No revision.
WASHINGTON							No revision.
WILLIAMSON							No revision.
YOUNG							No revision.