GROUNDWATER MANAGEMENT PLAN

PECAN VALLEY

GROUNDWATER CONSERVATION DISTRICT

Adopted 10/22/2003

1st Revision 02/17/2009

2nd Revision 03/18/2014

3rd Revision 01/15/2019

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District Mission

The Pecan Valley Groundwater Conservation District (District) provides for the conservation, preservation, protection, recharging, and prevention of waste of the groundwater within the defined boundary of the District, through sound management strategies, while protecting private property rights.

The Pecan Valley Groundwater Conservation District will pursue this goal through the gathering of scientific data regarding the hydrological characteristics of the aquifers that underlie DeWitt County, and the adoption and enforcement of fair and appropriate rules governing well spacing and production and use of the groundwater, and through a monitoring program to manage groundwater withdrawal within the district to a sustainable yield of the aquifer.

Purpose of Management Plan

Senate Bill 1 (SB 1), enacted by the 75th Texas Legislature in 1997, and Senate Bill 2 (SB 2), enacted by the 77th Texas Legislature in 2001, established a comprehensive state-wide water resource planning process and the actions necessary for groundwater conservation districts to manage and conserve the groundwater resources of the State of Texas. These bills require all groundwater conservation districts to develop a management plan which defines the groundwater needs and groundwater supplies within each district and the goals each district has set to achieve its mission. In addition, the 79th Texas Legislature enacted HB 1763 in 2005 that requires joint planning among districts that are in the same Groundwater Management Area (GMA). These districts must jointly agree upon and establish the desired future conditions (DFC) of the aquifers within their respective GMAs. Through this process, the districts will submit the DFC conditions to the executive administrator of the Texas Water Development Board (TWDB), who will provide each district in the GMA with the amount of Modeled Available Groundwater (MAG) for each district. The MAG will be based on the desired future conditions jointly established for each aquifer within the respective GMA divisions.

Technical information, such as the desired conditions of the aquifers within the District's jurisdiction and the amount of modeled available groundwater from such aquifers is required by statute to be included in the District's management plan and will guide the District's regulatory and management policies. This management plan is intended to satisfy the requirements of SB 1, SB 2, HB 1763, the statutory requirements of Texas Water Code (TWC) Chapter 36, and the rules and requirements of the Texas Water Development Board.

Technical District Information Required by Texas Administrative Code

Estimate of Modeled Available Groundwater in District Based on Desired Future Conditions

Texas Water Code 36.001 defines modeled available groundwater as "the amount of water that the executive administrator determines may be produced on an average annual basis to achieve a desired future condition established under Section 36.108".

The joint planning process set forth in Texas Water Code 36.108 must be collectively conducted by all groundwater conservation districts within the same GMA. The District is a member of GMA 15.

GMA 15 completed the second-round of the joint planning process to determine the desired future condition of the aquifers within the groundwater management area.

District representatives adopted the desired future condition for the Gulf Coast Aquifer within GMA 15 on April 29, 2016. The adopted DFC's were then forwarded to the TWDB for development of the Modeled Available Groundwater calculations.

The desired future condition for the entire area is stated as follows*: "Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 13 feet in December 2069 from estimated year 2000 conditions."*

The desired future condition for DeWitt County is stated as follows: *"Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 17 feet in December 2069 from estimated year 2000 conditions."*

The Texas Water Development Board reported the modeled available groundwater for GMA 15 based on the desired future condition in GAM Run 16-025 MAG which is incorporated into this management plan as Appendix C. The modeled available groundwater, in acre-feet per year (AFY), of the Gulf Coast Aquifer within the district which is coextensive to DeWitt County is as follows:

County	Year						
	2010	2020	2030	2040	2050	2060	2069
DeWitt	***15,471***	***15,476***	***15,476***	***14,485***	***14,485***	***14,485***	***14,485***

The submittal package for the DFC's can be found here:
http://www.twdb.texas.gov/groundwater/dfc/docs/GMA15_DFCExpRep.pdf

Amount of Groundwater Being Used within the District on an Annual Basis

Please refer to Appendix A

Annual Amount of Recharge from Precipitation to the Groundwater Resources within the District

Please refer to Appendix B

Annual Volume of Water that Discharges from the Aquifer to Springs and Surface Water Bodies

Please refer to Appendix B

Estimate of the Annual Volume of Flow into the District, out of the District, and Between Aquifers in the District

Please refer to Appendix B

Projected Surface Water Supply within the District

Please refer to Appendix A

Projected Total Demand for Water within the District

Please refer to Appendix A

CONSIDER THE WATER SUPPLY NEEDS AND WATER MANAGEMENT STATEGIES INCLUDED IN THE ADOPTED STATE WATER PLAN – TWC §36.1071 (e)(4)

The 2017 State Water Plan identifies water supply needs for DeWitt County for the Gonzales County WSC, irrigation and mining water user groups. The sum of projected water supply needs is 118 acre-feet in year 2020 and decreases to 2 acre-feet in year 2070.

The 2017 State Water Plan identifies water management strategies for DeWitt County as the development of the Carrizo-Wilcox Aquifer for Gonzales County WSC and development of mining supply from the Gulf Coast Aquifer.

The district has implemented well spacing, production limits and historic use protections within the rules of the district and utilizes these regulations to evaluate permitting requests.

Please refer to Appendix A

Details on the District Management of Groundwater

District Authority and Management Rules and Policies

The Texas Legislature has determined that GCDs, such as the Pecan Valley Groundwater Conservation District, are the state's preferred method of groundwater management. The Texas Legislature codified its groundwater management policy decision in Section 36.0015 of the Texas Water Code, which provides that GCDs will manage groundwater resources through rules developed and implemented in accordance with Chapter 36 of the Texas Water Code. Chapter 36 establishes directives for GCDs and the statutory authority to carry out such directives to enable GCDs to have the proper tools to protect and preserve the groundwater resources with their boundaries. The District will give strong consideration to the economic and cultural activities which occur within the District and which rely upon the continued use of groundwater.

The District using the regulatory tools it has been given by Chapter 36 to properly address the groundwater issues within DeWitt County, such as groundwater quality and groundwater supply. The District believes that the prevention of contamination of its groundwater resources through abandoned and deteriorated water wells is important. Wells that have been abandoned or not properly maintained provide direct conduits or pathways that allow contamination from the surface to quickly reach the groundwater resources of the District. To address the threats to the water quality of its groundwater resources, the District requires, through its rules, that all abandoned, deteriorated, or replaced wells be plugged in compliance with the Water Well Drillers and Pump Installers Rules of the Texas Department of Licensing and Regulation. The District will also place a priority on the capping of water wells that the well owner plans to use at a later date in order to eliminate waste, prevent pollution, and stop future deterioration of the well casing.

The District has established a monitoring well network to monitor the changing storage conditions of the groundwater supplies within the District. The District will make a regular assessment of water supply and groundwater storage conditions and has reported and will continue to report those conditions to the District Board of Directors and to the public. The District has also worked and will continue to work with any local governmental entities or agencies of the State of Texas on any well monitoring efforts or well investigations which are conducted.

The District is using the regulatory tools granted to GCDs by Chapter 36 to preserve and protect the existing and historic users of groundwater within the District. The Texas Legislature empowered the District to protect existing users of groundwater, which are those individuals or entities currently invested in and using groundwater or the groundwater resources within the District for a beneficial purpose, and preserve historic use by historic users, which are those individuals or entities who used groundwater beneficially in the past. The District

strives to protect and preserve such use to the extent practicable under the goals and objectives of this Management Plan. In accordance with Section 36.116 of the Texas Water Code, the District is also protecting historic use though District Rules on spacing of wells and production limits on groundwater to the extent practicable consistent with this Management Plan.

In order to better manage the groundwater resources of DeWitt County during times of high demand or within areas of high demand, the District may establish Critical Groundwater Depletion Areas and adopt different Rules for those areas. The District may also adopt different Rules for each subdivision of an aquifer or geologic strata located in whole or in part within the boundaries of the District or each geographic area overlying a subdivision of an aquifer located in whole or in part within the boundaries of the District. The District has adopted Rules to regulate groundwater withdrawals by means of spacing and/or production limits. The relevant factors to be considered in making a determination to grant or deny a permit or limit groundwater withdrawals shall include those set forth in the Chapter 36 of the Texas Water Code, and the rules of the District.

Actions, Procedures, Performance and Avoidance for District Implementation of Management Plan

The District will use the Management Plan to guide the District in its efforts to preserve and protect the groundwater resources of DeWitt County. Operations of the District, agreements entered into by the District and planning efforts in which the District may participate will be consistent with the provisions of this plan.

A copy of the Rules of Pecan Valley Groundwater Conservation District may be found at www.pvgcd.org. The District will adopt rules relating to the permitting of wells and the production of groundwater. The rules adopted by the District shall be pursuant to the TWC Ch36 and the provisions of this plan. All rules will be adhered to and enforced. The promulgation and enforcement of the rules will be based on the best technical evidence available.

The District shall treat all citizens with equality. Citizens may apply to the District for discretion in enforcement of the rules on grounds of adverse economic effect or unique local conditions. In granting of discretion to any rule, the Board shall consider the potential for adverse effect on adjacent landowners. The exercise of said discretion by the Board shall not be construed as limiting the power of the Board.

The District may amend the District rules as necessary to comply with changes to Chapter 36 of the Texas Water Code and to insure the best management practices of the groundwater in the District. The implementation of the rules of the District will be based on the best available scientific and technical data, and on fair and reasonable evaluation.

The District is committed to work and plan with other GCD's in Groundwater Management Area 15. The District will use the Management Plan as part of its cooperation efforts with the neighboring GCDs. The District will manage the supply of groundwater within the District based on Desired Future Conditions and Modeled Available Groundwater resulting from the Groundwater Management Area 15 cooperative planning process, exempt and non-exempt wells and groundwater demands, and the District's best available data.

The District has encouraged and will continue to encourage public cooperation in the implementation of the management plan for the District.

METHODOLOGY TO TRACK DISTRICT PROGRESS IN ACHIEVING MANAGEMENT GOALS – 31 TAC 356.52 (a)(4)

The General Manager of the District will prepare and present an annual report to the Board of Directors evaluating the impact of the District's activities on its goals, management objectives, and performance standards. The Annual Report will be presented 120 days following the completion of the District's fiscal year

Management Goals

A. Providing the Most Efficient Use of Groundwater

Objective: Develop and maintain a Water Well Registration Program for tracking well information for wells within the District's boundaries.
Performance Standard: Each year the District will summarize within the annual report the changes related to water well registration including the number of new and existing wells registered.

Objective: Develop and maintain a Water Well Permitting Program for tracking all permits authorizing water well operation and groundwater production.
Performance Standard: Each year the District will summarize within the annual report the changes related to water well permitting including the number of new applications and the disposition of the applications.

B. Controlling and Preventing Waste of Groundwater

Objective: Initiate a program to identify the location of abandoned wells that will include a survey of landowners, well drillers, and the Texas Railroad Commission regarding any known abandoned wells, and initiate actions as necessary to enforce the notice, plugging and other requirements of Section 1901.255, Occupations Code.
Performance Standard: Include in the annual report the number of water well inspections resulting from these activities.

C. Controlling and Preventing Subsidence

This goal is not applicable to the Pecan Valley Groundwater Conservation District at this time because no significant subsidence has occurred in DeWitt County. The District will continue to monitor conditions for evidence of subsidence

D. Conjunctive Surface Water Management Issues

Objective: Participate in the regional water planning process by attending at least two South Central Texas Regional Water Planning Group (Region L) meetings.
Performance Standard: Report annually to the Board the attendees, dates and the number of meetings attended.

E. Natural Resource Issues

Objective: Develop and maintain a Water Quality Monitoring Program.

Performance Standard: Each year, the District will summarize within the annual report the monitoring activities including the number of wells monitored and the year to year change of water quality.

F. Drought Conditions

Objective: Collect and review drought condition information related to DeWitt County and the surrounding region of Texas on a monthly basis.
Performance Standard: Each year the District will summarize within the annual report the monthly drought information including U.S. Drought Monitor. Additionally, the number of weeks and/or months that the District experienced drought based on the US Drought Monitor will be reported in the annual report.

G. Conservation, Recharge Enhancement, Rainwater Harvesting, and Brush Control

Objective: Promote conservation, rainwater harvesting and brush control within DeWitt County.

Performance Standard: The District will summarize the activities related to conservation, rainwater harvesting and brush control, including the number of educational materials developed and/or delivered to local schools, the number of public speaking events and presentations, the number of community events participated in, and the number of educational publications.

Goals related to Recharge Enhancement and Precipitation Enhancement are deemed to be not appropriate or cost effective programs for the District at this time because there are no existing programs in nearby counties in which the District could participate and share costs.

H. Addressing the Desired Future Conditions

Objective: The District will monitor water levels and evaluate whether the average change in water levels is in conformance with the DFC's adopted by the District. The District will estimate the total annual groundwater production for each aquifer based on water use reports, estimated exempt use and other relevant information and compare these production estimates to the MAG's.
Performance Standard: Each year the District will summarize within the annual report the monitoring activities including the number of wells monitored and the average annual change of water levels and compare them to the DFC's. The District will also record the estimated annual production from each aquifer and compare these amounts to the MAG. These production amounts will also be reported in the annual report.

List of Appendices

Appendix A - Estimated Historical Water Use and 2012 State Water Plan Datasets provided by Texas Water Development Board

Appendix B – Groundwater Availability Model Run 12-024 provided by Texas Water Development Board

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Appendix G – Minutes of Pecan Valley Groundwater Conservation District Board of Directors Meetings related to the public hearing for and adoption of the Management Plan

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Appendix A - Estimated Historical Water Use and 2017 State Water Plan Datasets provided by Texas Water Development Board

Estimated Historical Water Use And 2017 State Water Plan Datasets:

Pecan Valley Groundwater Conservation District

by Stephen Allen
Texas Water Development Board
Groundwater Division
Groundwater Technical Assistance Section
stephen.allen@twdb.texas.gov
(512) 463-7317
August 27, 2018

GROUNDWATER MANAGEMENT PLAN DATA:

This package of water data reports (part 1 of a 2-part package of information) is being provided to groundwater conservation districts to help them meet the requirements for approval of their five-year groundwater management plan. Each report in the package addresses a specific numbered requirement in the Texas Water Development Board's groundwater management plan checklist. The checklist can be viewed and downloaded from this web address:

http://www.twdb.texas.gov/groundwater/docs/GCD/GMPChecklist0113.pdf

The five reports included in this part are:

1. Estimated Historical Water Use (checklist item 2)

   from the TWDB Historical Water Use Survey (WUS)
2. Projected Surface Water Supplies (checklist item 6)
3. Projected Water Demands (checklist item 7)
4. Projected Water Supply Needs (checklist item 8)
5. Projected Water Management Strategies (checklist item 9)

   from the 2017 Texas State Water Plan (SWP)

Part 2 of the 2-part package is the groundwater availability model (GAM) report for the District (checklist items 3 through 5). The District should have received, or will receive, this report from the Groundwater Availability Modeling Section. Questions about the GAM can be directed to Dr. Shirley Wade, shirley.wade@twdb.texas.gov, (512) 936-0883.

DISCLAIMER:

The data presented in this report represents the most up-to-date WUS and 2017 SWP data available as of 8/27/2018. Although it does not happen frequently, either of these datasets are subject to change pending the availability of more accurate WUS data or an amendment to the 2017 SWP. District personnel must review these datasets and correct any discrepancies in order to ensure approval of their groundwater management plan.

The WUS dataset can be verified at this web address:

http://www.twdb.texas.gov/waterplanning/waterusesurvey/estimates/

The 2017 SWP dataset can be verified by contacting Sabrina Anderson (sabrina.anderson@twdb.texas.gov or 512-936-0886).

For additional questions regarding this data, please contact Stephen Allen (stephen.allen@twdb.texas.gov or 512-463-7317).

Estimated Historical Water Use
TWDB Historical Water Use Survey (WUS) Data

Groundwater and surface water historical use estimates are currently unavailable for calendar year 2017. TWDB staff anticipates the calculation and posting of these estimates at a later date.

DEWITT COUNTY

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2016	GW	2,973	162	2,999	0	405	919	7,458
	SW	1	0	333	0	0	613	947
2015	GW	3,058	226	4,588	0	211	908	8,991
	SW	2	0	510	0	0	605	1,117
2014	GW	3,274	222	5,337	0	886	883	10,602
	SW	4	0	594	0	0	589	1,187
2013	GW	3,327	230	3,264	0	922	878	8,621
	SW	6	0	362	0	0	585	953
2012	GW	3,680	272	1,832	0	915	893	7,592
	SW	16	0	152	0	0	595	763
2011	GW	4,064	242	1,808	0	601	1,561	8,276
	SW	13	0	369	0	0	1,038	1,420
2010	GW	3,372	165	338	0	462	1,500	5,837
	SW	12	0	69	0	0	999	1,080
2009	GW	3,701	172	191	0	648	1,105	5,817
	SW	31	0	39	0	0	736	806
2008	GW	3,531	191	43	0	636	1,109	5,510
	SW	32	0	9	0	0	740	781
2007	GW	3,021	177	0	0	153	1,342	4,693
	SW	25	0	0	0	0	896	921
2006	GW	3,628	209	0	0	265	1,232	5,334
	SW	36	0	0	0	0	821	857
2005	GW	3,232	519	0	0	234	1,196	5,181
	SW	37	0	0	0	0	797	834
2004	GW	4,021	582	0	0	96	112	4,811
	SW	41	0	0	0	0	1,813	1,854
2003	GW	2,776	584	0	0	61	59	3,480
	SW	11	0	0	0	0	940	951
2002	GW	3,204	188	0	0	88	103	3,583
	SW	41	0	0	0	0	1,658	1,699
2001	GW	2,763	576	0	0	88	93	3,520
	SW	50	0	0	0	0	1,509	1,559

Projected Surface Water Supplies
TWDB 2017 State Water Plan Data

DEWITT COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
L	GONZALES COUNTY WSC	GUADALUPE	CANYON LAKE/RESERVOIR	36	34	32	30	28	26
L	LIVESTOCK, DEWITT	GUADALUPE	GUADALUPE LIVESTOCK LOCAL SUPPLY	631	631	631	631	631	631
L	LIVESTOCK, DEWITT	LAVACA	LAVACA LIVESTOCK LOCAL SUPPLY	282	282	282	282	282	282
L	LIVESTOCK, DEWITT	LAVACA-GUADALUPE	LAVACA-GUADALUPE LIVESTOCK LOCAL SUPPLY	9	9	9	9	9	9
L	LIVESTOCK, DEWITT	SAN ANTONIO	SAN ANTONIO LIVESTOCK LOCAL SUPPLY	75	75	75	75	75	75
	Sum of Projected Surface Water Supplies (acre-feet)			**1,033**	**1,031**	**1,029**	**1,027**	**1,025**	**1,023**

Projected Water Demands
TWDB 2017 State Water Plan Data

Please note that the demand numbers presented here include the plumbing code savings found in the Regional and State Water Plans.

DEWITT COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
L	COUNTY-OTHER, DEWITT	GUADALUPE	1,139	1,138	1,126	1,125	970	976
L	COUNTY-OTHER, DEWITT	LAVACA	203	203	200	200	173	174
L	COUNTY-OTHER, DEWITT	LAVACA-GUADALUPE	2	2	2	2	2	2
L	COUNTY-OTHER, DEWITT	SAN ANTONIO	88	88	87	87	75	76
L	CUERO	GUADALUPE	2,195	2,229	2,232	2,248	1,942	1,955
L	GONZALES COUNTY WSC	GUADALUPE	113	115	117	118	102	102
L	IRRIGATION, DEWITT	GUADALUPE	520	520	520	520	520	520
L	IRRIGATION, DEWITT	LAVACA	846	846	846	846	846	846
L	IRRIGATION, DEWITT	LAVACA-GUADALUPE	15	15	15	15	15	15
L	IRRIGATION, DEWITT	SAN ANTONIO	104	104	104	104	104	104
L	LIVESTOCK, DEWITT	GUADALUPE	1,517	1,517	1,517	1,517	1,517	1,517
L	LIVESTOCK, DEWITT	LAVACA	309	309	309	309	309	309
L	LIVESTOCK, DEWITT	LAVACA-GUADALUPE	18	18	18	18	18	18
L	LIVESTOCK, DEWITT	SAN ANTONIO	150	150	150	150	150	150
L	MANUFACTURING, DEWITT	GUADALUPE	330	352	373	391	421	454
L	MANUFACTURING, DEWITT	LAVACA	220	234	249	261	281	302
L	MINING, DEWITT	GUADALUPE	2,405	2,259	1,668	1,081	494	229
L	MINING, DEWITT	LAVACA	506	476	351	228	104	48
L	MINING, DEWITT	SAN ANTONIO	254	238	176	113	52	24
L	YOAKUM	LAVACA	455	458	455	456	402	404
L	YORKTOWN	GUADALUPE	447	448	446	449	388	390
	Sum of Projected Water Demands (acre-feet)		**11,836**	**11,719**	**10,961**	**10,238**	**8,885**	**8,615**

Projected Water Supply Needs
TWDB 2017 State Water Plan Data

Negative values (in red) reflect a projected water supply need, positive values a surplus.

DEWITT COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
L	COUNTY-OTHER, DEWITT	GUADALUPE	45	46	58	59	214	208
L	COUNTY-OTHER, DEWITT	LAVACA	3	5	15	24	52	51
L	COUNTY-OTHER, DEWITT	LAVACA-GUADALUPE	0	0	0	0	0	0
L	COUNTY-OTHER, DEWITT	SAN ANTONIO	1	1	2	2	14	13
L	CUERO	GUADALUPE	1,847	1,813	1,810	1,794	2,100	2,087
L	GONZALES COUNTY WSC	GUADALUPE	27	17	7	-3	6	-2
L	IRRIGATION, DEWITT	GUADALUPE	0	0	0	0	0	0
L	IRRIGATION, DEWITT	LAVACA	-74	-68	-39	-6	0	0
L	IRRIGATION, DEWITT	LAVACA-GUADALUPE	0	0	0	0	0	0
L	IRRIGATION, DEWITT	SAN ANTONIO	0	0	0	0	0	0
L	LIVESTOCK, DEWITT	GUADALUPE	0	0	0	0	0	0
L	LIVESTOCK, DEWITT	LAVACA	0	0	0	0	0	0
L	LIVESTOCK, DEWITT	LAVACA-GUADALUPE	0	0	0	0	0	0
L	LIVESTOCK, DEWITT	SAN ANTONIO	0	0	0	0	0	0
L	MANUFACTURING, DEWITT	GUADALUPE	125	103	82	64	34	1
L	MANUFACTURING, DEWITT	LAVACA	94	83	80	82	64	43
L	MINING, DEWITT	GUADALUPE	0	0	0	0	0	0
L	MINING, DEWITT	LAVACA	-44	-38	-16	-2	0	0
L	MINING, DEWITT	SAN ANTONIO	0	0	0	0	0	0
L	YOAKUM	LAVACA	3	0	3	2	56	54
L	YORKTOWN	GUADALUPE	525	524	526	523	584	582
	Sum of Projected Water Supply Needs (acre-feet)		**-118**	**-106**	**-55**	**-11**	**0**	**-2**

Projected Water Management Strategies
TWDB 2017 State Water Plan Data

DEWITT COUNTY

WUG, Basin (RWPG) All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
COUNTY-OTHER, DEWITT, GUADALUPE (L)							
MUNICIPAL WATER CONSERVATION (RURAL)	DEMAND REDUCTION [DEWITT]	32	0	0	0	0	0
		32	**0**	**0**	**0**	**0**	**0**
COUNTY-OTHER, DEWITT, LAVACA (L)							
MUNICIPAL WATER CONSERVATION (RURAL)	DEMAND REDUCTION [DEWITT]	6	0	0	0	0	0
		6	**0**	**0**	**0**	**0**	**0**
COUNTY-OTHER, DEWITT, LAVACA-GUADALUPE (L)							
MUNICIPAL WATER CONSERVATION (RURAL)	DEMAND REDUCTION [DEWITT]	0	0	0	0	0	0
		0	**0**	**0**	**0**	**0**	**0**
COUNTY-OTHER, DEWITT, SAN ANTONIO (L)							
MUNICIPAL WATER CONSERVATION (RURAL)	DEMAND REDUCTION [DEWITT]	2	0	0	0	0	0
		2	**0**	**0**	**0**	**0**	**0**
CUERO, GUADALUPE (L)							
MUNICIPAL WATER CONSERVATION (RURAL)	DEMAND REDUCTION [DEWITT]	270	333	381	452	656	767
		270	**333**	**381**	**452**	**656**	**767**
GONZALES COUNTY WSC, GUADALUPE (L)							
LOCAL CARRIZO AQUIFER DEVELOPMENT	CARRIZO-WILCOX AQUIFER [GONZALES]	0	0	0	3	3	3
MUNICIPAL WATER CONSERVATION (RURAL)	DEMAND REDUCTION [DEWITT]	14	21	28	35	35	42
		14	**21**	**28**	**38**	**38**	**45**
IRRIGATION, DEWITT, LAVACA (L)							
LOCAL GULF COAST AQUIFER DEVELOPMENT	GULF COAST AQUIFER [DEWITT]	75	75	75	75	75	75
		75	**75**	**75**	**75**	**75**	**75**
MINING, DEWITT, LAVACA (L)							
LOCAL GULF COAST AQUIFER DEVELOPMENT	GULF COAST AQUIFER [DEWITT]	44	44	44	44	44	44
		44	**44**	**44**	**44**	**44**	**44**
YOAKUM, LAVACA (L)							
MUNICIPAL WATER CONSERVATION (RURAL)	DEMAND REDUCTION [DEWITT]	42	51	26	7	56	64

		42	**51**	**26**	**7**	**56**	**64**
YORKTOWN, GUADALUPE (L)							
MUNICIPAL WATER CONSERVATION (RURAL)	DEMAND REDUCTION [DEWITT]	47	51	28	12	51	59
		47	**51**	**28**	**12**	**51**	**59**
Sum of Projected Water Management Strategies (acre-feet)		**532**	**575**	**582**	**628**	**920**	**1,054**

Appendix B – Groundwater Availability Model Run 18-011 provided by Texas Water Development Board

GAM RUN 18-011: PECAN VALLEY GROUNDWATER CONSERVATION DISTRICT GROUNDWATER MANAGEMENT PLAN

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May 21, 2018

Shirley C. Wade
5/21/2018

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GAM RUN 18-011: PECAN VALLEY GROUNDWATER CONSERVATION DISTRICT GROUNDWATER MANAGEMENT PLAN

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Groundwater Division
Groundwater Availability Modeling Department
512-936-0883
May 21, 2018

EXECUTIVE SUMMARY:

Texas State Water Code, Section 36.1071, Subsection (h) (Texas Water Code, 2015), states that, in developing its groundwater management plan, a groundwater conservation district shall use groundwater availability modeling information provided by the Executive Administrator of the Texas Water Development Board (TWDB) in conjunction with any available site-specific information provided by the district for review and comment to the Executive Administrator.

The TWDB provides data and information to the Pecan Valley Groundwater Conservation District in two parts. Part 1 is the Estimated Historical Water Use/State Water Plan dataset report, which will be provided to you separately by the TWDB Groundwater Technical Assistance Department. Please direct questions about the water data report to Mr. Stephen Allen at 512-463-7317 or stephen.allen@twdb.texas.gov. Part 2 is the required groundwater availability modeling information and this information includes:

1. the annual amount of recharge from precipitation, if any, to the groundwater resources within the district;
2. for each aquifer within the district, the annual volume of water that discharges from the aquifer to springs and any surface-water bodies, including lakes, streams, and rivers; and
3. the annual volume of flow into and out of the district within each aquifer and between aquifers in the district.

The groundwater management plan for the Pecan Valley Groundwater Conservation District should be adopted by the district on or before February 6, 2019

and submitted to the Executive Administrator of the TWDB on or before March 8, 2019. The current management plan for the Pecan Valley Groundwater Conservation District expires on May 7, 2019.

We used three groundwater availability models to estimate the management plan information for the aquifers within the Pecan Valley Groundwater Conservation District. Information for the Carrizo-Wilcox Aquifer is from version 2.01 of the groundwater availability model for the southern part of the Carrizo-Wilcox, Queen City, and Sparta aquifers (Kelley and others, 2004). Information for interaction between the Yegua-Jackson subcrop and parts of the Gulf Coast Aquifer System is from version 1.01 of the groundwater availability model for the Yegua-Jackson Aquifer (Deeds and others, 2010). Information for the Gulf Coast Aquifer System is from version 1.01 of the groundwater availability model for the central portion of the Gulf Coast Aquifer System (Chowdhury and others, 2004).

This report replaces the results of GAM Run 12-024 (Wade, 2012), as the approach used for analyzing model results has since been refined. Tables 1 and 2 summarize the groundwater availability model data required by statute and Figures 1 and 2 show the area of the models from which the values in the tables were extracted. If, after review of the figures, the Pecan Valley Groundwater Conservation District determines that the district boundaries used in the assessment do not reflect current conditions, please notify the TWDB at your earliest convenience.

METHODS:

In accordance with the provisions of the Texas State Water Code, Section 36.1071, Subsection (h), the three groundwater availability models mentioned above were used to estimate information for the Pecan Valley Groundwater Conservation District management plan. Water budgets were extracted for the historical model periods for the Carrizo-Wilcox, Aquifer (1980 through 1999), Yegua-Jackson subcrop (1980 through 1997) and Gulf Coast Aquifer System (1980 through 1999) using ZONEBUDGET Version 3.01 (Harbaugh, 2009). The average annual water budget values for recharge, surface-water outflow, inflow to the district, outflow from the district, and inter-aquifer flow for the aquifers within the district are summarized in this report.

PARAMETERS AND ASSUMPTIONS:

Carrizo-Wilcox Aquifer

- We used version 2.01 of the groundwater availability model for the southern part of the Carrizo-Wilcox, Queen City, and Sparta aquifers. See Deeds and others (2003) and Kelley and others (2004) for assumptions and limitations of the groundwater

availability model for the southern part of the Carrizo-Wilcox, Queen City, and Sparta aquifers.

- This groundwater availability model includes eight layers, which generally represent the Sparta Aquifer (Layer 1), the Weches Formation confining unit (Layer 2), the Queen City Aquifer (Layer 3), the Reklaw Formation confining unit (Layer 4), the Carrizo Formation (Layer 5), the Upper Wilcox Unit (Layer 6), the Middle Wilcox Unit (Layer 7), and the Lower Wilcox Unit (Layer 8).

- Because the Queen City and Sparta aquifers are not present in Pecan Valley Groundwater Conservation District, water budgets for the district were determined only for the Carrizo-Wilcox Aquifer (Layers 5 through 8, collectively).

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

Gulf Coast Aquifer System

- We used version 1.01 of the groundwater availability model for the central part of the Gulf Coast Aquifer System for this analysis. See Chowdhury and others (2004) and Waterstone and others (2003) for assumptions and limitations of the groundwater availability model.

- The model has four layers which represent the Chicot Aquifer (Layer 1), the Evangeline Aquifer (Layer 2), the Burkeville Confining Unit (Layer 3), and the Jasper Aquifer and parts of the Catahoula Formation in direct hydrologic communication with the Jasper Aquifer (Layer 4).

- Water budgets for the district were determined for the Gulf Coast Aquifer System (Layers 1 through 4, collectively).

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

- Because this model assumes a no-flow boundary condition at the base we used version 1.01 of the groundwater availability model for the Yegua-Jackson Aquifer to investigate groundwater flows between the Catahoula Formation and the Yegua-Jackson subcrop (non-aquifer) and between the Catahoula Formation and the base of the Gulf Coast Aquifer System. See Deeds and others (2010) for assumptions and limitations of the groundwater availability model for the Yegua-Jackson Aquifer.

RESULTS:

A groundwater budget summarizes the amount of water entering and leaving the aquifers according to the groundwater availability model. Selected groundwater budget components listed below were extracted from the groundwater availability model results for the Carrizo-Wilcox Aquifer and the Gulf Coast Aquifer System, located within Pecan Valley Groundwater Conservation District and averaged over the historical calibration periods, as shown in Tables 1 and 2.

1. Precipitation recharge—the areally distributed recharge sourced from precipitation falling on the outcrop areas of the aquifers (where the aquifer is exposed at land surface) within the district.

2. Surface-water outflow—the total water discharging from the aquifer (outflow) to surface-water features such as streams, reservoirs, and springs.

3. Flow into and out of district—the lateral flow within the aquifer between the district and adjacent counties.

4. Flow between aquifers—the net vertical flow between the aquifer and adjacent aquifers or confining units. This flow is controlled by the relative water levels in each aquifer and aquifer properties of each aquifer or confining unit that define the amount of leakage that occurs.

The information needed for the district's management plan is summarized in Tables 1 and 2. It is important to note that sub-regional water budgets are not exact. This is due to the size of the model cells and the approach used to extract data from the model. To avoid double accounting, a model cell that straddles a political boundary, such as a district or county boundary, is assigned to one side of the boundary based on the location of the centroid of the model cell. For example, if a cell contains two counties, the cell is assigned to the county where the centroid of the cell is located.

TABLE 1. SUMMARIZED INFORMATION FOR THE CARRIZO-WILCOX AQUIFER FOR PECAN VALLEY GROUNDWATER CONSERVATION DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-FOOT.

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Carrizo-Wilcox Aquifer	0
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Carrizo-Wilcox Aquifer	0
Estimated annual volume of flow into the district within each aquifer in the district	Carrizo-Wilcox Aquifer	346
Estimated annual volume of flow out of the district within each aquifer in the district	Carrizo-Wilcox Aquifer	0
Estimated net annual volume of flow between each aquifer in the district	Flow from Carrizo-Wilcox Aquifer into the overlying Reklaw Confining Unit	16
	Flow from Carrizo-Wilcox Aquifer to brackish Carrizo-Wilcox units	317

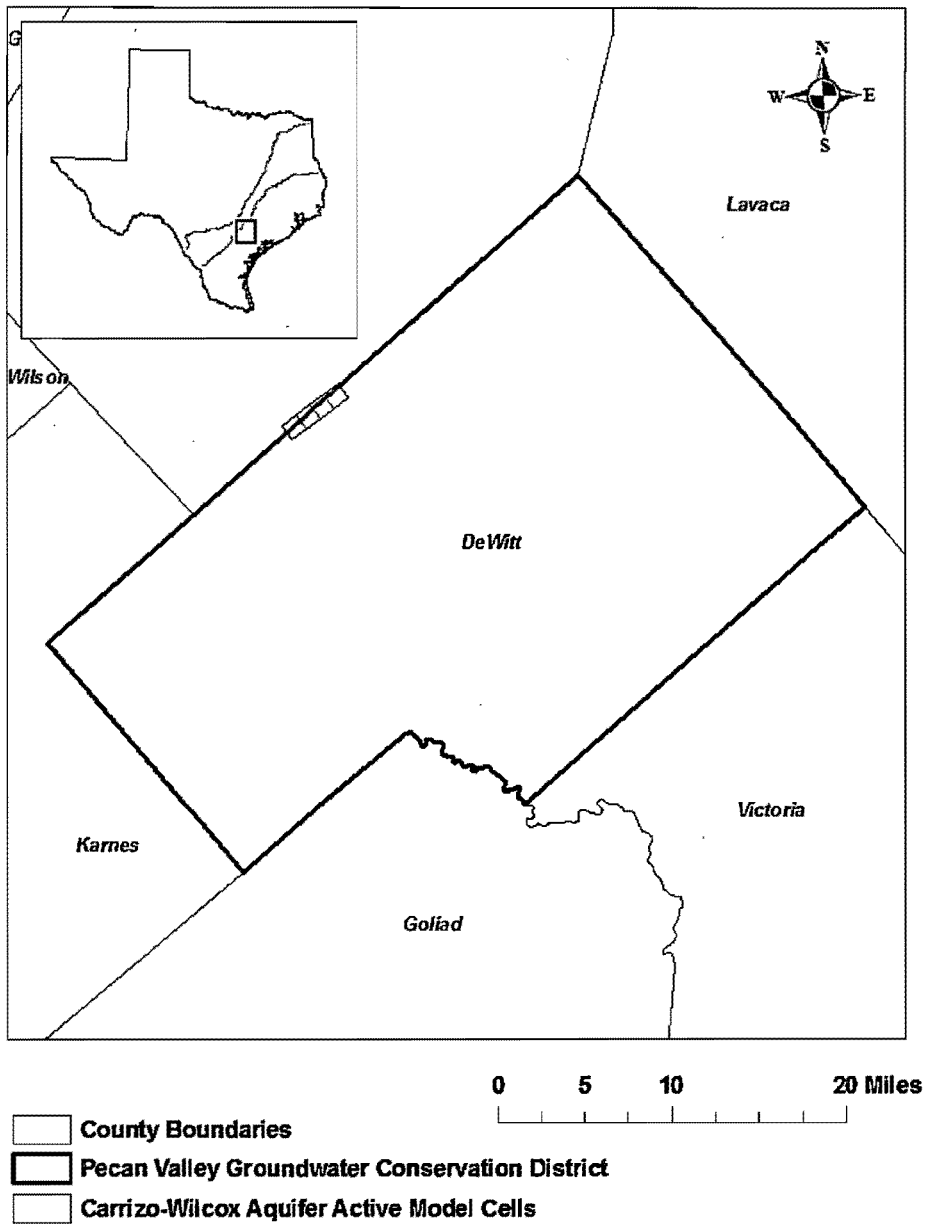

FIGURE 1. AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE CARRIZO-WILCOX AQUIFER FROM WHICH THE INFORMATION IN TABLE 1 WAS EXTRACTED (THE AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

TABLE 2. SUMMARIZED INFORMATION FOR THE GULF COAST AQUIFER SYSTEM FOR PECAN VALLEY GROUNDWATER CONSERVATION DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-FOOT.

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Gulf Coast Aquifer System	9,832
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Gulf Coast Aquifer System	9,967
Estimated annual volume of flow into the district within each aquifer in the district	Gulf Coast Aquifer System	1,854
Estimated annual volume of flow out of the district within each aquifer in the district	Gulf Coast Aquifer System	10,652
Estimated net annual volume of flow between each aquifer in the district	Flow from the Catahoula Formation into the Jasper Aquifer[1]	381
	Flow into the Catahoula Formation from underlying formations[2]	175

[1] Based on the general-head boundary flux from the groundwater availability model for the Yegua-Jackson Aquifer. A part of the flow from the Catahoula Formation confining system to the Jasper Aquifer represents flow to the Gulf Coast Aquifer System from deeper units and part represents flow within the Gulf Coast Aquifer System.

[2] Based on flux between layers 1 and 2 in the groundwater availability model for the Yegua-Jackson Aquifer.

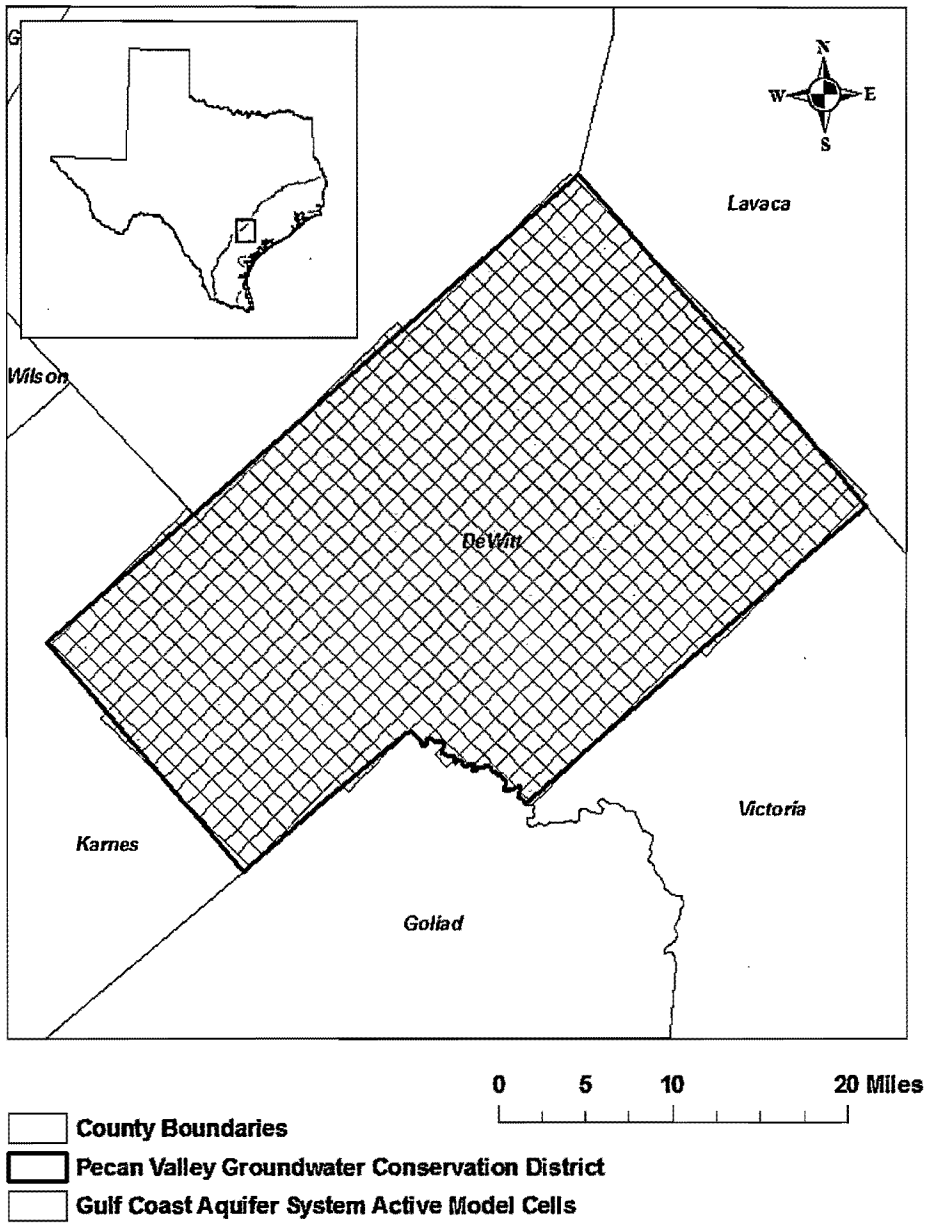

FIGURE 2. AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE GULF COAST AQUIFER SYSTEM FROM WHICH THE INFORMATION IN TABLE 2 WAS EXTRACTED (THE AQUIFER SYSTEM EXTENT WITHIN THE DISTRICT BOUNDARY).

LIMITATIONS:

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

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

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

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

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

REFERENCES:

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Waterstone Environmental Hydrology and Engineering Inc. and Parsons, 2003, Groundwater availability of the Central Gulf Coast Aquifer: Numerical Simulations to

2050, Central Gulf Coast, Texas Contract report to the Texas Water Development Board, 157 p.

Appendix C – Groundwater Availability Model Run 16-025 MAG

GAM RUN 16-025 MAG:
MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 15

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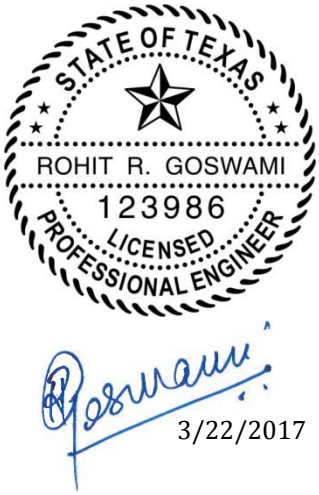
(512) 463-0495
March 22, 2017



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GAM RUN 16-025 MAG: MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 15

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March 22, 2017

EXECUTIVE SUMMARY:

The modeled available groundwater for Groundwater Management Area 15 for the Gulf Coast Aquifer System is summarized by decade for the groundwater conservation districts (Table 1) and for use in the regional water planning process (Table 2). The modeled available groundwater estimates range from approximately 515,000 acre-feet per year in 2020 to approximately 518,000 acre-feet per year in 2069(Table 1). The estimates were extracted from results of a model run using the groundwater availability model for the central part of the Gulf Coast Aquifer System (version 1.01). The model run files, which meet the desired future conditions adopted by district representatives of Groundwater Management Area 15, were submitted to the Texas Water Development Board (TWDB) on June 28, 2016, as part of the Desired Future Conditions Explanatory Report for Groundwater Management Area 15. The explanatory report and other materials submitted to the Texas Water Development Board (TWDB) were determined to be administratively complete on October 20, 2016.

REQUESTOR:

Mr. Tim Andruss, chair of Groundwater Management Area 15.

DESCRIPTION OF REQUEST:

In a letter dated June 23, 2016, Mr. Tim Andruss provided the TWDB with the desired future conditions of the Gulf Coast Aquifer System adopted by the groundwater conservation districts in Groundwater Management Area 15. The Gulf Coast Aquifer System includes the Chicot Aquifer, Evangeline Aquifer, Burkeville Confining Unit and the Jasper Aquifer (including parts of the Catahoula Formation). TWDB staff worked with INTERA Incorporated, the consultant for Groundwater Management Area 15, in reviewing

model files associated with the desired future conditions. We received clarification from INTERA Incorporated, on behalf of Groundwater Management Area 15, on September 18, 2016, concerning assumptions on variances of average drawdown values per county to model results, which was ±3.5 feet for nearly all areas within the Groundwater Management Area 15. The exception is Goliad County which has a variance in drawdown of ±5 feet. The desired future conditions for the Gulf Coast Aquifer System, as described in Resolution No. 2016-01 and adopted April 29, 2016, by the groundwater conservation districts within Groundwater Management Area 15, are described below:

Groundwater Management Area 15 [all counties]

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 13 feet in December 2069 from estimated year 2000 conditions.

Aransas County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 0 feet in December 2069 from estimated year 2000 conditions.

Bee County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 7 feet in December 2069 from estimated year 2000 conditions.

Calhoun County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 5 feet in December 2069 from estimated year 2000 conditions.

Colorado County

Drawdown shall not exceed an average of 17 feet in Chicot and Evangeline Aquifers and 23 feet in in the Jasper Aquifer in December 2069 from estimated year 2000 conditions.

DeWitt County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 17 feet in December 2069 from estimated year 2000 conditions.

Fayette County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 16 feet in December 2069 from estimated year 2000 conditions.

Goliad County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 10 feet in December 2069 from estimated year 2000 conditions.

Jackson County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 15 feet in December 2069 from estimated year 2000 conditions.

Karnes County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 22 feet in December 2069 from estimated year 2000 conditions.

Lavaca County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 18 feet in December 2069 from estimated year 2000 conditions.

Matagorda County

Drawdown shall not exceed an average of 11 feet in Chicot and Evangeline Aquifers in December 2069 from estimated year 2000 conditions.

Refugio County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 5 feet in December 2069 from estimated year 2000 conditions.

Victoria County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 5 feet in December 2069 from estimated year 2000 conditions.

Wharton County

Drawdown shall not exceed an average of 15 feet in Chicot and Evangeline Aquifers in December 2069 from estimated year 2000 conditions.

Based on the adopted desired future conditions, TWDB has estimated the modeled available groundwater for the Gulf Coast Aquifer System in Groundwater Management Area 15.

METHODS:

The groundwater availability model for the central part of the Gulf Coast Aquifer System (Figure 1) was run using the model files submitted with the explanatory report (GMA 15 and others, 2016). Model-calculated water levels were extracted for the year 2000 and the end of the year 2069, and drawdown was calculated as the difference between water levels at the beginning of 2000 and water levels at the end of 2069. Drawdown averages were calculated for each county by aquifer and for the entire Groundwater Management Area 15 by aquifer. As specified in the explanatory report (GMA 15 and others, 2016), drawdown for cells which became dry during the simulation (water level dropped below the base of the cell) were excluded from the averaging. The calculated drawdown averages were compared with the desired future conditions to verify that the pumping scenario achieved the desired future conditions within one foot.

The modeled available groundwater values were determined by extracting pumping rates by decade from the model results using ZONEBUDGET Version 3.01 (Harbaugh, 2009). Annual pumping rates are presented by county and groundwater conservation district, subtotaled by groundwater conservation district, and then summed by Groundwater Management Area 15 (Figure 2 and Table 1). Annual pumping rates are also presented by county, river basin, and regional water planning area within Groundwater Management Area 15 (Figure 2 and Table 2).

Modeled Available Groundwater and Permitting

As defined in Chapter 36 of the Texas Water Code, “modeled available groundwater” is the estimated average amount of water that may be produced annually to achieve a desired future condition. Groundwater conservation districts are required to consider modeled available groundwater, along with several other factors, when issuing permits in order to manage groundwater production to achieve the desired future condition(s). The other factors districts must consider include annual precipitation and production patterns, the estimated amount of pumping exempt from permitting, existing permits, and a reasonable estimate of actual groundwater production under existing permits.

PARAMETERS AND ASSUMPTIONS:

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

- Version 1.01 of the groundwater availability model for the central portion of the Gulf Coast Aquifer System was used for this analysis. See Chowdhury and others (2004) and Waterstone and others (2003) for assumptions and limitations of the model.

- The model has four layers which represent the Chicot Aquifer (Layer 1), the Evangeline Aquifer (Layer 2), the Burkeville Confining Unit (Layer 3), and the Jasper Aquifer and parts of the Catahoula Formation in direct hydrologic communication with the Jasper Aquifer (Layer 4).

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

- Drawdown averages and modeled available groundwater values are based on the extent of the model area rather than official aquifer boundaries (Figures 1 and 2).

- Drawdown for cells with water levels below the base elevation of the cell ("dry" cells) were excluded from the averaging per emails exchanged with INTERA, Inc. dated October 21, 2015.

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

- A model drawdown tolerance of up to 5 feet was assumed for Goliad County and up to 3.5 feet for the rest of Groundwater Management Area 15 when comparing desired future conditions (average drawdown values per county) to model drawdown results.

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

RESULTS:

The modeled available groundwater for the Gulf Coast Aquifer System that achieves the desired future conditions adopted by Groundwater Management Area 15 increases from approximately 515,000 acre-feet per year in 2020 to approximately 518,000 acre-feet per year in 2069 (Table 1). The modeled available groundwater is summarized by groundwater conservation district and county (Table 1). The modeled available groundwater has also been summarized by county, river basin, and regional water planning area for use in the regional water planning process (Table 2). Small differences of values between table summaries are due to rounding.

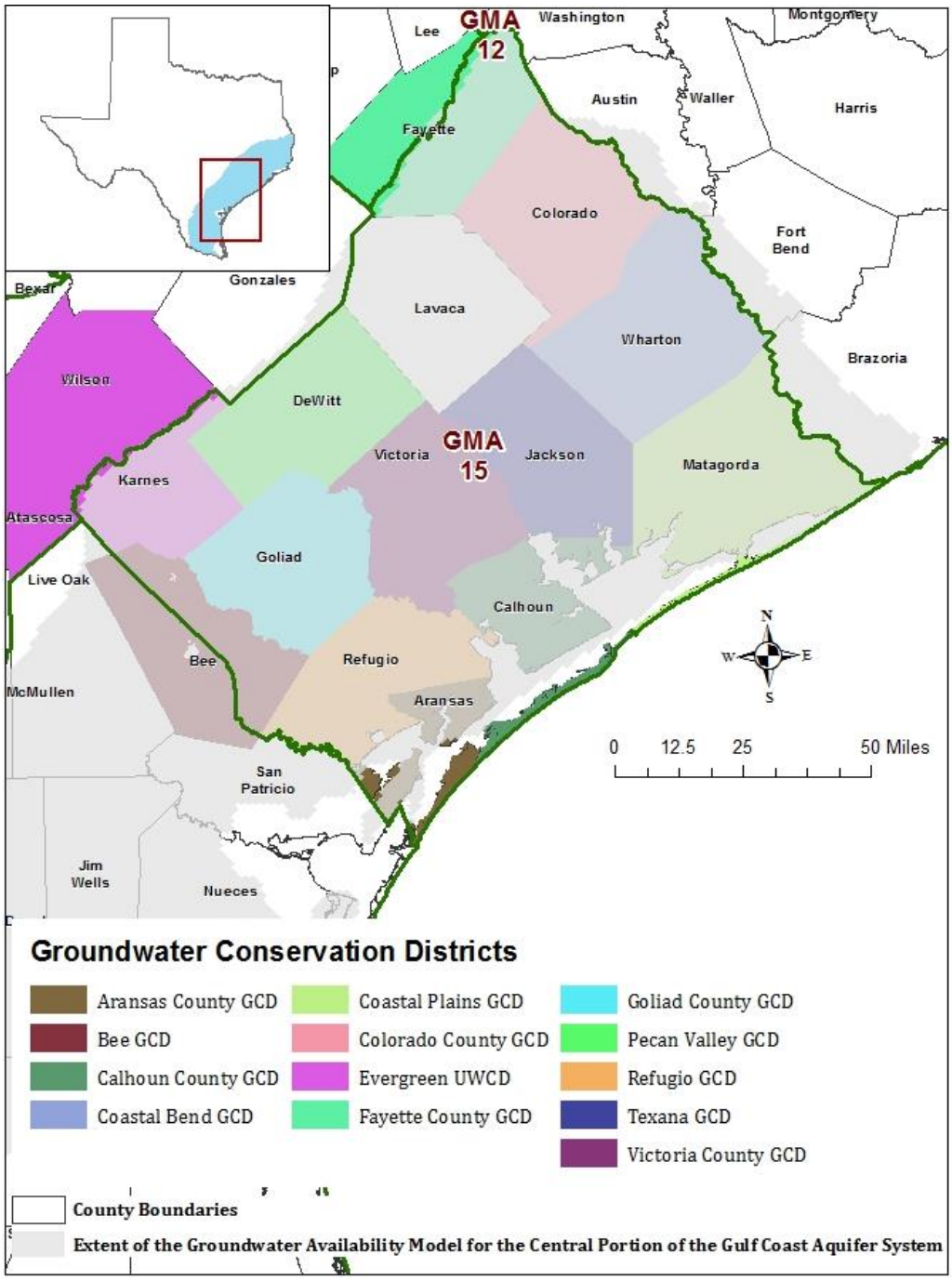


FIGURE 1. MAP SHOWING GROUNDWATER CONSERVATION DISTRICTS (GCDS) AND COUNTIES IN GROUNDWATER MANAGEMENT AREA 15 OVERLAIN ON THE EXTENT OF THE GROUNDWATER AVAILABILITY MODEL FOR THE CENTRAL PORTION OF THE GULF COAST AQUIFER SYSTEM.

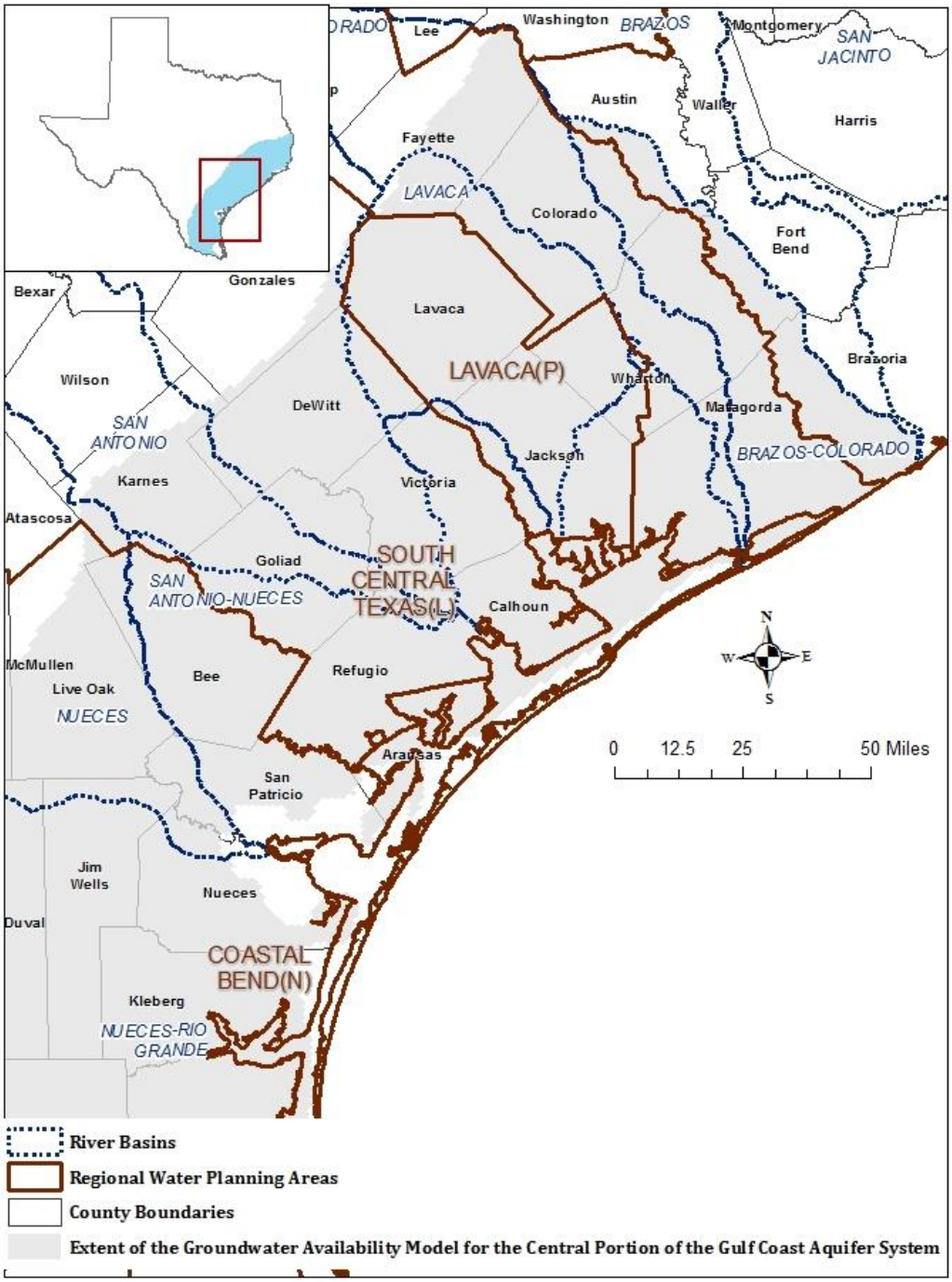


FIGURE 2. MAP SHOWING REGIONAL WATER PLANNING AREAS, GROUNDWATER CONSERVATION DISTRICTS (GCDS), COUNTIES, AND RIVER BASINS IN GROUNDWATER MANAGEMENT AREA 15 OVERLAIN ON THE EXTENT OF THE GROUNDWATER AVAILABILITY MODEL FOR THE CENTRAL PORTION OF THE GULF COAST AQUIFER SYSTEM.

TABLE 1. MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 15 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2010 AND 2069. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District	County	Aquifer	2010	2020	2030	2040	2050	2060	2069
Aransas County GCD Total	**Aransas**	**Gulf Coast Aquifer System**	**1,542**	**1,542**	**1,542**	**1,542**	**1,542**	**1,542**	**1,542**
Bee County GCD Total	**Bee**	**Gulf Coast Aquifer System**	**9,456**	**9,456**	**9,431**	**9,431**	**9,379**	**9,379**	**9,361**
Calhoun County GCD Total	**Calhoun**	**Gulf Coast Aquifer System**	**2,569**	**7,565**	**7,565**	**7,565**	**7,565**	**7,565**	**7,565**
Coastal Bend GCD Total	**Wharton**	**Gulf Coast Aquifer System (Chicot and Evangeline)**	**181,168**	**181,168**	**181,168**	**181,168**	**181,168**	**181,168**	**181,168**
Coastal Plains GCD Total	**Matagorda**	**Gulf Coast Aquifer System (Chicot and Evangeline)**	**38,828**	**38,828**	**38,828**	**38,828**	**38,828**	**38,828**	**38,828**
Colorado County GCD	Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	79,780	74,964	74,964	72,765	72,765	71,618	71,618
Colorado County GCD	Colorado	Gulf Coast Aquifer System (Jasper)	918	918	918	918	918	918	918
Colorado County GCD Total	**Colorado**	**Gulf Coast Aquifer System**	**80,698**	**75,882**	**75,882**	**73,683**	**73,683**	**72,536**	**72,536**
Evergreen UWCD Total	**Karnes**	**Gulf Coast Aquifer System**	**10,196**	**10,196**	**10,196**	**3,015**	**2,917**	**2,751**	**2,751**
Fayette County GCD Total	**Fayette**	**Gulf Coast Aquifer System**	**1,977**	**1,853**	**1,853**	**1,853**	**1,853**	**1,853**	**1,703**
Goliad County GCD Total	**Goliad**	**Gulf Coast Aquifer System**	**11,420**	**11,539**	**11,539**	**11,539**	**11,539**	**11,552**	**11,539**

Groundwater Conservation District	County	Aquifer	2010	2020	2030	2040	2050	2060	2069
Pecan Valley GCD Total	**DeWitt**	**Gulf Coast Aquifer System**	**15,471**	**15,476**	**15,476**	**14,485**	**14,485**	**14,485**	**14,485**
Refugio GCD Total	**Refugio**	**Gulf Coast Aquifer System**	**5,847**	**5,847**	**5,847**	**5,847**	**5,847**	**5,847**	**5,847**
Texana GCD Total	**Jackson**	**Gulf Coast Aquifer System**	**76,787**	**90,482**	**90,482**	**90,482**	**90,482**	**90,482**	**90,482**
Victoria County GCD Total	**Victoria**	**Gulf Coast Aquifer System**	**35,640**	**44,974**	**49,970**	**54,966**	**54,966**	**59,963**	**59,963**
Total (GCDs)		**Gulf Coast Aquifer System**	**471,599**	**494,808**	**499,779**	**494,404**	**494,254**	**497,951**	**497,770**
No District-County	Bee	Gulf Coast Aquifer System	10	10	10	10	10	10	10
No District-County	Lavaca	Gulf Coast Aquifer System	20,253	20,253	20,253	20,253	20,253	20,253	20,239
No district-County Total		**Gulf Coast Aquifer System**	**20,263**	**20,263**	**20,263**	**20,263**	**20,263**	**20,263**	**20,249**
Total for GMA 15		**Gulf Coast Aquifer System**	**491,862**	**515,071**	**520,042**	**514,667**	**514,517**	**518,214**	**518,019**

TABLE 2 MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 15. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), RIVER BASIN, AND AQUIFER.

County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060
Aransas	N	San Antonio- Nueces	Gulf Coast Aquifer System	1,542	1,542	1,542	1,542	1,542
Bee	N	San Antonio- Nueces	Gulf Coast Aquifer System	9,439	9,414	9,414	9,362	9,362
Bee	N	Nueces	Gulf Coast Aquifer System	27	27	27	27	27
Calhoun	L	Colorado- Lavaca	Gulf Coast Aquifer System	5,210	5,210	5,210	5,210	5,210
Calhoun	L	Guadalupe	Gulf Coast Aquifer System	18	18	18	18	18
Calhoun	L	Lavaca-Guadalupe	Gulf Coast Aquifer System	2,330	2,330	2,330	2,330	2,330
Calhoun	L	San Antonio- Nueces	Gulf Coast Aquifer System	7	7	7	7	7
Colorado	K	Brazos-Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	15,342	15,342	15,342	15,342	15,342
Colorado	K	Brazos-Colorado	Gulf Coast Aquifer System (Jasper Aquifer)	49	49	49	49	49
Colorado	K	Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	20,506	20,506	20,066	20,066	20,066
Colorado	K	Colorado	Gulf Coast Aquifer System (Jasper Aquifer)	273	273	273	273	273
Colorado	K	Lavaca	Gulf Coast Aquifer System (Chicot and Evangeline)	39,116	39,116	37,357	37,357	36,210
Colorado	K	Lavaca	Gulf Coast Aquifer System (Jasper Aquifer)	596	596	596	596	596
Dewitt	L	Guadalupe	Gulf Coast Aquifer System	11,358	11,358	10,470	10,470	10,470
Dewitt	L	Lavaca-Guadalupe	Gulf Coast Aquifer System	417	417	417	417	417
Dewitt	L	Lavaca	Gulf Coast Aquifer System	2,935	2,935	2,935	2,874	2,874
Dewitt	L	San Antonio	Gulf Coast Aquifer System	766	766	724	724	724

County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060
Fayette	K	Brazos	Gulf Coast Aquifer System	2	2	2	2	2
Fayette	K	Colorado	Gulf Coast Aquifer System	989	989	989	989	989
Fayette	K	Lavaca	Gulf Coast Aquifer System	862	862	862	862	862
Goliad	L	Guadalupe	Gulf Coast Aquifer System	4,377	4,377	4,377	4,377	4,380
Goliad	L	San Antonio- Nueces	Gulf Coast Aquifer System	1,190	1,190	1,190	1,190	1,195
Goliad	L	San Antonio	Gulf Coast Aquifer System	5,972	5,972	5,972	5,972	5,977
Jackson	P	Colorado-Lavaca	Gulf Coast Aquifer System	28,025	28,025	28,025	28,025	28,025
Jackson	P	Lavaca-Guadalupe	Gulf Coast Aquifer System	12,875	12,875	12,875	12,875	12,875
Jackson	P	Lavaca	Gulf Coast Aquifer System	49,582	49,582	49,582	49,582	49,582
Karnes	L	Guadalupe	Gulf Coast Aquifer System	11	11	11	11	11
Karnes	L	Nueces	Gulf Coast Aquifer System	1,057	1,057	78	78	78
Karnes	L	San Antonio	Gulf Coast Aquifer System	9,082	9,082	2,880	2,782	2,616
Karnes	L	San Antonio-Nueces	Gulf Coast Aquifer System	46	46	46	46	46
Lavaca	P	Guadalupe	Gulf Coast Aquifer System	41	41	41	41	41
Lavaca	P	Lavaca-Guadalupe	Gulf Coast Aquifer System	401	401	401	401	401
Lavaca	P	Lavaca	Gulf Coast Aquifer System	19,811	19,811	19,811	19,811	19,811
Matagorda	K	Brazos-Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	15,282	15,282	15,282	15,282	15,282
Matagorda	K	Colorado-Lavaca	Gulf Coast Aquifer System (Chicot and Evangeline)	20,329	20,329	20,329	20,329	20,329
Matagorda	K	Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	3,217	3,217	3,217	3,217	3,217
Refugio	L	San Antonio- Nueces	Jasper Aquifer	5,526	5,526	5,526	5,526	5,526
Refugio	L	San Antonio	Gulf Coast Aquifer System	321	321	321	321	321
Victoria	L	Guadalupe	Gulf Coast Aquifer System	17,600	22,596	27,592	27,592	27,592
Victoria	L	Lavaca-Guadalupe	Gulf Coast Aquifer System	25,451	25,451	25,451	25,451	30,448
Victoria	L	Lavaca	Gulf Coast Aquifer System	234	234	234	234	234
Victoria	L	San Antonio	Gulf Coast Aquifer System	1,689	1,689	1,689	1,689	1,689

County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060
Wharton	K	Brazos-Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	50,527	50,527	50,527	50,527	50,527
Wharton	K	Colorado-Lavaca	Gulf Coast Aquifer System (Chicot and Evangeline)	16,196	16,196	16,196	16,196	16,196
Wharton	P	Colorado-Lavaca	Gulf Coast Aquifer System (Chicot and Evangeline)	14,091	14,091	14,091	14,091	14,091
Wharton	K	Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	35,910	35,910	35,910	35,910	35,910
Wharton	P	Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	873	873	873	873	873
Wharton	K	Lavaca	Gulf Coast Aquifer System (Chicot and Evangeline)	579	579	579	579	579
Wharton	P	Lavaca	Gulf Coast Aquifer System (Chicot and Evangeline)	62,992	62,992	62,992	62,992	62,992
GMA 15 Total			**Gulf Coast Aquifer System**	**515,071**	**520,042**	**514,667**	**514,517**	**518,214**

LIMITATIONS:

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

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

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

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

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

REFERENCES:

Chowdhury, A., Wade, S., Mace, R.E., and Ridgeway, C. 2004. Groundwater Availability of the Central Gulf Coast Aquifer System: Numerical Simulations through 1999: Texas Water Development Board, unpublished report.

Harbaugh, A. W., 2009, Zonebudget Version 3.01, A computer program for computing subregional water budgets for MODFLOW ground-water flow models, U.S. Geological Survey Groundwater Software.

Harbaugh, A.W. and McDonald, M.G., 1996, User's documentation for MODFLOW-96, an update to the U.S. Geological Survey Modular Finite-Difference Ground-Water Flow Model: U.S. Geological Survey, Open-File Report 96-485.

National Research Council, 2007, Models in Environmental Regulatory Decision Making Committee on Models in the Regulatory Decision Process, National Academies Press, Washington D.C., 287 p., http://www.nap.edu/catalog.php?record_id=11972.

Texas Water Code, 2011, http://www.statutes.legis.state.tx.us/docs/WA/pdf/WA.36.pdf.

Waterstone Engineering, Inc., and Parsons, Inc., 2003, Groundwater Availability of the Central Gulf Coast Aquifer: Numerical Simulations to 2050, Central Gulf Coast, Texas: Contract draft report submitted to Texas Water Development Board

Appendix D – Public Notices Regarding Hearing Related to Plan Adoption

PECAN VALLEY GROUNDWATER CONSERVATION DISTRICT
Board of Directors

Notice of Hearing and Public Meeting

The Board of Directors of the Pecan Valley Groundwater Conservation District will conduct a public hearing on the proposed Revised Management Plan. These hearings are conducted to receive comments and suggestions from the public concerning the proposed Revised Management Plan of the District. The hearing will be held at 9:00 A.M., Tuesday, January 15 at the Pecan Valley Groundwater Conservation District Office, located at 107 N. Gonzales Street, Cuero, Texas. A copy of the proposed Revised Management Plan may be reviewed or copied at the Pecan Valley GCD Office or on the District website at www.pvgcd.org.

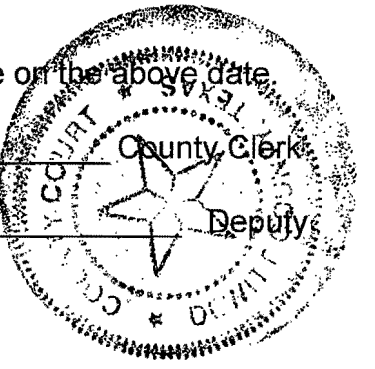
Certificate of Posting

The above Notice of Meeting was posted at 3:25 pm on Wednesday January 2, 2019 at a place convenient to the public on a bulletin board in the DeWitt County Courthouse at Cuero, Texas.

WITNESS MY HAND AND SEAL of office on the above date.

Natalie Carlson County Clerk

by Brandi Reupes Deputy



AFFIDAVIT OF PUBLICATION

THE STATE OF TEXAS §
COUNTY OF DE WITT §
§
§

BEFORE ME, the undersigned authority, a Notary Public in and for the State of Texas, on this day personally appeared Glenn Rea, who after being by me duly sworn, upon oath says that he/she is a representative of Yoakum News-View a newspaper in general circulation in DeWitt County, Texas which newspaper satisfies each of the requirements of Subchapter C, Chapter 2051, as amended, Texas Government Code, so as to constitute an official publication in which legal notices may be published as set forth in said newspaper.

Publisher further deposes and says that the attached notice was published in said newspaper on the following date(s) to wit: 1-2-19

Pecan Valley Groundwater Conservation District Board of Directors Notice of Hearing and Public Meeting - Proposed Revised Management Plan.

Glenn Rea
Editor and Publisher

SUBSCRIBED AND SWORN TO before me, the undersigned authority, on the 2nd day of January, 2019, to verify which witness my hand and seal of office.

Shannon Heinold
Notary Public
State of Texas

SHANNON HEINOLD
Notary Public, State of Texas
Notary ID # 13093329-4
My Commission Expires
December 15, 2020

AFFIDAVIT OF PUBLICATION

THE STATE OF TEXAS §
COUNTY OF DE WITT §
§
§

BEFORE ME, the undersigned authority, a Notary Public in and for the State of Texas, on this day personally appeared Glenn Rea, who after being by me duly sworn, upon oath says that he/she is a representative of The Cuero Record, a newspaper in general circulation in DeWitt County, Texas which newspaper satisfies each of the requirements of Subchapter C, Chapter 2051, as amended, Texas Government Code, so as to constitute an official publication in which legal notices may be published as set forth in said newspaper.

Publisher further deposes and says that the attached notice was published in said newspaper on the following date(s) to wit: 1-2-19

Pecan Valley Groundwater Conservation District Board of Directors Notice of Hearing and Public Meeting - Proposed Revised Management Plan.

Glenn Rea
Editor and Publisher

SUBSCRIBED AND SWORN TO before me, the undersigned authority, on the 2nd day of January, 2019, to verify which witness my hand and seal of office.

Notary Public
State of Texas

SHANNON HEINOLD
Notary Public, State of Texas
Notary ID # 13093329-4
My Commission Expires
December 15, 2020

Appendix E – Letters Coordinating with Regional Surface Water Management Entities

PECAN VALLEY GROUNDWATER CONSERVATION DISTRICT
107 N. Gonzales, Cuero, Texas 77954
(361) 275-8188
E-Mail: director@pvgcd.org Website: www.pvgcd.org

January 29, 2019

Ecleto Water District
491 N. Sunset Strip, Ste. 103
Kenedy, Texas 78119

RE: Pecan Valley Groundwater Conservation District Revised Management Plan

Please find attached to this letter a copy of the Revised Management Plan for Pecan Valley Groundwater Conservation District. A public hearing was held on January 15, 2019 with no comments being submitted verbally or in writing. The District approved the plan and signed the resolution adopting the Revised Management Plan on January 15, 2019.

If you have any questions, please contact the District.

Sincerely,

C Krause

Charlotte Krause
General Manager

PECAN VALLEY GROUNDWATER CONSERVATION DISTRICT
107 N. Gonzales, Cuero, Texas 77954
(361) 275-8188
E-Mail: director@pvgcd.org Website: www.pvgcd.org

January 29, 2019

Guadalupe Blanco River Authority
933 East Court Street
Sequin, Texas 78155

RE: Pecan Valley Groundwater Conservation District Revised Management Plan

Please find attached to this letter a copy of the Revised Management Plan for Pecan Valley Groundwater Conservation District. A public hearing was held on January 15, 2019 with no comments being submitted verbally or in writing. The District approved the plan and signed the resolution adopting the Revised Management Plan on January 15, 2019.

If you have any questions, please contact the District.

Sincerely,

CKrause

Charlotte Krause
General Manager

PECAN VALLEY GROUNDWATER CONSERVATION DISTRICT
107 N. Gonzales, Cuero, Texas 77954
(361) 275-8188
E-Mail: director@pvgcd.org Website: www.pvgcd.org

January 29, 2019

City of Yorktown
Attn: City Manager
P.O. Box 605
Yorktown, Texas 78164

RE: Pecan Valley Groundwater Conservation District Revised Management Plan

Please find attached to this letter a copy of the Revised Management Plan for Pecan Valley Groundwater Conservation District. A public hearing was held on January 15, 2019 with no comments being submitted verbally or in writing. The District approved the plan and signed the resolution adopting the Revised Management Plan on January 15, 2019.

If you have any questions, please contact the District.

Sincerely,

Charlotte Krause
General Manager

PECAN VALLEY GROUNDWATER CONSERVATION DISTRICT
107 N. Gonzales, Cuero, Texas 77954
(361) 275-8188
E-Mail: director@pvgcd.org Website: www.pvgcd.org

January 29, 2019

DeWitt County Drainage District 1
106 N. Gonzales, Ste. B
Cuero, Texas 77954

RE: Pecan Valley Groundwater Conservation District Revised Management Plan

Please find attached to this letter a copy of the Revised Management Plan for Pecan Valley Groundwater Conservation District. A public hearing was held on January 15, 2019 with no comments being submitted verbally or in writing. The District approved the plan and signed the resolution adopting the Revised Management Plan on January 15, 2019.

If you have any questions, please contact the District.

Sincerely,

C Krause

Charlotte Krause
General Manager

Appendix F – Pecan Valley Groundwater Conservation District Board of Director Resolution Adopting Revised Management Plan

RESOLUTION

Resolution Number: 2019-01-15

Resolution Adopting the Revised Pecan Valley Groundwater Conservation District Management Plan

WHEREAS on January 2, 2019, a Notice of Hearing was posted at the DeWitt County Courthouse and published in the Cuero Record, Yorktown News and Yoakum Herald Times newspapers regarding a public hearing on the adoption of the Revised Pecan Valley Groundwater Conservation District Management Plan; and

WHEREAS on January 15,2019, the Pecan Valley Groundwater Conservation District Board of Directors, with a quorum being present, conducted a public hearing regarding the adoption of the Revised Pecan Valley Groundwater Conservation District Management Plan;

NOW THEREFORE BE IT RESOLVED that the Revised Pecan Valley Groundwater Conservation District Management Plan is **ADOPTED** as described in the Pecan Valley Groundwater Conservation District Management Plan attached hereto and made part hereof for all purposes and that said Management Plan be submitted to the Executive Administrator of the Texas Water Development Board for review and approval.

ADOPTED by a vote of 5 ayes and 0 nays on the **15th day of January 2019**.

Darnell Krippa - Board President

I, the undersigned, do hereby certify that the above **Resolution was adopted** by the Board of Directors of the Pecan Valley Groundwater Conservation District on the **15th day of January 2019.**

Wilbert Sauermilch – Board Secretary

Appendix G – Minutes of Pecan Valley Groundwater Conservation District Board of Directors Meetings related to the public hearing for and adoption of the Management Plan

PECAN VALLEY GROUNDWATER CONSERVATION DISTRICT
107 N. GONZALES CUERO, TX 77954
BOARD MEETING MINUTES
JANUARY 15, 2019 – 9:00 A.M.

Board Members Present: Darnell Knippa, Chairman (Pct. 2), Clem Waskow, Vice-Chairman (At Large), Tim Pennell, Director (Pct. 1), Wilbert Sauermilch, Secretary/Treasurer (Pct. 3) and Marvin Sager, Director (Pct. 4)

Also in attendance: Charlotte Krause, GM, Carole Moore, Admin. Assistant

1. Call to order: The meeting was called to order by the Chairman at 9:00 A.M.

2. Welcome guests: Donald Goldman and Trey Parma, (Goldman, Hunt & Notz), Robert Egg

3. Public comment: Robert Egg said he would like to see blue in the new office building for fresh water.

4. Oath of Office – Tim Pennell, Wilbert Sauermilch: Oaths of Office were completed

5. Election of Officers: A motion to keep the same slate of officers for 2019 was made by Tim Pennell, seconded by Marvin Sager, and carried unanimously.

PUBLIC HEARINGS OPENED AT 9:05 A.M.

6. Public hearing on proposed Revised Management Plan
   a. Public Hearing on Proposed Revised Management Plan: No public comment or objection stated.

   b. Discussion and possible action on Revised Management Plan: A motion to approve the Revised Management Plan as presented was made by Tim Pennell, seconded by Clem Waskow, which carried unanimously.

PUBLIC HEARINGS CLOSED AT 9:22 A.M.

7. Presentation and discussion on Annual Audit from Goldman Hunt & Notz: Donald Goldman summarized the annual outside financial audit and he stated PVGCD is very sound financially.

8. Minutes from 12-18-18 Meeting (provided prior to meeting): A motion to approve the minutes as presented was made by Marvin Sager, seconded by Clem Waskow, which carried unanimously.

9. Financial Report – December: A motion to approve the December Financial Report as presented was made by Wilbert Sauermilch, seconded by Marvin Sager, which carried unanimously.

10. Discussion and possible action on Investment Report – December (provided prior to meeting): Investment report tabled until February Board Meeting.

11. Report on uncontested permits: The General Manger gave the report on the uncontested permits. (Report attached to the minutes.)

12. Discussion and possible action on construction project and payment of contractor:
    a. Possible Site Visit – A motion to recess and go to make a site visit was made by Tim Pennell, seconded by Clem Waskow, which carried unanimously. Recessed at 11:04 A.M. Reconvened at 11:15 A.M.
    b. Interior Colors - No action taken.
    c. Site issues – No action taken.

13. Adjourn: The meeting adjourned at 11:37 A.M. with a motion by Tim Pennell, seconded by Marvin Sager, which carried unanimously.

_____
Sec/Wilbert Sauermilch
Recorded: Carole Moore, Admin. Assistant

Appendix H – Pecan Valley Groundwater Conservation District contact information

District Contact Information

Mailing Address:

107 N. Gonzales Street
Cuero, TX 77954

Email Address:

director@pvgcd.org

Phone Number:

(361) 275-8188

Board of Directors:

Mr. Darnell Knippa, President
Mr. Clem Waskow, Vice President
Mr. Wilbert Sauermilch, Secretary/Treasurer
Mr. Marvin Sager, Director
Mr. Tim Pennell, Director

Staff:

Ms. Charlotte Krause, General Manager
Ms. Carole Moore, Administrative Assistant