

Appendices

Appendix 1

Appendix 1:

Rule 5.1.2

SECTION 5. PRODUCTION LIMITATIONS.

RULE 5.1. MAXIMUM ALLOWABLE PRODUCTION.

1. A non-exempt well or well system may not be drilled and equipped for the production of a cumulative total of more than 10 gallons per minute (GPM) per contiguous acre owned or controlled by the well owner or operator, and each well having a production capacity of 1000 gpm. or more, shall have monitoring equipment reasonably required by the District and be capable for use as a monitoring well. [Amended July 12, 2005]
2. Excluding wells operated pursuant to an historic use permit, in no event may a non-exempt well or well system be operated such that the total annual production exceeds 2 acre feet of water per contiguous acre owned or controlled by the landowner, well owner, or well operator, as applicable. If the production of water for a Management Zone reaches the level at which reductions in the permitted amounts are made under Section 16, the maximum amount of groundwater that is authorized by a permit within that Management Zone shall be reduced by the percentage amount that the permitted production is reduced for that Management Zone under Section 16, unless the Board finds the reduced production will likely be for a limited period. [Amended April 8, 2008]

Appendix 2

- 1. The District's Permits and Pumping July 2013 File.*
- 2. This is an Excel File and is on the enclosed disc ONLY.*
- 3. The Carizzo Aquifer is labeled as the Carrizo-Wilcox Aquifer.*

Appendix 3

Appendix 3:

Table 8-1. Modeled Available Groundwater Values Calculated for 2060 by the TWDB based on the DFCs adopted by GMA 8 and 12

Aquifer	Acre-ft/year (AFY)
Brazos River Alluvium	
Declared a Non-relevant Aquifer in GMA 8	NA
In Milam and Burleson County and in GMA 12	25,138 ¹
Aquifers in Trinity GAM	
Paluxy	0 ²
Glen Rose	149 ²
Hensel	36 ²
Hosston	103 ²
Subtotal	288
Aquifers in the Queen City/Sparta GAM	
Sparta	6,734 ³
Queen City	502 ⁴
Carrizo	7,059 ⁵
Upper Wilcox (Calvert Bluff Fm)	1,038 ⁵
Middle Wilcox (Simsboro Fm)	48,501 ⁵
Lower Wilcox (Hooper Fm)	4,422 ⁵
Subtotal	68,256
Yegua-Jackson Aquifer	12,923 ⁶
Total	106,605

¹ GTA AQUIFER ASSESSMENT 10-20 MAG(Bradley,2011)

² GAM RUN 10-063 MAG(Oliver and Bradley, 2011)

³ GAM RUN 10-046 MAG(Oliver, 2012a)

⁴ GAM RUN 10-045 MAG(Oliver, 2012b)

⁵ GAM RUN 10-044 MAG(Oliver, 2012c)

⁶ GAM RUN 10-060MAG(Oliver, 2012d)

NOTES:

- Table 8-1 is from the District's Management Plan adopted October 9, 2012.
- MAGs displayed in Table 8-1 are for the year 2060.

Appendix 4

Update of Preliminary Groundwater Modeling Results

PRESENTED TO:
GROUNDWATER MANAGEMENT AREA 12

FEBRUARY 25, 2015



Model Simulations

- ▶ Assemble data to update groundwater pumping in model from 1999 through 2010 for GMA 12.
- ▶ Utilize Central Queen City-Sparta GAM extended to 2070 for simulations.
- ▶ Comparison of results to current desired future conditions.

Model Simulations (cont'd)

Predictive Scenario 1 (PS1)

- ▶ Perform model simulation from 2000 to 2070 based on current permits within the GCDs being fully utilized beginning in 2015.
- ▶ Develop estimates of average drawdown in 2070 from 2000 by aquifer and GCD.



Model Simulations (cont'd)

Predictive Scenario 2 (PS2)

- ▶ Utilizing current permits within each GCD, estimate the ramp up in pumping beginning in 2015 to 2070. Gradual increases in pumping mainly controlled by increases in public supply water usage.
- ▶ Perform simulation to calculate average drawdown in 2070 from 2000.

Model Simulations (cont'd)

Predictive Scenario 3 (PS3)

- ▶ Update of PS1
- ▶ Updated pumping numbers by LPGCD and FCGCD
- ▶ Confirmed pumping numbers by BVGCD and METGCD
- ▶ POSGCD pumping numbers remain preliminary
- ▶ Perform simulation to calculate average drawdown in 2070 from 2000.

Model Simulations (cont'd)

Predictive Scenario 4 (PS4)

- ▶ Update of PS2
- ▶ Updated pumping numbers by LPGCD and FCGCD
- ▶ Confirmed pumping numbers by BVGCD and METGCD
- ▶ POSGCD pumping numbers remain preliminary
- ▶ Perform simulation to calculate average drawdown in 2070 from 2000.

Current MAGs

From 2010 planning

Year 2060 Managed Available Groundwater in Acre-Feet

District	Brazos River		Calvert Bluff		Simsboro Hooper		Queen City		Yegua-Jackson		Total
	Alluvium	Carrizo	Bluff	Bluff	Simsboro	Hooper	Queen City	City	Sparta	Jackson	
Brazos Valley	-	5,496	1,755	96,185	316	529	7,923	7,071	119,275		
Fayette County	-	1,000	-	-	-	570	3,729	5,762	11,061		
Lost Pines	-	12,052	3,985	37,249	2,592	1,133	1,877	-	58,888		
Mid-East Texas	-	11,088	3,912	7,170	827	974	3,334	1,122	28,427		
Post Oak Savannah	25,138	7,059	1,038	48,501	4,422	502	6,734	12,923	106,377		
GMA 12	-	36,695	10,690	189,105	8,157	3,688	23,597	26,878	323,968		



Predictive Scenario 1 Pumping

Year 2070 in Acre-Feet

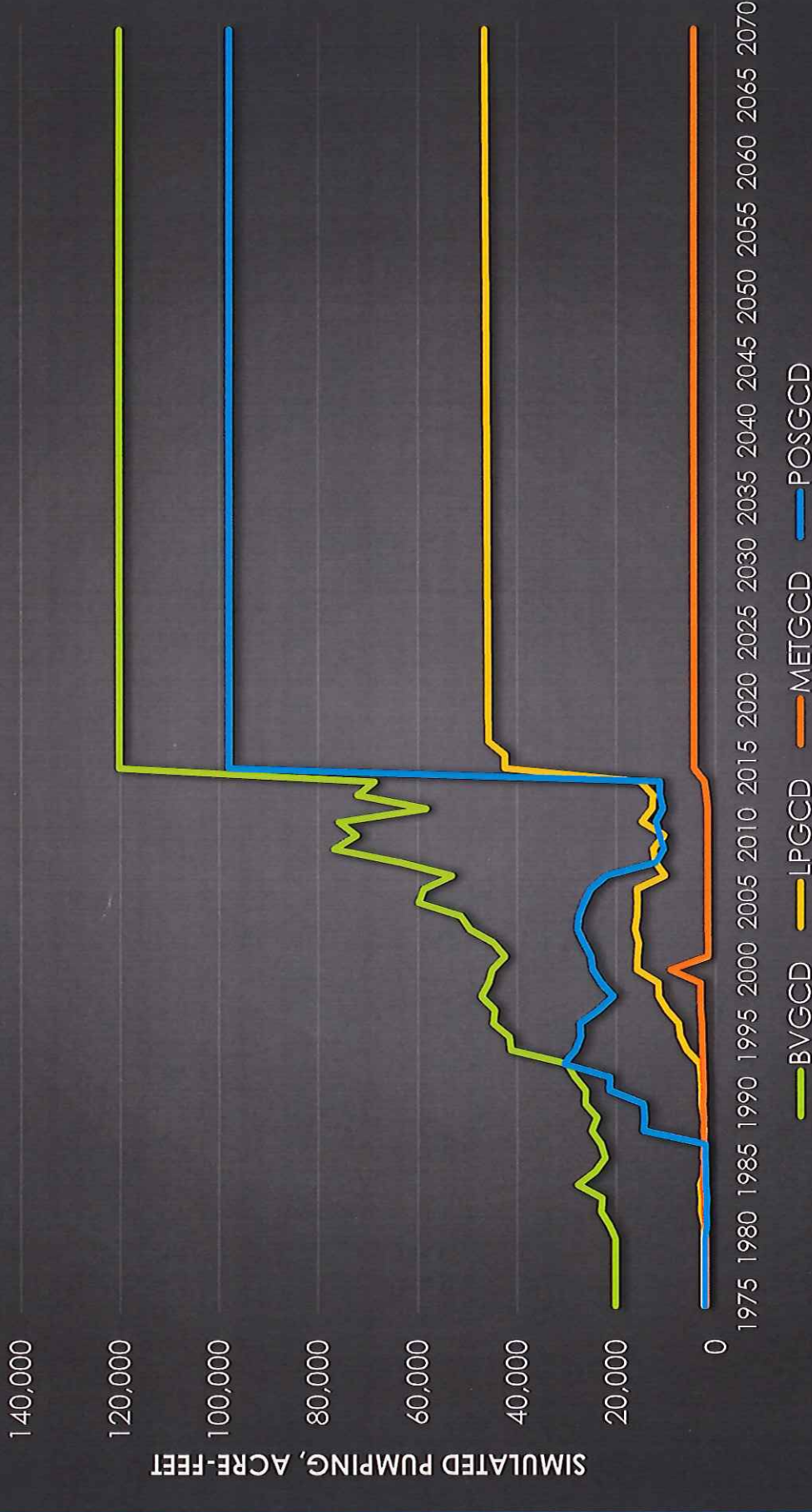
District	Carizzo	Calvert Bluff	Simsboro	Hooper	Queen City	Sparta	Total
Brazos Valley	4,748	3,184	120,252	1,831	1,157	9,228	140,400
Fayette County	1,000	-	-	-	1,857	7,249	10,107
Losf Pines	17,091	4,056	46,621	673	2,648	872	71,962
Mid-East Texas	2,852	6,345	4,380	5,550	1,249	5,112	25,488
Post Oak Savannah	17,841	1,486	98,079	5,321	385	1,862	124,974
GMA 12	43,533	15,071	269,333	13,375	7,296	24,322	372,931

Preliminary



Predictive Scenario 1

Simsboro Pumping



Preliminary



Predictive Scenario 2 Pumping

Year 2070 in Acre-Feet

District	Carrizo	Calvert Bluff	Simsboro	Hooper	Queen City	Sparta	Total
Brazos Valley	4,748	3,184	120,252	1,831	1,157	9,228	140,400
Fayette County	1,000	-	-	-	1,857	7,249	10,107
Lost Pines	11,509	3,906	45,213	673	1,084	565	62,949
Mid-East Texas	2,851	6,305	4,342	5,527	1,245	5,093	25,363
Post Oak Savannah	9,604	575	70,926	3,059	490	1,577	86,231
GMA 12	29,712	13,970	240,734	11,090	5,833	23,712	325,051

Preliminary



Predictive Scenario 2

Simsboro Pumping



Preliminary



Predictive Scenario 3 Pumping

Year 2070 in Acre-Feet

District	Carrizo	Calvert Bluff	Simsboro	Hooper	Queen City	Sparta	Total
Brazos Valley	4,765	3,207	120,262	1,832	1,158	9,259	140,485
Fayette County	1,985	-	-	-	2,709	2,802	7,496
Lost Pines	17,092	4,057	64,926	673	2,648	872	90,269
Mid-East Texas	2,852	6,345	4,380	5,550	1,249	5,112	25,488
Post Oak Savannah	17,841	1,486	98,079	5,321	385	1,862	124,974
GMA 12	44,536	15,095	287,648	13,376	8,149	19,907	388,711

Preliminary



Predictive Scenario 3

Simsboro Pumping



Preliminary



Predictive Scenario 4 Pumping

Year 2070 in Acre-Feet

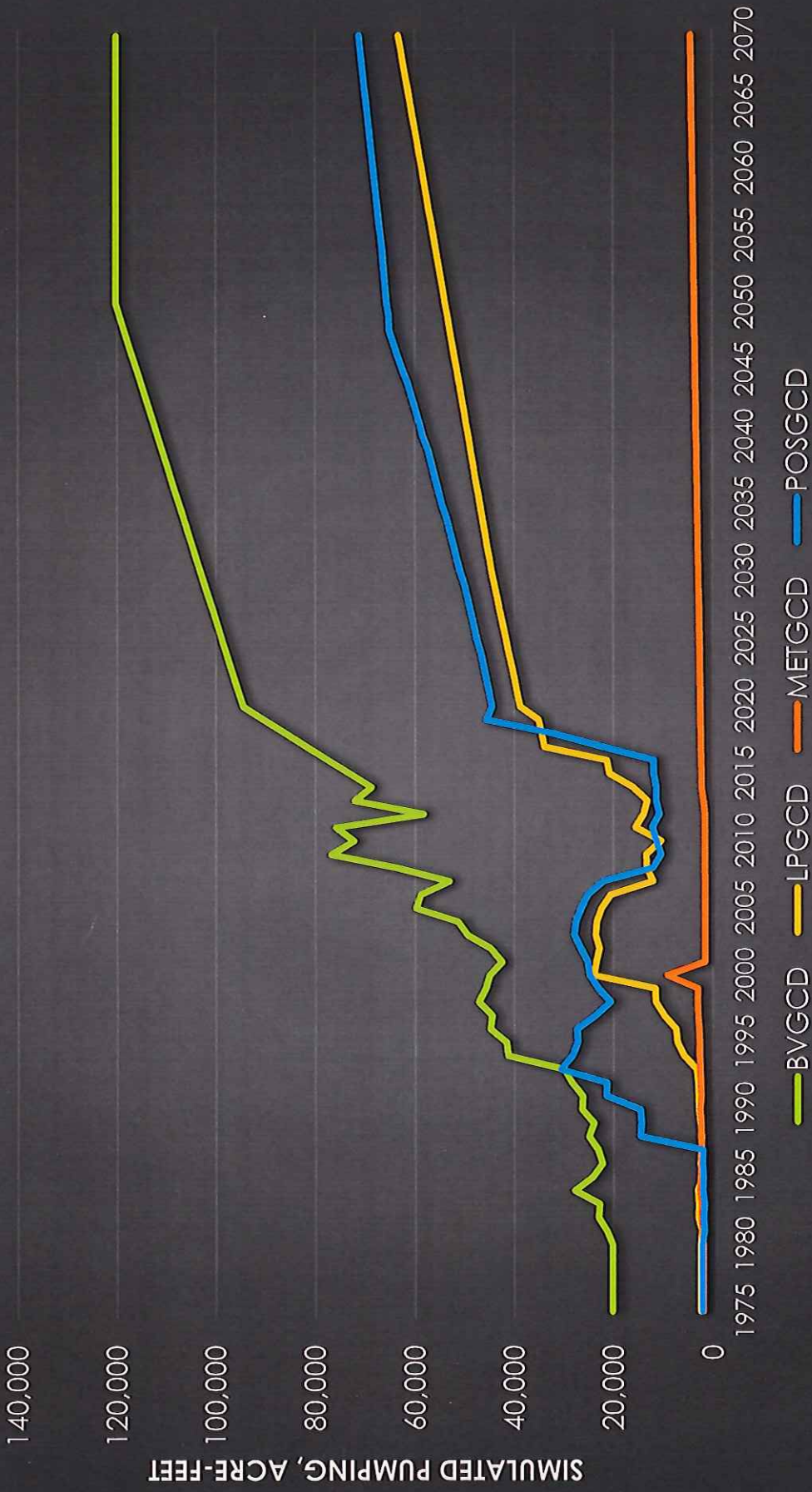
District	Carizo	Calvert Bluff	Simsboro	Hooper	Queen City	Sparta	Total
Brazos Valley	4,765	3,197	120,262	1,832	1,158	9,259	140,475
Fayette County	1,985	-	-	-	2,709	2,802	7,496
Lost Pines	11,510	3,906	62,828	673	1,084	565	80,565
Mid-East Texas	2,851	6,305	4,342	5,527	1,245	5,093	25,363
Post Oak Savannah	9,604	575	70,926	3,059	490	1,577	86,231
GMA 12	30,715	13,983	258,358	11,091	6,686	19,297	340,130

Preliminary



Predictive Scenario 4

Simsboro Pumping

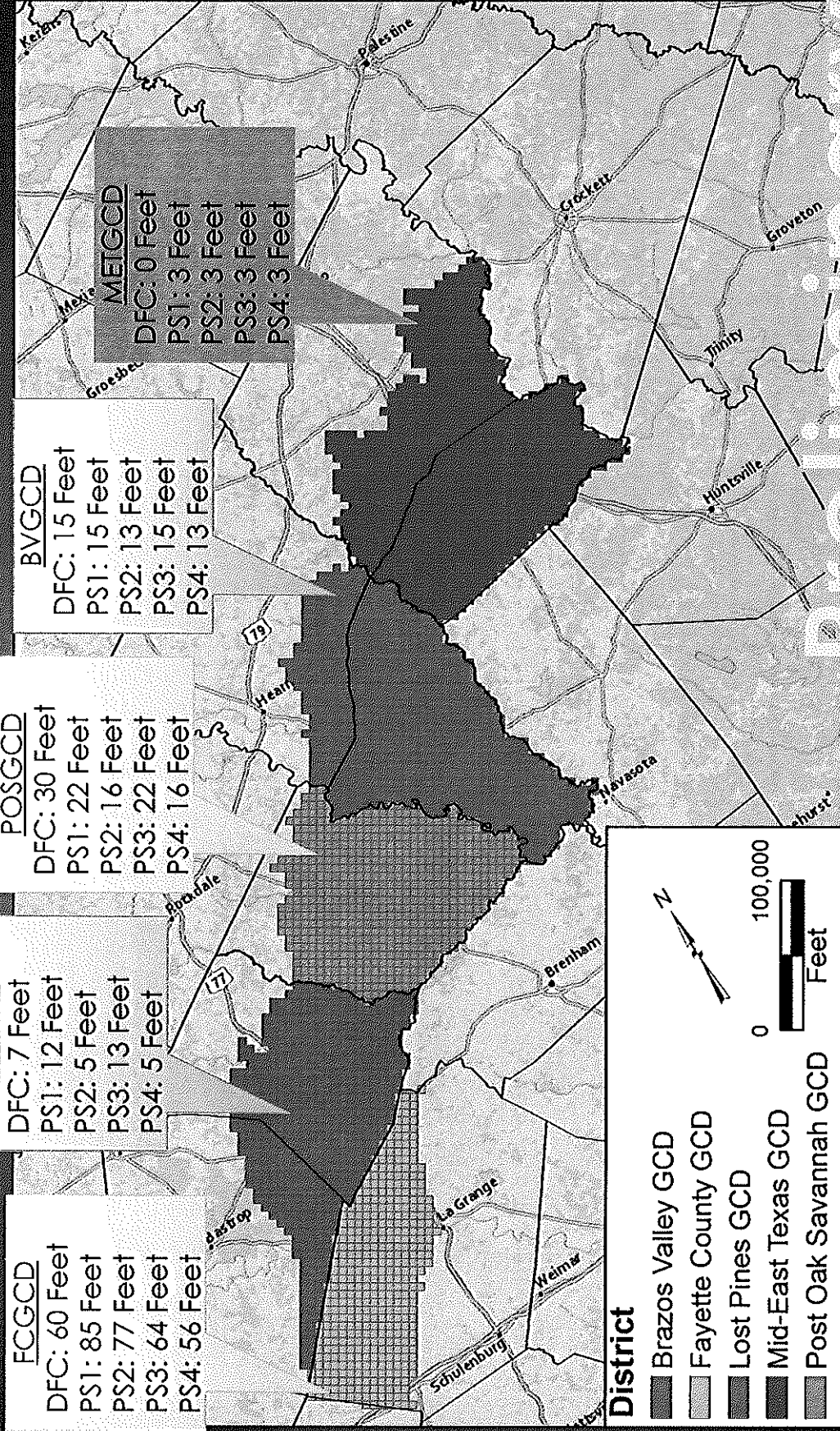


Preliminary



Sparta Aquifer (Layer 1)

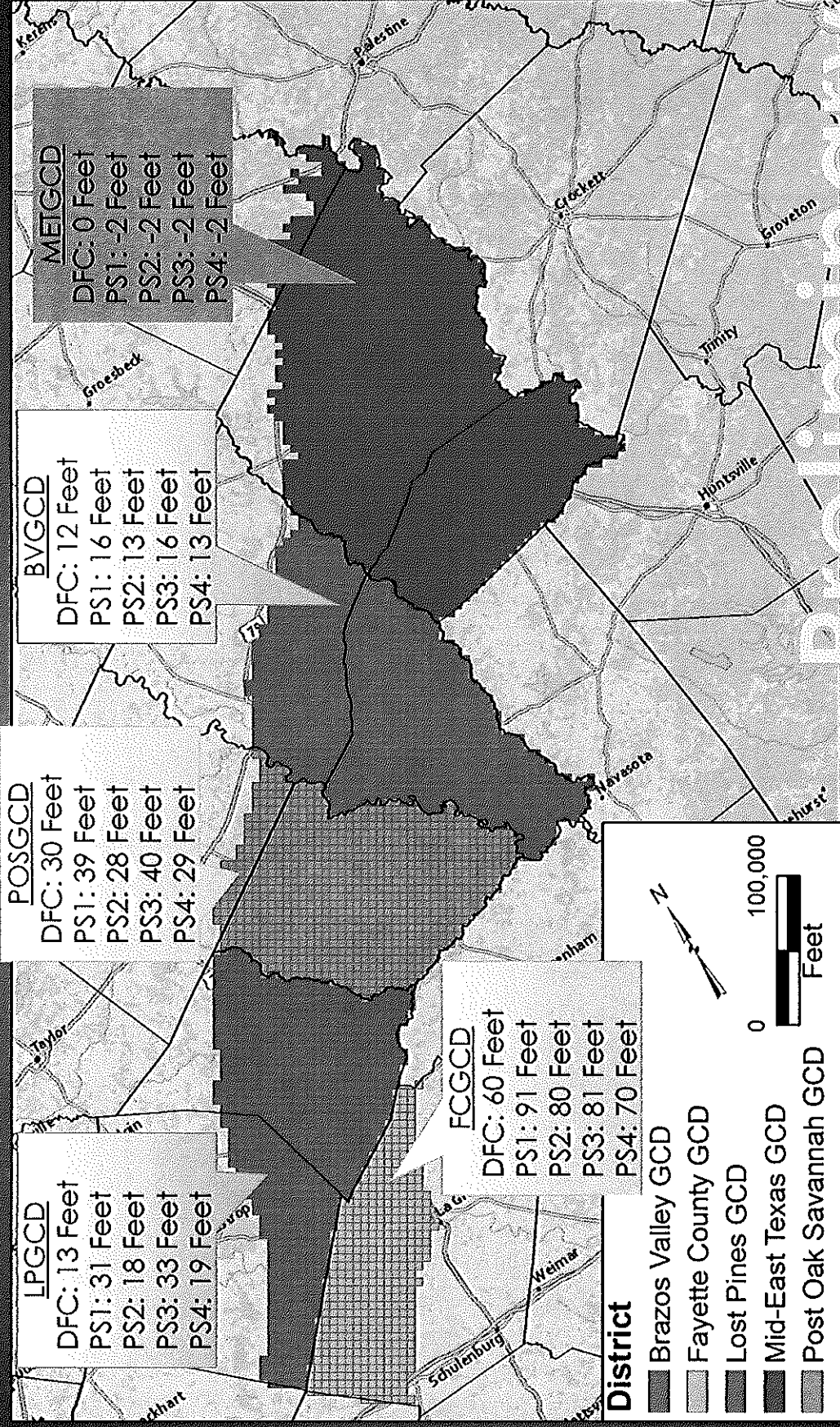
Average Drawdown - 2000 to 2070



preliminary



Queen City Aquifer (Layer 3) Average Drawdown - 2000 to 2070

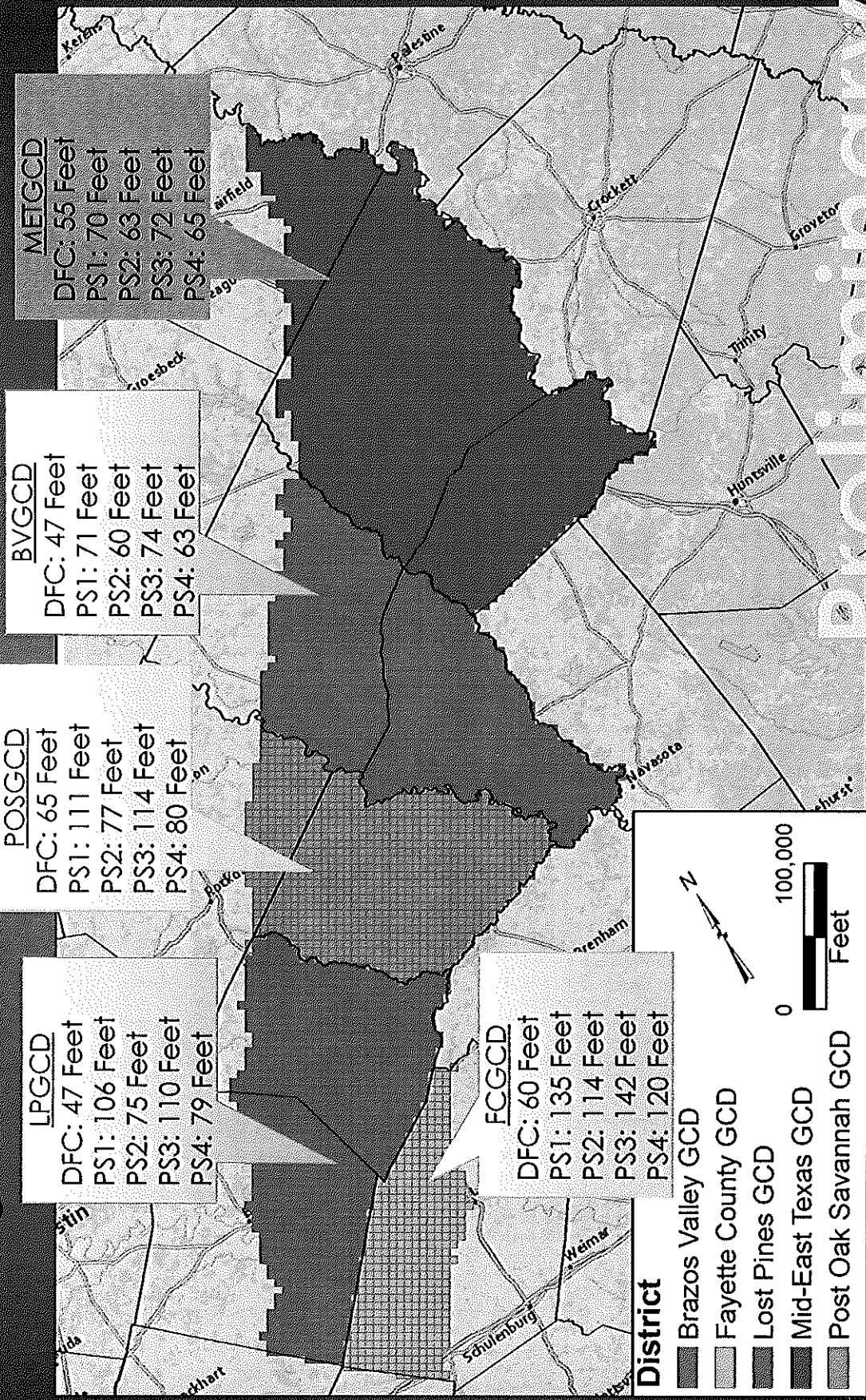


Preliminary



Carrizo Aquifer (Layer 5)

Average Drawdown - 2000 to 2070



District

- Brazos Valley GCD
- Fayette County GCD
- Lost Pines GCD
- Mid-East Texas GCD
- Post Oak Savannah GCD

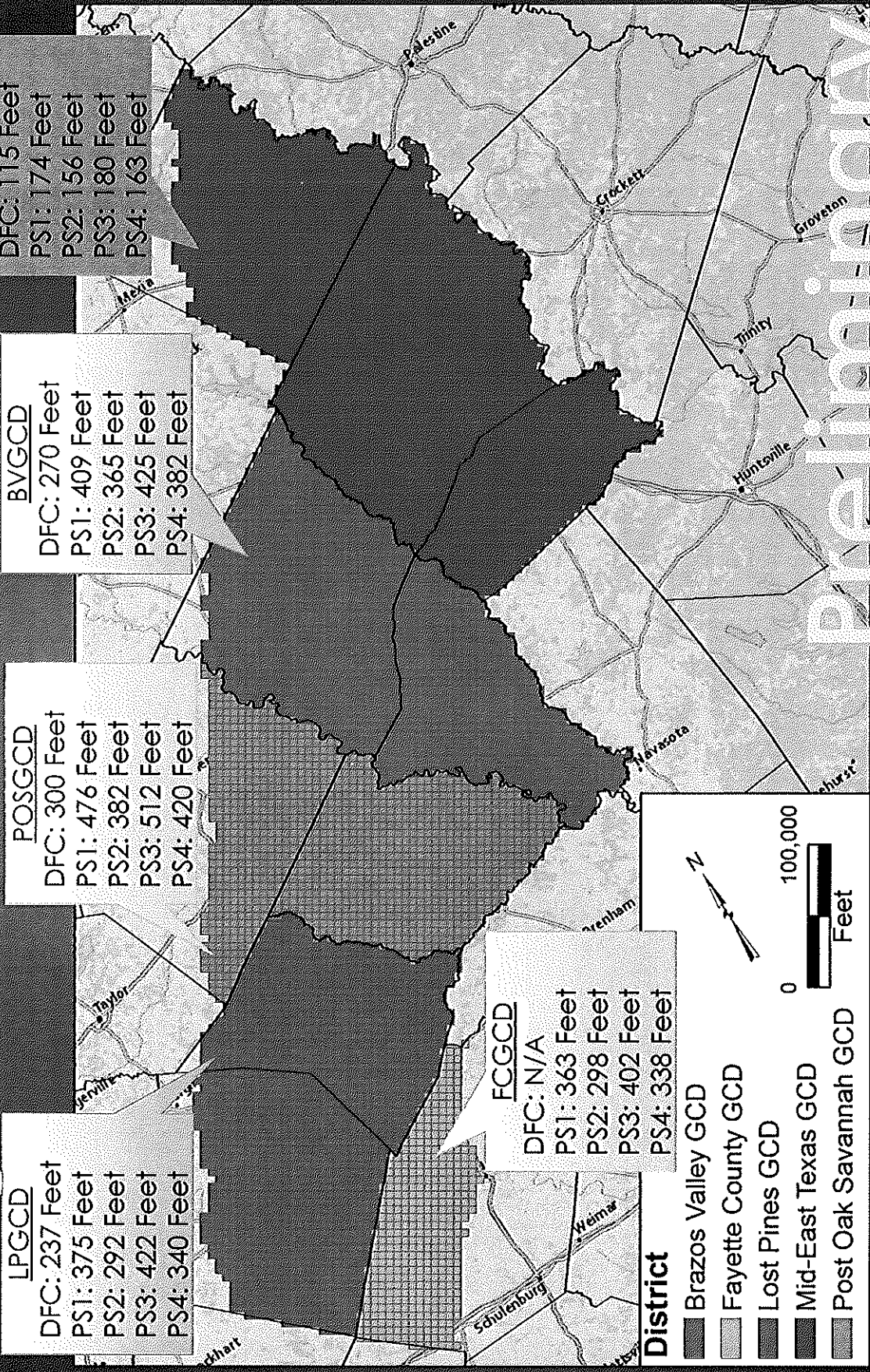
Preliminary



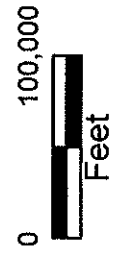


Simsboro Aquifer (Layer 7)

Average Drawdown - 2000 to 2070



Preliminary



- District**
- Brazos Valley GCD
 - Fayette County GCD
 - Lost Pines GCD
 - Mid-East Texas GCD
 - Post Oak Savannah GCD

Appendix 5

Appendix 5:

Table 7-1. Adopted DFCs based on the Average Threshold that occurs between January 2000 and December 2059

Aquifer	Drawdown (ft)
Sparta	30
Queen City	30
Carrizo	65
Upper Wilcox (Calvert Bluff Fm)	140
Middle Wilcox (Simsboro Fm)	300
Lower Wilcox (Hooper Fm)	180
Yegua-Jackson	100

NOTE: Table 7-1 is from the District's Management Plan adopted October 9, 2012.

Appendix 6

Appendix 6:

NOTE: Section 16 of the District's rules.

SECTION 16. MANAGEMENT OF WATER AVAILABILITY AND PRODUCTION

RULE 16.1. MANAGEMENT ZONES. Groundwater availability will be conserved, preserved and protected by well spacing, permit requirements, and/or limiting water drawdown levels within the Management Zones listed in Section 5 of the Management Plan. [Amended June 12, 2012]

RULE 16.2. GENERAL. All permits issued by the District that authorize the production of water shall be subject to the terms, conditions and provisions of this Section 16. All other terms, conditions and provisions of these rules shall be and remain in full force and effect. Any conflict between this Section 16 and any other Rule will be resolved by the Board upon a written request being made.

RULE 16.3. MONITORING OF GROUNDWATER. The District will monitor estimated total annual production, water quality, and the water levels. An analysis of the monitoring data will be reported at least once every three years. If, within a Management Zone, the drawdown based on monitored groundwater levels, or total estimated annual production, or projected average water level drawdowns, reach a threshold established in Rule 16.4, then, as determined appropriate by the Board, the District will give notice to well permittees in the affected Management Zone(s) as provided in Rule 16.4. The District will take action as found appropriate by the Board, based on the analysis of measured water levels, projected average water level drawdowns, permitted production, current and projected total estimated annual production and relevant hydrogeologic and water resource information including, but not limited to surface water availability and drought conditions, and review and evaluate the current and predicted water availability. The District may reduce both the maximum acre feet of water per acre of land for which the District may issue a permit and/or the volume of water authorized to be produced under any permit issued by the District for a Management Zone, as a result of the groundwater availability, total estimated annual production, or groundwater level drawdown within a Management Zone. The District may also adopt rule changes for a Management Zone if production in that Management Zone is shown to adversely impact groundwater conditions in another Management Zones. [Amended July 12, 2005] [Amended June 12, 2012]

RULE 16.4. ACTIONS BASED ON MONITORING RESULTS. Monitoring and threshold levels will be used to initiate appropriate responses designed to help achieve the DFCs, conserve and preserve groundwater availability and protect groundwater users. Three threshold levels are adopted to help guide these actions. Each threshold level provides for an increased level of response based on the change in production or water levels associated with a Management Zone. The threshold levels are: Level 1; Level 2; and Level 3. [Amended June 12, 2012]

1. Threshold Level 1. Threshold Level 1 will be reached, and additional study and investigation may be undertaken as appropriate, at such time as: [Amended June 12, 2012]

a. Total estimated annual production is greater than 70% of the Modeled Available Groundwater (MAG) value listed in Section 8 of the Management Plan;

b. An average groundwater drawdown, calculated from monitored water levels for an aquifer, is greater than 60% of the average groundwater drawdown adopted as a DFC for that aquifer in Section 7 of the Management Plan;

c. An average groundwater drawdown, calculated from monitored water levels, for a Shallow Management Zone is greater than 60% of the threshold value for average drawdown in that Shallow Management Zone listed in Section 7 of the Management Plan; or

d. Projected average water level drawdowns, calculated with a District approved methodology, indicate that a DFC for 2060 that is listed in Section 7 of the Management Plan will be exceeded within 15 years.

2. Threshold Level 2. Threshold Level 2 will be reached, and a review of the Management Plan, rules and regulations may be initiated, at such time as: [Amended June 12, 2012]

a. Total estimated annual production is greater than 85% of the Modeled Available (MAG) value listed in Section 8 of the Management Plan;

b. Average groundwater drawdown, calculated from monitored water levels, for an aquifer is greater than 80% of the average groundwater drawdown adopted as a DFC for that aquifer in Section 7 of the Management Plan; or

c. An average groundwater drawdown, calculated from monitored water levels, for a Shallow Management Zone is greater than 80% of the threshold value for average drawdown in that Shallow Management Zones listed in Section 7 of the Management Plan;

3. Threshold Level 3. Threshold Level 3 will be reached, and the Board will consider amendments to the Management Plan rules and regulations at such time as an average groundwater drawdown, calculated from monitored water levels, for an aquifer is greater than 95% of an average groundwater drawdown adopted as a

DFC for that aquifer in Section 7 of the Management Plan. [Amended June 12, 2012]

4. The threshold levels will be administered and applied separately to each Management Zone. As part of the evaluations and determinations, the District will consider the pumping-induced impacts to groundwater resources that occur between or among management zones. The evaluation will determine if pumping or production in one management zone is contributing to adverse impacts to groundwater conditions in another management zone. [Amended June 12, 2012]

a. If Threshold Level 1 is exceeded, the District may consider performing studies to provide information on aquifer properties, aquifer recharge, aquifer and surface water interactions, and aquifer pumping. The results may be used to improve the models, tools, and methodologies used to analyze data and predict future groundwater levels and availability.

b. If Threshold Level 2 is exceeded, the District may re-evaluate the Management Plan and rules regarding management zones, recharge estimates, the collection and analysis of monitoring data, and proposed changes to DFCs for consideration in the joint planning process.

c. If Threshold Level 3 is exceeded, the District will conduct a public hearing to discuss the status of the aquifers and develop a Level 3 Response Action Work Plan focused on achieving the District's goals and objectives, including the DFCs. The work plan will be completed within 6 months after the first public hearing and will be made available to the public through the District's web site.

i. The notice will include the cause for the notice, the fact that an additional review, evaluation and study is being made, and that a reduction of the maximum allowable production per acre and/or the permitted production may be approved following the review and evaluation. [Amended July 12, 2005]

ii. The general manager, in consultation with the district geohydrologist, will review and evaluate the permit applications pending, the permits issued and the records of the District, any estimates of total production by exempt wells, and increase the frequency or locations of water drawdown monitoring within the Management Zone. If the notice is due to the average drawdown based on monitored water levels then an evaluation of the reasons for the drawdown will be included in the review. [Amended July 12, 2005] [Amended June 12, 2012]

iii. The general manager will promptly report to the Board that notices have been, or are being, given and the event that required the notice to be given. The general manager will advise the Board of the plan for review and evaluation recommended under (b) and, if the plan will be implemented over a period of

more than one month, during the evaluation, review, study and any additional monitoring period, the general manager will keep the Board advised of the progress of the review and evaluation. Upon completion of the review, evaluation and any additional monitoring, the general manager and district geohydrologist will make a final report to the Board, together with their recommendation for action.

- iv. If the general manager, in consultation with the district geohydrologist, finds the evaluation, study, review and/or monitoring supports a recommendation that an adjustment of permitted production is recommended for a Management Zone or another Management Zone in which threshold level 3 was reached, the recommendation shall be consistent with the finding and provide supporting documentation for the limitation. [Added July 12, 2005] [Amended June 12, 2012]
- v. The general manager may, after consultation with the district geohydrologist and in combination with or in addition to the above, recommend any action or combination of actions set forth in Rule 16.4. [Amended June 12, 2012]

5. The terms, provisions and the actions provided for in this Rule 16.4 are in addition to and not in lieu of the terms, conditions and provisions of any other rule or provision of this Section 16. This rule does not limit the authority of the Board to act pursuant to any other rule. The Board shall have the discretion to take any action authorized by this Section 16. [Amended June 12, 2012]

RULE 16.5. REDUCTIONS REQUIRED BY REGULATORY ACTION. Notwithstanding any other term or provision of these rules, the Board may proportionately reduce the maximum amount of water that may be permitted per acre and volume of water authorized to be produced under any permit issued by the Board, and may adjust the thresholds established in Rule 16.4, as required by state law or by a regional plan or an area or regional agreement mandated by state law and which, by authority of state law, requires water availability or production to be limited or regulated based on water availability within a geographic area that includes land in more than one groundwater conservation district. In the event permitted production or water level drawdown will be reduced by reason of any such state law or regulation, the District will give notices as provided in Rule 16.4, hold one or more public hearings on the resulting limitations, and, to the extent permitted by state law, or the regional plan or agreement, implement any such reductions in a manner and over a period consistent with this Section 16. [Amended June 12, 2012]

RULE 16.6. ADJUSTING MAXIMUM PRODUCTION PERMITTED. The maximum groundwater production permitted per acre, the permitted production under any permit issued by the District, and the water drawdown level for a Management Zone may be adjusted as follows: [Amended July 12, 2005]

- 1. If the water drawdown level within a Management Zone, or in an adjacent zone in which the water drawdown level is impacted by production in such Management Zone, exceeds the water drawdown Threshold Level 3 in Rule 16.4, the maximum water production permitted per acre for the Management Zone and the water authorized to be produced under any permit

issued by the District for that zone may be reduced. The required reduction will be determined by the Board based on the evaluation and the evidence received by the Board. The production in one Management Zone may be reduced to the extent that production in that Management Zone is impacting water drawdown levels in an another zone. [Amended July 12, 2005] [Amended June 12, 2012]

2. The maximum allowable production of 2 acre feet of groundwater per acre of land, provided in Rule 5.1.2, may be reduced, and the maximum allowable production may be established or reduced for any one, or more than one, Management Zone(s). [Amended July 12, 2005]
3. Production authorized under permits issued by the District for any Management Zone may be reduced on a schedule to, when considered together with future permits for which the authorized production per acre will be at the lower maximum allowable production per acre, generally over a period not to exceed 40 years, reduce groundwater production by an amount required to return the water level in the Management Zone to levels deemed acceptable by the Board based on evidence provided by the general manager, in consultation with the district geohydrologist. [Amended July 12, 2005] [Amended June 12, 2012]
4. The Board may adjust permitted production within a Management Zone, based upon the results of a review, evaluation, study, and monitoring, and any evidence presented at a public hearing, if it finds the adjustment is appropriate. [Amended July 12, 2005] [Amended June 12, 2012]

RULE 16.7. PERMIT LIMITATIONS AND REDUCTIONS. The maximum allowable production of water authorized by a permit may be limited, adjusted and reduced as follows:

1. If the maximum allowable production of 2 acre feet of groundwater per acre of contiguous land is reduced for a Management Zone, or if any such reduced maximum of allowable production is thereafter reduced again, a new permit may not be issued for the production of more water than is established under this Section 16 as the maximum allowable production of water per acre of land for the Management Zone; [Amended June 12, 2012]
2. Excluding production authorized by a historic use permit, and production authorized by wells exempt under Rule 7.10(1), the production of water authorized by any permit issued by the District for the production of water is subject to limitation, adjustment and reduction;
3. The volume of water authorized by permit to be produced in a Management Zone may be reduced by up to two percent per year with the reduction beginning twelve months after a decision by the Board that such reduction is reasonably required for the conservation and preservation of groundwater, or the protection of the aquifer or groundwater users, within the Management Zone; and [Amended June 12, 2012]
4. If the Board finds it is necessary to reduce the maximum allowable production per acre, or the permitted production for any Management Zone, more quickly than is provided in Rule 16.7(3), to preserve and conserve groundwater or protect groundwater users within a Management Zone, or to implement reductions required under Rule 16.5, the Board shall

establish a schedule for a phased reduction in the maximum allowable production or permitted production for the zone. [Amended July 12, 2005]

RULE 16.8. EXCEPTIONS. The following are exceptions to the rules set forth in this Section 16 for the limitation and reduction of production:

1. After a reduction of the maximum allowable permitted production per acre in a Management Zone, the maximum allowable production per acre of land for which a permit may be issued in the Management Zone shall not exceed the maximum allowable production per acre as modified or established under this Section 16; [Amended July 12, 2005]
2. Within the Trinity Zone groundwater availability will be preserved and conserved, and groundwater users will be protected, by well spacing and the maximum allowable production per acre provided in Rule 5.1.2;
3. The Queen City-Sparta and Yegua-Jackson Zones are recharge based zones with relatively low to moderate yield domestic and small municipal wells, and, in lieu of limiting water drawdown levels in this zone, during droughts permitted production may be temporarily reduced to protect groundwater users; and [Amended June 12, 2012]
4. The Board may, in addition to or in combination with any action authorized in this Section 16, take any action authorized in Section 17. [Added June 12, 2012]

RULE 16.9 NOTICE AND HEARINGS. A limitation, adjustment or reduction of the maximum allowable production of water per acre, or of the volume of water authorized to be produced under permits issued by the District, may be adopted by the Board at any time after written notice is given to the permit holders as provided in Rule 16.4 and a public hearing held, for which twenty days, or more, notice of such public hearing is published in one or more newspapers of general circulation in Milam County and Burleson County, Texas.

RULE 16.10. REHEARING. The owner or the operator of a well or well field for which permitted production is being reduced pursuant to this Section 16 may request a rehearing on a decision by the Board to reduce permitted production by more than ten percent in any five year period, or to make a reduction that exceeds two percent in any one year period. Except as otherwise specifically provided herein any such motion for rehearing must be in writing, state the nature of material additional evidence to be presented, and filed in the district office within thirty days after the date of the Board decision that is being appealed. Such rehearing request will not stay or abate the required reduction or production while the request is pending.