TCEQ Docket No. 2022-0299-MIS

PETITION FOR INQUIRY	**)**	**BEFORE THE**
	)	
FILED BY	**)**	**TEXAS COMMISSION ON**
	)	
CURTIS CHUBB	**)**	**ENVIRONMENTAL QUALITY**

POST OAK SAVANNAH GROUNDWATER CONSERVATION DISTRICT'S RESPONSE TO THE PETITION FOR INQUIRY FILED BY CURTIS CHUBB

INTRODUCTION

The Post Oak Savannah Groundwater Conservation District ("District")[1] has, from its inception long before the decisions in the Day and the Bragg[2] cases and the more recent amendments of *Section 36.002, Texas Water Code,*[3] "...emphasized the fact that conserving and protecting the aquifers requires actual management of the aquifers to realize the benefits and values of the resource, and the rights of the owners of the water on an on-going basis, while assuring the aquifers are a viable resource for not only a planning period of fifty years but thereafter into the future."[4] The District has accomplished, and does accomplish, its goals and duties to conserve and protect the aquifers by adopting and enforcing Rules and a Management Plan that secure the ability of the District to manage water production and the aquifers, protect the property rights of landowners and provide water for the State of Texas, and the State needs groundwater that can be produced on a sustainable basis without damage to or depletion of the aquifers. The owners of land that overlie an aquifer are entitled to an equitable share of the water that can be produced from the aquifer underlying their property on a long-term and sustainable basis without damage to or impairment of the aquifers. Unfortunately, in Dr. Curtis Chubb's ("Petitioner" or "Chubb") case, while he owns land, he does

[1] Sec, 36.001, Texas Water Code, defines district as follows: "District" means any district or authority created under Section 52, Article III, or Section 59, Article XVI, Texas Constitution, that has (lie authority to regulate the spacing of water wells, the production from water wells, or both. [Emphasis Added]

[2] Edwards Aquifer Authority v. Dav (Tex. 2012) 369 SW 3rd 814; Edwards Aquifer Authority v, Bragg (CA San Antonio 2013) 421 SW 3td 118.

[3] In pertinent part, *Sec. 36.002, Texas Water Code*, (a) The legislates recognizes that a landowner owns the groundwater below the surface of the landowner's land as real property, [Emphasis Added]

(b) The groundwater ownership and rights described by this section:
(1) entitle the landowner …. to drill for and produce die groundwater below the surface of real property ... without causing waste or malicious drainage of other property or negligently causing subsidence ...
(c) Nothing in this code shall be construed as granting the authority to deprive or divest a landowner ... of the groundwater ownership and rights described by this section.
(d) This section does not: ...
(2) affect the ability of a district to regulate groundwater production as authorized under Section 36.113, 36.116, or 36.122 or otherwise under this chapter or a special law governing a district; [Emphasis Added]

[4] See: Exhibit "A" presented by Gary Westbrook, General Manager, at die University of Texas School of Law, 2014 Texas Water Law Institute, November 21,2014.

not own any of the water that may underlie his property.[5] The District continues to view its mission as being one to protect and conserve the aquifers by actively and actually managing the aquifers and production in a manner to avoid harm to the aquifers, sustain the long-term viability and production of the aquifers, ***and*** allow those landowners whose water rights are retained to benefit from the long-term availability of a sustainable supply of groundwater.

As he has in the past, Petitioner continues to refuse to understand the purpose of the MAG and the fact that it is the estimated production, which is based on a model prediction that is known to be inaccurate, that can be produced every year over a period of 50 years to accomplish the Desired Future Conditions (DFCs). Petitioner simply disagrees with the District's approach of permitting the production of groundwater subject to the reserved authority to limit and decrease the volume of permitted production as more landowners seek production permits, production otherwise increases, or monitoring of actual groundwater levels evidences that authorized production should be limited to benefit the aquifer or assure the long-term sustainable yield of the aquifer is accurate. While the tone of this response is appropriately firm and direct, the Board and Staff of the District continue to encourage all stakeholders to participate in and provide comments on any and all management strategies and Rules of the District, and this response should in no way be construed as a desire to deter those efforts of any citizen. The District encourages attendance and participation by stakeholders and citizens at all public meetings which might facilitate enhanced communication and alleviate some of the concerns expressed by the Petitioner.

However, with or without comments from the public or stakeholders, the District is well aware of its charge, and is in line with the Rules it has adopted to facilitate compliance with Chapter 36, *Texas Water Code.* Each member of the Board serves on various committees that assist and facilitate the outreach to the community as well as the programs, studies, and work with the District's professionals to ensure all of its Directors are knowledgeable and engaged in the mission of the District and the mandates it operates under.

HISTORICAL BACKGROUND

The Desired Future Conditions in question were required to be adopted using the best available science, which was the State's Groundwater Availability Model (GAM). Unfortunately, the application of that previous version of the GAM has led to inaccurate predictions of DFCs and such inaccuracies ultimately and unknowingly led to adoption of unattainable DFCs by the District.

During the past five years the District has cooperated with the Texas Water Development Board ("TWDB") and other stakeholders (committing nearly $300,000 of District funds in this effort) to make wholesale improvements to the GAM. After the updated GAM was approved by the TWDB, the District began using it, as the best available science as required by law, to perform the many evaluations discussed herein. What became evident because of the inaccuracies of that previous GAM, and what has been well documented in the many presentations and meetings referenced in this response, was that the DFCs in question were simply unattainable by the District. In essence there was no action available to the Board to consider which would achieve the DFCs in question. This is an important fact which the Board considered as it followed the correct processes in appropriately following its Rules to manage the groundwater resources under its jurisdiction.

Instances such as this have led the Board to develop the District's Management Strategies Report, a comprehensive effort, which will assist the Board in identifying and evaluating ongoing additional challenges and in meeting the District's management goals, as well as possible remedies.

[5] See Exhibit "B," Applicant's Statement Of Position On Party Status filed during the Application Of Blue Water Vista Ridge LLC For Amendment To Drilling And Operating Permit No. POS-D&O/A&M-0001D And For Amendment To Transport Permit No. POS-T-0001B

REVIEW OF PETITION

Central to Petitioner's assertions is that the District is failing to enforce its own Rules. In reviewing that assertion, the District notes the following from Chubb's Petition:

1. **Petitioner asserts that the District has not provided notice to well permittees upon reaching any threshold established in District Rule 16.4.**

Petitioner would have you believe that the District is simply dismissing and/or disregarding the requirements of Section 36.1132, *Texas Water Code*; that is untrue. As stated above, Post Oak Savannah Groundwater Conservation District is centered in active and ongoing management of the groundwater and aquifers that it is tasked with protecting. The Board has adopted Rules that support the various statutory constructs and mandates found in Chapter 36, *Texas Water Code* and brings those provisions to life in the Post Oak Savannah Groundwater Conservation District. The Board has set up a Rules Committee that crafts, studies and reviews on an ongoing basis the District's Rules to ensure that they are in line with Chapter 36, *Texas Water Code*, as it may be amended, together with the enabling legislation that created the District – all in an effort to ensure that nothing that the Legislature has required of it is overlooked. The Texas Commission on Environment Quality ("TCEQ"), as a regulatory body itself, is well aware that a Court will uphold an agency's interpretation of its own Rules if the interpretation is reasonable and does not contradict the Rule's plain language.[6] TCEQ itself has had its own rules or construction thereof challenged from time to time; "[t]he true test for court applying the substantial-evidence rule to an agency's decision is not whether the agency reached the correct conclusion but whether some reasonable basis exists in the record for the action taken by the agency."[7] In that framework, the District provides for you a record replete with instances in which it is documented to be following its Rules in the very instances the Petitioner notes it did not *and* there is a reasonable basis for the action taken.

District Rule 16.3 conditions giving notice to well permittees upon the District's *Board* determining it is appropriate to do so. Because the Board has not yet determined it is appropriate to notify the well permittees, the District was not required to send notifications to well permittees. What the District has undertaken as set out in Rule 16.4.1 Threshold Level 1 is undertaking additional studies to evaluate the nature and extent of curtailment in groundwater production that may be required to achieve the District's management objectives inclusive of achieving DFCs and PDLs. Extensive review of the DFCs and the District's Management Plan has been ongoing since 2017 through 2021. The District provided regular updates at properly noticed public DFC Committee and Board meetings. Further, the District and/or its professional consultants are in contact with well permittees personnel on an ongoing basis and they were keenly aware of thresholds being reached; many of their representatives have attended all or nearly all public meetings in which DFCs and the District's Management Plan[8] have been discussed – from Committee meetings to Board meetings. The studies that the District has undertaken have been through the District's professional hydrogeologist and the team at Intera. Finally, as Petitioner has noted and thoroughly utilized in crafting *this* Petition, the studies are on the District's website, available 24/7. Numerous public meetings have been held on the very topic that Petitioner has raised; such meetings began

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[6] *See, Tex. Comm'n on Env't Quality v. Maverick County,* --- S.W.3d ——, 2022 WL 413939, at *4 (Tex. Feb. 11, 2022).

[7] *See,* Tex. Gov't Code Ann. § 2001.174.

[8] *See*, POSGCD Management Plan Adopted December 5, 2017 and Appendices A and B, all attached as Exhibit "C".

no later than August 2017 and are continuing through today. In fact, at the December 4 meeting no less than six previously reviewed reports on these matters were again revisited, reviewed, and discussed by the committee at that meeting.

This translates to ongoing studies and ongoing review and ongoing monitoring. In fact, over the last few years, the District has made a concerted effort to increase the number of its monitor wells and currently is at 370[9] and is broken down by formation as such: Hooper 51; Simsboro 63; Calvert Bluff 64; Carrizo 102; Queen City 38; Sparta 24; Yegua-Jackson 21; and Brazos River Alluvium 7.

Petitioner also asserts that the District is not adhering the Rule 16.4.2 Threshold Level 2.

"Threshold Level 2 will be reached, and a review of the Management Plan, rules and regulations will be initiated, and pending the results of Threshold Level 1 studies, the District will notify well owners of possible plans for curtailing groundwater production. The Threshold Level 2 actions will be conducted at such time as:

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

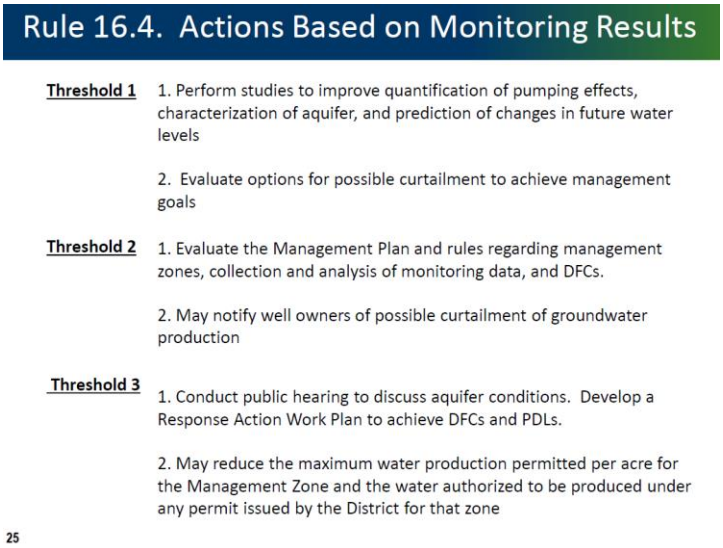
It is important to note that the presentation that Petitioner cites to in his Petition explains both studies as well as conclusions that make it incredibly clear that because of updated model files and pumping information provided by other Districts in GMA 12, there was no possible plan available for the Board to consider for curtailing groundwater production that would achieve the applicable DFCs.

As noted above, the District has implemented studies to address the concerns of reaching Threshold Levels 1 and 2, they have had ongoing meetings to address these studies, they have given public reports about their findings and they have undergone review of their Management Plan and Rules. Proof that the Board has exercised utmost concern and diligence during these ongoing efforts is the development of the District's Management Strategies Report which will assist the Board in identifying and evaluating additional challenges in meeting the District's management goals. These meetings and reports have been public and have taken place with public notice.

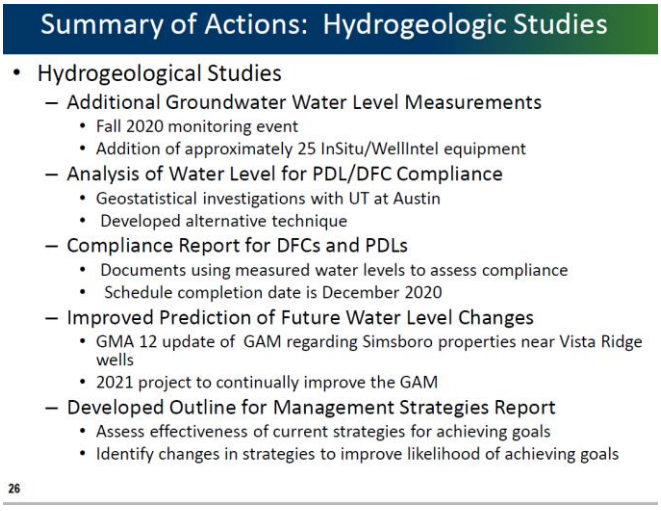
Specifically, Petitioner provides copies of Slides 24 and 25 from the "Desired Future Committee Update" prepared by the District's professional hydrogeologist team and presented on December 4, 2020[10] as part of his claims that the District has taken no actions as a result of exceeding thresholds limits in Rule 16.4. Petitioner presented Slide 25 (see below) to list "a few of the actions required in response to Threshold Levels being breached. (pg 13 of 22)"

[9] District records show 88 monitor wells in 2015.

[10] See: *Desired Future Committee Update* prepared by the District's professional hydrogeologist team at Intera and presented on December 4, 2020, attached as Exhibit "D."



Were he to have reviewed the next slide, Slide 26 (see below), it provides a summary of District actions and studies that are in progress because of threshold exceedance. The actions listed in Slide 26 unequivocally show that considerable studies and actions have been undertaken by the District. Slides 27 through 31 (which are provided in Attachment A) provides results of curtailment studies performed in the Carrizo. In addition, Slides 32 through 37 evaluates management issues with DFCs, Slides 3 through 10 discuss results from a study to better predict changes in future water levels, and Slides 11 through 19 provides results from a POSGCD study to present a detailed analysis of pumping effects.



While this is just one such documented presentation of the District's efforts to undertake studies and evaluate the outcomes, the December 4 presentation demonstrates unequivocally that Petitioner's claim that the District has not initiated any actions as required by Rule 16.4 is totally without merit.

2. Petitioner Asserts That the District Treats MAGs as Irrelevant Numbers

Petitioner states on page 4 "One of the multitudes of problems with the District is that they treat MAGs as irrelevant numbers. The degree to which the District disregards MAGs can be understood by the multiple times that the District has not adhered to the Texas Water Code 36.1132 – a State water law based on the MAG as evidenced by its title: "Permits based on Modeled Available Groundwater"" He states similar provisions on pages 5 and 6 as well. He also states that "[a] close reading of Texas Water Code 36.1132

allows one to understand that its sole purpose is to assist groundwater districts achieve the DFCs by requiring the MAGs to be considered…"

Petitioner's claim that the District treats MAGs as irrelevant numbers is contrary to both the District's Rules and, more importantly, the District's actions. The District's use of the MAGs to establish thresholds in Rule 16.4 demonstrates the MAGs are not irrelevant. In his petition and as mentioned earlier, Petitioner shows Slide 24 (see below) from the December 4, 2020 District's DFC meeting. The slide shows that several MAG-based thresholds have been exceeded. POSGCD reporting of GAM-based threshold exceedance further demonstrates that the District does not consider the MAGs are irrelevant numbers.

3. Petitioner Asserts That the District Does Not Adhere to Texas Water Code Sec. 36.1132

Petitioner's claim that the District does not adhere to Texas Water Code Sec. 36.1132 is also inaccurate. Texas Water Code Section 36.1132, as excerpted below, does not require a District to treat the MAG as a cap on permit amounts as implied by Petitioner. This position of Petitioner has been raised and addressed before with this body in 2015. In the District's Response to Chubb's Petition for Inquiry, it was noted that "[f]or example, in November 2013 just prior to the Commissioner's Court appointing new board members, Petitioner placed an ad in a local newspaper that stated in pertinent part that; "Available Groundwater is the pumping cap set by the State based on the District's decision..."[11] Larry French, Director of the Groundwater Resources Division of the Texas Water Development Board, was asked by the General Manager to clarify the issue for use before the Commissioner's Court.

"Mr, French responded in pertinent part as follows:[12] "Modeled available groundwater (I assume that is what is meant by "available groundwater" in the advertisement) is a value (in acre-feet per year) estimated by the TWDB that achieves the desired future condition (DFC) in the aquifer. The DFC is proposed and adopted by districts in a groundwater management area. The TWDB uses the DFC statement to calculate the modeled available groundwater (MAG), which is then provided to each district. The MAG is the amount of water that the TWDB determines may be produced on an average annual basis to achieve a DFC as determined by a regional groundwater availability model (GAM). Each district - to the extent possible - is to issue permits up to the point that the total volume of permitted and exempt pumping will achieve the DFC. However, there are various other considerations that the GCDs are required to weigh in issuing pumping permits: the MAG, the amount of groundwater produced under exemptions, current pumping permits, reasonable estimates of groundwater production authorized under existing permits, and yearly precipitation and production patterns. So there is an element of flexibility introduced....and one reason it is not correct to refer to the MAG as a pumping cap. Districts may and have issued permits for more water than the MAG, but they also are responsible for achieving the DFC and may have to adjust the production allowed under those permits from time to time."

Reiterating what was stated then: "The MAG is not an annual cap and was never intended to be!"

> Sec. 36.1132. PERMITS BASED ON MODELED AVAILABLE GROUNDWATER. (a) A district, to the extent possible, shall issue permits up to the point that the total volume of exempt

[11] See, pgs 16-17 of filing (pgs 13-14 of Response Filing), Post Oak Savannah Groundwater Conservation District's Response to Request for Inquiry, filed on July 6, 2015 in TCEQ Docket No. 2015-0844-MIS.
[12] Id. at pg 14

and permitted groundwater production will achieve an applicable desired future condition under Section 36.108.

(b) In issuing permits, the district shall manage total groundwater production on a long-term basis to achieve an applicable desired future condition and consider:…

Section 16.4 Threshold Exceedances

Threshold	Description	Aquifer(s)
Level 1	> 50% of DFCs	**Sparta (28 ft)**
Level 1	> PDLs in 15 years	**Carrizo (20 ft), Calvert Bluff (20 ft), Simsboro (20 ft)**
Level 1	> 60% of MAG	**Simsboro (38,468 AFY)**
Level 2	> 70% of MAG	**Queen City (468 AFY), Carrizo(4,706 AFY)**

Note 1: Modeled Available Groundwater(MAG) is for 2020
Desired Future Conditions (DFC) is for 2070
Protective Drawdown Limit (PDL) is for 2070

Note 2: Green colored aquifers indicates exceedance anticipated before December 31, 2020

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4. Petitioner Asserts that the District Uses Average Water Level of Monitoring Wells

On page 2 of Chubb's Petition, Chubb makes a claim that the District uses average water level of monitoring wells as DFCs. That is unquestionably inaccurate. The DFCs are established through the joint planning process that was drafted by the Legislature through the passage of HB 1763[13]. In GMA 12, the process of setting DFCs is heavily based on results from GAM predictions of water level declines based on several future pumping scenarios. To check compliance to DFC, the District uses average water levels but it does not average the water levels as suggested by Petitioner. The District checks compliance to DFCs by using mathematical algorithms that uses the measured average water levels as input to evaluate compliance with DFCs.

CONCLUSION

Post Oak Savannah Groundwater Conservation District, having demonstrated that its Rules are in line with and support Chapter 36, *Texas Water Code*, and that such Rules are being referred to and followed in substantial compliance with such Chapter, Post Oak Savannah Groundwater Conversation District requests that:

(1) TCEQ dismiss the Petition for Inquiry pursuant to Tex. Water Code, Section 36.3011(c)(1);
(2) TCEQ deny all other relief requested by the Petitioner; and
(3) TCEQ grant any and other further relief to which the District may be entitled.

[13] 79th Regular Legislative Session.

Respectfully submitted

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CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing Response of Post Oak Savannah Groundwater Conservation District to the Petition for Inquiry was served by mail as indicated on the attached mailing list on April 13, 2022.

Barbara Boulware
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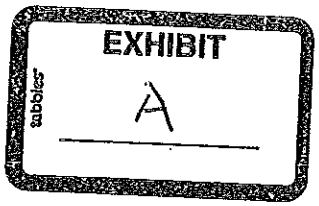

Post Oak Savannah Groundwater Conservation District

Finding Balance Between Regulation, Management and Property Rights in the Central Carrizo-Wilcox

2014 Texas Water Law Institute

November 21, 2014
Austin, TX

Presented by:

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Overview

The primary and over-riding purpose of all groundwater conservation districts is to regulate the production of groundwater to protect and conserve the aquifers as a continuing, long-term supply of water for the benefit of the residents of the district and the State of Texas. However, if this were the only purpose of groundwater districts that could be readily accomplished in much simpler ways than providing state agencies or groundwater districts to regulate the drilling of wells and production of groundwater. As a result, The Post Oak Savannah Groundwater Conservation District ("Post Oak") is committed to accomplishing this purpose in a manner to permit the public and the landowners to realize the benefits of the aquifers both now and in the continuing future. Post Oak has, from its inception, emphasized the fact that conserving and protecting the aquifers requires actual management of the aquifers to realize the benefits and values of the resource and the rights of the owners of the water on an on-going basis, while assuring the aquifers are a viable resource fifty years and thereafter in the future. Accomplishment of the purposes of the districts consistent with State law requires an emphasis be placed on both conservation and management.

It is now clear, and should have been clear before the opinion in the *Day* [1] case, that landowners own the water that is in place beneath the surface of their land. The fact that the value of this property right was subject to being diminished under the rule of capture did not modify that ownership because the landowner had the right to produce as much water as was available subject only to it being used for a beneficial purpose. However, as with all property rights, when necessary to accomplish a public purpose, those rights are subject to reasonable regulation. As a result, Post Oak has recognized from its inception that groundwater districts were created not to take property rights but to regulate the use of those rights for the benefit of the property owner, other similarly situated owners, and the public.

As most of our sister groundwater districts believe of their approach, Post Oak believes its approach is the best answer to the question presented for this panel. We proceed with the intent and actions to do those things necessary to assure the aquifers within the district remain viable and substantially equal resources fifty years from now and thereafter. To accomplish this purpose Post Oak continues to conduct studies to ascertain the best hydrogeological information available, maintain and benefit from 88 monitoring wells and to add monitoring wells as appropriate to collect information needed to manage and protect the aquifers. Based on this information, on-going studies, monitoring, and adjustments regarding specific aquifers, Post Oak regulates and manages the use and production of groundwater in a manner to protect the aquifers, enable landowners and the public to benefit from the property rights and resource, and preserve the aquifers so the groundwater will continue to benefit the landowners and the public on substantially the same basis as now, for future generations.

Post Oak's Rules and the permits issued by Post Oak provide for each owner of land that overlies an aquifer or management zone to share equally on an acre for acre basis in the groundwater that is in place within their property and the applicable aquifer or management zone. Under the Rules there is no motivation for a "land rush" approach to obtaining permits. Excluding *historic use permits* no priority

[1] Edwards Aquifer Authority vs. Day, 369 S.W.3rd 814 (Tex. 2012)

right or benefit is established by obtaining an earlier dated permit. Essentially, the Rules and permits allow Post Oak to decrease the production permitted under previously issued permits as necessary to allow landowners that overlie an aquifer to apply for and obtain a permit in the future that will allow them to produce their pro-rata share of the groundwater in place within their property and available for permit within the aquifer. The Rules and permits issued under those Rules also provide the basis for adjusting permitted production as reasonably necessary to limit production on a proportionate basis to a sustainable level, e.g. reducing permitted production within a Management Zone based on measured water drawdown levels.

The *Day* case recognized that regulation of groundwater by the exercise of police powers was authorized by the Constitution and the landowner has absolute title to the groundwater in place under his land subject to the rule of capture and police regulations, i.e. the landowner owns all of the water in place under his land separately, distinctly and exclusively. The Court further recognized that: "Groundwater regulation must take into account not only historical usage but future needs, including the relative importance of various uses, as well as concerns unrelated to use, such as environmental impacts and subsidence." We believe a careful reading of this case supports the policies and rules followed by Post Oak since its inception, and have not yet identified any Rule or policy of the District that should be amended in response to this case.

Similarly, the Court's opinion and ruling in the *Bragg*[2] case was consistent with Post Oak's policies and rules, i.e. generally stated: (1) groundwater is the property of the landowners, (2) groundwater can be regulated to preserve the aquifer and the interests of the landowners in the groundwater, but (3) the use of groundwater cannot be unreasonably restricted or taken, except as necessary to allow all owners to share proportionately in the available groundwater. However, Post Oak does have concerns about the customary method of valuing in takings applied by the Court in the *Bragg* case, i.e. the difference in the value of the land with unlimited access to water and the value of the land with (1) 2 acre/ft/acre of water and (2) no access to groundwater. This method of calculating damages should be modified to reflect a calculation based on the number of acre feet of water available per acre if all properties are granted a proportionate share of the water available under a valid regulatory program.

We believe these cases support the basis for the regulatory program established by Post Oak, i.e. approve documented historical use permits, and allow other landowners up to 2 acre feet/acre until overall usage within the District increases to a point that a reduction in the permitted amounts is required to protect the aquifer or provide reasonable protections for other landowners, and allow all landowners to equitably share in the groundwater that is in place within their property that may be produced without damaging the aquifer. In that manner, each landowner receives the benefits of reasonable regulation, i.e. continues to receive a pro-rata share of the available water in place. Any limit on production that is not necessary to protect the aquifer or assure landowners an equitable, pro-rata share of the available groundwater will be suspect.

Adopting policies and rules structured to comply with the *Day* and *Bragg* opinions, policies that authorize modification of permits issued for the production of groundwater as may be required when more landowners seek to produce their proportionate share of the groundwater in place under their

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[2] Edwards Aquifer Authority v. Bragg, 421 S.W.3d 118 (Tex. C.A. -San Antonio 2013)

land, or the water level in one or more aquifers declines more than anticipated, or that is acceptable to accomplish the primary purpose and obligation to conserve the aquifer for future generations, may be one answer to the question before this panel.

Discussion Points- where the rubber meets the road

Background and History

POSGCD includes all of Milam and Burleson Counties and was created by the 77th Legislature in 2001 through HB 1784 due to interests in marketing of groundwater resources from the central Carrizo-Wilcox aquifers. It was estimated that by that time between 30,000 and 35,000 acres of water rights had been leased or secured in these two counties. The District adopted its first set of Rules in March, 2004. Main concerns at that time were conservation and preservation of the aquifers, respect for property rights, protection of existing users, availability of the resource for future use and growth, lack of accurate scientific data, and reasonable management of the resource.

Protection & Preservation of Resources, or, *"How do you allow production by landowners who desire to produce their property, while protecting the property of those who do not?"*

The District first adopted limits to allowable aquifer impacts in its Rules and Management Plan in 2005. In that process the District thoroughly considered and evaluated the nature of the aquifers in the District, with shallow up-dip regions which become deeper, or down-dip, as the formations run towards the coast, (see Figure 1) and evaluated the height of the water column above well screens of registered wells. As Chapter 36 affords a GCD the ability to protect existing wells, the District has adopted separate shallow and deep management zones for each aquifer, and different limits of allowable drawdown impacts for the different zones. This approach provided for allowance of greater drawdown of artesian pressure in the confined aquifers, where appropriate, than decline in the water level in the unconfined aquifers. In addition, the management zones allows for consideration of areas most sensitive to hydraulic head changes due to production, These Rules and strategies were adopted prior to the Legislature's passage of HB1763 during that same year, which was the beginning of the joint planning process as we know it today. Later, during the joint planning process, the District worked with other GCDs in Groundwater Management Area 12 (see Figure 2) to morph its adopted management limits on allowable water level decline into Desired Future Conditions, which provide for overall protective management of the aquifers of the District and the GMA. These DFCs for GMA 12 were expressed as an average reduction in hydraulic head across an entire District from 2010 to 2060. However, POSGCD continued to provide protection for the more shallow wells in the District by continuing to designate separate Management Zones in the shallow or unconfined areas of each aquifer, and adopting a separate limit, or threshold, for drawdown for those zones, which are used in conjunction with the overall DFCs adopted by GMA 12. In this way the District maintains overall regional GMA DFC goals, which help to regulate impacts from pumping outside the District and across the entire region, while affording POSGCD the ability to add the necessary detail at the local, or District, level (see Figure 3). Also of note is recent action by the POSGCD Board to request other GCDs in GMA 12 to adopt DFCs for the shallow areas of the aquifers in the GMA.

As previously stated, the District manages with respect and recognition of property rights as modified by reasonable regulation to prevent adjoining landowners from causing excessive impacts to one another, or production from the deeper confined portions of the aquifer affecting availability of groundwater in the more shallow unconfined areas. This approach to management utilizes correlative rights and is accomplished with several management tools. One such tool is well spacing requirements which include both horizontal and vertical offsets specifically tailored to each aquifer based on hydrologic evaluations. One of the purposes for well spacing requirements is to spatially distribute the pumping across the areal and vertical extent of the aquifers. Next, the District employs a contiguous acreage requirement to regulate overall volumes of annual production. Currently this limit is set at a fairly conservative maximum allowable production of 2 acre feet per acre of groundwater annually. This requirement will be one tool used to adjust allowable production should curtailment of permitted production in the future become a necessity to protect the resource. Additionally, The District recognized historic users through the issuance of Historic Use permits. These permits protect the investments of producers prior to the District's creation, and can be curtailed at a different rate than other permits. Among key aspects of these Historic Use permits is production being specific to use, amount, location of withdrawal, and term limits to with the life of the well.

To insure proper evaluations for management of the aquifers, POSGCD maintains an active water level monitoring program and detailed monitoring network of water wells throughout all aquifers and management zones in the District. In deeper areas of aquifers where water wells are not readily available to provide a monitoring presence, POSGCD is aggressively involved in entering into agreements with landowners in converting abandoned oil & gas wells to water wells. POSGCD also partners with county agencies to obtain access to strategic locations for monitoring groundwater conditions.

Permitting Structure

With due considerations to the characteristics of the aquifers in the Central Carrizo-Wilcox area, the District has developed a permitting structure that allows for long-term permits. Because patterns of use by producers fluctuate from year to year, and because of the large volume of water in storage of the regional aquifer system, it is anticipated that large regional changes in hydraulic head will develop with sufficient lead time to take corrective measures before undesirable groundwater conditions evolve. Therefore, the District issues 40-year production permits which can be adjusted as needed according to Section 16 of the District's Rules. The District also employs a 5-year review of all permits which allows sufficient opportunities to adjust permits so they are in line with changes to DFCs or the Management Plan. Any necessary adjustment or curtailment of production will be enacted simultaneously to all permits of the same class in the same management zone, thereby avoiding necessity of denial of a permit application even during times of curtailment, and treating any and all property owners the same on any given day. Since the District will manage based on actual water levels, as well as relying on the GAM for insightful evaluations and interpretations of the most current field data, this management strategy also allows the District to achieve the requirements of Chapter 36, Sec. 36.108 (d-2) by allowing the aquifer to determine the "highest practicable level of groundwater production" while providing for "the conservation, preservation, and protection" of the resource by protecting the "at risk" areas.

Conservation

Because the District is fee based, and asses fees on permitted amounts, POSGCD has funded $7.8 million in groundwater conservation programs since 2006 which includes, among other items, reduction of losses in transmission.

Figure 1

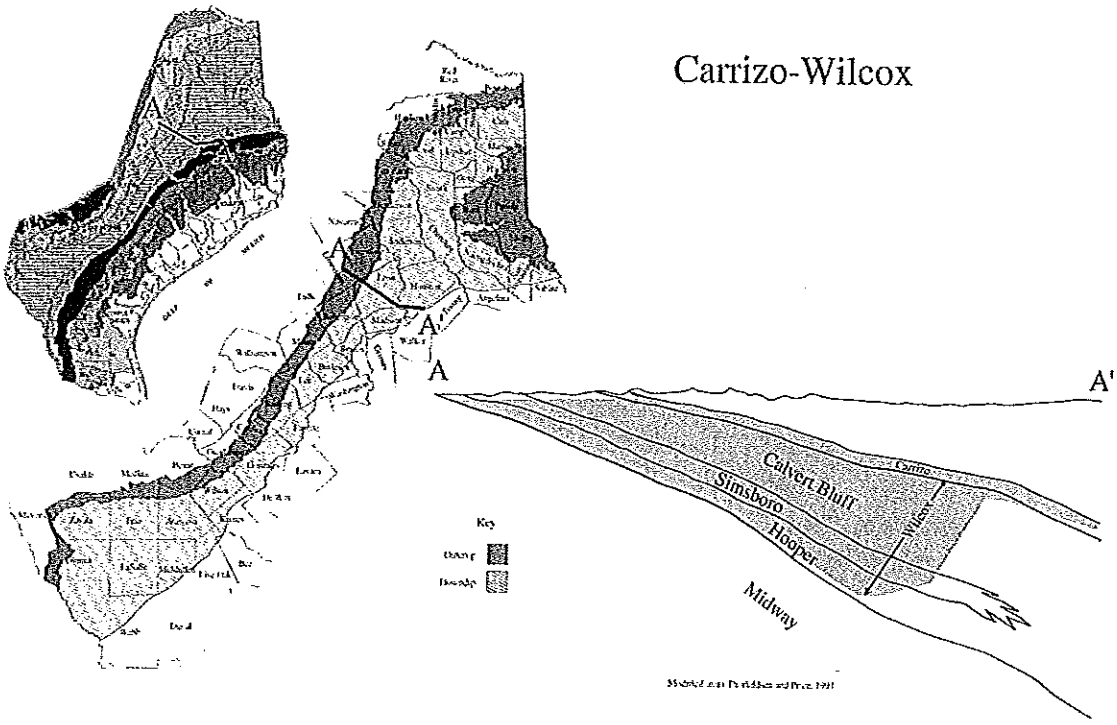


Figure 2

Groundwater Management Area 12

#55- Mid-East Texas GCD

#8- Brazos Valley GCD

#68- Post Oak Savannah GCD

#48- Lost Pines GCD

#23- Fayette County GCD

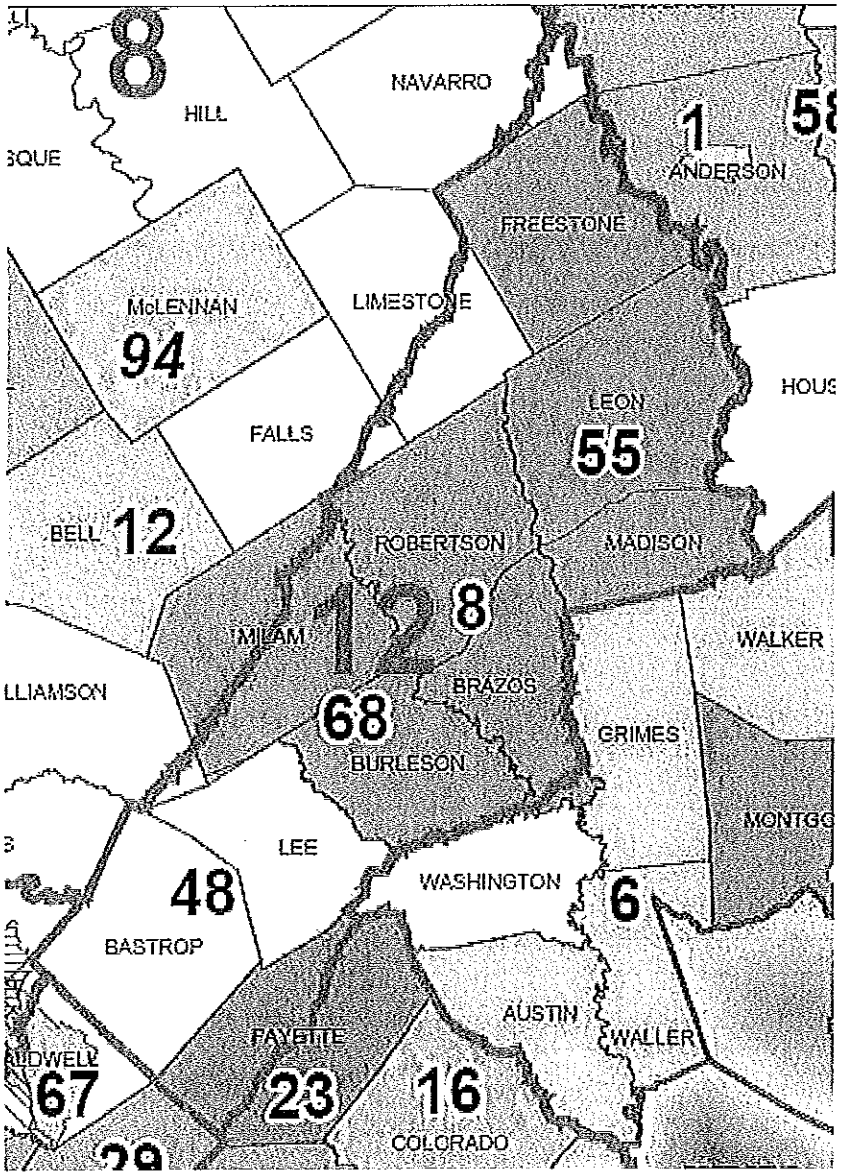
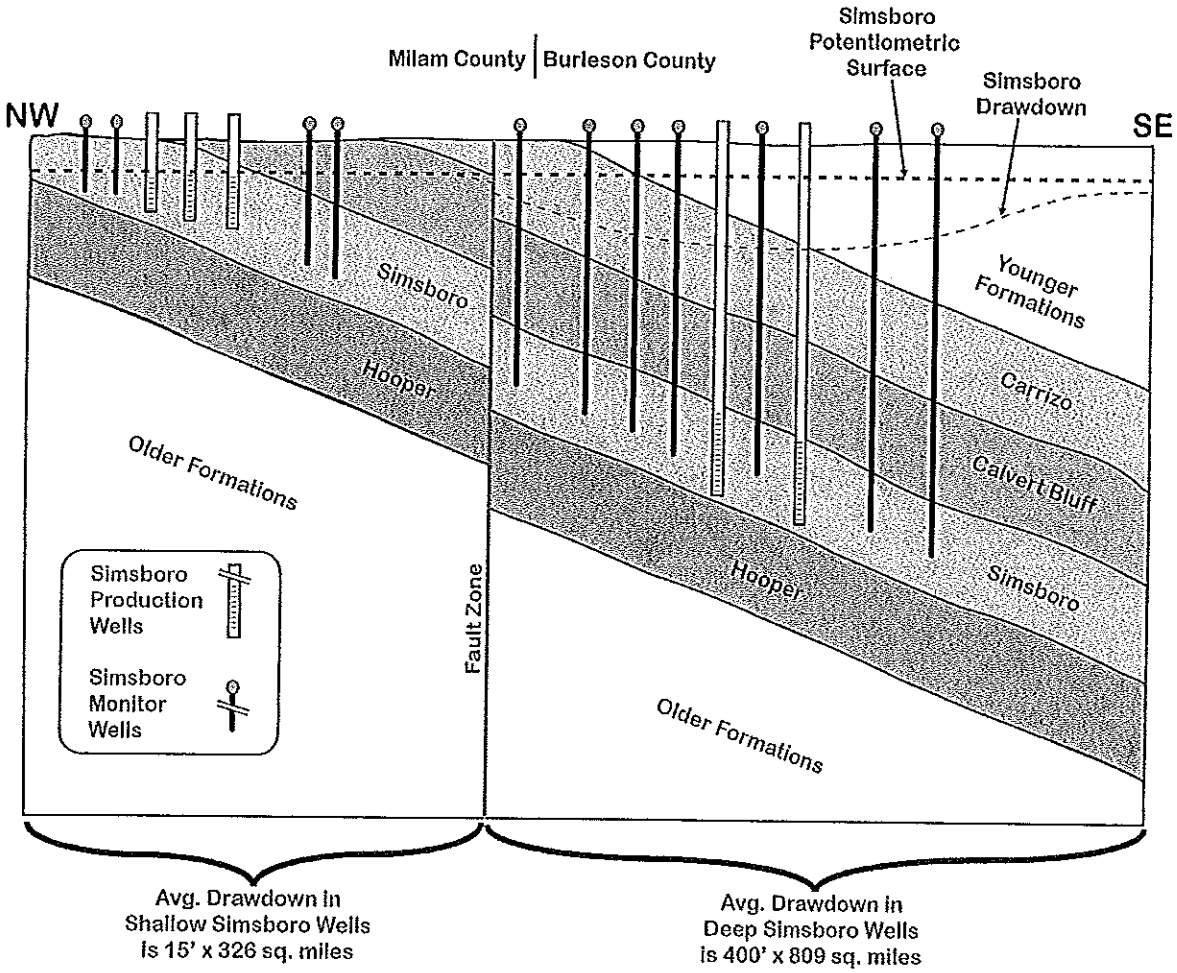


Figure 3 (Provided for discussion of DFCs)

Schematic Cross Section
Simsboro Drawdown



APPLICATION OF	§	
BLUE WATER VISTA RIDGE LLC	§	BEFORE THE
FOR AMENDMENT TO DRILLING AND	§	
OPERATING PERMIT NO.	§	POST OAK SAVANNAH
POS-D&O/A&M-0001D AND FOR	§	GROUNDWATER CONSERVATION
AMENDMENT TO TRANSPORT	§	DISTRICT
PERMIT NO. POS-T-0001B	§	

APPLICANT'S STATEMENT OF POSITION ON PARTY STATUS

1. Blue Water Vista Ridge LLC ("BWVR") has filed an application (the "Application") with the Post Oak Savannah Groundwater Conservation District (the "District") for four amendments to Drilling and Operating Permit No. POS-D&O/A&M-0001d (the "Operating Permit") and to Transport Permit No. POS-T-0001d (the "Transport Permit").

2. The BWVR wells at issue are all *Simsboro* wells. The Carrizo-Wilcox Aquifer is a major aquifer in Texas, and there are four individual formations within the Carrizo-Wilcox in Milam and Burleson Counties, which, from upper to lower units, are the Carrizo Formation, the Calvert Bluff Formation, the Simsboro Formation, and the Hooper Formation. These formations are separate, distinct, and independent. The Simsboro is confined by thick layers of impermeable clay, such that production of water from the Simsboro does not materially impact even the next closest formation (the Calvert Bluff), let alone other aquifers overlying the Carrizo-Wilcox. A readily-observable product of the Simsboro's confined geology is the hydrostatic pressure within the aquifer that creates approximately 2,000 feet of artesian lift in the vicinity of the Vista Ridge well field. The top of the Simsboro in the Vista Ridge well field is approximately 2,200 feet in depth.

3. On August 2, 2019, the District declared BWVR's Application administratively complete. The preliminary hearing on the Application has been set for October 3, 2019.

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3. On August 2, 2019, the District declared BWVR's Application administratively complete. The preliminary hearing on the Application has been set for October 3, 2019.

I. Two Potential Parties have sought to intervene in this proceeding.

4. Curtis Chubb ("Chubb") submitted a written request to the District on September 23, 2019, to be designated an "affected person" in these proceedings. Chubb owns property at 830 County Road 330, Milano, Texas 76556—about 17 miles north of the Vista Ridge well field. A map showing the location of Mr. Chubb's property and its distance from the Vista Ridge well field is attached as Ex. A. Chubb's hearing request does not identify any groundwater well on his property, let alone a Simsboro well. In fact, Chubb does not own any rights to the groundwater beneath his property. He seeks to intervene based on his ownership of land over the Simsboro.

5. Sidney Zgabay ("Zgabay") submitted a written request to the District on September 26, 2019, to be designated an "affected person" in these proceedings. Zgabay owns property at 8710 W. Hwy. 21, Caldwell, Texas 77836, to the east of the Vista Ridge well field. A map showing the location of Mr. Zgabay's property and its distance from the Vista Ridge well field is attached as Ex. B. Zgabay has a groundwater well on his property, but admits that the well is at a depth between 450 and 500 feet—*i.e.*, not a Simsboro well. A cross-section showing Mr. Zgabay's well in relation to the Vista Ridge wells in the Simsboro aquifer is attached as Ex. C.

II. The Potential Parties must have a "personal justiciable interest" to contest BWVR's Application.

6. Chapter 36 of the Texas Water Code requires a groundwater conservation district such as the District to adopt procedural rules that "limit participation" in a hearing on a contested application to persons:

> who have a personal justiciable interest related to a legal right, duty, privilege, power, or economic interest that is within a district's regulatory authority and affected by a permit or permit amendment application, not including persons who have an interest common to members of the public.

TEX. WATER CODE § 36.415(b)(2).

7. The District complied with the Legislature's requirement and adopted Rules to limit participation in its hearing process. Under the District's Rules, a person must be an "affected person" in order to be a party to BWVR's Application, including the right to "testify, offer any evidence, or file any document." *See* Dist. Rule 14.3.2. An "affected person" is defined as a person who has "a personal justiciable interest related to a legal right, duty, privilege, power, or economic interest affected by the application." *See* Dist. Rule 1.1. Importantly, an "interest common to members of the general public" does *not* qualify as such a justiciable interest. *See* Dist. Rule 1.1. Also importantly, the District's "affected person" determination "shall" take into account, among other things: (a) "distance restrictions . . . imposed by law on the affected interest" including the person's "proximity to well locations"; (b) "whether a reasonable relationship exists between the interest claimed and the activity regulated" and the "likely impact of the regulated activity on use of the impacted natural resource by the person." *See* Dist. Rule 1.1.

8. The burden of proof to establish a personal justiciable interest is on the person making a request for party status—here, Chubb and Zgabay. *See* Dist. Rule 7.5.3. To meet such burden of proof, the potential parties must demonstrate their personal justiciable interests, *in writing*, at least five business days before the preliminary hearing. *See* Dist. Rules 7.5.3, 14.2.4, 14.5.3.b.

9. Thus, the Legislature and this District have not broadly conferred standing to any landowner over the subject aquifer. Instead, the Legislature and this District have limited participation in well permit application hearings to those *actually harmed*. Well permit hearings are highly specialized matters, involving expert-driven, technical questions such as well spacing and hydrologic impact on wells that might be potentially affected. By not conferring standing to

"any landowner," and instead directing groundwater conservation districts to "limit participation" in those hearings, the Legislature and this District signaled their plain intent to keep well permit hearings tied to technical issues, and to prevent those hearings from devolving into thinly-disguised political protests.

10. A person cannot request a contested case hearing unless he first establishes that he is an affected person. *See id.* § 36.415(b)(3).

III. A "personal justiciable interest" requires a well in the same aquifer as at issue under the Application.

11. Chubb and Zgabay's requests for party status rest on the notion that any landowner over an aquifer is entitled to protest a well application, regardless of whether they have a well in the affected aquifer. On the contrary, the District has an obligation to limit party status to those landowners actually affected by a well application. TEX. WATER CODE § 36.415(b)(2).

12. The requirement of showing actual or imminent injury, rather than hypothetical or speculative injury, applies to groundwater resources in the same way that it applies to land ownership. *See Collins v. Tex. Natural Res. Conservation Comm'n*, 94 S.W.3d 876, 882 (Tex. App.—Austin 2002, no pet.) (affirming agency denial of a hearing request by landowner alleging potential harm to groundwater resources 1.3 miles away from facility because landowner failed to demonstrate he was an "affected person").

13. Chubb and Zgabay assert that they have property rights in groundwater. As a factual and legal matter (as demonstrated below), Chubb is incorrect. But, in any case, having property rights in groundwater is simply not enough—alone—to establish standing. BWVR does not dispute that landowners have certain groundwater rights that are one of the sticks in the bundle of rights that comes with land ownership in Texas. TEX. WATER CODE § 36.002(a) ("The legislature recognizes that a landowner owns the groundwater below the surface of the

landowner's land as real property."). However, inchoate ownership rights in groundwater—standing alone—simply do not confer universal standing to challenge any and every action that might hypothetically affect a groundwater resource under one's property, regardless of actual injury. The Carrizo-Wilcox Aquifer, of which the Simsboro is a component, stretches from the Rio Grande in south Texas to the Louisiana border in east Texas. A map showing the extent of the Carrizo-Wilcox aquifer is attached as Ex. D. The central Texas portion of the Carrizo-Wilcox alone is a vast aquifer that underlies several counties and, according to the Texas Water Development Board, contains 1 billion acre-feet of water in storage. It cannot be that every landowner over that vast area of land can protest any application to withdraw water from any groundwater district overlying the aquifer, regardless of facts that would demonstrate injury (such as ownership of a well in the affected aquifer and proximity to the proposed well). Such a rule would be entirely unworkable and would turn well application hearings, which turn on technical questions such as compliance with well spacing regulations, into political circuses bearing no relation to the technical questions actually at issue, nor to the actual injury of the protesting parties.

14. If land ownership alone were enough to confer standing, then any landowner anywhere could challenge any environmental permit. That is not the law, and loosening standing requirements by removing the actual injury requirement would create a nightmare for regulatory agencies such as this District. *See Tex. Disposal Sys. Landfill, Inc. v. Tex. Comm'n on Envtl. Quality*, 259 S.W.3d 361 (Tex. App—Amarillo 2008, no pet.) ("[L]ike the chance of a pig growing wings, the purported injury that might befall [a landfill owner located 200 miles away] is mere speculation, and as such, it falls short of establishing a justiciable interest and standing.").

15. It is a reasonable application of this District's Rules, therefore, for the District to require that a person have an actual groundwater well that produces from the aquifer which is the subject of the application—or, at a bare minimum, concrete, imminent plans for such a well—to have standing to challenge another person's application for a well. It is also a reasonable application of this District's Rules to require that the landowner's well be within reasonable proximity of the proposed well at issue. Both of these limitations are directly tied to the foundational component of standing—actual or imminent injury. As a practical matter, without such reasonable, common-sense limitations, the District would be required to allow any landowner over the entire aquifer to demand a contested case to protest any application for a well permit. The Legislature has mandated that groundwater conservation districts "limit participation" in permit hearings, and the District has discretion to draw the line in this manner. *See R.R. Comm'n v. Ennis Transp. Co.*, 695 S.W.2d 706, 710 (Tex. App.—Austin 1985, writ ref'd n.r.e.).[1]

16. The Lost Pines Groundwater Conservation District affirmed this very conclusion regarding the Simsboro in the End Op case (SOAH Docket No. 952-13-5210). The Administrative Law Judge concluded that landowners near the applicable Simsboro wells did not have standing to be an "affected person" because they were "not using and have not shown that they intend to use groundwater that will be drawn from the Simsboro." A copy of the ALJ's order is attached as Ex. E. The Lost Pines Groundwater Conservation District agreed with this result by its January 19, 2015 Order. A copy of the Lost Pines GCD's order is attached as Ex. F. The Lost Pines decision was affirmed on appeal on jurisdictional grounds, with one justice explicitly affirming the standing decision, rendering the Lost Pines District's decision final and

[1] Environmental concerns do not alter the analysis. *See Save Our Springs Alliance v. City of Dripping Springs*, 304 S.W.3d 871, 880 (Tex. App.—Austin 2010, pet. denied) ("In sum, we do not find any Texas case in which an alleged injury to a plaintiff's environmental, scientific, or recreational interests conferred standing in the absence of allegations that the plaintiff has an interest in property affected by the defendants' actions.").

unchallenged. *End Op, L.P. v. Meyer*, 2018 Tex. App. LEXIS 6934 (Tex. App.—Austin 2018, no pet.). That final decision should be followed in this case as well.[2]

IV. The Potential Parties do not have an actual or imminent Simsboro well.

17. There are two potential parties who have sought to be admitted in these proceedings—Chubb and Zgabay.

18. Chubb has no personal justiciable interest to protest BWVR's Application. Chubb has no ownership of the groundwater beneath his land whatsoever. The property deed to Chubb expressly reserves "all of the groundwater in and under" the land from being conveyed to him. *See* Ex. G. As a result, Chubb has no actual or imminent injury from BWVR's groundwater wells. Even if Chubb owned his groundwater rights, those rights are subject to a lease that has been assigned to Blue Water. The lease, which Chubb obliquely acknowledges in his hearing request, has been pooled, and is in effect today as a matter of public record. A copy of the Fifty-Third Amendment and Ratification of Designation of Collective Water Development and Production Unit is attached as Ex. H. Finally, even if Chubb owned the groundwater beneath his land, and his groundwater rights were not leased, he still would not be an affected person. Chubb's property is 17 miles from the Vista Ridge well field. Chubb does not have a Simsboro well, nor any imminent plans to drill a Simsboro well. Moreover, Chubb's hearing request does not identify any well that he claims is affected, nor could he, since he holds no ownership right to the groundwater beneath his land.

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[2] While the Administrative Law Judge in the pending Lower Colorado River Authority case (SOAH Docket No. 952-19-0705) allowed persons with a groundwater well to participate even if the well is not connected to the Simsboro, there are two simple reasons not to rely on that ruling here. First, this was done in the context of the applicant itself not challenging their party status, thereby seeking to avoid any possibility of a district court reversal. Second, the Lost Pines District has not yet had the opportunity to affirm or reverse this conclusion, since it directly contradicts the Lost Pines District's prior conclusion in the End Op case.

19. The only other person to timely file a written request for affected party status is Zgabay. Zgabay also has no personal justiciable interest to protest BWVR's Application. Although Zgabay owns the groundwater beneath his land and has a groundwater well on the property, there is one critical fact that defeats his standing—the well on his property is not a Simsboro well, and, in fact, is several hydrologically-separate formations above the Simsboro. According to this hearing request, Zgabay's well is between 450-500 feet deep, which places his well in the Queen City Aquifer. Zgabay's well in the Queen City Aquifer is more than 1,700 feet above the top of the Simsboro, and there are several formations between the Queen City and the Simsboro. *See* Ex. C. As noted earlier, the Simsboro is a confined aquifer, with thick layers of impermeable clay resulting in artesian conditions in the Simsboro. Production of water in the Simsboro bears no reasonable relationship to a shallow well in the Queen City, separated by 1,700 feet and multiple confining formations. Put another way, BWVR's Application for 4,842 acre-feet of annual production from the Simsboro aquifer will not impact Zgabay's use of his Queen City well. Zgabay does not have a Simboro well, nor will pumping from the hydrologically separate Simsboro aquifer affect his well that is four formations above the Simsboro. Therefore, Zgabay is not an affected party.

20. One of the irreducible constitutional minimums of standing is that, to be an injury in fact, the harm to the plaintiff from the defendant's conduct must be actual or imminent, not conjectural or hypothetical. *See Lujan v. Defenders of Wildlife*, 504 U.S. 555, 560 (1992); *Brown v. Todd*, 53 S.W.3d 297, 302 (Tex. 2001). Neither Chubb nor Zgabay has an "actual or imminent" Simsboro well. Under basic standing principles, neither Chubb nor Zgabay have met their burden to show actual or imminent harm.

21. Land ownership over an aquifer—standing alone—is not sufficient to protest a groundwater well application; nor is ownership of a well that produces from an aquifer that is hydrologically separate from the Simsboro Formation of the Carrizo-Wilcox Aquifer. Without a well in the Simsboro, Chubb and Zgabay cannot distinguish themselves from any other landowner in the entire District. The District should deny Chubb and Zgabay's standing to challenge BWVR's Application, because they have failed to carry their burden to demonstrate an interest that will be harmed by BWVR's Application, and their complaints are instead common to members of the public. *See* Dist. Rule 1.1.

Respectfully submitted,

By: _____

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Austin, Texas 78701
Tel: (512) 474-9100
Fax: (512) 474-9888
pterrill@terrill-law.com

ATTORNEY FOR BLUE WATER VISTA RIDGE, LLC

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing was served as indicated on October 3, 2019, to the following:

VIA E-MAIL
Curtis Chubb
830 County Road 330
Milano, Texas 76556
texas.rain@centurylink.net

VIA FIRST-CLASS MAIL
Sidney Zgabay
8710 W. St. Hwy 21
Caldwell, Texas 77836

VIA E-MAIL
Judith McGeary
P.O. Box 962
Cameron, Texas 76520-0962
judith@farmandranchfreedom.org

VIA EMAIL
Barbara Boulware Wells
The Knight Law Firm, LLP
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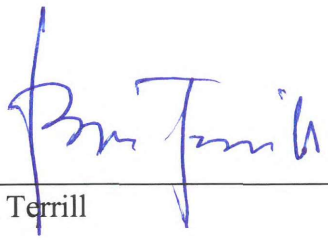


Paul M. Terrill

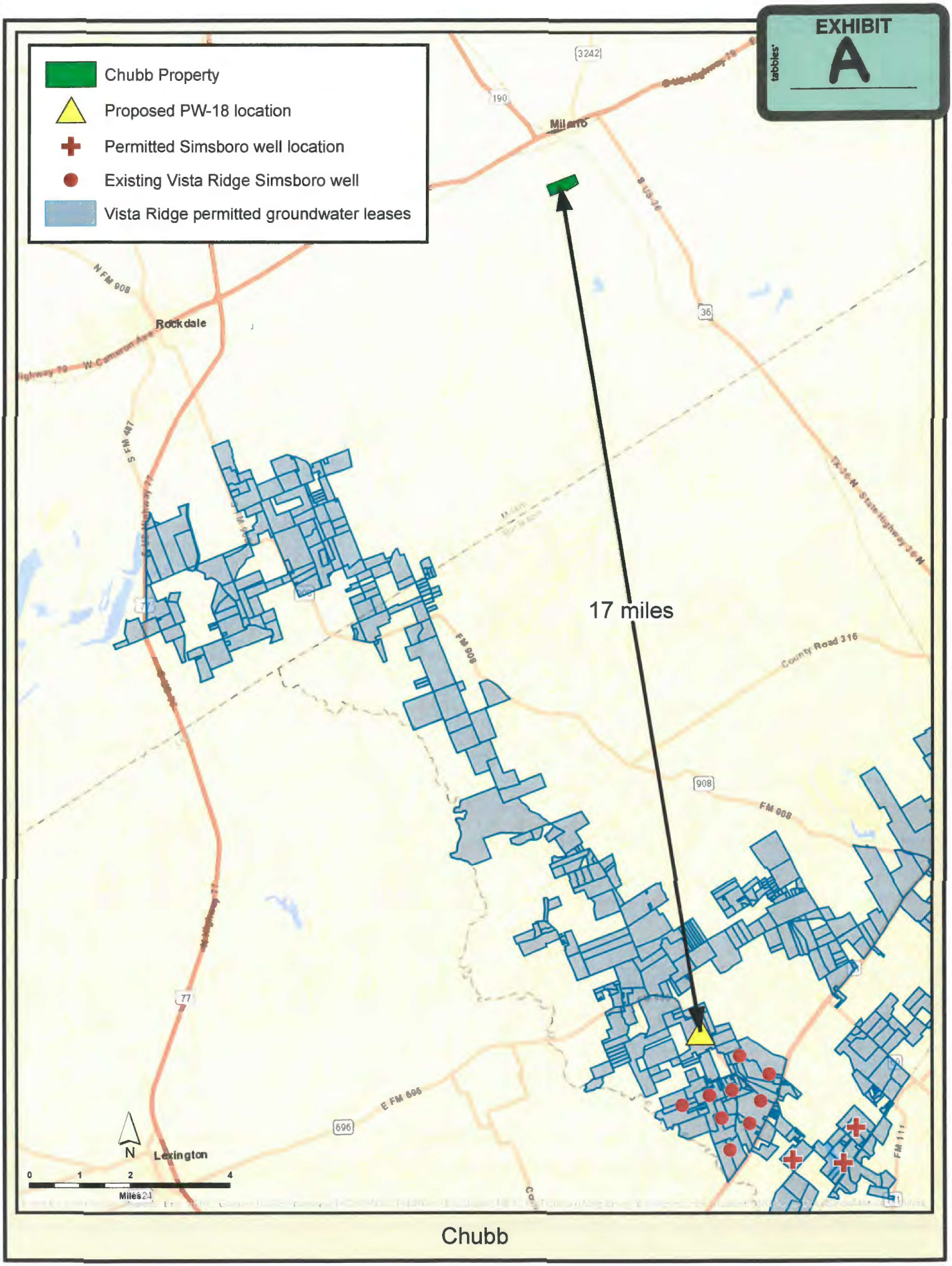
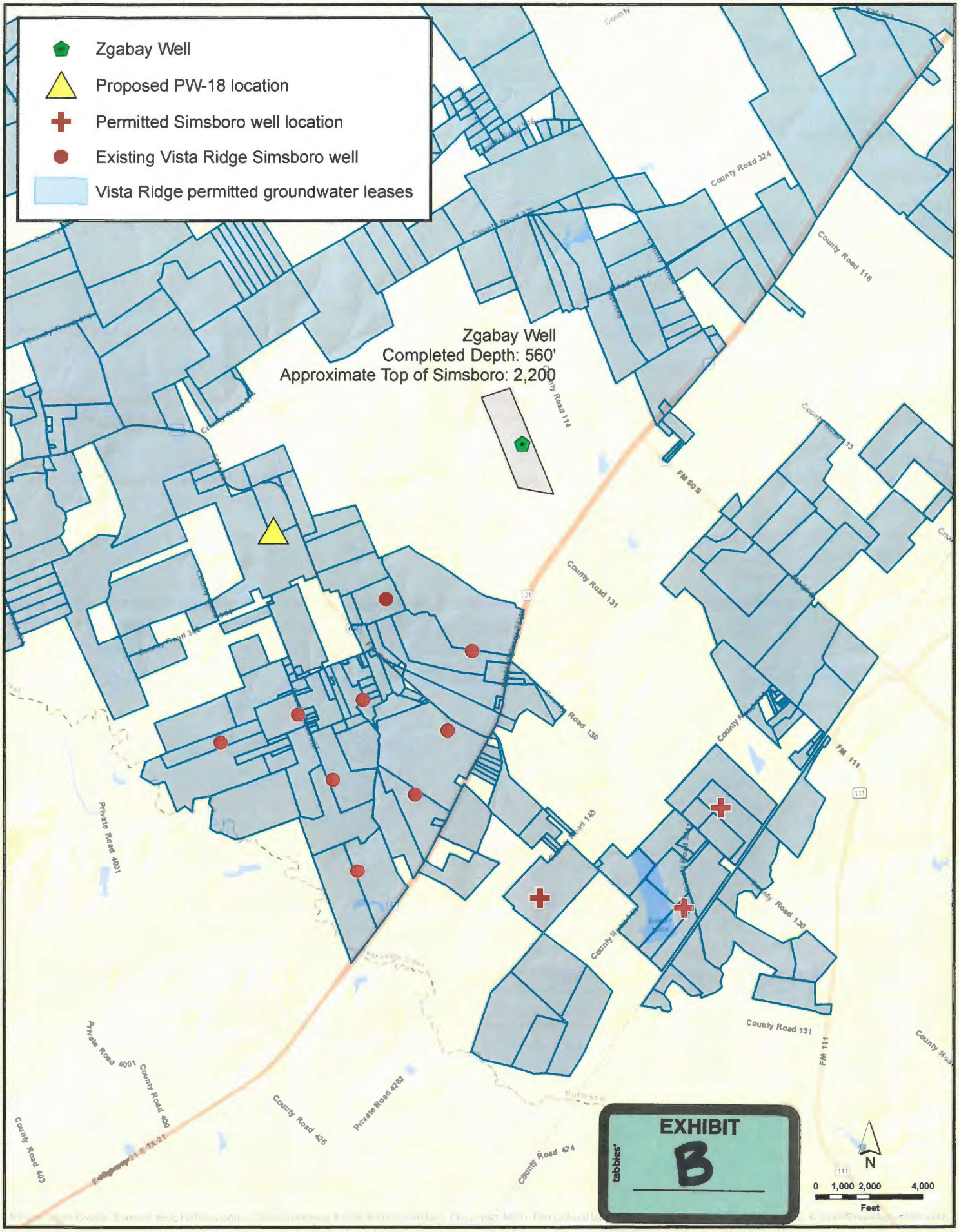


EXHIBIT
A
tabbies
Chubb Property
Proposed PW-18 location
Permitted Simsboro well location
Existing Vista Ridge Simsboro well
Vista Ridge permitted groundwater leases
17 miles
Rockdale
Milano
Lexington
N FM 908
S FM 487
FM 908
County Road 316
E FM 696
N
0 1 2 4
Miles

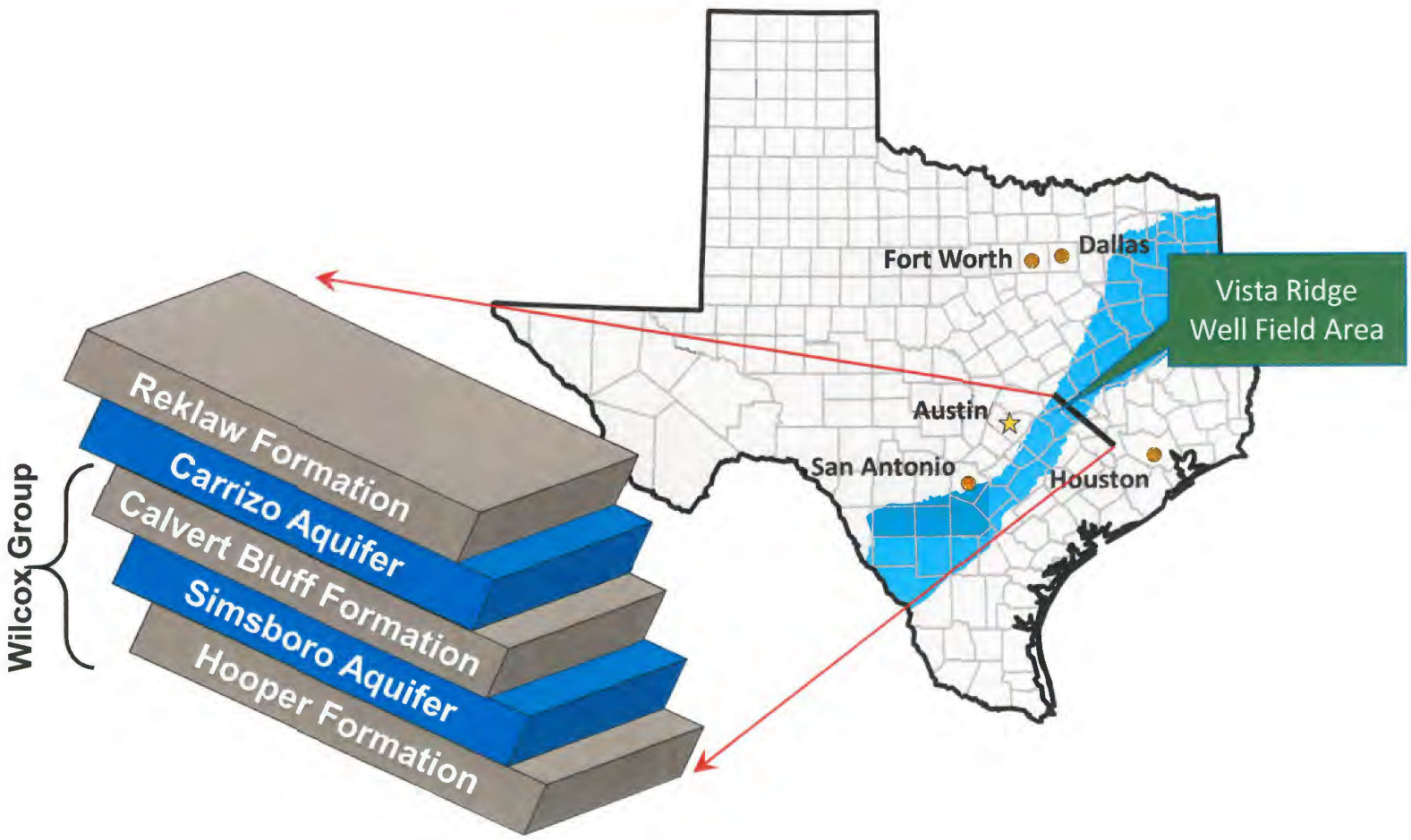
Chubb

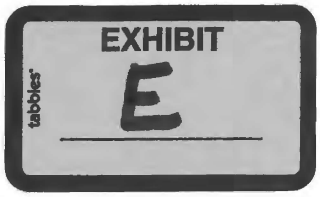

Zgabay Well
Proposed PW-18 location
Permitted Simsboro well location
Existing Vista Ridge Simsboro well
Vista Ridge permitted groundwater leases
Zgabay Well
Completed Depth: 560'
Approximate Top of Simsboro: 2,200
County Road 324
County Road 116
County Road 114
FM 60 S
County Road 131
County Road 130
FM 111
Private Road 4001
County Road 130
County Road 151
FM 111
Private Road 4001
County Road 400
County Road 426
Private Road 4202
County Road 424
County Road 403
EXHIBIT
B
tabbies
N
0 1,000 2,000 4,000
Feet

Zgabay

EXHIBIT
D

Carrizo-Wilcox Aquifer





SOAH DOCKET NO. 952-13-5210

APPLICATIONS OF END OP, L.P. FOR WELL REGISTRATION, OPERATING PERMITS, AND TRANSFER PERMITS	§	**BEFORE THE STATE OFFICE**
	§	**OF**
	§	**ADMINISTRATIVE HEARINGS**

ORDER NO. 3
DENYING ENVIRONMENTAL STEWARDSHIP, BETTE BROWN, ANDREW MEYER AND DARWYN HANNA PARTY STATUS, AND GRANTING AQUA WATER SUPPLY CORPORATION PARTY STATUS

I. INTRODUCTION

In 2007, End Op, L.P. ("End Op") filed Applications for groundwater permits with the Lost Pines Groundwater Conservation District ("the District") seeking to withdraw water from the Simsboro Aquifer ("Simsboro"). The District imposed a moratorium on End Op's applications, preventing action on them until January 2013. On March 18, 2013 the District posted notice that a hearing would be held to consider End Op's applications on April 17, 2013.

Prior to the hearing and pursuant to the District's Rule 14.3(D),[1] Aqua Water Supply Corporation ("Aqua") filed a timely request for a contested case hearing on End Op's applications. On April 18, 2013, public comment on End Op's applications was conducted and closed, and the District's Board of Directors (the "Board") set a preliminary hearing on Aqua's request for May 15, 2013. On May 8, 2013, Environmental Stewardship ("ES"), Bette Brown, Andrew Meyer, and Darwyn Hanna (collectively, the "Landowners") filed requests for party status in any contested case hearing on End Op's Applications.

At the May 15th hearing, the District considered the timeliness of the Landowners' requests for party status and reached the conclusion that the Landowners' requests were timely. The District then designated the Landowners as parties for this contested case hearing at the

[1] District Rule 14.3(D) provides that: "A request for a contested case hearing on the Application, to be conducted under Rule 14.4, must be made in writing and filed with the District no later than the 5th day before the date of the Board meeting at which the Application will be considered."

May 15th hearing and referred the issue of the Landowners' standing to the State Office of Administrative Hearings ("SOAH").

II. PARTIES' ARGUMENTS AND ALJ'S ANALYSIS

A. Timeliness

1. End Op Argues Landowners' Requests for Party Status Were Improper and Untimely and Should Be Denied.

First, End Op argues that the Landowners' requests for party status should be denied because a person may not be a party in a contested case proceeding on groundwater permit unless they filed a timely request for a contested case hearing. End Op points to Chapter 36 of the Texas Water Code, which requires groundwater districts to adopt procedural rules limiting participation in a hearing on a contested application to persons with standing[2] and provides that when hearings are conducted by SOAH only Subchapters C, D, and F of the Administrative Procedure Act ("APA") and district rules consistent with the procedural rules of SOAH apply.[3] End Op claims that Chapter 36 does not permit a groundwater district or an Administrative Law Judge ("ALJ") with SOAH to designate a person who has not timely requested a contested case hearing as a party because to do so would violate the District's own procedural rules concerning party status. Since the Landowners did not file such requests, End Op argues, neither the District nor the ALJ may designate them as parties.

Second, End Op claims that the Landowners' requests for party status are untimely and should be denied because they had notice and ample time to request a contested case hearing or party status and did not make such requests. Third, End Op argues that granting party status is unnecessary because the Landowners' interests are already protected by the District. Finally, End Op claims that granting the Landowners party status would render the District's Rule 14.3(D) a nullity, would add considerable delay to an already greatly delayed venture, would burden End Op with substantial additional expense, and would create a loophole precedent which would allow for a continuous flow of new requests for party status beyond the proper deadline.

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[2] *See* Tex. Water Code § 36.415.
[3] *See* Tex. Water Code § 36.416.

2. Landowners Argue That Since the District Has Already Determined that Landowners' Requests for Party Status Were Timely, It Is Unnecessary for This ALJ to Revisit the Issue of Timeliness.

Landowners note that the District has already determined that Landowners' requests for party status were timely. The Landowners argued that, under District rules, a request for party status presents a separate and independent question apart from whether to grant a request for a contested case hearing. Since the District determined that Protestants requests for party status were timely, they argue, it is unnecessary for this ALJ to revisit the issue.

3. ALJ'S Analysis

District Rule 14.3(D) contemplates who may request a contested case hearing on a permit application.[4] After a hearing has been properly requested, Rule 14.3(E) governs the District's consideration of that request.[5] Rule 14.3(E) gives the Board the authority to grant or deny the request at its meeting, to designate parties at its meeting, or to schedule a preliminary hearing where the Board will make a determination of those issues.[6] End Op admits that Aqua filed a timely request for a contested case hearing on End Op's Applications. Accordingly, the Board was then given the authority to consider that request under Rule 14.3(E). The Board was entirely within its authority when it scheduled such a hearing for May 15, 2013. Under Rule 14.3(E), the Board has the authority to designate parties at this hearing.[7] The Landowners' requests for party status were filed on May 8, 2013. There is nothing in the District's rules that states that the

[4] District Rule 14.3(D) reads: "Request for contested case hearing. A request for a contested case hearing on the Application, to be conducted under Rule 14.4, must be made in writing and filed with the District no later than the 5th day before the date of the Board meeting at which the Application will be considered. A request for a contested case hearing may be granted if the request is made by: (1) the General Manager; (2) the applicant; or (3) a person who has a personal justiciable interest that is related to a legal right, duty, privilege, power, or economic interest that is within the District's regulatory authority and that is affected by the Board's action on the Application, not including persons who have an interest common to members of the public."

[5] District Rule 14.3(E) reads: "Consideration of request for contested case hearing. (1) If the District receives a timely-filed request for a contested case hearing on the Application, then, at its meeting, the Board may: (a) determine whether to grant or deny a request for a contested case; (b) designate parties... (e) schedule a preliminary hearing at which the Board will determine all of the matters described in subsections (a) to (e) or any matters described in those subsections that were not decided at the meeting."

[6] *Id.*

[7] *Id.*

Board may not consider requests that were filed before the date it holds its hearing pursuant to Rule 14.3(E). Accordingly, the Landowners' requests for party status are procedurally adequate.

B. Standing

Having found Landowners' requests for party status procedurally adequate, the next issue is whether the Landowners meet the mandatory standing test set out in section 36.415(b)(2) of the Texas Water Code. This test, which embodies constitutional standing principles, requires that groundwater districts:

> limit participation in a hearing on a contested application to persons who have a personal justiciable interest related to a legal right, duty, privilege, power, or economic interest that is within a district's regulatory authority and affected by a permit or permit amendment application, not including persons who have an interest common to members of the public.[8]

In *City of Waco v. Tex. Com'n on Environmental Quality*, the Court of Appeals in Austin determined "an affected person"[9] must meet the following requirements to have standing to request a contested case hearing before Texas Commission on Environmental Quality ("TCEQ"):[10]

> (1) an "injury in fact" from the issuance of the permit as proposed—an invasion of a "legally protected interest" that is (a) "concrete and particularized" and (b) "actual or imminent, not conjectural or hypothetical";
> (2) the injury must be "fairly traceable" to the issuance of the permit as proposed, as opposed to the independent actions of third parties or other alternative causes unrelated to the permit; and
> (3) it must be likely, and not merely speculative, that the injury will be redressed by a favorable decision on its complaints regarding the proposed permit (i.e., refusing to grant the permit or imposing additional conditions).[11]

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[8] Tex. Water Code § 36.415(b)(2).

[9] "Affected person" is defined in § 5.115 of the Texas Administrative Code as one "who has a personal justiciable interest related to a legal right, duty, privilege, power, or economic interest" in the matter at issue, and not merely an "interest common to members of the general public" -- a definition that is essentially identical to § 36.415(b)(2) of the Texas Waster Code. Additionally, the District adopted the same definition in Section 1, Rule 1.1 of its Rules and Regulations.

[10] Although Landowners are requesting party status, not a contested case hearing, the analysis of the meaning of a "justiciable interest" is applicable.

[11] *City of Waco v. Texas Com'n on Environmental Quality*, 346 S.W.3d 781, 802 (Tex.App.-Austin 2011), reh'g overruled (Aug. 2, 2011), review denied (June 29, 2012), order vacated (Feb. 1, 2013), *rev'd*, 11-0729, 2013 WL 4493018 (Tex. 2013); *See Brown v. Todd*, 53 S.W.3d 297, 305 (Tex. 2001) (quoting *Raines v. Byrd*, 521 U.S. 811,

The burden is upon the Landowners to present evidence establishing each of these elements, showing they possess a qualifying personal justiciable interest.

1. **Landowners' Position**

The Landowners argue that under section 36.002 of the Texas Water Code, they own the groundwater beneath their respective properties as a real property interest. Accordingly, they argue they possess standing to challenge the deprivation or divestment of their property interests (what they refer to as a "taking") by virtue of being landowners whose property sits above the aquifer at issue in this case.

The Landowners agree with End Op that a person seeking party status must (1) establish an injury in fact that is (2) fairly traceable to the issuance of the permit as proposed and (3) that it is likely, not merely speculative, that the injury will be redressed by a favorable decision on its complaints regarding the proposed permit. The Landowners argue, however, that particular treatment is given to questions of fact related to standing that overlap with the merits of a case. They argue that they need not prove the merits of their case in order to demonstrate a potential impact, but rather need only show that a fact issue exists. To be deemed an affected person, they argue that they need only show a potential impact.

Landowners also argue that they have demonstrated the necessary justiciable interest with regard to End Op's Applications to warrant admission as parties. The ownership of land over the aquifer at issue, they argue, which brings with it a real property interest in the water beneath the land, constitutes a legally protected interest under the Water Code. Since this interest is protected, they maintain that there is no need to demonstrate ownership of a well or intent to drill a well in order to demonstrate that interest. The Landowners claim that it is undisputed that End Op's pumping operations will result in a drawdown of water within the aquifer extending to their

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818–19 (1997), *Lujan v. Defenders of Wildlife*, 504 U.S. 555, 560–61 (1992); *Stop the Ordinances Please v. City of New Braunfels*, 306 S.W.3d 919, 926–27 (Tex.App.-Austin 2010, no pet.); *Save Our Springs Alliance, Inc. v. City of Dripping Springs*, 304 S.W.3d 871, 878 (Tex.App.-Austin 2010, pet. denied). Although the *City of Waco* case has been reversed by the Texas Supreme Court, the relevant law on injury-in-fact, relied upon in many other Texas cases, remains valid law. The *City of Waco* case was reversed on grounds other than the law relating to injury-in-fact related to party status.

respective properties. They argue that this drawdown will make it more difficult for each of the Landowners to access water in the aquifer and will make it more likely that they will lose access altogether. They state that this drawdown constitutes the necessary injury in fact required for party standing and that the potential injury would be fairly traceable to End Op's operations.

Further, they argue that demonstrated use of said groundwater is not required for standing. In response to End Op's argument that the Landowners lack standing because they do not have wells or plans to develop wells on their property, the Landowners cite *Edwards Aquifer Authority v. Day* for the proposition that their standing is not affected by use, non-use, or intended use of the groundwater.[12] Landowners argue instead that a person seeking party status must only demonstrate a potential impact, and must only raise a question of fact on issues where standing and the merits overlap.

ES, which owns property in Bastrop County near the Colorado River, additionally argues that it has demonstrated a justiciable interest by virtue of the impact of the proposed permits on the Colorado River's flow. ES argues that the proximity of its property to the river gives it a level of access not common to the general public. ES claims that the damage to its interest is that the pumping to be authorized by the permits would reduce the natural inflows to the Colorado River from Simsboro, reducing the flow of the river and reducing ES's ability to use and enjoy the river and the property it owns near the river.

2. End Op's Position

End Op argues that even if Landowners had filed proper and timely requests, Landowners fail to meet the mandatory standing test set out in Tex. Water Code § 36.415(b)(2) and thus may not participate in the contested case hearing on End Op's applications. End Op maintains that the Landowners fail to meet the test because (1) groundwater ownership alone is insufficient to establish standing, (2) non-use of groundwater is a relevant factor when analyzing standing, and (3) an injury in fact that is traceable and redressable, not system-wide effects, is the standard.

[12] *Edwards Aquifer Auth. v. Day*, 369 S.W.3d 814 (Tex. 2012), reh'g denied (June 8, 2012).

a. Groundwater ownership alone is insufficient to establish standing.

End Op argues that mere ownership of groundwater under Texas Water Code section 36.002 as a real property interest does not satisfy the standing test. In *City of Waco*, End Op notes, the court found that the city possessed the requisite legally protected interest to have standing, as an affected person under the Water Code, in light of undisputed evidence that the city had ownership rights over the water, used the water as the sole supply for its municipal water utility, had an obligation to treat the water, and experienced escalating treatment costs.[13] End Op argues that when the court relied on this combination of factors, instead of relying on ownership alone, it established that mere ownership was insufficient to convey standing.

End Op also claims that the Landowners' reliance on *Edwards Aquifer Authority v. Day* is misplaced. End Op argues that *Day* addresses whether landowners have an interest in groundwater that is compensable under the Takings Clause of the Texas Constitution, not what factors are necessary to obtain third-party standing in a contested case hearing on an applicant's permit. End Op takes the position that the analysis in *Day* addressing whether non-use as the basis for denial of a permit application constitutes a constitutional taking without compensation does not bear on the issue of whether use or non-use establishes a legally protected interest distinct from the general public.

b. Showing a potential impact on system-wide groundwater levels is insufficient; Landowners must prove a specific injury in fact that is traceable and redressable.

End Op also argues that demonstrating a potential impact to groundwater levels, without offering proof of a specific injury to their exercise of their groundwater rights, is insufficient to obtain standing. End Op claims that under *City of Waco*, a potential party must establish both that it has a legally protected personal justiciable interest and an injury to its legally protected

[13] *City of Waco*, 346 S.W.3d at 809 ("These undisputed *facts* establish, as a matter of law, the type of interest, rooted in property rights, that constitute legally protected interests, distinct from those of the general public) (*emphasis added*).

interest.[14] Further, End Op argues, *City of Waco* expressly dismisses that "allegation or proof of *some* or *any* 'potential' for harm, however remote, are sufficient" and instead expressly states that the "required 'potential harm'... must be more than speculative."[15] End Op cites *United Copper* and *Heat Energy* to demonstrate this injury requirement, arguing that the injury or potential harm that conferred standing was established through proof of potential injury unique to each complainant and different from that suffered by the general public. In *United Copper,* the "potential harm" that conferred standing was established by United Copper's own data indicating that its operations would increase levels of lead and copper particulate at Grissom's home and his child's school, together with proof that Grissom and his child suffered from "serious asthma."[16] In *Heat Energy,* the "potential harm" was established where the association member's house was located one-and-a-half blocks from the facility, the permit applicant had acknowledged in another Commission proceeding that the facility indeed emitted odors, and the association member claimed to detect strong odors coming from it.[17] The member in *Heat Energy* testified the odors affected his breathing, and that he had sought medical attention for throat problems caused by the odors.[18] End Op argues that none of the Landowners can establish such a concrete and particularized, actual or imminent injury that is traceable and redressable because they have not presented evidence of a unique injury not common to the general public as was the case in *United Copper* and *Heat Energy.*

End Op further argues that the Landowners' claim that a system-wide drawdown will occur if End Op's applications are granted is merely a prediction based on an uncertain mathematical model that cannot by itself establish a specific injury for either persons who do not own wells or persons who own wells that produce from a formation other than the Simsboro aquifer.

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[14] *City of Waco* 346 S.W.3d 781 at 810.
[15] *City of Waco* 346 S.W.3d 781 at 805.
[16] *United Copper Indus., Inc. v. Grissom*, 17 S.W.3d 797, 803-04 (Tex.App.-Austin 2000, pet. dism'd).
[17] *Heat Energy Advanced Tech., Inc. v. W. Dallas Coal. for Envt. Justice*, 962 S.W.2d 288, 295 (Tex.App.-Austin 1998, pet. denied).
[18] *Heat Energy*, 962 S.W.2d at 295.

i. Environmental Stewardship

End Op argues that ES has not established a specific injury in fact that is traceable and redressable. First, End Op argues that since ES does not have a well and has no existing use, it does not have the requisite legally protected interest, separate and distinct from other landowners that could give rise to a personal justiciable interest as described in *City of Waco*. Second, End Op argues that ES has no specific injury that is traceable and redressable and not merely speculative or hypothetical. End Op points to the Landowners' own expert, who conceded that existing pumping can cause drawdowns and that no specific analysis was performed with regard to any of the Landowners' properties. Third, End Op argues that the record establishes that ES is barred from drilling a well by district rules, and that it is impossible for the claimed drawdown to adversely affect ES's groundwater ownership interest when they cannot drill a well. End Op also claims that any hypothetical impact on the surface flow of the Colorado River would be an impact to the general public regardless of groundwater ownership.

ii. Andrew Meyer

End Op argues that Andrew Meyer has not established a legally protected interest that may give rise to a personal justiciable interest and specific injury because he does not have a well, has not filed a permit application, and has no plans to do so.

iii. Darwyn Hanna

End Op argues that Darwyn Hanna has not established a legally protected interest that may give rise to a personal justiciable interest and specific injury because he does not have a well and sees no need to drill so long as Aqua is his service provider.

iv. Bette Brown

End Op concedes that Ms. Brown has two wells but notes that neither well is registered with the District. End Op argues that while Ms. Brown's alleged current use could help her establish a legally protected interest that may give rise to a personal justiciable interest as outlined in *City of Waco*, Ms. Brown must still establish a specific injury. End Op argues that Ms. Brown has submitted no evidence of specific injury since Ms. Brown has provided no evidence on the amount of use or depth of the operating well, nor has her expert conducted any analysis with regard to the potential impact of End Op's permits on Ms. Brown's wells. Finally, End Op argues that Ms. Brown's wells are not in the Simsboro formation.

3. ALJ's Analysis

The Texas Supreme Court ruled that for a party to have standing to challenge a governmental action, it "must demonstrate a particularized interest in a conflict distinct from that sustained by the public at large."[19] The issue, in other words, is "whether the particular plaintiff has a sufficient personal stake in the controversy to assure the presence of an actual controversy that the judicial declaration sought would resolve."[20] As previously discussed, in *City of Waco*, the Court of Appeals determined "an affected person" must have an injury in fact that is concrete, actual, fairly traceable, and likely to be redressed by a favorable decision to have standing to request a contested case hearing before TCEQ. Accordingly, to prevail, the Landowners must show a concrete, particularized injury-in-fact that must be more than speculative, and there must be some evidence that would tend to show that the legally protected interests will be affected by the action.[21] The *United Copper* and *Heat Energy* further show that the person seeking standing must (1) establish that it has a legally protected personal justiciable interest and (2) demonstrate injury of that personal interest that is concrete, particularized, and not speculative.

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[19] *S. Tex. Water Auth. v. Lomas*, 223 S.W.3d 304, 307 (Tex. 2007).
[20] *City of Waco* 346 S.W.3d at 801-02.
[21] *City of Waco*, 346 S.W.3d at 805; *See Save Our Springs Alliance, Inc.*, 304 S.W.3d at 883.

a. Environmental Stewardship, Andrew Meyer, and Darwyn Hanna

The Landowners, ES, Meyer, and Hanna, who do not have wells,[22] are not like the association member in *Heat Energy*. In *Heat Energy*, the odors from the facility were negatively affecting the member and his use of his property. Here, unlike the member in *Heat Energy*, the Landowners in this case cannot demonstrate a particularized injury that is not common to the general public because owning land and the groundwater under the land is not sufficient to show a particularized injury, especially since the Landowners are not using and have not shown that they intend to use groundwater that will be drawn from the Simsboro. Similarly, the Landowners are not like the Gissom family in *United Copper*. In *United Copper*, the potential harm that conferred standing was not just that United Copper's data indicated that its operations would increase the amount of particulates in the air, there was proof that Grissom and his son were injured on a personal level. Here, End Op's data may indicate a potential for aquifer drawdown at some time in the future, but these Landowners cannot demonstrate that they suffer a particularized and concrete injury that is not common to the general public. In the universe of *United Copper*, they would resemble citizens concerned about particulate pollution in general. It is not enough that these Landowners possess an ownership right in the groundwater; that right must be potentially impaired in order for them to possess standing.[23] System-wide aquifer drawdowns affect the general public (all persons who own rights to the groundwater contained within that aquifer). Aqua, a well owner situated in the same field where End Op plans to operate, possesses the requisite protected interest and specific injury. However, without demonstrating ownership of wells or plans to exercise their groundwater rights, the Landowners lack a personal justiciable interest and therefore lack standing to participate in a contested case hearing on End Op's applications.

Furthermore, ES's argument that the water flow of the Colorado River will be negatively impacted by the potential drawdown, thereby impacting its use and enjoyment, is an interest shared by the general public. In addition, there is no credible evidence that the water flow of the

[22] Mr. Hanna will likely never build a well so long as he can obtain water from Aqua. Although Mr. Meyer may build a well at some point in the future, he has not filed a permit application for a well.

[23] End Op presented evidence that, even if the Landowners were to build wells, some of the Landowners would not draw their water from the Simsboro, given the formation of the Simsboro and the closer proximity of other aquifers to the Landowners' property and associated groundwater.

Colorado River will be impacted to such a degree (or at all) that ES's enjoyment of the river will be negatively impacted.[24] Finally, the record shows that ES cannot drill a well that complies with the District rules. Although it may be able to seek a variance, it is unlikely given the size of ES's lot and the cost to build a well, that ES will ever build a well.

b. Bette Brown

The facts concerning Bette Brown's request for party standing are slightly different from the other Landowners. The record demonstrates that she has two wells on her property. However, Ms. Brown must still establish a specific injury to a personal justiciable interest. Neither of Ms. Brown's two wells are registered or permitted with the District. Ms. Brown has submitted no evidence demonstrating that her wells draw from the Simsboro aquifer, no evidence on the amount of use or depth of the well that is operational, and no expert analysis with regard to the potential impact of End Op's permits on Ms. Brown's operational well. Without any such showing, Ms. Brown has not demonstrated a potential impact on her groundwater interest. For this reason, along with the reasoning expressed above with regards to the other Landowners, Ms. Brown lacks a personal justiciable interest and therefore lacks standing to participate in a contested case hearing on End Op's applications.

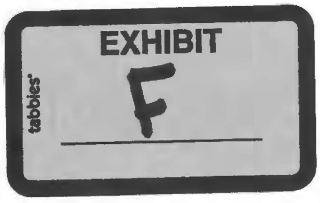
Accordingly, the Landowners' Requests (the requests of ES, Meyer, Hanna, and Brown) for Party Standing are **DENIED**. Aqua's request for party status is **GRANTED**.

SIGNED September 25, 2013.

Michael J. O'Malley

MICHAEL J. O'MALLEY
ADMINISTRATIVE LAW JUDGE
STATE OFFICE OF ADMINISTRATIVE HEARING

[24] Not only is there no credible evidence to support this argument, any impact on water flow is highly speculative.



LOST PINES GROUNDWATER CONSERVATION DISTRICT

AN ORDER DENYING PARTY STATUS TO ENVIRONMENTAL STEWARDSHIP, DARWYN HANNA, BETTE BROWN, ANDREW MEYER, AND F.D. BROWN IN CONSIDERING APPLICATIONS OF END OP, L.P. FOR OPERATING PERMITS AND TRANSPORT PERMITS

WHEREAS, End Op, L.P. ("Applicant") submitted applications for Operating Permits and Transport Permits for 14 wells in Bastrop and Lee Counties seeking authorization to withdraw an aggregate of 56,000 acre-feet per year from the Simsboro aquifer to be used for municipal purposes in Travis and Williamson Counties (the "Applications"); and

WHEREAS, after proper notice under District Rule 14.3.C, the Board of Directors of the District (the "Board") held a public hearing on the Applications at 5:00 p.m. on April 18, 2013, at the American Legion Hall in Giddings, Texas; and

WHEREAS, on April 10, 2013, Aqua Water Supply Corporation ("Aqua") submitted to the District a request for a contested case hearing on the Applications; and

WHEREAS, on May 8, 2013, Environmental Stewardship, Darwyn Hanna, Bette Brown, Andrew Meyer, and F.D. Brown (collectively, the "Landowners"), filed requests to be designated as parties in any contested case hearing held on the Applications.

WHEREAS, on May 9, 2013, Applicant requested that the District contract with the State Office of Administrative Hearings ("SOAH") to conduct a hearing on Aqua's request for a contested case hearing; and

WHEREAS, on June 19, 2013, the District issued an order that: (1) granted Aqua's request for a contested case hearing on the Applications; (2) denied all other requests for a contested case hearing on the Applications, if any, as untimely under the District rules; (3) authorized the General Manager to enter into a contract with SOAH to conduct a contested case hearing on the Applications; (4) found that the requests for party status filed by the Landowners were timely under the District rules; and (5) referred the issue of whether the Landowners have standing to participate in the contested case hearing as parties at SOAH; and

WHEREAS, after a preliminary hearing on August 12, 2013, the Administrative Law Judge ("ALJ") determined that Aqua had standing as a party under the provisions of Chapter 36, Water Code, to participate in this contested case hearing and that the Landowners had not demonstrated the required interest to participate as parties in the contested case hearing; and

WHEREAS, On October 7, 2013, the Landowners filed a Request for Certified Question or, Alternatively, Request for Permission to Seek Interlocutory Appeal of Order No. 3, and Motion to Abate, or, Alternatively, Request for Provisional Party Status; and

WHEREAS, on October 10, 2013, End Op, L.P., the General Manager of the District, and Aqua Water Supply Corporation responded to the Landowner's motions, and on October 14, 2013, the Landowners filed a reply to those responses; and

WHEREAS, on October 15, 2013, the Administrative Law Judge issued Order No. 5 denying the Landowners Request for Certified Question or, Alternatively, Request for Permission to Seek Interlocutory Appeal of Order No. 3, and Motion to Abate, or, Alternatively, Request for Provisional Party Status because neither the District Rules or SOAH Rules to certify an issue to the District, nor is there authority to convert an interim order to a Proposal for Decision; and

WHEREAS, on September 10, 2014 the Board held the Final Hearing on the End Op, L.P. Applications and voted to deny Party Status to the Landowners as set forth in this Order.

NOW THEREFORE, the Board ORDERS that:

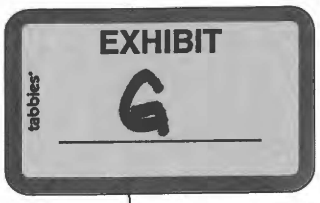
1. Environmental Stewardship, Darwyn Hanna, Bette Brown, Andrew Meyer, and F.D. Brown are hereby denied party status.

2. The Board hereby adopts the evidence presented, the Findings of Fact and the Conclusions of Law in the Administrative Law Judge's Order No. 3.

ISSUED:

President, Lost Pines Groundwater
Conservation District Board of Directors

Date: 1-19-15



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WARRANTY DEED WITH VENDOR'S LIEN

DATE: September 3, 2003

GRANTOR: Larry E. Sanders and Harry D. Vowell, d/b/a S&V, acting by and through Harry D. Vowell, Individually and as Agent and Attorney in Fact for Larry E. Sanders

GRANTOR'S MAILING ADDRESS (including county):

P. O. Box 2505, Longview, Gregg County, Texas, 75606

GRANTEE: Curtis E. Chubb

GRANTEE'S MAILING ADDRESS (including county):

P. O. Box 1360, Blanco, Blanco County, Texas, 78606

CONSIDERATION:

1.) Ten Dollars ($10.00) cash and other good and valuable consideration in hand paid by Grantee herein to Grantor herein, the receipt of which is hereby acknowledged and confessed, and

2.) One Hundred Eleven Thousand Seven Hundred Dollars ($111,700.00) advanced by CAPITAL FARM CREDIT, FLCA, at the special instance and request of the Grantee, the receipt of which is hereby acknowledged and for which the Grantee has executed and delivered to the said CAPITAL FARM CREDIT, FLCA, his one certain promissory note for such amount, bearing interest and being due and payable in accordance with the terms as contained in said note. Said note contains the usual acceleration of maturity, tax, insurance and attorney's fee clauses, and the Vendor's Lien and superior title herein reserved are hereby transferred and conveyed to the said CAPITAL FARM CREDIT, FLCA, to secure the payment of said note. The payment of said note is further secured by a Deed of Trust executed by Grantee herein, Curtis E. Chubb, to Ben R. Novosad, Trustee, for the use and benefit of CAPTIAL FARM CREDIT, FLCA, bearing even date herewith.

PROPERTY (including any improvements):

All that certain lot, tract or parcel of land, containing 83.166 acres, being out of and a part of the Jno. Nolan and Eli Williams Surveys in Milam County, Texas, and being more particularly described as follows, to-wit:

VOL. 916 PAGE 619
OFFICIAL RECORDS
MILAM COUNTY, TEXAS

PROPERTY (including any improvements):

In Re: 83.166 Acres out of a
166.737 Acre Tract
Jno. Nolan Survey, A-286
Eli Williams Survey, A-380
Milam County, Texas

All that certain tract or parcel of land situated in Milam County, Texas, being part of the Jno. Nolan Survey, Abstract No. 286 and the Eli Williams Survey, Abstract No. 380 and being part of a 166⅔ acre tract (166.737 acres surveyed by me this date) as conveyed from Robert D. Barger, et ux to Larry E. Sanders and Harry D. Vowell DBA S&V by Deed dated July 29, 2002 and being recorded in Volume 881, Page 083 of the Official Records of said Milam County and being more particularly described by metes and bounds as follows, to wit:

BEGINNING at an iron pin set at a fence corner post on a common line between said Williams Survey and said Nolan Survey, same being the South line of Milano Truck Lot 89, Burnett Addition (Plat Records - Cabinet A, Slide 6A&B), Town of Milano, for the Northwest corner of a Lee C. Keen "Fourth Tract" - 6 acres (286/329) and for a common Northeast corner of said original 166⅔ acre tract and of this tract;

THENCE with an occupied common line as fenced between said original 166⅔ acre tract and said Keen 6 acre tract and a Lee C. Keen "Third Tract" - 62½ acres (286/329), respectively, as follows:

S18°46'06"E - 884.79 feet to an iron pin set at a fence corner post for an interior ell corner of this tract;
S20°27'31"E - 100.75 feet to an iron pin set for the Southeast corner of this tract;

THENCE entering said original 166⅔ acre tract for division as follows:

S62°32'52"W - 1867.71 feet to an iron pin set for an exterior ell corner of this tract;
N27°27'08"W - 100.00 feet to an iron pin set at a fence corner post for an interior ell corner of this tract;
S69°16'13"W - 1260.47 feet to an iron pin set on a common line between the East line of County Road No. 330 and said original 166⅔ acre tract for the Southwest corner of this tract;

THENCE with an occupied common line as fenced between the East and South lines, respectively, of said County Road No. 330 and said original 166⅔ acre tract as follows:

N19°00'00"W (Deed Bearing) - 709.14 feet to a fence corner post for an interior ell corner of this tract;

N19°35'37"W - 422.80 feet to a fence corner post for the Northwest corner of this tract;
N09°40'13"E - 44.84 feet to a fence corner post for an exterior ell corner of this tract;
N26°58'15"E - 11.08 feet to a fence corner post for an exterior ell corner of this tract;
N43°49'43"E - 108.12 feet to a fence corner post for an exterior ell corner of this tract;
N66°02'41"E - 136.82 feet to a fence corner post for an exterior ell corner of this tract;
N68°31'28"E - 83.67 feet to a fence corner post for an exterior ell corner of this tract;
N69°47'08"E - 71.41 feet to a fence corner post for an exterior ell corner of this tract;
N72°21'36"E - 126.25 feet to a fence corner post for an exterior ell corner of this tract;
N75°50'31"E - 200.53 feet to a fence corner post for an interior ell corner of this tract;
N67°52'55"E - 173.08 feet to a fence corner post for an exterior ell corner of this tract;
N72°59'55"E, at 75.00 feet passing a fence corner post at a turn of said road to the North for the Southwest corner of Milano Truck Lot 91 (Burnett Addition), continuing on with an occupied South line of Truck Lots 91 and 90, respectively, for a total distance of 1185.58 feet to a fence corner post for an interior ell corner of this tract;

THENCE N70°40'48"E - 1026.78 feet with an occupied common line as fenced between said original 166¾ acre tract and Milano Truck Lots 90 and 89, respectively, to the PLACE OF BEGINNING and containing 83.166 Acres of Land.

I, W. L. Ferguson, Registered Professional Land Surveyor No. 2547 in the State of Texas, do hereby certify that the above survey was performed on the ground under my supervision and that the field notes hereon are true and correct to the best of my knowledge.

Given under my hand and seal this 21st day of July, 2003.

W. L. FERGUSON, RPLS

STATE OF TEXAS
REGISTERED
2547
PROFESSIONAL
LAND SURVEYOR

RESERVATIONS FROM AND EXCEPTIONS TO CONVEYANCE AND WARRANTY:

This property is subject to existing easements, rights-of-way and prescriptive rights, whether of record or not; all presently recorded restrictions, reservations, covenants, conditions, oil and gas leases, mineral severances and other instruments other than liens and conveyances that affect the property, specifically the following:

A.) Memorandum of Groundwater Lease executed by S&V Partnership to Metropolitan Water Company, L.P., dated the 6th day of March, 2003, of record in Volume 899 page 643, Official Records of Milam County, Texas.

B.) Ratification of Groundwater Lease between S&V Partnership, et al, and Metropolitan Water Company, L.P., dated March 6, 2003, of record in Volume 901 page 761, Official Records of Milam County, Texas.

C.) Amendment and Ratification of Groundeater Lease between S&V Partnership and Metropolitan Water Company, dated June 23, 2003, of record in Volume 912 page 327, Official Records of Milam County, Texas.

D.) Further, Seller hereby reserves (i) all of the groundwater in and under the herein described 83.18 ±/- acres of land (the Property) together with the right of reasonable ingress and egress using existing roads for the purpose of developing, producing and marketing same, and (ii) all benefits and rights of the "Lessor" in that certain Groundwater Lease dated March 6, 2003, by and between S&V Partnership, as Lessor, and Metropolitan Water Company, L.P., as Lessee (the "Groundwater Lease"), subject to the Groundwater Addendum dated the 3rd day of September 2003, signed by Seller, S&V Partnership, a Texas general partnership and Harry D. Vowell, Individually, and Buyer Curtis E. Chubb.

FURTHER, Seller/Grantor reserves seventy five per cent (75%) of the oil, gas and other minerals owned by Seller/Grantor.

Grantor, for the consideration and subject to the reservations from and exceptions to conveyance and warranty, grants, sells, and conveys to Grantee the Property, together with all and singular the rights and appurtenances thereto in anywise belonging, to have and to hold it to Grantee, Grantee's heirs, executors, administrators, successors, or assigns forever. Grantor binds Grantor and Grantor's heirs, executors, administrators, and successors to warrant and forever defend all and singular the property to Grantee and Grantee's heirs, executors, administrators, successors, and assigns against every person whomsoever lawfully claiming or to claim the same or any part thereof, except as to the reservations from and exceptions to conveyance and warranty.

BUT it is expressly agreed that the VENDOR'S LIEN, as well as the Superior Title in and to the above described premises, is retained against the above described property, premises and improvements until the above described note and all interest thereon are fully paid according to the face, tenor, effect and reading thereof, when this Deed shall become absolute.

CAPITAL FARM CREDIT, FLCA, at Grantee's request has paid in cash to Grantor that portion of the purchase price of the property that is evidenced by the vendor's lien note herein described. The vendor's lien and superior title to the property are retained for the benefit of CAPITAL FARM CREDIT, FLCA, and are transferred to that party without recourse on Grantor.

When the context requires, singular nouns and pronouns include the plural.

EXECUTED this the 3rd day of September , A. D. 2003.

LARRY E. SANDERS and
HARRY E. VOWELL, d/b/a S&V

By: Harry D. Vowell
Harry D. Vowell, Individually
and as Agent and Attorney in Fact
for Larry E. Sanders

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OFFICIAL RECORDS
MILAM COUNTY, TEXAS

THE STATE OF TEXAS, X

COUNTY OF MILAM. X THIS instrumetn was acknowledged before me, on this the 3rd day of September, 2003, by Harry D. Vowell, acting both Individually and in his capacity as Agent and Attorney in Fact for Larry E. Sanders, acting for and on behalf of the said Larry E. Sanders.

DORIS GAMBLE
NOTARY PUBLIC
STATE OF TEXAS
My Commission Expires 09-30-2004

Doris Gamble
Notary Public, State of Texas.

Notary's Name (Printed): Doris Gamble

My commission expires:
September 30, 2004

CLERK'S NOTICE: ANY PROVISION HEREIN WHICH RESTRICTS THE SALE, RENTAL OR USE OF THE DESCRIBED REAL PROPERTY BECAUSE OF COLOR OR RACE, IS INVALID AND UNENFORCEABLE UNDER FEDERAL LAW.

FILED
AT 9:40 O'CLOCK A M
ON THE 5 DAY OF Sept
A.D., 20 03

La Verne Soefje
COUNTY CLERK, MILAM COUNTY, TEXAS
BY Joan Pratt DEPUTY

STATE OF TEXAS
COUNTY OF MILAM
I hereby certify that this instrument was FILED on the date and at the time stamped hereon by me and was duly RECORDED in the Volume and Page of the Official Records of Milam County, Texas.

La Verne Soefje
County Clerk, Milam County, Texas
VOL. 916 PAGE 619
RECORDED 9-5-03 @ 5100 P.
BY Joan Pratt DEPUTY

JOAN PRATT

VOL. 916 PAGE 624
OFFICIAL RECORDS
MILAM COUNTY, TEXAS

C. GLASER
19A

FIFTY-THIRD AMENDMENT AND RATIFICATION OF DESIGNATION OF COLLECTIVE WATER DEVELOPMENT AND PRODUCTION UNIT

METROPOLITAN WATER COMPANY, L.P. PORTERS BRANCH COLLECTIVE WATER DEVELOPMENT AND PRODUCTION UNIT

THE STATE OF TEXAS §
§ KNOW ALL MEN BY THESE PRESENTS, THAT:
COUNTIES OF BURLESON §
AND MILAM §

WHEREAS, by Designation of Collective Water Development and Production Unit dated December 25, 2000, recorded in Volume 538, Page 5 of the Official Public records of Burleson County; Volume 868, Page 813 of the Real Property Records of Lee County; and Volume 835, Page 308 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** created the **PORTERS BRANCH COLLECTIVE WATER DEVELOPMENT AND PRODUCTION UNIT**; and

WHEREAS, by First Amendment and Ratification of Designation of Collective Water Development and Production Unit dated February 14, 2001, recorded in Volume 541, Page 226 of the Official Public Records of Burleson County; Volume 871, Page 284 of the Real Property Records of Lee County; and Volume 838, Page 772 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include additional Groundwater Leases covering lands located within the boundaries of such unit; and

WHEREAS, by Second Amendment and Ratification of Designation of Collective Water Development and Production Unit dated May 22, 2001, recorded in Volume 548, Page 556 of the Official Public Records of Burleson County; Volume 876, Page 888 of the Real Property Records of Lee County; and Volume 846, Page 379 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include additional Groundwater Leases covering lands located within the boundaries of such unit; and

WHEREAS, by Third Amendment and Ratification of Designation of Collective Water Development and Production Unit dated September 17, 2001, recorded in Volume 555, Page 644 of the Official Public Records of Burleson County; Volume 882, Page 76 of the Real Property Records of Lee County; and Volume 854, Page 449 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include additional Groundwater Leases covering lands located within the boundaries of such unit; and

WHEREAS, by Fourth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated December 25, 2001, recorded in Volume 563, Page 105 of the Official Public Records of Burleson County; Volume 887, Page 635 of the Real Property Records of Lee County; and Volume 863, Page 329 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include additional Groundwater Leases covering lands located within the boundaries of such unit; and

WHEREAS, by Fifth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated April 20, 2002, recorded in Volume 571, Page 772 of the Official Public Records of Burleson County; Volume 894, Page 344 of the Real Property Records of Lee County; and Volume 872, Page 11 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include additional Groundwater Leases covering lands located within the boundaries of such unit; and

WHEREAS, by Sixth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated September 7, 2002, recorded in Volume 581, Page 731 of the Official Public Records of Burleson County; Volume 902, Page 34 of the Real Property Records of Lee County; and Volume 886, Page 801 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to

include additional Groundwater Leases covering lands located within the boundaries of such unit; and

WHEREAS, by Seventh Amendment and Ratification of Designation of Collective Water Development and Production Unit dated December 32, 2002, recorded in Volume 590, Page 335 of the Official Public Records of Burleson County; Volume 910, Page 608 of the Real Property Records of Lee County; and Volume 894, Page 183 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include additional Groundwater Leases covering lands located within the boundaries of such unit; and

WHEREAS, by Eighth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated January 23, 2003, recorded in Volume 593, Page 548 of the Official Public Records of Burleson County; Volume 915, Page 73 of the Real Property Records of Lee County; and Volume 898, Page 574 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P. and CARRIZO-WILCOX WATER ALLIANCE, L.L.C.** amended the above described Designation of Collective Water Development and Production Unit to include additional Groundwater Leases covering lands located within the boundaries of such unit; and

WHEREAS, by Ninth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated July 4, 2011, recorded in Volume 847, Page 639 of the Official Public Records of Burleson County and Volume 1159, Page 440 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit by revising the listing of the leases covered by and included in Said Unit, by revising the plat depicting the lands covered by Said Unit and to delete Exhibit "C" of Said Unit entirely; and

WHEREAS, by Tenth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated December 18, 2014, recorded in Volume 984, Page 464 of the Official Public Records of Burleson County and Volume 1242, Page 639 of the Official Records of Milam County, Texas, **METROPOLITAN WATER**

COMPANY, L.P. amended the above described Designation of Collective Water Development and Production Unit to include additional leases and lands to be covered by and included in Said Unit; and

WHEREAS, by Eleventh Amendment and Ratification of Designation of Collective Water Development and Production Unit dated February 4, 2015, recorded in Volume 991, Page 74 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Twelfth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated March 5, 2015, recorded in Volume 994, Page 290 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Thirteenth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated April 1, 2015, recorded in Volume 997, Page 798 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Fourteenth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated April 29, 2015, recorded in Volume 1000, Page 741 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Fifteenth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated May 18, 2015, recorded in Volume 1003, Page 654 of the Official Public Records of Burleson County, Texas, **METROPOLITAN**

COMPANY, L.P. amended the above described Designation of Collective Water Development and Production Unit to include additional leases and lands to be covered by and included in Said Unit; and

WHEREAS, by Eleventh Amendment and Ratification of Designation of Collective Water Development and Production Unit dated February 4, 2015, recorded in Volume 991, Page 74 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Twelfth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated March 5, 2015, recorded in Volume 994, Page 290 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Thirteenth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated April 1, 2015, recorded in Volume 997, Page 798 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Fourteenth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated April 29, 2015, recorded in Volume 1000, Page 741 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Fifteenth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated May 18, 2015, recorded in Volume 1003, Page 654 of the Official Public Records of Burleson County, Texas, **METROPOLITAN**

WATER COMPANY, L.P. amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Sixteenth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated June 5, 2015, recorded in Volume 1005, Page 645 of the Official Public Records of Burleson County, Texas, and recorded in Volume 1256, Page 586 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Seventeenth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated June 22, 2015, recorded in Volume 1008, Page 72 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Eighteenth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated June 30, 2015, recorded in Volume 1009, Page 209 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Nineteenth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated July 7, 2015, recorded in Volume 1009, Page 745 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Twentieth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated July 14, 2015, recorded in Volume 1010,

Page 406 of the Official Public Records of Burleson County, Texas and in Volume 1259, Page 261 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Twenty-First Amendment and Ratification of Designation of Collective Water Development and Production Unit dated July 31, 2015, recorded in Volume 1013, Page 557 of the Official Public Records of Burleson County, Texas and in Volume 1260, Page 687 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Twenty-Second Amendment and Ratification of Designation of Collective Water Development and Production Unit dated August 31, 2015, recorded in Volume 1017, Page 194 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Twenty-Third Amendment and Ratification of Designation of Collective Water Development and Production Unit dated September 18, 2015, recorded in Volume 1019, Page 838 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Twenty-Fourth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated October 12, 2015, recorded in Volume 1023, Page 794 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Twenty-Fifth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated November 24, 2015, recorded in Volume 1269, Page 134 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Twenty-Sixth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated December 18, 2015, recorded in Volume 1270, Page 533 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Twenty-Seventh Amendment and Ratification of Designation of Collective Water Development and Production Unit dated January 7, 2016, recorded in Volume 1033, Page 89 of the Official Public Records of Burleson County and Volume 1271, Page 674 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Twenty-Eighth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated February 10, 2016, recorded in Volume 1033, Page 89 of the Official Public Records of Burleson County and Volume 1273, Page 881 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Twenty-Ninth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated March 3, 2016, recorded in Volume 1040, Page 93 of the Official Public Records of Burleson County and Volume 1275, Page 305 of the Official Records of Milam County, Texas, **METROPOLITAN**

WATER COMPANY, L.P. amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Thirtieth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated March 30, 2016, recorded in Volume 1046, Page 21 of the Official Public Records of Burleson County and Volume 1277, Page 628 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Thirty-First Amendment and Ratification of Designation of Collective Water Development and Production Unit dated April 29, 2016, recorded in Volume 1049, Page 64 of the Official Public Records of Burleson County and Volume 1279, Page 791 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Thirty-Second Amendment and Ratification of Designation of Collective Water Development and Production Unit dated June 1, 2016, recorded in Volume 1052, Page 370 of the Official Public Records of Burleson County and Volume 1282, Page 494 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Thirty-Third Amendment and Ratification of Designation of Collective Water Development and Production Unit dated July 1, 2016, recorded in Volume 1056, Page 208 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Thirty-Fifth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated August 22, 2016, recorded in Volume 1288, Page 268 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Thirty-Sixth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated September 2, 2016, recorded in Volume 1064, Page 578 of the Official Public Records of Burleson County, Texas, and Volume 1289, Page 453 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Thirty-Seventh Amendment and Ratification of Designation of Collective Water Development and Production Unit dated October 20, 2016, recorded in Volume 1069, Page 685 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Thirty-Eighth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated November 1, 2016, recorded in Volume 1071, Page 353 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Thirty-Ninth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated December 7, 2016, recorded in Volume 1076, Page 361 of the Official Public Records of Burleson County, Texas, and Volume 1297, Page 1 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water

Development and Production Unit to include an additional lease and lands to be covered by and included in Said Unit; and

WHEREAS, by Fortieth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated December 20, 2016, recorded in Volume 1077, Page 787 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit; and

WHEREAS, by Forty-First Amendment and Ratification of Designation of Collective Water Development and Production Unit dated February 1, 2017, recorded in Volume 1083, Page 270 of the Official Public Records of Burleson County, Texas and Volume 1301, Page 163 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit; and

WHEREAS, by Forty-Second Amendment and Ratification of Designation of Collective Water Development and Production Unit dated March 6, 2017, recorded in Volume 1086, Page 791 of the Official Public Records of Burleson County, Texas and Volume 1303, Page 463 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit; and

WHEREAS, by Forty-Third Amendment and Ratification of Designation of Collective Water Development and Production Unit dated April 3, 2017, recorded in Volume 1090, Page 633 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit; and

WHEREAS, by Forty-Fourth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated May 1, 2017, recorded in Volume 1094, Page 51 of the Official Public Records of Burleson County, Texas, and Volume 1307, Page 678 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit; and

WHEREAS, by Forty-Fifth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated May 30, 2017, recorded in Volume 1097, Page 603 of the Official Public Records of Burleson County, Texas, and Volume 1310, Page 37 of the Official Records of Milam County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit; and

WHEREAS, by Forty-Sixth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated July 27, 2017, recorded in Volume 1106, Page 682 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit; and

WHEREAS, by Forty-Seventh Amendment and Ratification of Designation of Collective Water Development and Production Unit dated September 5, 2017, recorded in Volume 1113, Page 582 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit; and

WHEREAS, by Forty-Eighth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated October 2, 2017, recorded in Volume 1116, Page 323 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit; and

WHEREAS, by Forty-Ninth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated November 6, 2017, recorded in Volume 1120, Page 403 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit; and

WHEREAS, by Fiftieth Amendment and Ratification of Designation of Collective Water Development and Production Unit dated December 4, 2017, recorded in Volume 1126, Page 625 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit; and

WHEREAS, by Fifty-First Amendment and Ratification of Designation of Collective Water Development and Production Unit dated December 18, 2017, recorded in Volume 1127, Page 167 of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit; and

WHEREAS, by Fifty-Second Amendment and Ratification of Designation of Collective Water Development and Production Unit dated January 31, 2017, recorded in Volume ____, Page ___ of the Official Public Records of Burleson County, Texas, **METROPOLITAN WATER COMPANY, L.P.** amended the above described Designation of Collective Water Development and Production Unit; and

WHEREAS, once the Fifty-Second Amendment and Ratification of Designation of Collective Water Development and Production Unit was filed of record, said Unit included 1,210 Groundwater Leases covering 20,031.3893 acres of land, more or less, as therein described and upon the terms and conditions as stated therein, for the production of water; and

WHEREAS, the leases included within Said Unit grant unto **METROPOLITAN WATER COMPANY, L.P.** the power and authority to amend Said Unit; and

WHEREAS, it is now the desire of **METROPOLITAN WATER COMPANY, L.P.** to exercise the power and authority to once again amend Said Unit, as provided for in such leases of Said Unit, to include additional leases and lands to be covered by and included in Said Unit.

NOW, **THEREFORE**, in consideration of the premises, **METROPOLITAN WATER COMPANY, L.P.** hereby amends Said Unit by including the Groundwater Leases listed on Exhibit "A", attached hereto and made a part hereof, in addition to the Groundwater Leases listed on the Exhibits "A" attached to and made a part of the Ninth, Tenth, Eleventh, Twelfth, Thirteenth, Fourteenth, Fifteen, Sixteenth, Seventeenth, Eighteenth, Nineteenth, Twentieth, Twenty-First, Twenty-Second, Twenty-Third, Twenty-Fourth, Twenty-Fifth, Twenty-Sixth, Twenty-Seventh, Twenty-Eighth, Twenty-Ninth, Thirtieth, Thirty-First, Thirty-Second, Thirty-Third, Thirty-Fourth, Thirty-Fifth, Thirty-Sixth, Thirty-Seventh, Thirty-Eighth, Thirty-Ninth, Fortieth, Forty-First, Forty-Second, Forty-Third, Forty-Fourth, Forty-Fifth,

Forty-Sixth, Forty-Seventh, Forty-Eighth, Forty-Ninth, Fiftieth, Fifty-First and Firty-Second Amendments and Ratifications of Designation of Collective Water Development and Production Unit referenced hereinabove. Such additional Groundwater Leases described on Exhibit "A" and as depicted on Exhibits "B1" and "B2", each of which are attached hereto and made a part hereof, and shall now be considered a part of Said Unit.

Except as set out above, the **METROPOLITAN WATER COMPANY, L.P. PORTERS BRANCH COLLECTIVE WATER DEVELOPMENT AND PRODUCTION UNIT** is in no way changed or altered and Said Unit is hereby **RATIFIED, CONFIRMED** and **ADOPTED** upon the identical terms and conditions contained therein and as amended hereby, **METROPOLITAN WATER COMPANY, L.P.** does declare that Said Unit, as so amended herein, to be in full force and effect.

DATED this 1st day of March, 2018.

METROPOLITAN WATER COMPANY, L.P.
BY: METROPOLITAN WATER COMPANY OF TEXAS, L.L.C., its General Partner

BY: _____

PRINTED NAME: W. SCOTT CARLSON

TITLE: PRESIDENT

THE STATE OF TEXAS §
§
COUNTY OF WASHINGTON §

This instrument was acknowledged before me this the 1st day of March, 2018, by W. Scott Carlson, President of Metropolitan Water Company of Texas, L.L.C., a Texas Limited Liability Company, on behalf of said limited liability company.

MELISSA WALKER
Notary Public, State of Texas
Comm. Expires 03-10-2021
Notary ID 126832631

_____
Notary Public in and for the State of Texas.

My Comm. Expires: 3/10/21

Melissa Walker
Printed Name of Notary Public

mw-amend-unit.053

EXHIBIT "A"

Attached to and made a part of that certain Fifty-Third Amendment and Ratification of Designation of Collective Water Development and Production Unit dated March 1, 2018 by Metropolitan Water Company, L.P.

TRACT NO.	LESSOR	LEASE DATE	GROSS ACRES	RECORDING DATA
186-022m	Keen, Lee C.	03/28/2003	23.9900	902/428 ***
286-009m	Keen, Lee C.	03/29/2003	9.6000	902/424 ***
286-010m	Keen, Lee C.	03/26/2003	2.6000	902/380 ***
286-011m	Keen, Lee C.	03/30/2003	43.0000	902/396 ***
380-003m	Keen, Lee C.	03/31/2003	6.0000	902/388 ***
380-004m	Keen, Lee C.	03/31/2003	62.5000	902/392 ***
380-005m	Keen, Lee C.	03/31/2003	95.0000	902/384 ***
139-003m	Keen, Pete A.	03/28/2003	70.0000	902/364 ***
139-004m	Keen, Pete A.	03/27/2003	56.2000	902/376 ***
139-005m	Keen, Pete A.	03/27/2003	56.2000	902/372 ***
139-006m	Keen, Pete A.	03/28/2003	20.0000	902/360 ***
139-007m	Keen, Pete A.	03/29/2003	61.2200	902/352 ***
139-008m	Keen, Pete A.	03/28/2003	134.7500	902/356 ***
318-009m	Keen, Pete A.	03/29/2003	10.1100	902/336 ***
318-010m	Keen, Pete A.	03/30/2003	10.1100	902/340 ***
318-011m	Keen, Pete A.	03/30/2003	8.4100	902/344 ***
318-012m	Keen, Pete A.	03/30/2003	10.1100	902/348 ***
328-006m	Lagrone, Ben Earl and wife, Mary Evelyn Lagrone	03/29/2003	19.3990	902/436 ***
328-009m	Lagrone, Ben Earl and wife, Mary Evelyn Lagrone	03/28/2003	27.2500	902/440 ***
008-003	Lewis, Norma Fay	03/26/2003	48.0000	597/363 *
008-004	Lewis, Norma Fay	03/26/2003	100.0000	597/367 *
274-014	Lewis, Norma Fay	03/25/2003	3.2700	597/347 *
274-018	Lewis, Norma Fay	03/24/2003	10.5590	597/355 *
274-020	Lewis, Norma Fay	03/26/2003	9.0000	597/351 *
274-021	Lewis, Norma Fay	03/24/2003	255.0000	597/371 *
274-021.1	Lewis, Norma Fay	03/25/2003	1.0000	597/343 *
274-023	Lewis, Norma Fay	03/25/2003	11.3500	597/359 *
008-003	Rasmus, Mildred T.	03/22/2003	48.0000	596/781 *
008-004	Rasmus, Mildred T.	03/22/2003	100.0000	596/785 *
274-014	Rasmus, Mildred T.	03/21/2003	3.2700	596/765 *
274-018	Rasmus, Mildred T.	03/20/2003	10.5590	596/773 *
274-020	Rasmus, Mildred T.	03/21/2003	9.0000	596/769 *

TRACT NO.	LESSOR	LEASE DATE	GROSS ACRES	RECORDING DATA
274-021	Rasmus, Mildred T.	03/20/2003	255.0000	596/789 *
274-021.1	Rasmus, Mildred T.	03/20/2003	1.0000	596/761 *
274-023	Rasmus, Mildred T.	03/21/2003	11.3500	596/777 *
007-001m	S & V Partnership	03/06/2003	202.3600	899/643 ***
037-001m	S & V Partnership	03/06/2003	437.7500	596/458 * 899/648 ***
140-014m	S & V Partnership	03/06/2003	166.3690	899/638 ***
380-002m	S & V Partnership	03/06/2003	166.2500	899/643 ***
254-4-188B 254-4-189B	Smelley, Zelma	03/05/2003	0.5222	598/188 *
008-003	Thomas, Lloyd and wife, L. Mildred Thomas	03/13/2003	48.0000	596/490 *
008-004	Thomas, Lloyd and wife, L. Mildred Thomas	03/13/2003	100.0000	596/494 *
034-006	Thomas, Lloyd and wife, L. Mildred Thomas	03/14/2003	24.8900	596/486 *
274-014	Thomas, Lloyd and wife, L. Mildred Thomas	03/11/2003	3.2700	596/470 *
274-018	Thomas, Lloyd and wife, L. Mildred Thomas	03/10/2003	10.5590	596/478 *
274-020	Thomas, Lloyd and wife, L. Mildred Thomas	03/12/2003	9.0000	596/474 *
274-021	Thomas, Lloyd and wife, L. Mildred Thomas	03/10/2003	255.0000	596/462 *
274-021.1	Thomas, Lloyd and wife, L. Mildred Thomas	03/11/2003	1.0000	596/466 *
274-023	Thomas, Lloyd and wife, L. Mildred Thomas	03/12/2003	11.3500	596/482 *

* Official Public Records of Burleson County, Texas

*** Official Records of Milam County, Texas

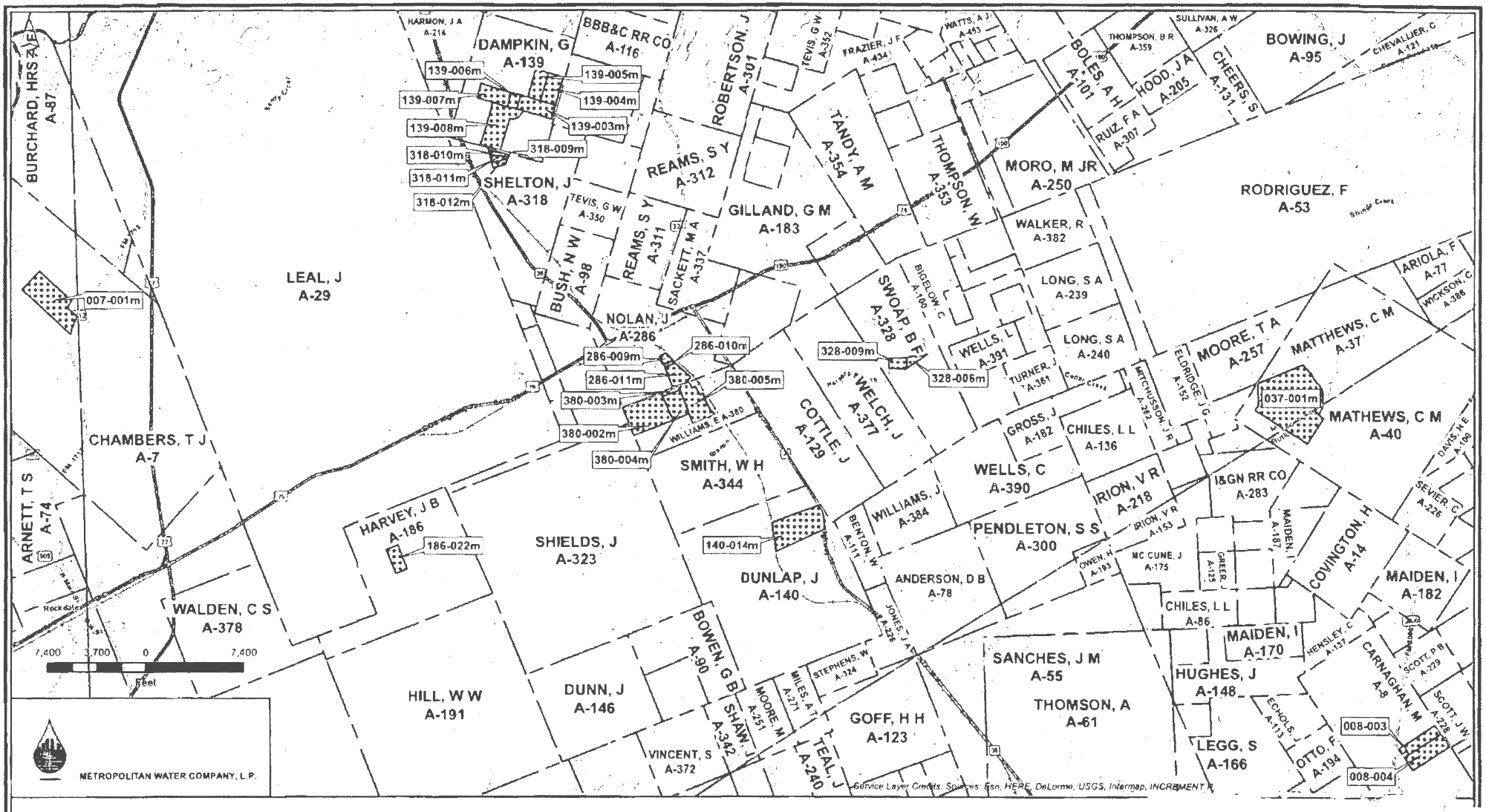

Exhibit "B1"

Attached to and made a part of that certain Fifty-Third Amendment and Ratification of Designation of Collective Water Development and Production Unit dated March 1, 2018 from Metropolitan Water Company, L.P. to the Public

Doc DR001599 Bk OR Vol 1135 Pg 636

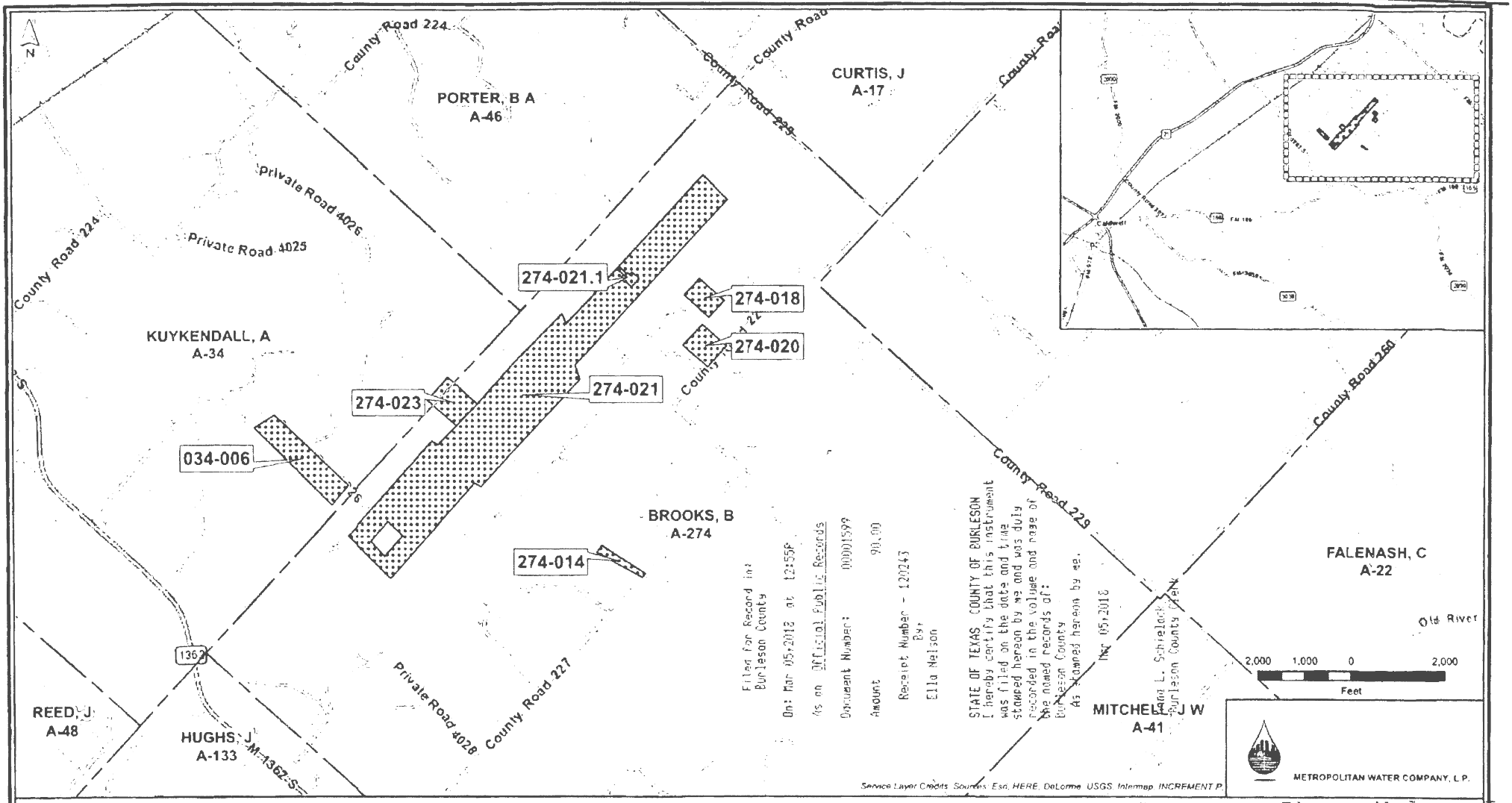

Exhibit "B2"

Attached to and made a part of that certain Fifty-Third Amendment and Ratification of Designation of Collective Water Development and Production Unit dated March 1, 2018 from Metropolitan Water Company, L.P. to the Public

Doc 00001599 Bk OR Vol 1135 Pg 63

Groundwater Management Plan

Adopted December 5, 2017

Post Oak Savannah Groundwater Conservation District
310 East Avenue C
P. O. Box 92
Milano, Texas 76556
Phone: 512 / 455 – 9900
Fax: 512 / 455 – 9909
Website: www.posgcd.org
General Manager: Gary Westbrook

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POST OAK SAVANNAH GROUNDWATER CONSERVATION DISTRICT
GROUNDWATER MANAGEMENT PLAN

1. DISTRICT MISSION

The Post Oak Savannah Groundwater Conservation District (POSGCD) mission is to provide for the conservation, preservation, protection, recharging, and prevention of waste of groundwater, and to protect groundwater users, by adopting and enforcing Rules consistent with state law. The District will accomplish this mission by imposing spacing requirements, regulating production, requiring permits for wells and production, establishing water drawdown levels and monitoring groundwater levels and production, making appropriate adjustments to allowable and permitted production, and encouraging conservation.

2. TIME PERIOD OF THIS PLAN

This plan will become effective upon adoption by the POSGCD Board of Directors ("Board") and approval as administratively complete by the Texas Water Development Board. The plan will remain in effect for five (5) years after the date of certification, and thereafter until a revised plan is adopted and approved.

3. BACKGROUND

The POSGCD was created in Milam and Burleson counties by HB 1784, 77th Legislature, 2001, and a local confirmation election in November 2002. The purpose of this bill is to provide a locally controlled groundwater district to conserve and preserve groundwater, protect groundwater users, protect and recharge groundwater, prevent pollution or waste of groundwater in the central Carrizo-Wilcox area, control subsidence caused by withdrawal of water from the groundwater reservoirs in that area, and regulate the transport of water out of the boundaries of the districts. The POSGCD has 10 directors, 5 from each county. It does not have the power to tax and receives all of its revenue from fees imposed on municipal/commercial pumpers and transporters of groundwater. Successful confirmation elections were held in November 2002 in both counties in accordance with Sections 36.017, 36.018, and 36.019, Water Code, and Section 41.001, Election Code.

The POSGCD is a member of Groundwater Management Area 12 (GMA 12) and Groundwater Management Area 8 (GMA 8), whose areal extents are shown in Figure 1. To help establish desired future conditions (DFCs) for the relevant aquifers within the boundaries of GMA 12 and GMA 8, POSGCD will consider groundwater availability models (GAMs) and other data or information. As part of the joint planning process, POSGCD will establish management goals and objectives that are consistent with the DFCs adopted by GMA 8 and GMA 12.

4. GROUNDWATER RESOURCES

Located within the District's boundaries are portions of the Trinity, Wilcox, Carrizo, Queen City, Sparta, Yegua/Jackson, and the Brazos River Alluvium aquifers. Figure 2 shows the locations of the outcrops of these aquifers based on the surface geology mapped by Barnes (1994), Kelley and others (2004), Deeds and others (2010), and Shah and Houston (2007). In Figure 2, the outcrop area for the Carrizo Aquifer includes the

outcrop area associated with the Reklaw Formation, the outcrop area for the Queen City Aquifer includes the outcrop area associated with the Weches Formation, and the outcrop area for the Sparta Aquifer includes the outcrop area for the Catahoula Formation. Within the District, the Trinity Aquifer does not outcrop and is overlaid primarily by the Midway Formation. Table 4-1 provides the area associated with each aquifer outcrop.

Table 4-1. Aquifer Outcrop Areas in the District

Aquifer and/or Geologic Formation	Outcrop Area (square miles)
Midway Formation	346
Wilcox	348
Carrizo/Reklaw	70
Queen City/Weches	159
Sparta	76
Cook Mountain/Yegua-Jackson /Catahoula	321
Brazos River Alluvium	161
Shallow Alluvium	215
Total	1,699

(a) Northern Trinity Aquifer. The northern Trinity Aquifer is located in the northwest corner of Milam County. The Trinity Aquifer comprises five geological formations considered to be relevant aquifers by GMA 8. These geologic formations are the Paluxy Aquifer, the Glen Rose Aquifer, the Travis Peak Aquifer, the Hensell Aquifer, and the Hosston Aquifer. The top and bottom surfaces for these geological formations are defined by the Updated Northern Trinity and Woodbine Aquifers GAM (Kelley and others, 2014).

(b) Wilcox Aquifer. The Wilcox aquifer is a major regional aquifer system. The outcrop of the Wilcox Aquifer forms a southwest to northeast trending belt through central Milam County; the downdip portion of the Wilcox Aquifer underlies southern Milam County and all of Burleson County. Freshwater exists in the Wilcox Aquifer in both Milam County and Burleson County. The Wilcox Aquifer comprises three geological formations that are considered to be relevant aquifers by GMA 12. These three geologic formations are the Hooper, the Simsboro, and the Calvert Bluff. The top and bottom surfaces for these three geological formations are defined by their model layer in the Central Carrizo GAM (Dutton and others, 2003). The Upper Wilcox Aquifer is associated with the Calvert Bluff Formation. The Middle Wilcox Aquifer is associated with the Simsboro Formation. The Lower Wilcox Aquifer is associated with the Hooper Formation.

The unconfined portion of the Upper Wilcox Aquifer is where the Central Carrizo GAM (Dutton and others, 2003) simulates the water level in the Calvert Bluff Formation to be below the top of the Calvert Bluff Formation at January 2000. The unconfined portion of the Middle Wilcox Aquifer is where the Central Carrizo GAM (Dutton and others, 2003) simulates the water level in the Simsboro Formation to be below the top of the Simsboro Formation at January 2000. The unconfined portion of the Lower Wilcox Aquifer is where the Central Carrizo GAM (Dutton and others,

2003) simulates the water level in the Hooper Formation to be below the top of the Hooper Formation at January 2000.

(c) Carrizo Aquifer. The Carrizo Aquifer is a regional aquifer system that occurs throughout most of the District. The outcrop of the Carrizo Aquifer forms a southwest to northeast trending belt through southern Milam County; the downdip portion of the Carrizo Aquifer underlies southern Milam County and all of Burleson County. Freshwater exists in the Carrizo Aquifer in both Milam County and Burleson County. The aquifer is a source of groundwater for numerous domestic wells and several large public water supply systems. The top and bottom surfaces for the Carrizo Aquifer are represented by its model layer in the Central Carrizo GAM (Dutton and others, 2003). The unconfined portion of the Carrizo Aquifer is where the Central Carrizo GAM (Dutton and others, 2003) simulates the water level in the Carrizo Formation to be below the top of the Carrizo Formation at January 2000.

(d) Queen City. The Queen City Aquifer outcrops across a 5- to 8-mile-wide zone that is generally aligned along the Milam-Burleson County line. The aquifer extends down dip in Burleson County and is a source of groundwater for domestic wells and some public water supply wells. Freshwater exists in the Queen City Aquifer in both Milam County and Burleson County. The top and bottom surfaces for the Queen City Aquifer are represented by its model layer in the Central Carrizo GAM (Kelley and others, 2004). The unconfined portion of the Queen City Aquifer is defined as the area where the Central Carrizo GAM (Kelly and others, 2004) simulates the water table to be below the top of the Queen City Aquifer at January 2000.

(e) Sparta Aquifer. The Sparta Aquifer outcrops across a 3- to 5-mile-wide zone trending southwest- northeast just north of Highway 21 in Burleson County. The Sparta extends downdip to the southeast throughout much of Burleson County. Like the Queen City Aquifer, the Sparta is used for numerous domestic water wells and some small public water supply systems in the District. Freshwater exists in the Sparta Aquifer in Burleson County. The top and bottom surfaces for the Sparta Aquifer are represented by its model layer in the Central Carrizo GAM (Kelley and others, 2004). The unconfined portion of the Sparta Aquifer is defined as the area where the Central Carrizo GAM (Kelly and others, 2004) simulates the water table to be below the top of the Sparta Aquifer at January 2000.

(f) Yegua/Jackson Aquifer. The Yegua/Jackson Aquifer outcrops across a 6- to 10-mile-wide zone trending southwest-northeast south of Highway 21 in Burleson County. The Yegua/Jackson Aquifer extends down-dip to the southeast through much of Burleson County. The Yegua/Jackson Aquifer includes to all four geologic units (the upper Yegua, the lower Yegua, the upper Jackson, and the lower Jackson), represented by the model layers in the Yegua/Jackson GAM (Deeds and others, 2010). In Burleson County, the Yegua/Jackson Aquifer provides small to moderate amounts of freshwater to domestic and irrigation wells and to a few public water systems.

(g) Brazos River Alluvium Aquifer. The Brazos River Alluvium Aquifer is comprised of floodplain and terrace deposits of the Brazos River along the eastern boundary of Milam and Burleson counties. The Brazos River Alluvium Aquifer occurs only as an unconfined aquifer in POSGCD, and the majority of it exists in Burleson County. The

Brazos River Alluvium supplies freshwater to many irrigation wells and several domestic wells. For the most part, the water discharges from the alluvium mainly through seepage to the Brazos River, evapotranspiration, and wells. The bottom surface for the Brazos River Alluvium is represented by the Brazos River Alluvium Aquifer GAM (Ewing and Jigmond, 2016).

(h) Shallow Alluvium Aquifers. Shallow alluvium aquifers have not been completely mapped across POSGCD. The aquifers represent floodplain and terrace deposits near major tributaries to the Brazos River. These aquifers are generally less than 30 feet thick, are characterized by mixtures of coarse sands and fine-grain materials, and are often well connected hydrologically to nearby streams. The areas of these aquifers are denoted by alluvium deposits denoted in the Bureau of Economic Geology map of surface geology (Proctor and others, 1974).

5. MANAGEMENT ZONES

The District is divided into groundwater management zones for the purpose of evaluating and managing groundwater resources recognizing the different characteristics and anticipated future development of the aquifers in the District.

The District will establish and enforce Rules for the spacing of wells, the maximum allowable production of groundwater per acre of land located over an aquifer, require permits for production, regulate drawdown and provide for a reduction in the maximum allowable production and permitted production of groundwater per acre of land based on the different surface and subsurface characteristics and different evaluation and monitoring within the Management Zones.

The Management Zones are as follows:

(a) Brazos River Alluvium Management Zone. This management zone is located along the eastern boundaries of the District in Milam and Burleson counties and is coterminous with the boundaries of the Brazos Alluvium outcrop in Figure 2. This zone extends to the depth of the water bearing alluvial sediments of the Brazos River Alluvium.

(b) Trinity Management Zone. This management zone includes the northern Trinity Aquifer, which is located beneath the footprint of the Midway outcrop shown in Figure 2. This management zone also includes the Midway Formation, which is generally a clayey deposit with low transmissivity.

(c) Sparta Management Zone. The Sparta Management Zone includes all of the water-bearing formations of the Sparta Aquifer found in the District.

(d) Queen City Management Zone. The Queen City Management Zone includes all of the water-bearing formations of the Queen City Aquifer found in the District.

(e) Carrizo Management Zone. The Carrizo Management Zone includes all of the water-bearing formations of the Carrizo Aquifer found in the District.

(f) Upper Wilcox Management Zone. The Upper Wilcox Management Zone includes all of the water-bearing formations of the Calvert Bluff Formation found in the District.

(g) Middle Wilcox Management Zone. The Middle Wilcox Management Zone includes all of the water-bearing formations of the Simsboro Formation found in the District.

(h) Lower Wilcox Management Zone. The Lower Wilcox Management Zone includes all of the water-bearing formations of the Hooper Formation found in the District.

(i) Yegua/Jackson Management Zone. This zone includes the outcrop and downdip portions of the geologic units of the Yegua and the Jackson formations of the Yegua/Jackson Aquifer, which occur in the southern portion of Burleson County.

(j) Shallow Management Zone for each Management Zone listed above items (b) through (i). This management zone corresponds to all deposits that occur at a depth of 400 feet or less, as measured from land surface, except for deposits associated with the Brazos River Alluvium. The Shallow Management Zone is not mutually exclusive from the aquifer management zones (b) through (i) but the uppermost portion of those management zones. The purpose of monitoring the Shallow Management zone is to characterize the water levels in the unconfined portions of the aquifers.

6. MANAGEMENT OF GROUNDWATER SUPPLIES

The District will evaluate and monitor groundwater conditions and regulate production consistent with this plan and the District Rules. Production will be regulated, as needed, to conserve groundwater, and protect groundwater users, in a manner not to unnecessarily and adversely limit production or impact the economic viability of the public, landowners and private groundwater users. In consideration of the importance of groundwater to the economy and culture of the District, the District will identify and engage in activities and practices that will permit groundwater production and, as appropriate, protect the aquifer and groundwater in accordance with this Management Plan and the District's rules. A monitoring well network will be maintained to monitor aquifer conditions within the District. The District will make a regular assessment of water supply and groundwater storage conditions and will report those conditions, as appropriate, in public meetings of the Board or public announcements. The District will undertake investigations, and cooperate with third-party investigations, of the groundwater resources within the District, and the results of the investigations will be made available to the public upon being presented at a meeting of the Board.

The District will adopt rules to regulate groundwater withdrawals by means of well spacing and production limits as appropriate to implement this Plan. In making a determination to grant a permit or limit groundwater withdrawals, the District will consider the available evidence and, as appropriate and applicable, weigh the public benefit against the individual needs and hardship.

The factors that the District may consider in making a determination to grant a drilling and operating or operating permit or limit groundwater withdrawals will include:

1. The purpose of the rules of the District;
2. The equitable distribution of the resource;
3. The economic hardship resulting from grant or denial of a permit, or the terms prescribed by the permit;
4. This Management Plan and DFCs of the District as adopted in Joint Planning under Tex. Water Code, Sec. 36.108; and
5. The potential effect the permit may have on the aquifer, and groundwater users.

The transport of groundwater out of the District will be regulated by the District according to the Rules of the District.

In pursuit of the District's mission of protecting the groundwater resources, the District may require adjustment of groundwater withdrawals in accordance with the Rules and Management Plan. To achieve this purpose, the District may, at the Board's discretion after notice and hearing, amend or revoke any permit for non- compliance, or reduce the production authorized by permit for the purpose of protecting the aquifer and groundwater availability. The determination to seek the amendment of a permit will be based on aquifer conditions observed by the District as stated in the District's rules. The determination to seek revocation of a permit will be based on compliance and non-compliance with the District's rules and regulations. The District will enforce the terms and conditions of permits and the rules of the District, as necessary, by fine and enjoining the permit holder in a court of competent jurisdiction as provided for in Texas Water Code (TWC) Ch. 36.102, etc.

A contingency plan to cope with the effects of water supply deficits due to climatic or other conditions will be developed by the District and will be adopted by the Board after notice and hearing. In developing the contingency plan, the District will consider all relevant factors, including, but not limited to, the economic effect of conservation measures upon all water resource user groups, the local implications of the degree and effect of changes in water storage conditions, the unique hydrogeologic conditions of the aquifers within the District and the appropriate conditions under which to implement the contingency plan.

The District will employ reasonable and necessary technical resources at its disposal to evaluate the groundwater resources available within the District and to determine the effectiveness of regulatory or conservation measures. A public or private user may appeal to the Board for discretion in enforcement of the provisions of the water supply deficit contingency plan on grounds of adverse economic hardship or unique local conditions. The exercise of discretion by the Board shall not be construed as limiting the power of the Board.

7. DESIRED FUTURE CONDITIONS

The District shall participate in the joint planning process in GMAs 8 and 12 as defined per TWC § 36.108, including establishment of DFCs for management areas within the District. In its evaluation of potential DFCs, the District shall consider results from GAMs, scientific reports, and the conditions of the aquifer within the management zones.

(a) DFCs Adopted by GMA 12. The District's DFCs for the area covered by GMA 12 are provided in Tables 7-1, 7-2, and 7-3 for both the 2010 and 2015 Joint Planning cycles. For each of the aquifers, the DFC average drawdowns are for the area covered by each aquifer in Milam and Burleson counties.

For the Queen City, Sparta, Carrizo and Wilcox aquifers (Table 7-1), the stratigraphy was defined using the TWDB GAM for the Queen City and Sparta Aquifers (Kelley and others, 2004) during both planning cycles. The DFCs from the 2010 Joint Planning cycle correspond with the Modeled Available Groundwater (MAG) values provided in Section 8. These DFCs are average drawdowns calculated by the Kelley and others (2004) model for a 60-year period beginning January 2000 and ending December 2059. The DFCs from the 2015 Joint Planning cycle are the most current POSGCD DFCs, but at the time of the current plan, the MAG values have not yet been calculated using these DFCs. These DFCs are average drawdowns calculated by the Kelley and others (2004) model for a 70-year period beginning January 2000 and ending December 2069.

For the Yegua-Jackson Aquifer (Table 7-2), the stratigraphy was defined using the TWDB GAM for the Yegua-Jackson Aquifer (Deeds and others, 2010) during both planning cycles. The DFCs from the 2010 Joint Planning cycle correspond with the MAG values provided in Section 8. These DFCs are average drawdowns calculated by the Deeds and others (2010) model for the 60-year period beginning January 2000 and ending December 2059. The DFCs from the 2015 Joint Planning cycle are the most current POSGCD DFCs, but at the time of the current plan, the MAG values have not yet been calculated using these DFCs. These DFCs are average drawdowns calculated by the Deeds and others (2010) model for a 60-year period beginning January 2010 and ending December 2069.

For the Brazos River Alluvium Aquifer (Table 7-3), there was no TWDB GAM available during the either joint planning period for GMA 12. The DFCs for the 2010 Joint Planning cycle represent declines in the saturated thickness measured in District monitoring well network over a 50-year period. The 50-year period begins January 2010 and ends December 2059. The DFCs for the 2015 Joint Planning cycle represent declines in the saturated thickness measured in District monitoring well network over a 60-year period. The 60-year period begins in January 2010 and ends on December 2069.

Table 7-1. Adopted DFCs for the Queen City, Sparta, Carrizo and Wilcox aquifers

Aquifer	2010 Joint Planning	2015 Joint Planning
	Average Drawdown between January 2000 and December 2059 (ft)	Average Drawdown between January 2000 and December 2069 (ft)
Sparta	30	28
Queen City	30	30
Carrizo	65	67
Upper Wilcox (Calvert Bluff Fm)	140	149
Middle Wilcox (Simsboro Fm)	300	318
Lower Wilcox (Hooper Fm)	180	205

Table 7-2. Adopted DFCs for the Yegua-Jackson Aquifer

Aquifer	2010 Joint Planning	2015 Joint Planning
	Average Drawdown between January 2000 and December 2059 (ft)	Average Drawdown between January 2010 and December 2069 (ft)
Yegua-Jackson	100	100

Table 7-3. Adopted DFCs for the Brazos River Alluvium Aquifer

County	2010 Joint Planning	2015 Joint Planning
	Average Decrease in Saturated Thickness between January 2010 and December 2059 (ft)	Average Decrease in Saturated Thickness between January 2010 and December 2069 (ft)
Milam in GMA 12	5	5
Burleson in GMA 12	6	6

(b) DFCs Adopted by GMA 8. On the date of this Plan's adoption, the District did not have any permitted wells in the portion of the Brazos River Alluvium Aquifer and the Trinity Aquifer in GMA 8. POSGCD participated in the GMA 8 joint planning process to help establish DFCs for the Brazos River Alluvium Aquifer and the Trinity Aquifer within the District boundaries, but for the purpose of this Plan, the District considers the portion of the Brazos River Alluvium Aquifer within GMA 8 as a non-relevant aquifer. The District will not monitor water levels in the GMA 8 portion of the Brazos River Alluvium until the GMA 8 portion of the Brazos River Alluvium is deemed as a relevant aquifer by the District. The District will also not monitor water levels in the Trinity Aquifer until there is at least one permitted well that pumps from the Trinity Aquifer.

The District's DFCs for the area covered by GMA 8 are provided in Table 7-4 for both the 2010 and 2015 Joint Planning cycles. The DFCs from the 2010 Joint Planning

cycle correspond with the MAG values provided in Section 8. These DFCs are average drawdowns for a 50-year period that begins January 2000 and ends December 2049. The average drawdowns are for areas covered by each aquifer in Milam County as defined by the stratigraphy provided by the TWDB GAM for the Northern Trinity Aquifer (Bené and others, 2004). The DFCs from the 2015 Joint Planning cycle are the most current POSGCD DFCs, but at the time of the current plan, the MAG values have not yet been calculated using these DFCs. These DFCs are average drawdowns for a 60-year period that begins on January 2010 and ends on December 2070. The average drawdowns are for areas covered by each aquifer in Milam County as defined by the stratigraphy provided by the TWDB Updated GAM for the Northern Trinity and Woodbine Aquifers (Kelley and others, 2014).

Table 7-4. Adopted DFCs for the Trinity Aquifer.

Aquifer	2010 Joint Planning	2015 Joint Planning
	Average Drawdown between January 2000 and December 2049 (ft)	Average Drawdown between January 2010 and December 2070 (ft)
Paluxy	252	--
Glen Rose	294	212
Travis Peak	--	345
Hensell	337	229
Hosston	344	345

(c) Protective Drawdown Limits (PDLs) for Shallow Management Zone Water Levels On the date of this Plan's adoption, neither GMA 12 nor 8 has established DFCs for the shallow unconfined sections of the aquifers within the GMAs. The District therefore developed the PDLs in Table 7-5 independently in order to limit drawdown in the shallow up-dip regions of the aquifers within the District. These PDLs were developed to help protect the production capacity of existing wells in the shallow unconfined portions of the aquifer where the water level above the well screen tends to be less than in the deep confined portions of the aquifer.

Table 7-5 PDL Threshold values for Average Drawdown for the Shallow Management Zones

Aquifer	Average Drawdown (ft) that Occurs between January 2000 and December 2069 in the Shallow Management Zone
Sparta	20
Queen City	20
Carrizo	20
Upper Wilcox (Calvert Bluff Fm)	20
Middle Wilcox (Simsboro Fm)	20
Lower Wilcox (Hooper Fm)	20
Yegua	20
Jackson	20

8. MODELED AVAILABLE GROUNDWATER (MAG)

Based on DFCs adopted by GMA 8 and GMA 12, the TWDB is required by TWC § 36.108 9(o) to provide the District with a MAG for each DFC. Table 8-1 lists the MAGs received by the District from the TWDB based on DFCs from the 2010 planning cycle. The TWDB has not yet provided GMA 8 nor GMA 12 with revised MAGs based on DFCs from the 2015 joint planning cycle.

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

GAM	Aquifer	Modeled available groundwater in acre-ft/year (AFY)					
		2010	2020	2030	2040	2050	2060
Brazos River Alluvium	GMA 8: Declared a Non-Relevant Aquifer	NA	NA	NA	NA	NA	NA
	GMA 12: Milam and Burleson County[1]	25,138	25,138	25,138	25,138	25,138	25,138
Aquifers in Trinity GAM	Paluxy[2]	0	0	0	0	0	0
	Glen Rose[2]	149	149	149	149	149	149
	Hensell[2]	36	36	36	36	36	36
	Hosston[2]	103	103	103	103	103	103
	Subtotal	*288*	*288*	*288*	*288*	*288*	*288*
Aquifers in the Queen City/ Sparta GAM	Sparta[3]	1,570	2,245	4,041	5,612	6,734	6,734
	Queen City[4]	430	468	502	502	502	502
	Carrizo[5]	4,025	4,706	5,177	6,118	6,353	7,059
	Upper Wilcox (Calvert	502	1,038	1,038	1,038	1,038	1,038
	Middle Wilcox	36,507	38,468	37,899	40,041	46,027	48,501
	Lower Wilcox (Hooper	899	2,960	4,139	4,433	4,433	4,422
	Subtotal	*43,933*	*49,885*	*52,796*	*57,744*	*65,087*	*68,256*
Yegua-Jackson Aquifer	Yegua-Jackson Aquifer[6]	12,923	12,923	12,923	12,923	12,923	12,923
	TOTAL	*82,282*	*88,234*	*91,145*	*96,093*	*103,43*	*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, 2012c)
[4] GAM RUN 10-045 MAG (Oliver, 2012b)
[5] GAM RUN 10-044 MAG (Oliver, 2012a)
[6] GAM RUN 10-060MAG (Oliver, 2012d)
NA – not applicable

9. WATER WELL INVENTORY

The District will assign permitted wells to a management zone and to an aquifer based on the location of the well's screen or well depth using the Rules of the District. If no well screen information is available, then a permitted well will be assigned to a management zone and to an aquifer based on the total depth of the well. The assignment of the permitted well will be made at the time of permit. The District will assign exempt wells to a management zone and to an aquifer based on available information for the exempt well. The District will use the assignments to help track the permitted pumping and production for each aquifer and for each management zone.

10. GROUNDWATER MONITORING

The District will maintain a monitoring well network that will be used by the District to obtain measured water levels. Groundwater monitoring will be designed to monitor changes

in groundwater conditions over time. The District encourages well owners to volunteer wells to be used as part of the monitoring network. The District will accept wells into, or replace an existing well in, the monitoring network. The selection process will consider the well proximity to other monitoring wells, to permitted and exempt wells, to streams, and to geographic and political boundaries. If no suitable well locations can be found to meet the monitoring objectives in a specific aquifer or management zone, the District may evaluate the benefits of converting an oil and gas well to a water well, drilling and installing a new well, or using modeled water levels for that area until such time as a suitable well can be obtained for monitoring.

The District shall perform groundwater monitoring. The monitoring of the wells will be performed under the direction of the general manager, by trained personnel using a Standard Operating Procedure adopted by the District. The District may coordinate with the neighboring groundwater conservation districts for the purpose of supplementing its monitoring data and of improving the consistency in the collection, management, and analysis of hydrogeological data in GMA 12.

11. THRESHOLD LEVELS AND ANALYSIS OF GROUNDWATER LEVEL DATA

The District shall use threshold levels to help achieve its DFCs and to conserve and preserve groundwater availability and protect groundwater users. The District shall administer separate threshold levels for each management zone based on the Rules of the District. As part of its evaluation and determinations, the District may also consider the pumping-induced impacts to groundwater resources, including production occurring outside of the District. The District will consider threshold levels based on one or more of the following metrics: estimated total annual production, measured water level change, and predicted water level change.

Among the factors to be considered to guide the District's actions are evaluating thresholds for declines in water levels established in the District's Rules. District actions which can be initiated if a threshold level has been exceeded are: additional aquifer studies to collect and analyze additional information, a re-evaluation of the Management Plan or rules, and/or a change in the Management Plan or rules.

12. PRODUCTION AND SPACING OF WELLS

Production and spacing of all wells within the District will be regulated by the District according to the Rules of the District. Well spacing and the rate of production of the well will be dependent on the management zone and the aquifer associated with the well, and other factors included in the Rules of the District.

13. ACTIONS, PROCEDURES, PERFORMANCE AND AVOIDANCE FOR PLAN IMPLEMENTATION

The District will implement this plan and utilize it as a guide for the ongoing evaluation, and the planning and establishing, of priorities for all District conservation and regulatory activities. All programs, permits and related operations of the District, and any additional planning efforts in which the District may participate will be consistent with this plan.

The District will adopt rules relating to the permitting of wells, the production and transport of groundwater and reducing permitted production. The rules adopted by the District shall be adopted pursuant to TWC Chapter 36 and provisions of this plan. All rules will be adhered to and enforced. The promulgation and enforcement of the rules will be based on technical data recommended by competent professionals and accepted by the Board.

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

The District will endeavor to cooperate with other agencies in the implementation of this plan and the management of groundwater supplies within the District. All activities of the District will be undertaken in a spirit of cooperation and coordination with the appropriate state and regional agencies.

14. METHODOLOGY FOR TRACKING DISTRICT PROGRESS IN ACHIEVING MANAGEMENT GOALS

The general manager of the District will prepare and present to the Board an annual report on the District's performance and accomplishment of the management goals and objectives. The presentation of the report will occur during the last monthly Board meeting each fiscal year, beginning after the adoption and certification of this plan. The report will include the number of instances in which each of the activities specified in the management objectives was engaged in during the fiscal year. Each activity will be referenced to the estimated expenditure of staff time and budget in accomplishment of the activity. The notations of activity frequency, staff time and budget will be referenced to the appropriate performance standard for each management objective describing the activity, so that the effectiveness and efficiency of the Districts operations may be evaluated. The Board will maintain the adopted report on file, for public inspection, at the District's offices. This methodology will apply to all management goals contained within this plan.

15. AQUIFER STORAGE AND RECOVERY PROJECTS

An Aquifer Storage and Recovery (ASR) project involves the injection of water into a geological formation for subsequent recovery and beneficial use. The District acknowledges that ASR projects can help to improve the overall management of water resources in GMA 12. However, the District also recognizes that poorly designed and instrumented ASR project can be operated in such a manner as to adversely affect the production capacity of existing wells located near the ASR project. As ASR projects are identified, the District will coordinate with the Texas Commission on Environmental Quality to provide data and/or technical expertise that could assist with the evaluation of the proposed ASR project.

16. MANAGEMENT GOALS, OBJECTIVES, & PERFORMANCE STANDARDS

16.1 Efficient Use of Groundwater

Management Objectives:

1. The District will maintain a monitoring well network with at least 100 monitoring wells to provide coverage across management zones and aquifers within the District. The District will measure water levels at the monitoring well locations at least once every calendar year. A written analysis of the water level measurements from the monitoring wells will be made available through a presentation to the Board of the District at least once every three years.
2. The District will provide educational leadership to citizens within the District concerning this subject. The activity will be accomplished annually through at least one printed publication, such as a brochure, and public speaking at service organizations and public schools as provided for in the District's Public Education Program.

Performance Standards:

1. Maintain a monitoring well network and its criteria, and measure at least 100 monitoring wells at least once every calendar year.
2. Number of monitoring wells measured annually by the District.
3. Written report presented to the Board to document that water levels at these monitoring wells have been measured a minimum of once each year.
4. The number of publications and speaking appearances by the District each year under the District's Public Education Program.

16.2 Controlling and Preventing Waste of Groundwater.

Management Objectives:

The District will provide educational leadership to citizens within the District concerning this subject. The activity will be accomplished annually through at least one printed publication, such as a brochure, and public speaking at service organizations and public schools as provided for in the District's Public Education Program. During years when District revenues are sufficient, the District will consider funding a grant to obtain a review, study, or report of pertinent groundwater issues, or to sponsor the attendance of students at summer camps/seminars that place emphasis on the conservation of water resources.

Performance Standards:

The number of publications and speaking appearances by the District each year, and the number of grants considered and students actually accepting and attending an educational summer camp or seminar.

16.3 Control and Prevent Subsidence

Management Objectives:

The District will monitor drawdowns with due consideration to the potential for land subsidence. At least once every three years, the District will assess the potential for land subsidence for areas where water levels have decreased more than 100 feet since the year 2000.

Performance Standards:

Within three years of the approval of this plan and every three years thereafter, the District will map any region where more than 100 feet of drawdown has occurred since the year 2000 and assess the potential for land subsidence. The results of the assessment will be discussed in a District Board meeting and be document in a presentation or a report.

16.4 Conservation of Groundwater including Rainwater Harvesting, Precipitation Enhancement, Brush Control, Conjunctive Use, and/or Recharge Enhancement of Groundwater Resources in the District

Management Objectives:

1. The District will provide educational leadership to citizens within the District concerning this subject. The educational efforts will be through at least one printed publication, such as a brochure, and at least one public speaking program at a service organization and/or public school as provided for in the District's Public Education Program. Each of the following topics will be addressed in that program:
    A. Conservation
    B. Rainwater Harvesting
    C. Brush Control
    D. Recharge Enhancement
    E. Conjunctive Use
    F. Precipitation Enhancement
2. During years when District revenues are sufficient, the District will consider sponsoring the attendance of students and/or teachers at summer camps/seminars that place emphasis on the conservation of groundwater, rainwater harvesting, brush control, groundwater recharge enhancement, conjunctive use, precipitation enhancement of water resources, or a combination of such groundwater management programs.
3. The District will encourage and support projects and programs to conserve and/or preserve groundwater, and/or enhance groundwater recharge, by annually funding the District's Groundwater Conservation and Enhancement Grant Program, during years when the District's revenues remain at a level sufficient to fund the program. The objective of this program is to obtain the active participation and cooperation of local water utilities, fire departments and

public agencies in the funding and successful completion of programs and projects that will result in the conservation of groundwater and the protection or enhancement of the aquifers in the District. The qualifying water conservation projects and programs will include, as appropriate, projects that: result in the conservation of groundwater, reduce the loss or waste of groundwater, recharge enhancement, rainwater harvesting, precipitation enhancement, brush control, or any combination thereof. The District's objective is to benefit the existing and future users of groundwater in the District by providing for the more efficient use of water, increasing recharge to aquifers, reducing waste, limiting groundwater level declines, and maintaining or increasing the amount of groundwater available, by awarding at least one grant under the program in each county annually.

Performance Standards:

1. The number of publications and speaking appearances by the District each year under the District's Public Education Program.
2. The number of students sponsored to attend a summer camp/seminar emphasizing the conservation of water.
3. Annual funding, when applicable, for the District's Groundwater Conservation and Enhancement Grant Program, and the number of projects and programs reviewed, approved, and funded under that program. A written report providing estimated benefit of the amount of groundwater conserved, of the recharge enhancement, and/or of addition groundwater protection provided by the program.
4. The number and content of reports submitted regarding sponsored programs.

16.5 Conjunctive Use of Surface and Groundwater

Management Objective:

The District will confer annually with the Brazos River Authority (BRA) on cooperative opportunities for conjunctive resource management.

Performance Standard:

1. The number of conferences with the BRA on conjunctive resource management.
2. The number of times each year in which the applicant, general manager or the Board considers conjunctive use in the permitting process.

16.6 Drought Management Strategy

The aquifers within the District are substantially resistant to water level declines during drought conditions. As a result, the District does not have a drought management strategy based on precipitation metrics such as the Palmer Drought Index. The District management strategy is to review and to verify enforcement of Drought Management Plans adopted by District permit holders and entities that contract to purchase water from District permit holders.

Management Objective:

When permits or contracts are issued, as applicable, the District will confirm that all entities have an Drought Management Plan or Drought Contingency Plan that has been approved by the Texas Commission on Environmental Quality or another regulatory agency in the State of Texas.

Performance Standard:

State approved Drought Management Plans or Drought Contingency Plans on file at the District Offices.

16.7 Natural Resource Issues That Impact the Use and Availability of Groundwater and Which are Impacted by the Use of Groundwater

Management Objectives:

1. The District will confer at least once every two years with appropriate agencies on the impact of groundwater resources in the District.
2. The District will evaluate permit applications for new wells and the information submitted by the applicants on those wells prior to drilling. The District will assess the impact of these wells on the groundwater resources in the District.
3. The District will implement the POSGCD Well Closure Program. The objective of the well closure program is to obtain the closure and plugging of derelict and abandoned wells in a manner that is consistent with state law, for the protection of the aquifers, the environment, and the public safety. The District will conduct a program to identify, inspect, categorize and cause abandoned and derelict water, oil and gas wells to be closed and plugged, by annually funding the program or segments or phases of the program appropriate to be funded in such fiscal year. The District will fund the closure of at least one abandoned well during years when the District's revenues remain at a level sufficient to fund the program.

Performance Standards:

1. The number of conferences with a representative of appropriate agencies.
2. Reports to the Board on the number of new well permit applications filed, and the possible impacts of those new wells on the groundwater resources in the District.
3. Annual funding, when applicable, for the District's Well Closure Program, and the number of wells closed and plugged as a result of the Well Closure Program.

16.8 Groundwater Well Assistance Program

Management Objective:

Beginning in 2018, the District will maintain a Groundwater Well Assistance Program (GWAP). The primary purpose of the GWAP is to help restore a water supply to well owners in the District who own wells that have experienced significant adverse impacts, and where applicable to address well conditions to prevent significant adverse impacts, from groundwater level declines caused by aquifer-wide groundwater pumping in GMA 12. A secondary purpose of the GWAP is to improve

the POSGCD monitoring program and the POSGCD's understanding of groundwater aquifer systems in POSGCD by increasing the number of monitoring wells in the monitoring well network and by performing localized hydrogeological studies at these monitoring locations.

Performance Standard:

GWAP adopted before the end of 2018.

16.9 Mitigation

Management Objective:

The District will require filing with the District of mitigation plans required by the District or any State agency regarding impacts caused by groundwater pumping in the District.

Performance Standards:

1. Mitigation plans on file at the District that are related to groundwater pumping in the District.
2. Report of impacts and predicted impacts on well owners in the District on file at the District Offices.

16.10 Desired Future Conditions (DFCs)

Management Objective:

At least once every three years, the District will monitor water levels and evaluate whether the change in water levels is in conformance with the DFCs adopted by the District. The District will estimate total annual groundwater production for each aquifer based on the water use reports, estimated exempted use, and other relevant information, and compare these production estimates to the MAGs listed in Table 8-1.

Performance Standards:

1. At least once every three years, the general manager will report to the Board the measured water levels obtained from the monitoring wells within each Management Zone, the average measured drawdown for each Management Zone calculated from the measured water levels of the monitoring wells within the Management Zone, a comparison of the average measured drawdowns for each Management Zone with the DFCs for each Management Zone, and the District's progress in conforming with the DFCs.
2. At least once every three years, the general manager will report to the Board the total permitted production and the estimated total annual production for each aquifer and compare these amounts to the MAGs listed in Table 8-1 for each aquifer.

17. PROJECTED WATER DEMANDS

The projected net water demands (in acre-feet) within the District based on the 2017 State Water Plan are compiled in Allen (2017), provided as **Appendix A**. The District also

established future Municipal Groundwater Use Demands in the District for planning purposes. The methodology and results of that effort are as follows:

Method for Establishing Future Municipal Use Demands of Groundwater. The District adopted a resolution, dated March 11, 2003, establishing production rights for Local Water Utilities within the District (water supply corporations, special utility districts, municipal utility districts and cities), as a rule. This rule allowed these Local Water Utilities to obtain a permit to produce a volume of water annually according to one of two methods:

1. An amount equal to the highest annual pumpage it reported from wells within the District in any consecutive twelve months prior to September 31, 2001; or
2. The Local Water Utility could present to the Board a Long-Term Plan prepared by a qualified engineer that projects the annualized long-term water needs as the official projection of the water required by that Local Water Utility in the planning period (for not more than forty [40] years) for providing retail water service within that Local Water Utility's defined service area. If a Local Water Utility adopted this plan on or before March 30, 2004, and the Board found the highest annual pumpage projected in the Long-Term Plan (the "Plan Amount") was not unreasonable, the Local Water Utility was authorized to obtain a permit to pump and produce up to the Plan Amount. Table 17-1 below contains the results of this effort.

Table 17-1 Municipal Use Groundwater Demands Projected through 2044

Producer	Estimated Acre-Feet per
Burleson County	
Apache Hills	11
Birch Creek	16
Burl. Co. MUD	73
Burl. Investm.	7
Cade Lakes	123
Centerline	21
Caldwell	1,969
Snook	154
Somerville	670
Clara Hills	5
Clay	7
Cooks Point	10
Deanville	350
Lakeview	21
Little Oak Forrest	5
Lyons	106
Post Oak Hill	11
Shupak Utilities	19
Tunis	108
Whispering Woods	7
Wilderness Sound	15
Total for Burleson Co.	3,708
Milam County	
Alcoa	702
Rockdale	2,129
Gause	74
Marlow	108
Milano	673
Minerva	28
North Milam	369
Southwest Milam	2,492
Total for Milam Co.	6,575
DISTRICT TOTALS	10,283

18. PROJECTED WATER SUPPLIES WITHIN THE DISTRICT

The projected surface water supplies (in acre-feet) within the District based on the 2017 State Water Plan are compiled in Allen (2017), provided as **Appendix A**.

Table 18-1 lists the projected groundwater supplies within the District in acre-feet per year according to the 2017 State Water Plan Data. The District has participated and will

participate in future regional water planning, and will consider the water supply needs and water management strategies included in the adopted state water plan.

Table 18-1. Projected Groundwater Supplies in acre-feet per year Within the District According the 2017 State Water Plan data

WUG Entity Name	Source Name	Source Subtype	2020	2030	2040	2050	2060	2070
Burleson County								
Caldwell	Carrizo-Wilcox Aquifer	Groundwater	2,352	2,352	2,352	2,352	2,352	2,352
County-Other, Burleson	Carrizo-Wilcox Aquifer	Groundwater	550	550	550	550	550	550
County-Other, Burleson	Queen City Aquifer	Groundwater	323	323	323	323	323	323
Deanville WSC	Carrizo-Wilcox Aquifer	Groundwater	701	701	701	701	701	701
Irrigation, Burleson	Brazos River Alluvium Aquifer	Groundwater	21,640	21,640	21,640	21,640	21,640	21,640
Irrigation, Burleson	Carrizo-Wilcox Aquifer	Groundwater	204	204	204	204	204	204
Irrigation, Burleson	Yegua-Jackson Aquifer	Groundwater	1,118	1,118	1,118	1,118	1,118	1,118
Manufacturing, Burleson	Sparta Aquifer	Groundwater	139	139	139	139	139	139
Milano WSC	Carrizo-Wilcox Aquifer	Groundwater	250	234	232	232	241	245
Mining, Burleson	Carrizo-Wilcox Aquifer	Groundwater	0	0	0	0	0	0
Snook	Sparta Aquifer	Groundwater	475	475	475	475	475	475
Somerville	Sparta Aquifer	Groundwater	891	891	891	891	891	891
Southwest Milam WSC	Carrizo-Wilcox Aquifer	Groundwater	205	184	154	167	167	158
		TOTAL	*28,848*	*28,811*	*28,779*	*28,792*	*28,801*	*28,796*
Milam County								
Bell-Milam Falls WSC	Trinity Aquifer	Groundwater	79	79	77	77	76	74
Bell-Milam Falls WSC	Trinity Aquifer	Groundwater	352	349	343	342	336	329
Buckholts	Trinity Aquifer	Groundwater	122	122	122	122	122	122
Irrigation, Milam	Brazos River Alluvium Aquifer	Groundwater	3,082	3,082	3,082	3,082	3,082	3,082
Irrigation, Milam	Carrizo-Wilcox Aquifer	Groundwater	2,221	2,066	1,828	2,043	2,135	2,135
Irrigation, Milam	Queen City Aquifer	Groundwater	53	56	56	56	56	56
Milano WSC	Carrizo-Wilcox Aquifer	Groundwater	260	240	237	237	249	255
Mining, Milam	Carrizo-Wilcox Aquifer	Groundwater	14	14	14	14	14	14
Mining, Milam	Trinity Aquifer	Groundwater	0	0	0	0	0	0
Rockdale	Carrizo-Wilcox Aquifer	Groundwater	2,000	1,860	1,396	1,589	1,672	1,672
Southwest Milam WSC	Carrizo-Wilcox Aquifer	Groundwater	1,625	1,443	1,202	1,307	1,314	1,261

WUG Entity Name	Source Name	Source Subtype	2020	2030	2040	2050	2060	2070
Thorndale	Carrizo-Wilcox Aquifer	Groundwater	229	229	229	229	229	229
Steam Electric Power, Milam	Carrizo-Wilcox Aquifer	Groundwater	15,786	13,009	12,943	14,444	15,084	15,074
		TOTAL	*25,823*	*22,549*	*21,529*	*23,542*	*24,369*	*24,303*

19. PROJECTED WATER NEEDS AND WATER STRATEGIES

The projected water supply needs and water management strategies (in acre-feet) within the District based on the 2017 State Water Plan are compiled in Allen (2017), provided as **Appendix A**.

20. ESTIMATED GROUNDWATER USE WITHIN THE DISTRICT

The estimated historical water use (in acre-feet) within the District based on the TWDB Historical Water Use Survey is compiled in Allen (2017), provided as **Appendix A**.

21. ESTIMATED ANNUAL RECHARGE OF GROUNDWATER RESOURCES WITHIN THE DISTRICT

The estimated annual recharge from precipitation to groundwater by aquifer (in acre-feet) within the District is compiled in GAM Run 16-015 (Ballew, 2017), provided as **Appendix B**.

22. ESTIMATED ANNUAL DISCHARGES FROM THE AQUIFER TO SPRINGS AND ANY SURFACE WATER BODIES, INCLUDING LAKES, STREAMS AND RIVERS

The estimated annual discharges from each aquifer to springs and any surface water bodies, including lakes, streams, and rivers (in acre-feet) within the District are compiled in GAM Run 16-015 (Ballew, 2017), provided as **Appendix B**.

23. ESTIMATED ANNUAL GROUNDWATER FLOW INTO AND OUT OF THE DISTRICT WITHIN EACH AQUIFER AND BETWEEN AQUIFERS IN THE DISTRICT

The estimated annual groundwater flow into and out of the District within each aquifer and between aquifers (in acre-feet) within the District is compiled in GAM Run 16-015 (Ballew, 2017), provided as **Appendix B**.

24. REFERENCES

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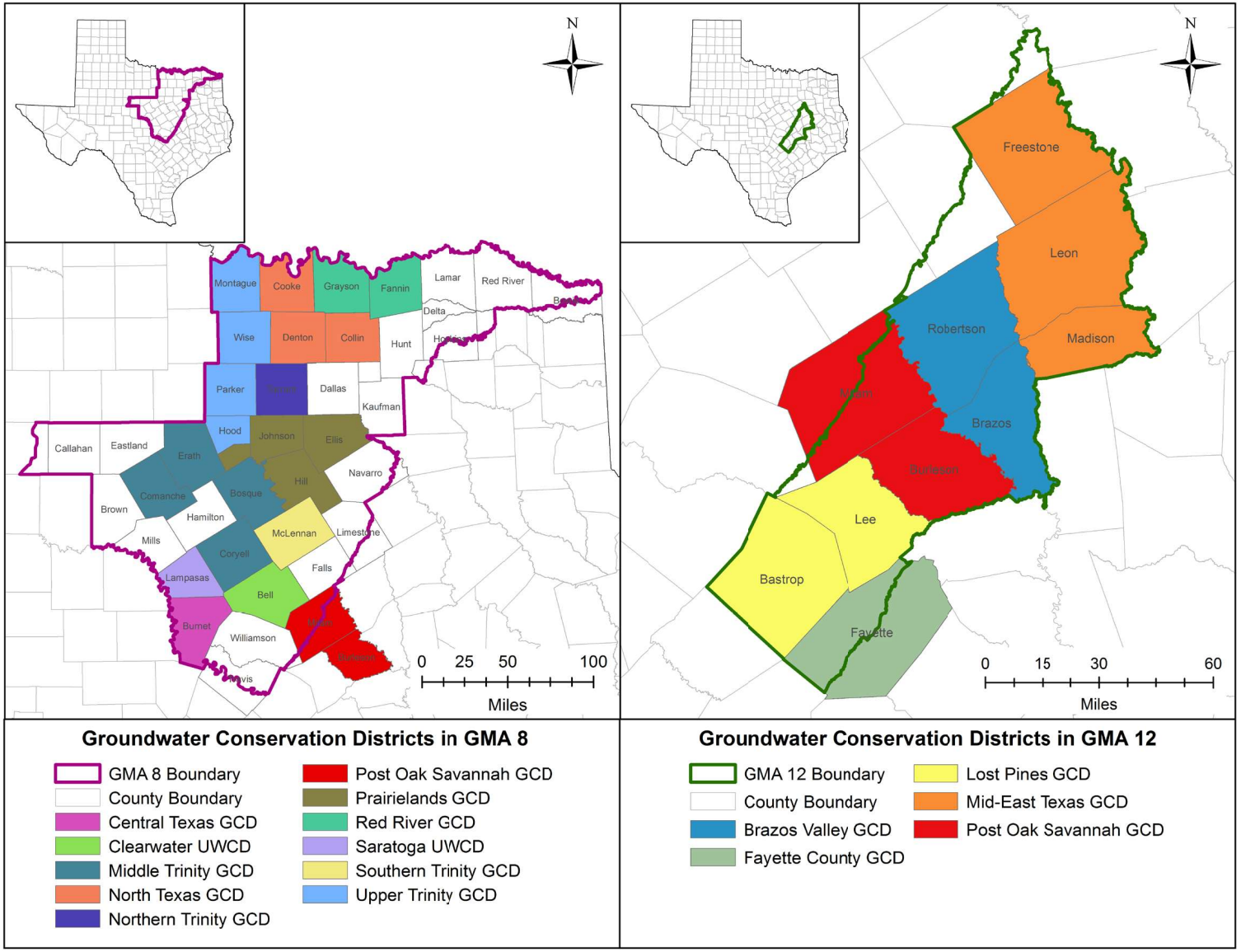

Figure 1. Counties and Groundwater Districts Associated with Groundwater Management Areas 8 and 12

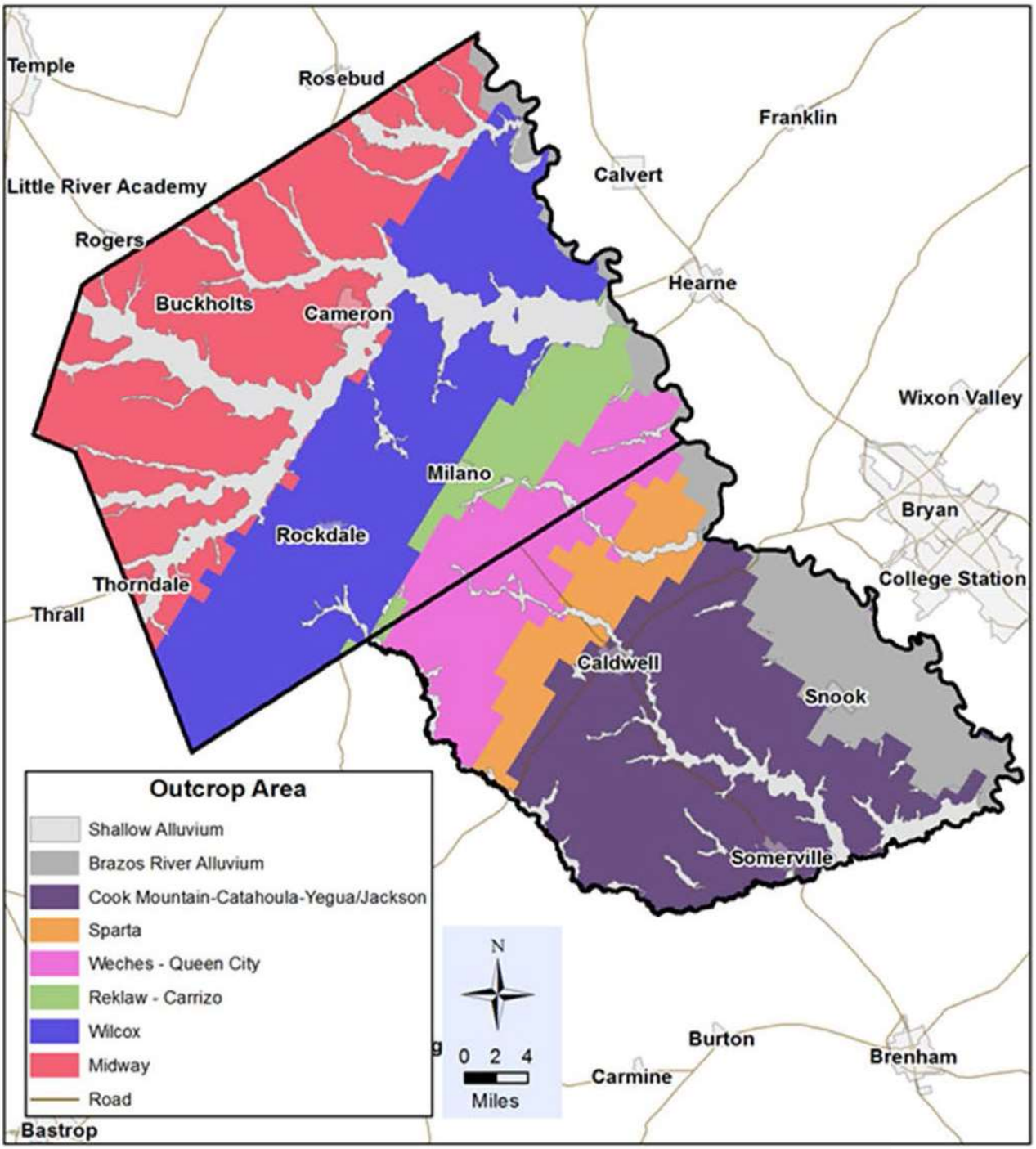

Figure 2. Outcrops Associated with Aquifers and Geological Formations in the District

Estimated Historical Water Use And 2017 State Water Plan Datasets:

Post Oak Savannah Groundwater Conservation District

by Stephen Allen
Texas Water Development Board
Groundwater Division
Groundwater Technical Assistance Section
stephen.allen@twdb.texas.gov
(512) 463-7317
September 15, 2017

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 9/15/2017. 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 2016. TWDB staff anticipates the calculation and posting of these estimates at a later date.

BURLESON COUNTY

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2015	GW	2,722	111	2,018	0	8,311	332	13,494
	SW	0	0	224	0	4,351	775	5,350
2014	GW	2,754	111	1,351	0	16,476	319	21,011
	SW	0	0	150	0	2,640	745	3,535
2013	GW	2,935	111	127	0	23,875	304	27,352
	SW	0	0	14	0	3,518	710	4,242
2012	GW	3,299	111	24	0	26,456	320	30,210
	SW	0	0	2	0	4,363	746	5,111
2011	GW	3,549	111	248	0	22,182	579	26,669
	SW	0	0	15	0	7,413	1,350	8,778
2010	GW	2,974	117	17	0	18,749	563	22,420
	SW	0	0	1	0	8,350	1,314	9,665
2009	GW	2,978	117	42	0	22,893	356	26,386
	SW	0	0	2	0	4,695	830	5,527
2008	GW	2,763	117	66	0	15,567	392	18,905
	SW	0	0	4	0	6,868	914	7,786
2007	GW	2,550	117	0	0	5,758	489	8,914
	SW	0	0	0	0	15,313	1,141	16,454
2006	GW	2,877	117	0	0	22,065	505	25,564
	SW	0	0	0	0	2,435	1,178	3,613
2005	GW	2,791	117	0	0	17,060	520	20,488
	SW	0	0	0	0	6,612	1,215	7,827
2004	GW	2,519	117	0	0	20,665	589	23,890
	SW	0	0	0	0	6,106	885	6,991
2003	GW	2,561	172	0	0	15,308	613	18,654
	SW	0	0	0	0	2,860	921	3,781
2002	GW	2,657	147	0	0	9,591	551	12,946
	SW	0	0	0	0	2,250	826	3,076
2001	GW	2,592	144	0	0	8,705	536	11,977
	SW	0	0	0	0	2,042	804	2,846
2000	GW	2,716	150	0	0	14,845	569	18,280
	SW	0	0	0	0	3,394	853	4,247

MILAM COUNTY

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2015	GW	2,866	0	2	8,968	4,981	766	17,583
	SW	1,356	0	0	12,105	284	1,788	15,533
2014	GW	3,103	0	25	11,747	5,883	745	21,503
	SW	1,327	0	3	12,962	522	1,739	16,553
2013	GW	3,307	0	139	9,800	6,085	746	20,077
	SW	1,340	0	3	17,712	615	1,740	21,410
2012	GW	6,982	0	259	0	8,844	826	16,911
	SW	7,872	12	2	19,273	446	1,928	29,533
2011	GW	4,228	0	32	13,716	5,273	912	24,161
	SW	1,729	12	2	13,034	1,350	2,127	18,254
2010	GW	3,698	0	15	12,653	1,920	912	19,198
	SW	1,450	12	1	19,601	1,574	2,128	24,766
2009	GW	3,536	11,206	0	0	2,613	552	17,907
	SW	1,470	8,903	0	0	2,155	1,287	13,815
2008	GW	2,890	11,171	0	0	3,099	538	17,698
	SW	1,557	8,876	0	0	1,782	1,257	13,472
2007	GW	2,603	24,678	0	0	4,210	509	32,000
	SW	1,365	4,482	0	0	3	1,188	7,038
2006	GW	3,298	30,116	0	0	5,655	564	39,633
	SW	1,601	12,568	0	0	492	1,315	15,976
2005	GW	3,268	34,762	0	0	4,752	570	43,352
	SW	1,400	11,177	0	0	860	1,329	14,766
2004	GW	2,399	36,435	0	0	3,589	755	43,178
	SW	1,338	11,607	0	0	1,672	1,132	15,749
2003	GW	3,073	36,329	0	0	4,469	756	44,627
	SW	1,655	15,166	0	0	756	1,134	18,711
2002	GW	2,912	35,496	0	0	900	743	40,051
	SW	1,655	12,861	0	0	1,827	1,114	17,457
2001	GW	2,924	31,903	0	0	787	719	36,333
	SW	1,816	12,625	0	0	1,597	1,078	17,116
2000	GW	3,164	31,968	0	0	779	712	36,623
	SW	1,916	14,447	0	0	1,613	1,068	19,044

Projected Surface Water Supplies
TWDB 2017 State Water Plan Data

BURLESON COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
G	LIVESTOCK, BURLESON	BRAZOS	BRAZOS LIVESTOCK LOCAL SUPPLY	1,508	1,508	1,508	1,508	1,508	1,508
	Sum of Projected Surface Water Supplies (acre-feet)			**1,508**	**1,508**	**1,508**	**1,508**	**1,508**	**1,508**

MILAM COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
G	BELL-MILAM FALLS WSC	BRAZOS	BRAZOS RIVER AUTHORITY LITTLE RIVER LAKE/RESERVOIR SYSTEM	352	349	343	342	336	329
G	BUCKHOLTS	BRAZOS	BRAZOS RIVER AUTHORITY LITTLE RIVER LAKE/RESERVOIR SYSTEM	122	122	122	122	122	122
G	CAMERON	BRAZOS	BRAZOS RUN-OF-RIVER	2,615	2,615	2,615	2,615	2,615	2,615
G	COUNTY-OTHER, MILAM	BRAZOS	BRAZOS RIVER AUTHORITY LITTLE RIVER LAKE/RESERVOIR SYSTEM	793	793	793	793	793	793
G	COUNTY-OTHER, MILAM	BRAZOS	BRAZOS RUN-OF-RIVER	163	163	163	163	163	163
G	IRRIGATION, MILAM	BRAZOS	BRAZOS RUN-OF-RIVER	42	42	42	42	42	42
G	LIVESTOCK, MILAM	BRAZOS	BRAZOS LIVESTOCK LOCAL SUPPLY	1,822	1,822	1,822	1,822	1,822	1,822
G	MANUFACTURING, MILAM	BRAZOS	BRAZOS RUN-OF-RIVER	14	14	14	14	14	14
G	STEAM ELECTRIC POWER, MILAM	BRAZOS	ALCOA LAKE/RESERVOIR	14,000	14,000	14,000	14,000	14,000	14,000
G	STEAM ELECTRIC POWER, MILAM	BRAZOS	BRAZOS RIVER AUTHORITY LITTLE RIVER LAKE/RESERVOIR SYSTEM	2,683	4,329	4,352	4,673	4,609	4,508
G	STEAM ELECTRIC POWER, MILAM	BRAZOS	BRAZOS RUN-OF-RIVER	650	650	650	650	650	650
	Sum of Projected Surface Water Supplies (acre-feet)			**23,256**	**24,899**	**24,916**	**25,236**	**25,166**	**25,058**

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.

BURLESON COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
G	CALDWELL	BRAZOS	1,027	1,043	1,073	1,073	1,091	1,108
G	COUNTY-OTHER, BURLESON	BRAZOS	615	673	703	771	809	841
G	DEANVILLE WSC	BRAZOS	465	471	490	487	493	499
G	IRRIGATION, BURLESON	BRAZOS	22,855	21,904	21,057	20,115	19,216	18,469
G	LIVESTOCK, BURLESON	BRAZOS	1,508	1,508	1,508	1,508	1,508	1,508
G	MANUFACTURING, BURLESON	BRAZOS	139	161	183	203	221	241
G	MILANO WSC	BRAZOS	212	220	224	231	237	243
G	MINING, BURLESON	BRAZOS	995	1,923	1,512	1,100	686	428
G	SNOOK	BRAZOS	184	195	201	209	216	221
G	SOMERVILLE	BRAZOS	266	277	285	296	305	313
G	SOUTHWEST MILAM WSC	BRAZOS	129	135	138	143	147	151
	Sum of Projected Water Demands (acre-feet)		**28,395**	**28,510**	**27,374**	**26,136**	**24,929**	**24,022**

MILAM COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
G	BELL-MILAM FALLS WSC	BRAZOS	255	264	269	279	290	300
G	BUCKHOLTS	BRAZOS	68	70	71	73	76	79
G	CAMERON	BRAZOS	1,359	1,409	1,441	1,500	1,556	1,612
G	COUNTY-OTHER, MILAM	BRAZOS	300	313	324	339	351	364
G	IRRIGATION, MILAM	BRAZOS	5,081	5,040	4,995	4,956	4,915	4,875
G	LIVESTOCK, MILAM	BRAZOS	1,822	1,822	1,822	1,822	1,822	1,822
G	MANUFACTURING, MILAM	BRAZOS	12	12	12	14	14	14
G	MILANO WSC	BRAZOS	220	225	228	236	244	253
G	MINING, MILAM	BRAZOS	14	14	14	14	14	14
G	ROCKDALE	BRAZOS	1,159	1,198	1,222	1,269	1,317	1,364
G	SOUTHWEST MILAM WSC	BRAZOS	1,021	1,055	1,078	1,121	1,163	1,204
G	STEAM ELECTRIC POWER, MILAM	BRAZOS	32,023	32,023	32,023	40,989	40,989	40,989
G	THORNDALE	BRAZOS	184	188	190	197	204	211
	Sum of Projected Water Demands (acre-feet)		**43,518**	**43,633**	**43,689**	**52,809**	**52,955**	**53,101**

Projected Water Supply Needs
TWDB 2017 State Water Plan Data

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

BURLESON COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
G	CALDWELL	BRAZOS	1,325	1,309	1,279	1,279	1,261	1,244
G	COUNTY-OTHER, BURLESON	BRAZOS	258	200	170	102	64	32
G	DEANVILLE WSC	BRAZOS	236	230	211	214	208	202
G	IRRIGATION, BURLESON	BRAZOS	107	1,058	1,905	2,847	3,746	4,493
G	LIVESTOCK, BURLESON	BRAZOS	0	0	0	0	0	0
G	MANUFACTURING, BURLESON	BRAZOS	0	-22	-44	-64	-82	-102
G	MILANO WSC	BRAZOS	38	14	8	1	4	2
G	MINING, BURLESON	BRAZOS	-995	-1,923	-1,512	-1,100	-686	-428
G	SNOOK	BRAZOS	291	280	274	266	259	254
G	SOMERVILLE	BRAZOS	625	614	606	595	586	578
G	SOUTHWEST MILAM WSC	BRAZOS	76	49	16	24	20	7
	Sum of Projected Water Supply Needs (acre-feet)		**-995**	**-1,945**	**-1,556**	**-1,164**	**-768**	**-530**

MILAM COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
G	BELL-MILAM FALLS WSC	BRAZOS	528	513	494	482	458	432
G	BUCKHOLTS	BRAZOS	176	174	173	171	168	165
G	CAMERON	BRAZOS	1,256	1,206	1,174	1,115	1,059	1,003
G	COUNTY-OTHER, MILAM	BRAZOS	656	643	632	617	605	592
G	IRRIGATION, MILAM	BRAZOS	317	206	13	267	400	440
G	LIVESTOCK, MILAM	BRAZOS	0	0	0	0	0	0
G	MANUFACTURING, MILAM	BRAZOS	2	2	2	0	0	0
G	MILANO WSC	BRAZOS	40	15	9	1	5	2
G	MINING, MILAM	BRAZOS	0	0	0	0	0	0
G	ROCKDALE	BRAZOS	841	662	174	320	355	308
G	SOUTHWEST MILAM WSC	BRAZOS	604	388	124	186	151	57
G	STEAM ELECTRIC POWER, MILAM	BRAZOS	1,096	-35	-78	-7,222	-6,646	-6,757
G	THORNDALE	BRAZOS	45	41	39	32	25	18
	Sum of Projected Water Supply Needs (acre-feet)		**0**	**-35**	**-78**	**-7,222**	**-6,646**	**-6,757**

Projected Water Management Strategies
TWDB 2017 State Water Plan Data

BURLESON COUNTY

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
CALDWELL, BRAZOS (G)							
MUNICIPAL WATER CONSERVATION (SUBURBAN) - CALDWELL	DEMAND REDUCTION [BURLESON]	40	121	203	240	242	246
		40	**121**	**203**	**240**	**242**	**246**
MANUFACTURING, BURLESON, BRAZOS (G)							
INDUSTRIAL WATER CONSERVATION	DEMAND REDUCTION [BURLESON]	4	8	13	14	15	17
SPARTA AQUIFER DEVELOPMENT	SPARTA AQUIFER [BURLESON]	0	50	50	50	85	85
		4	**58**	**63**	**64**	**100**	**102**
MINING, BURLESON, BRAZOS (G)							
INDUSTRIAL WATER CONSERVATION	DEMAND REDUCTION [BURLESON]	30	96	106	77	48	30
SPARTA AQUIFER DEVELOPMENT	SPARTA AQUIFER [BURLESON]	740	740	740	740	740	740
		770	**836**	**846**	**817**	**788**	**770**
SNOOK, BRAZOS (G)							
MUNICIPAL WATER CONSERVATION (RURAL) - SNOOK	DEMAND REDUCTION [BURLESON]	11	26	42	59	76	91
		11	**26**	**42**	**59**	**76**	**91**
SOMERVILLE, BRAZOS (G)							
MUNICIPAL WATER CONSERVATION (SUBURBAN) - SOMERVILLE	DEMAND REDUCTION [BURLESON]	8	26	23	23	23	24
		8	**26**	**23**	**23**	**23**	**24**
SOUTHWEST MILAM WSC, BRAZOS (G)							
MUNICIPAL WATER CONSERVATION (RURAL) - SOUTHWEST MILAM WSC	DEMAND REDUCTION [BURLESON]	3	0	0	0	0	0
		3	**0**	**0**	**0**	**0**	**0**
Sum of Projected Water Management Strategies (acre-feet)		**836**	**1,067**	**1,177**	**1,203**	**1,229**	**1,233**

MILAM COUNTY

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

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
CAMERON, BRAZOS (G)							
MUNICIPAL WATER CONSERVATION (RURAL) - CAMERON	DEMAND REDUCTION [MILAM]	58	163	269	389	448	464

		58	**163**	**269**	**389**	**448**	**464**
ROCKDALE, BRAZOS (G)							
MUNICIPAL WATER CONSERVATION (RURAL) - ROCKDALE	DEMAND REDUCTION [MILAM]	43	128	198	195	200	207
		43	**128**	**198**	**195**	**200**	**207**
SOUTHWEST MILAM WSC, BRAZOS (G)							
MUNICIPAL WATER CONSERVATION (RURAL) - SOUTHWEST MILAM WSC	DEMAND REDUCTION [MILAM]	22	1	0	0	0	0
		22	**1**	**0**	**0**	**0**	**0**
STEAM ELECTRIC POWER, MILAM, BRAZOS (G)							
INDUSTRIAL WATER CONSERVATION	DEMAND REDUCTION [MILAM]	0	1,601	2,869	2,869	2,869	2,869
LITTLE RIVER OCR	LITTLE RIVER OFF-CHANNEL LAKE/RESERVOIR [RESERVOIR]	0	0	0	4,353	4,000	4,000
		0	**1,601**	**2,869**	**7,222**	**6,869**	**6,869**
Sum of Projected Water Management Strategies (acre-feet)		**123**	**1,893**	**3,336**	**7,806**	**7,517**	**7,540**

GAM Run 16-015: Post Oak Savannah Groundwater Conservation District Groundwater Management Plan

Natalie Ballew, GIT
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Department
512-463-2779
August 31, 2017

Cynthia K. Ridgeway is the Manager of the Groundwater Availability Modeling Section and is responsible for oversight of work performed by Natalie Ballew under her direct supervision. The seal appearing on this document was authorized by Cynthia K. Ridgeway, P.G. 471 on August 31, 2017.

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GAM RUN 16-015: POST OAK SAVANNAH GROUNDWATER CONSERVATION DISTRICT GROUNDWATER MANAGEMENT PLAN

Natalie Ballew, GIT
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Department
512-463-2779
August 31, 2017

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 Post Oak Savannah 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 Post Oak Savannah Groundwater Conservation District should be adopted by the district on or before September 18, 2017, and submitted to the Executive Administrator of the TWDB on or before October 18, 2017. The current

management plan for the Post Oak Savannah Groundwater Conservation District expires on December 17, 2017.

We used four groundwater availability models to estimate the management plan information for the aquifers within the Post Oak Savannah Groundwater Conservation District. Information for the Trinity Aquifer is from version 2.01 of the groundwater availability model for the northern portion of the Trinity and Woodbine aquifers (Kelley and others, 2014). Information for the Carrizo-Wilcox, Queen City, and Sparta aquifers is from version 2.02 of the groundwater availability model for the central part of the Carrizo-Wilcox, Queen City, and Sparta aquifers (Kelley and others, 2004). Information for the Yegua-Jackson Aquifer is from version 1.01 of the groundwater availability model for the Yegua-Jackson Aquifer (Deeds and others, 2010). Information for the Brazos River Alluvium Aquifer is from version 1.01 of the groundwater availability model for the Brazos River Alluvium Aquifer (Ewing and Jigmond, 2016).

This report replaces the results of GAM Run 10-029 (Aschenbach, 2011). GAM Run 16-015 meets current standards set after the release of GAM Run 10-029 and includes results from recently released groundwater availability models for the northern portion of the Trinity and Woodbine aquifers (Kelley and others, 2014) and for the Brazos River Alluvium Aquifer (Ewing and Jigmond, 2016). Tables 1 through 6 summarize the groundwater availability model data required by statute and Figures 1 through 6 show the area of the model from which the values in the tables were extracted. If, after review of the figures, the Post Oak Savannah 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 four groundwater availability models mentioned above were used to estimate information for the Post Oak Savannah Groundwater Conservation District management plan. Water budgets were extracted for the historical model periods for the Trinity Aquifer (1980 through 2012), Carrizo-Wilcox, Queen City, and Sparta aquifers (1980 through 1999), Yegua-Jackson Aquifer (1980 through 1997) using ZONEBUDGET Version 3.01 (Harbaugh, 2009). The water budget for the Brazos River Alluvium Aquifer was extracted for the historical model period (1980 through 2012) using ZONEBUDGET-USG (Panday and others, 2013). The average annual water budget values for recharge, surface-water outflow, inflow to the district, and outflow from the district for the aquifers within the district are summarized in this report.

PARAMETERS AND ASSUMPTIONS:

Trinity Aquifer

- We used version 2.01 of the groundwater availability model for the northern portion of the Trinity and Woodbine aquifers. See Kelley and others (2014) for assumptions and limitations of the model.
- The groundwater availability model for the northern portion of the Trinity and Woodbine aquifers contains eight layers: Layer 1 (the surficial outcrop area of the units in layers 2 through 8 and units younger than Woodbine Aquifer), Layer 2 (Woodbine Aquifer and pass-through cells), Layer 3 (Washita and Fredericksburg, Edwards [Balcones Fault Zone], and pass-through cells), and Layers 4 through 8 (Trinity Aquifer).
- The Woodbine Aquifer does not exist within the Post Oak Savannah Groundwater Conservation District; water budgets for this aquifer were not calculated for this report.
- The model was run with MODFLOW-NWT (Niswonger and others, 2011).

Carrizo-Wilcox, Queen City, and Sparta aquifers

- We used version 2.02 of the groundwater availability model for the central part of the Carrizo-Wilcox, Queen City, and Sparta aquifers. See Dutton and others (2003) and Kelley and others (2004) for assumptions and limitations of the groundwater availability model for the central 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 Calvert Bluff Formation (Layer 6), the Simsboro Formation (Layer 7), and the Hooper Formation (Layer 8).
- Individual water budgets for the district were determined for the Sparta Aquifer (Layer 1), the Queen City Aquifer (Layer 3), and the Carrizo-Wilcox Aquifer (Layers 5 through 8, collectively).
- The model was run with MODFLOW-96 (Harbaugh and McDonald, 1996).

Yegua-Jackson Aquifer

- We used version 1.01 of the groundwater availability model for the Yegua-Jackson Aquifer. See Deeds and others (2010) for assumptions and limitations of the groundwater availability model.
- This groundwater availability model includes five layers which represent the outcrop of the Yegua-Jackson Aquifer and younger overlying units—the Catahoula Formation (Layer 1), the upper portion of the Jackson Group (Layer 2), the lower portion of the Jackson Group (Layer 3), the upper portion of the Yegua Group (Layer 4), and the lower portion of the Yegua Group (Layer 5).
- An overall water budget for the district was determined for the Yegua-Jackson Aquifer (Layer 1 through Layer 5, collectively, for the portions of the model that represent the Yegua-Jackson Aquifer).
- The model was run with MODFLOW-2000 (Harbaugh and others, 2000).

Brazos River Alluvium Aquifer

- We used version 1.01 of the groundwater availability model for the Brazos River Alluvium Aquifer released on December 16, 2016. See Ewing and Jigmond (2016) for assumptions and limitations of the model.
- The groundwater availability model for the Brazos River Alluvium Aquifer contains three layers. Layers 1 and 2 represent the Brazos River Alluvium Aquifer and Layer 3 represents the surficial portions of the Carrizo-Wilcox, Queen City, Sparta, Yegua-Jackson, and Gulf Coast aquifers as well as various geologic units of the Cretaceous System.
- Perennial rivers and streams were simulated using the MODFLOW Streamflow-Routing package and ephemeral streams were simulated using the MODFLOW River package. Springs were simulated using the MODFLOW Drain package.
- The model was run with MODFLOW-USG (unstructured grid; Panday and others, 2013).

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 Trinity, Carrizo-Wilcox, Queen City, Sparta, Yegua-Jackson, and Brazos River Alluvium aquifers located within Post Oak Savannah Groundwater Conservation District and averaged over the historical calibration periods, as shown in Tables 1 through 6.

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 through 6. 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 TRINITY AQUIFER FOR POST OAK SAVANNAH 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	Trinity Aquifer	0
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Trinity Aquifer	0
Estimated annual volume of flow into the district within each aquifer in the district	Trinity Aquifer	740
Estimated annual volume of flow out of the district within each aquifer in the district	Trinity Aquifer	382
Estimated net annual volume of flow between each aquifer in the district		NA[1]

[1] Not available because the model assumes a no-flow boundary condition at the base.

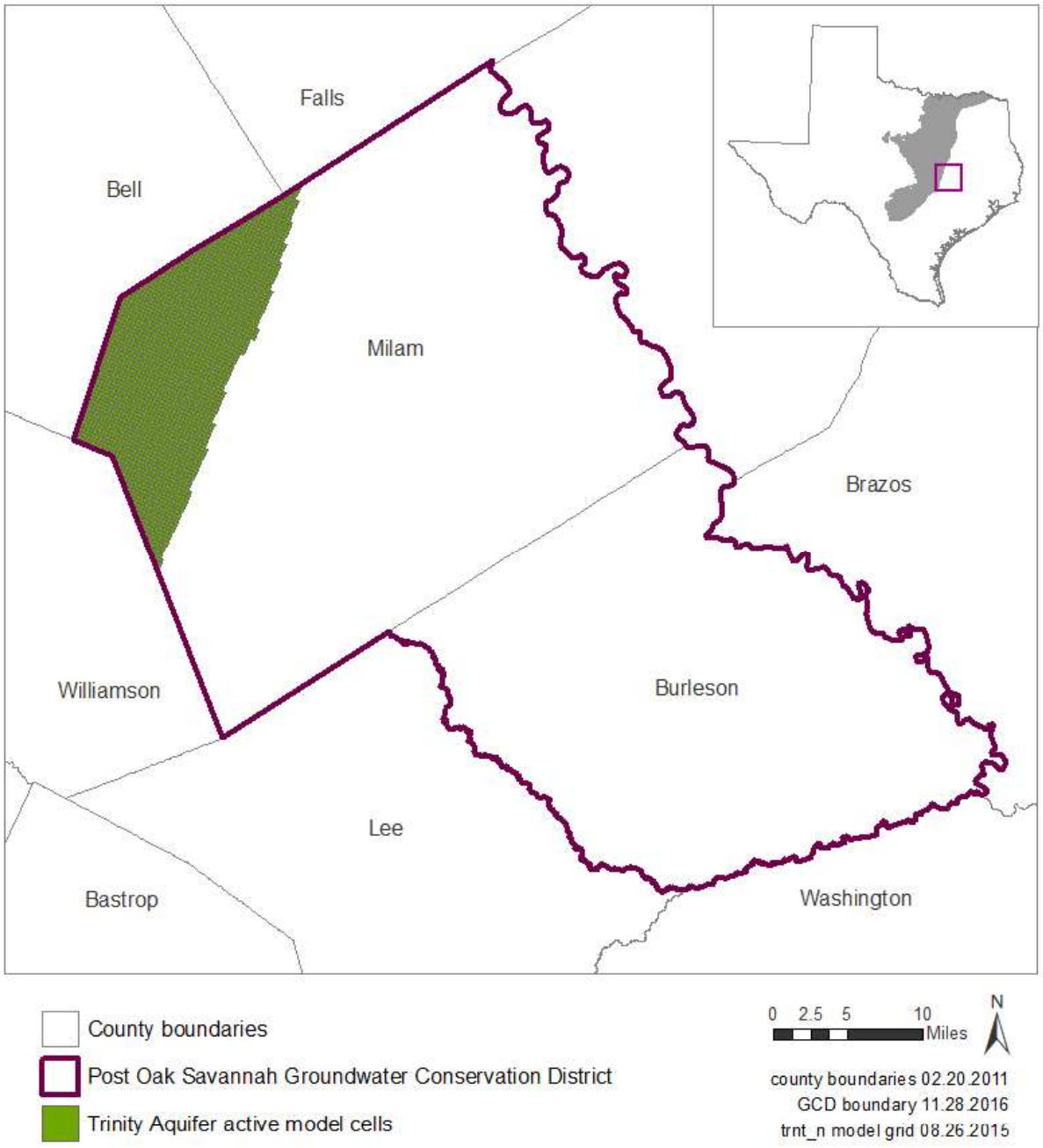

FIGURE 1. AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE TRINITY AQUIFER FROM WHICH THE INFORMATION IN TABLE 1 WAS EXTRACTED (THE AQUIFER SYSTEM EXTENT WITHIN THE DISTRICT BOUNDARY).

TABLE 2. SUMMARIZED INFORMATION FOR THE CARRIZO-WILCOX AQUIFER FOR POST OAK SAVANNAH 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	26,266
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	29,010
Estimated annual volume of flow into the district within each aquifer in the district	Carrizo-Wilcox Aquifer	19,237
Estimated annual volume of flow out of the district within each aquifer in the district	Carrizo-Wilcox Aquifer	25,823
Estimated net annual volume of flow between each aquifer in the district	Carrizo-Wilcox Aquifer into the overlying Reklaw Confining Unit	237

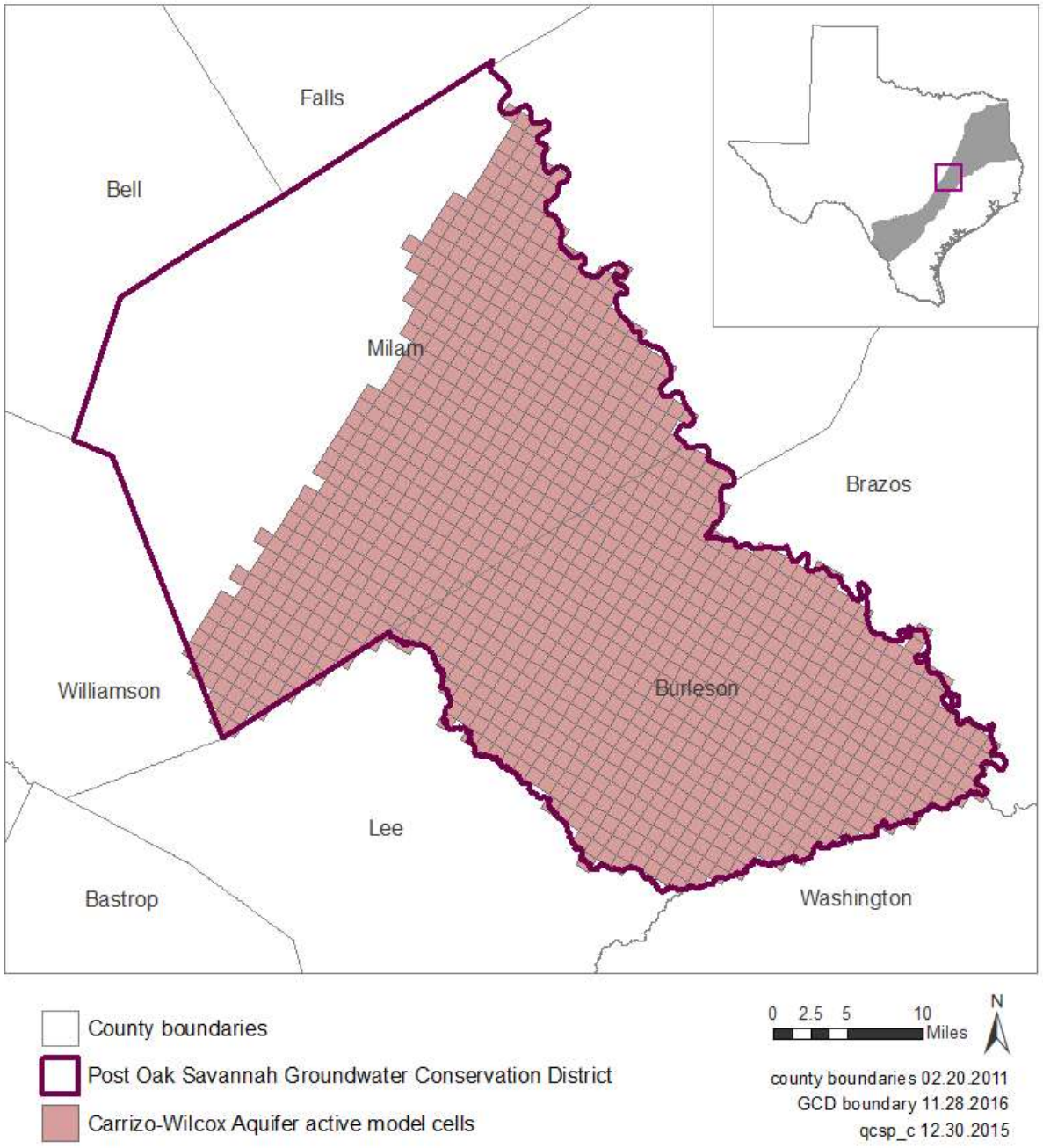

FIGURE 2. AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE CARRIZO-WILCOX AQUIFER FROM WHICH THE INFORMATION IN TABLE 2 WAS EXTRACTED (THE AQUIFER SYSTEM EXTENT WITHIN THE DISTRICT BOUNDARY).

TABLE 3. SUMMARIZED INFORMATION FOR THE QUEEN CITY AQUIFER FOR POST OAK SAVANNAH 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	Queen City Aquifer	8,811
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Queen City Aquifer	12,030
Estimated annual volume of flow into the district within each aquifer in the district	Queen City Aquifer	1,343
Estimated annual volume of flow out of the district within each aquifer in the district	Queen City Aquifer	965
Estimated net annual volume of flow between each aquifer in the district	Queen City Aquifer into the Overlying Weches Confining Unit	1,448
	Reklaw Confining Unit and adjacent underlying areas into the Queen City Aquifer	866

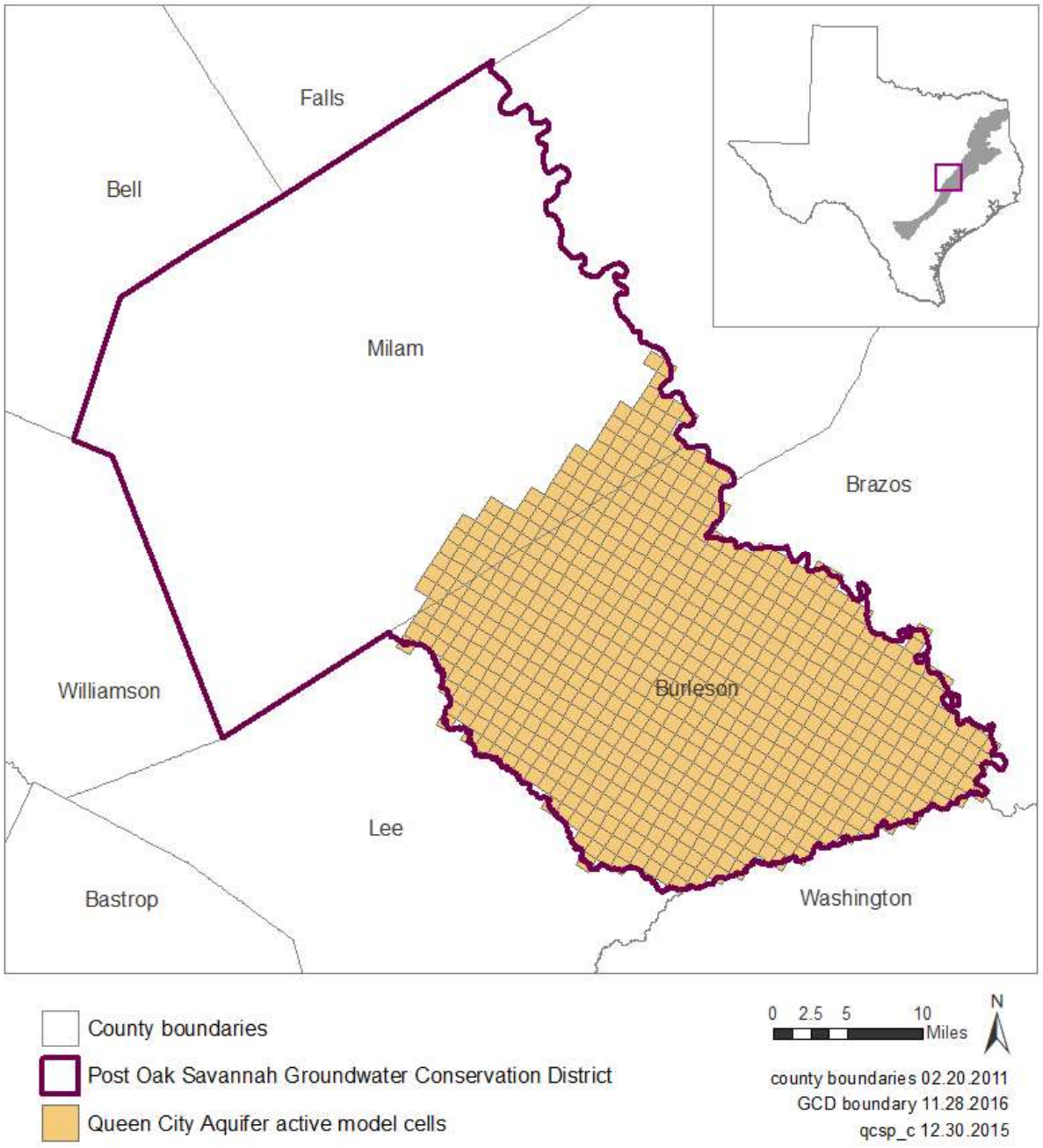

FIGURE 3. AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE QUEEN CITY AQUIFER FROM WHICH THE INFORMATION IN TABLE 3 WAS EXTRACTED (THE AQUIFER SYSTEM EXTENT WITHIN THE DISTRICT BOUNDARY).

TABLE 4. SUMMARIZED INFORMATION FOR THE SPARTA AQUIFER FOR POST OAK SAVANNAH 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	Sparta Aquifer	7,423
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Sparta Aquifer	4,808
Estimated annual volume of flow into the district within each aquifer in the district	Sparta Aquifer	763
Estimated annual volume of flow out of the district within each aquifer in the district	Sparta Aquifer	1,228
Estimated net annual volume of flow between each aquifer in the district	Weches Confining Unit and adjacent underlying areas into the Sparta Aquifer	1,583

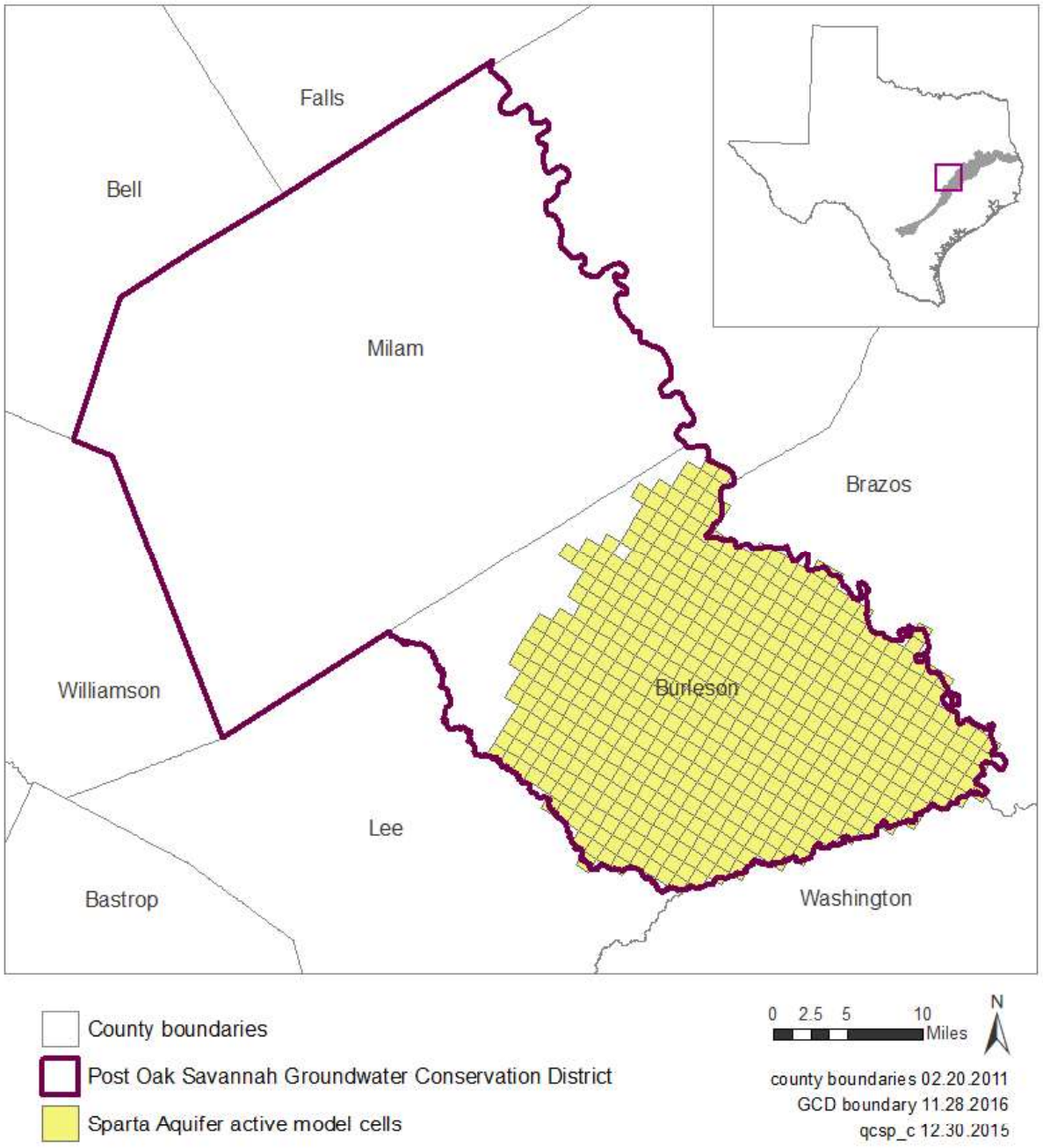

FIGURE 4. AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE SPARTA AQUIFER FROM WHICH THE INFORMATION IN TABLE 4 WAS EXTRACTED (THE AQUIFER SYSTEM EXTENT WITHIN THE DISTRICT BOUNDARY).

TABLE 5. SUMMARIZED INFORMATION FOR THE YEGUA-JACKSON AQUIFER FOR POST OAK SAVANNAH 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	Yegua-Jackson Aquifer	22,459
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Yegua-Jackson Aquifer	13,932
Estimated annual volume of flow into the district within each aquifer in the district	Yegua-Jackson Aquifer	5,087
Estimated annual volume of flow out of the district within each aquifer in the district	Yegua-Jackson Aquifer	8,690
Estimated net annual volume of flow between each aquifer in the district	Yegua-Jackson Aquifer	NA[2]

[2] Not available because the model assumes a no-flow boundary condition at the base.

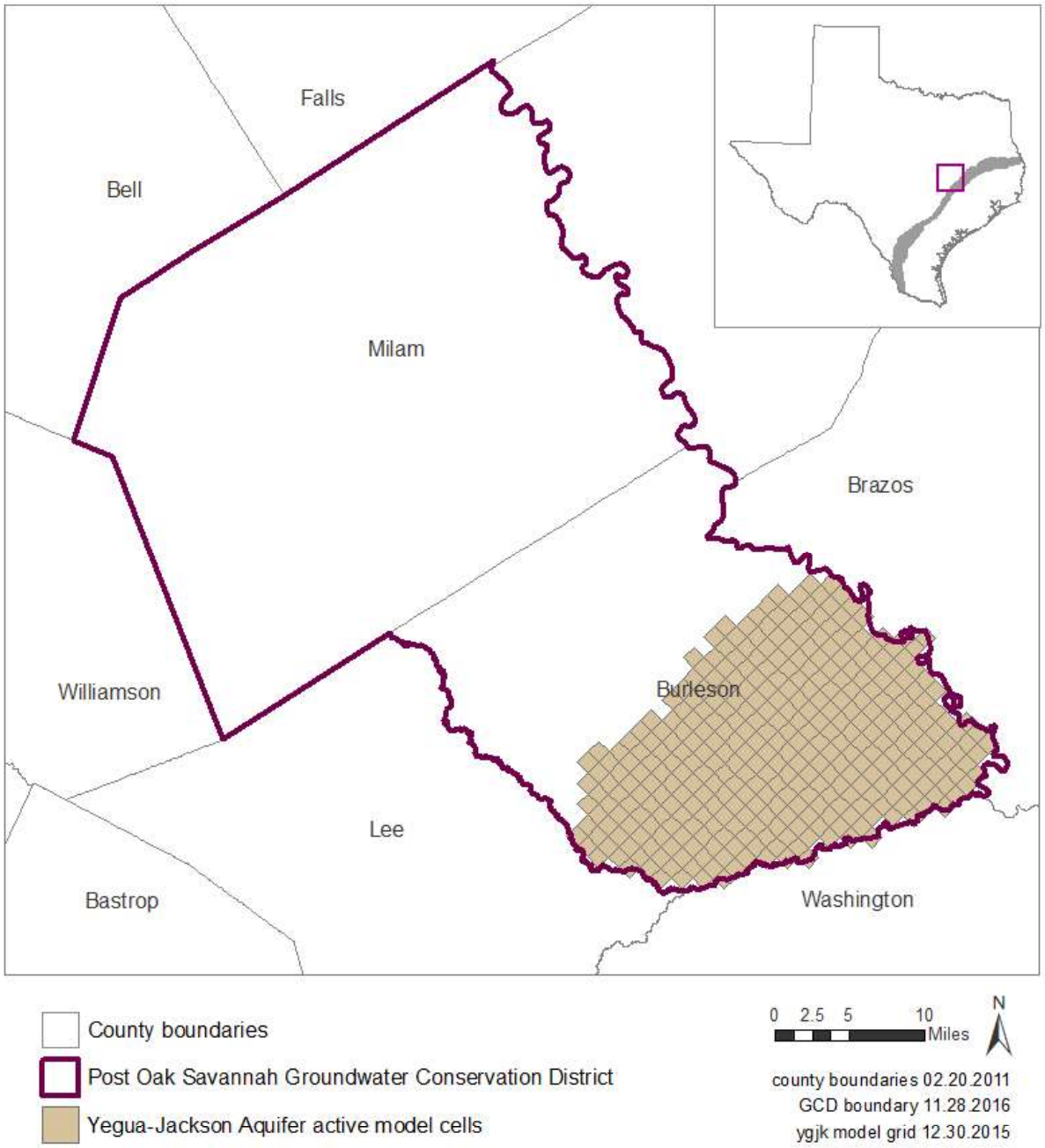

FIGURE 5. AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE YEGUA-JACKSON AQUIFER FROM WHICH THE INFORMATION IN TABLE 5 WAS EXTRACTED (THE AQUIFER SYSTEM EXTENT WITHIN THE DISTRICT BOUNDARY).

TABLE 6. SUMMARIZED INFORMATION FOR THE BRAZOS RIVER ALLUVIUM AQUIFER FOR POST OAK SAVANNAH 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	Brazos River Alluvium Aquifer	15,510
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Brazos River Alluvium Aquifer	25,447
Estimated annual volume of flow into the district within each aquifer in the district	Brazos River Alluvium Aquifer	15,181
Estimated annual volume of flow out of the district within each aquifer in the district	Brazos River Alluvium Aquifer	19,706
Estimated net annual volume of flow between each aquifer in the district	Flow into the Brazos River Alluvium Aquifer from underlying formations and geological units	9,532

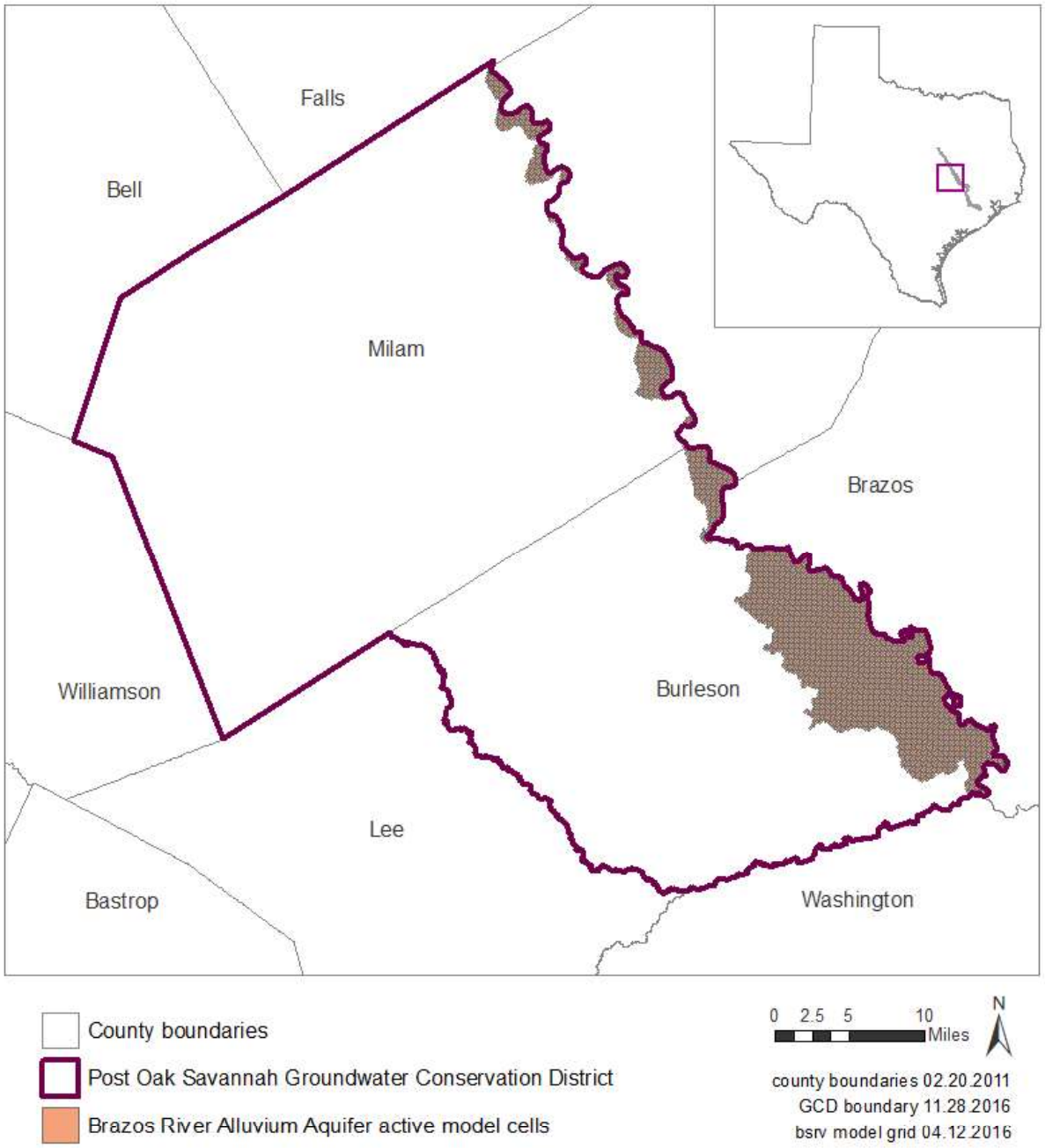

FIGURE 6. AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE BRAZOS RIVER ALLUVIUM AQUIFER FROM WHICH THE INFORMATION IN TABLE 6 WAS EXTRACTED (THE AQUIFER SYSTEM EXTENT WITHIN THE DISTRICT BOUNDARY).

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 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 interaction with streams are specific to particular historic 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. Historic precipitation patterns also need to be placed in context as future climatic conditions, such as dry and wet year precipitation patterns, may differ and affect groundwater flow conditions.

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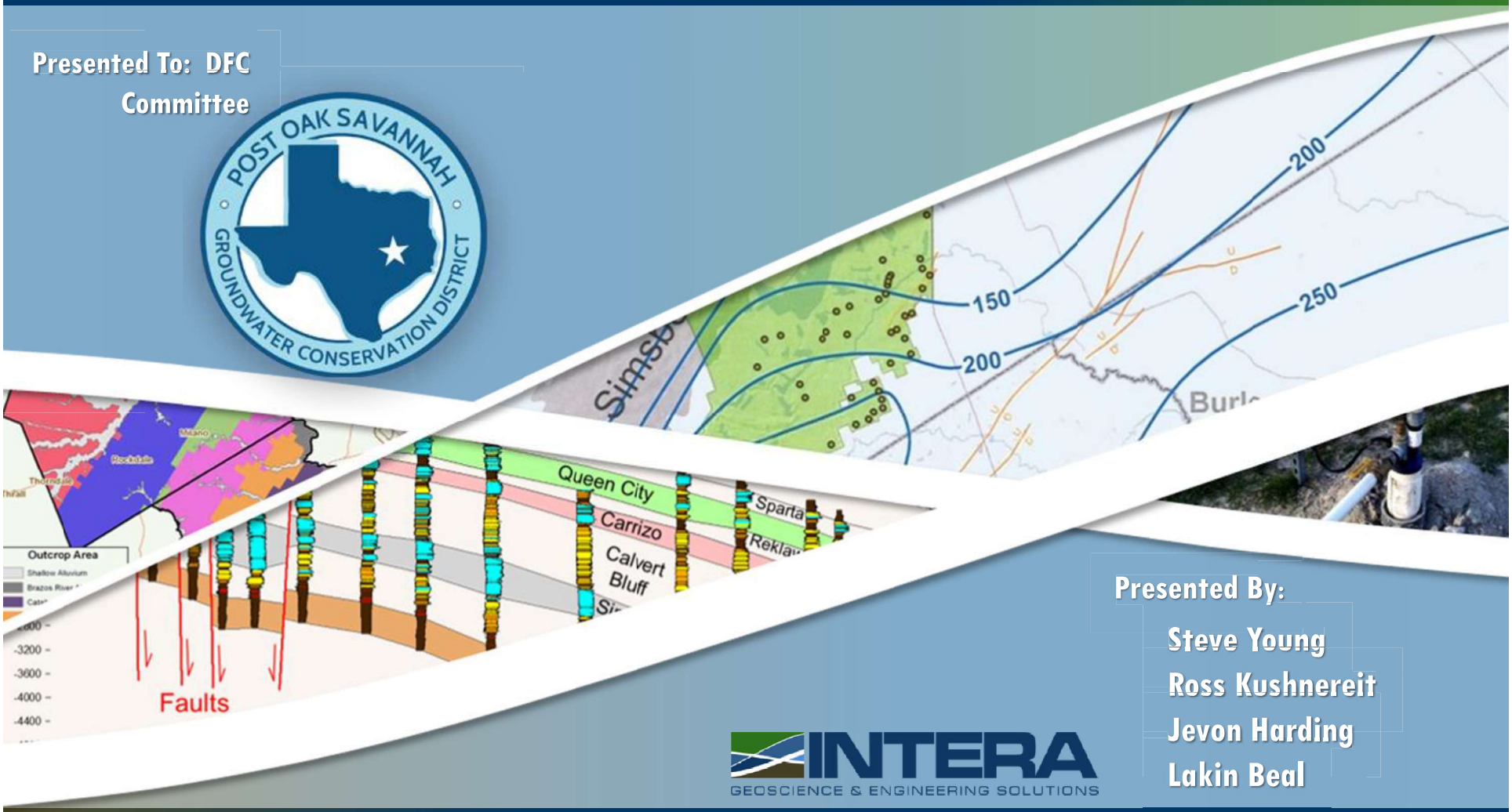
Desired Future Committee Update

Presented To: DFC Committee



Presented By:

Steve Young
Ross Kushnereit
Jevon Harding
Lakin Beal

December 4, 2020

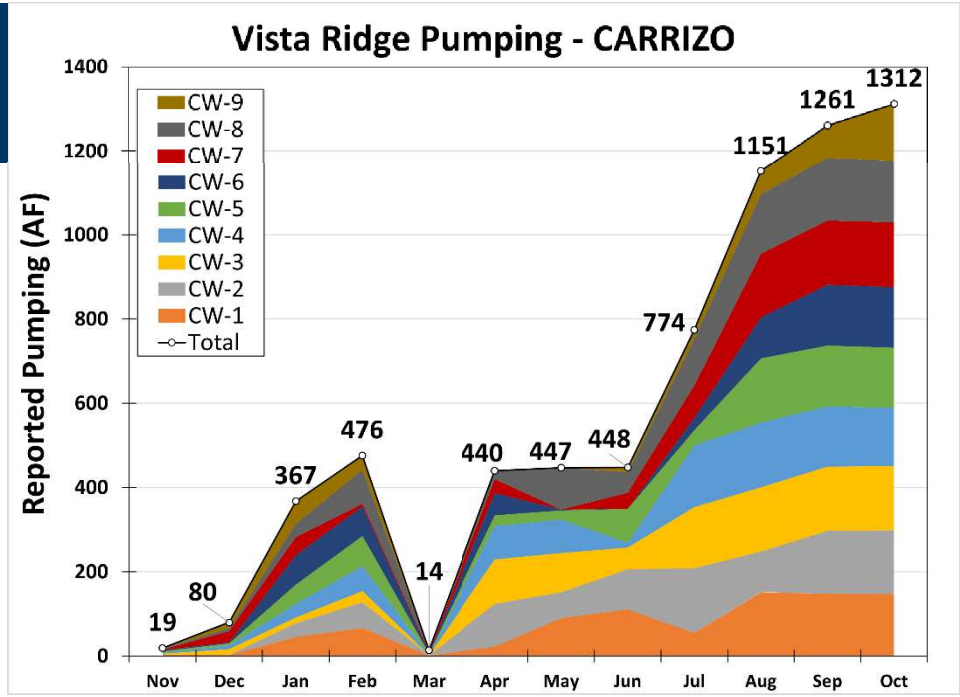
Outline

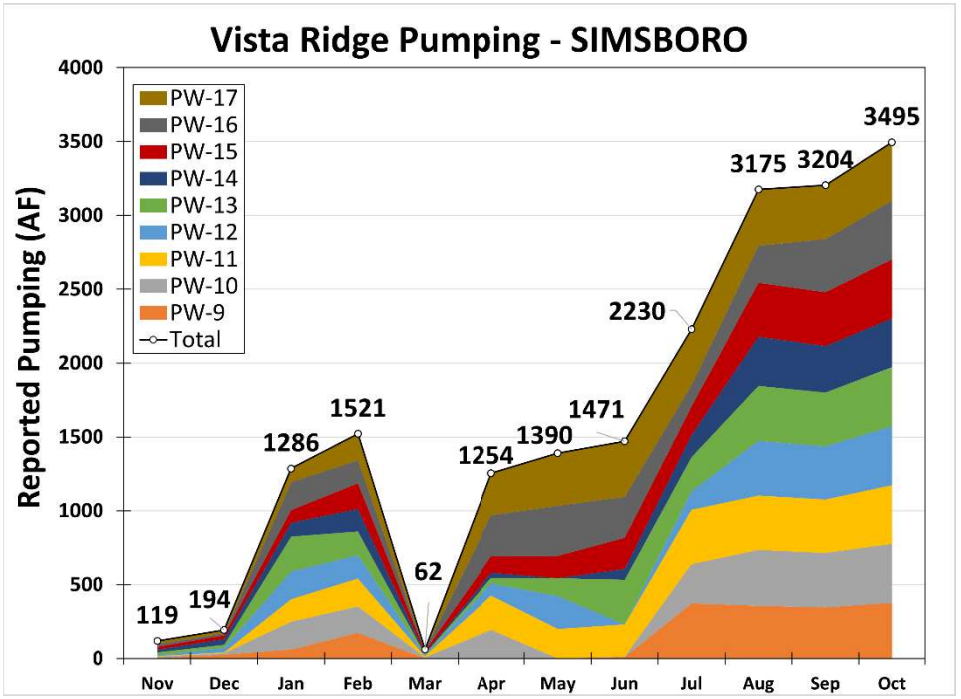
- Vista Ridge Modeling Update
- GWAP Annual Needs Assessment Report
- Compliance for DFCs and PDLs
- Update on Rule 16.4 Thresholds
- Sparta/Queen City/Carrizo-Wilcox GAM Runs and Options for DFC consideration

Vista Ridge Modeling Update

Vista Ridge Pumping Through October 2020

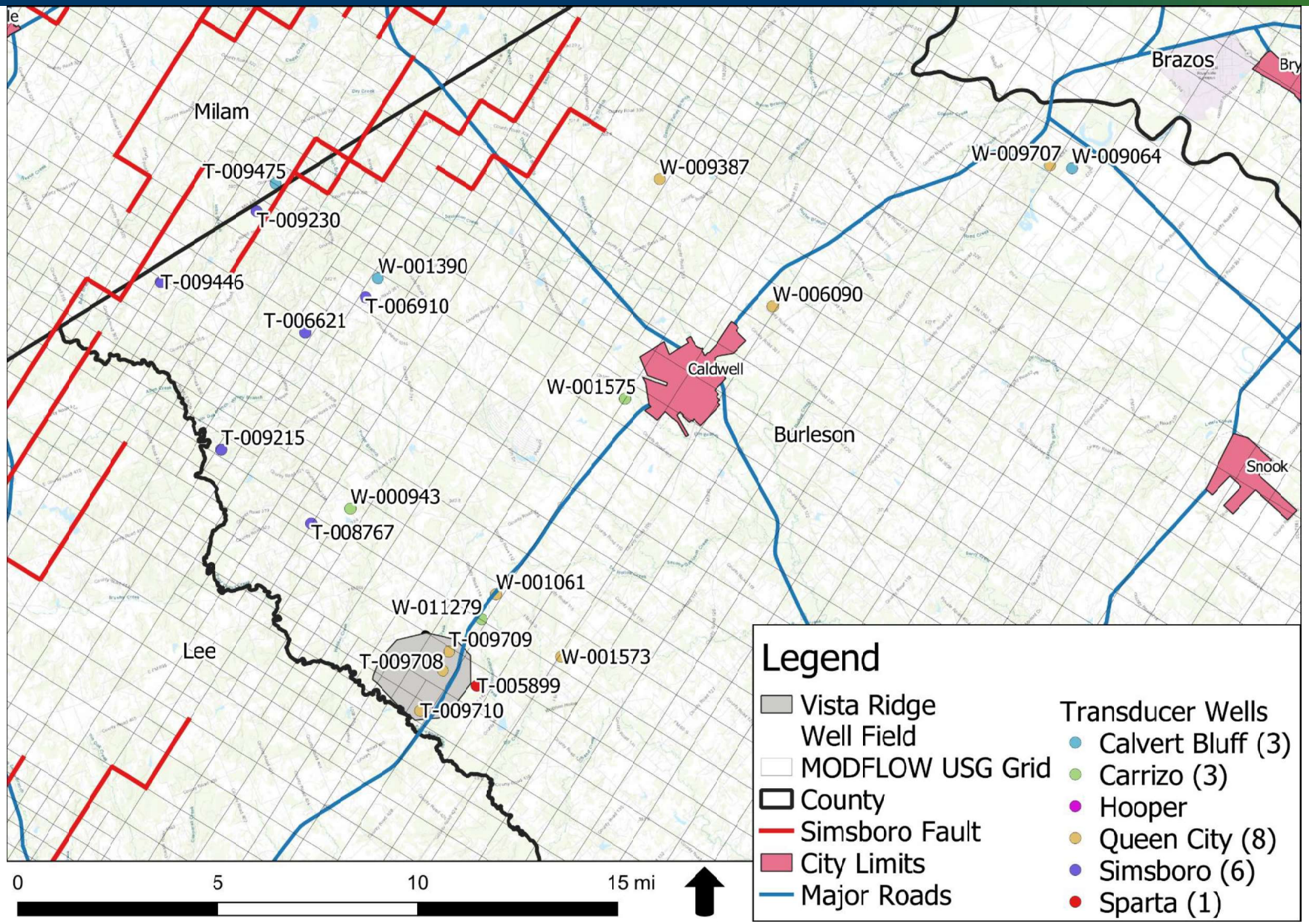
Month	Monthly acre-feet		
	Carrizo	Simsboro	Total
Nov 2019	19	119	138
Dec 2019	80	194	274
Jan 2020	367	1,286	1,653
Feb 2020	476	1,521	1,997
Mar 2020	14	62	76
Apr 2020	440	1,254	1,694
May 2020	447	1,390	1,837
Jun 2020	448	1,471	1,919
Jul 2020	774	2,230	3,004
Aug 2020	1,151	3,175	4,326
Sept 2020	1261	3204	4,464
Oct 2020	1,312	3,495	4,807
Avg. Monthly Permit	1,250	2,994	4,244



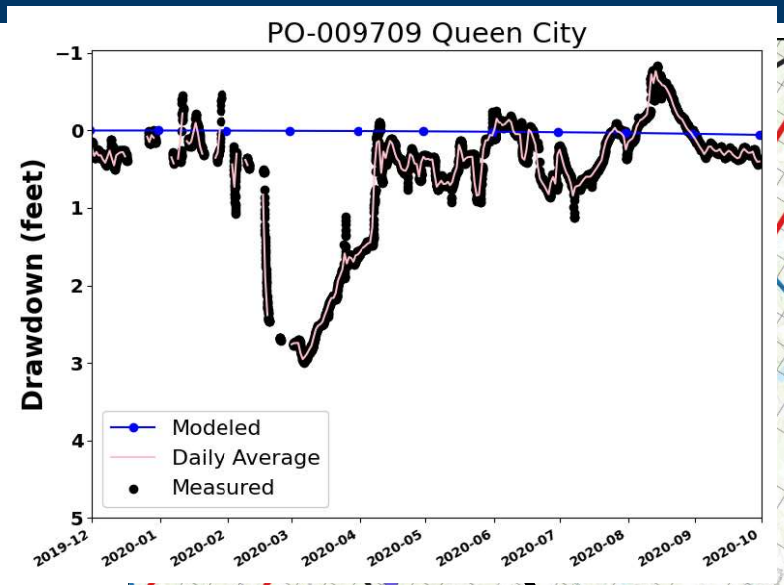


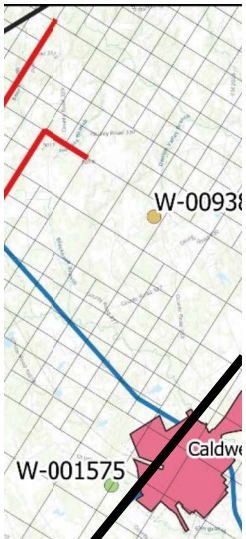
*1000 af/month = 7,428 gpm

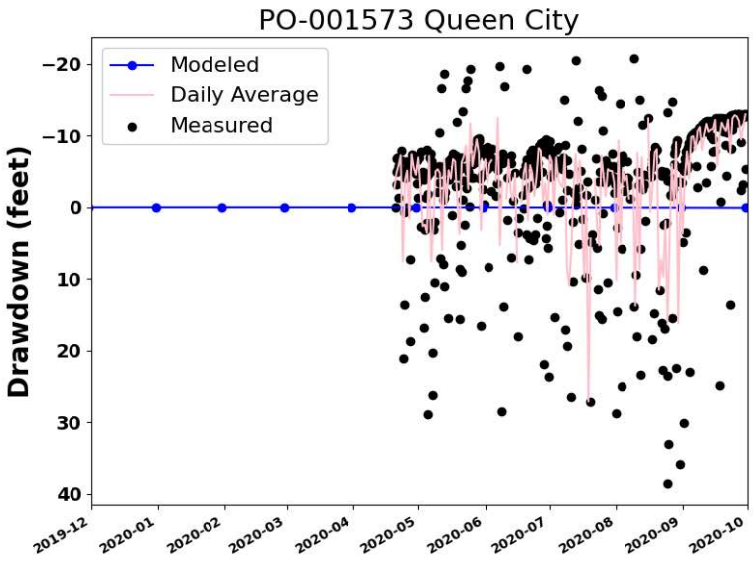
Location of Transducers

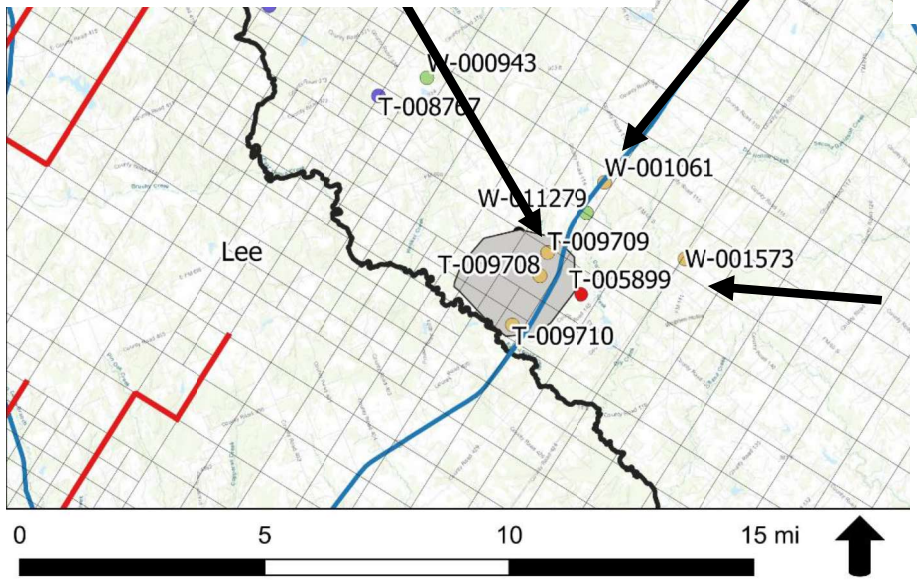


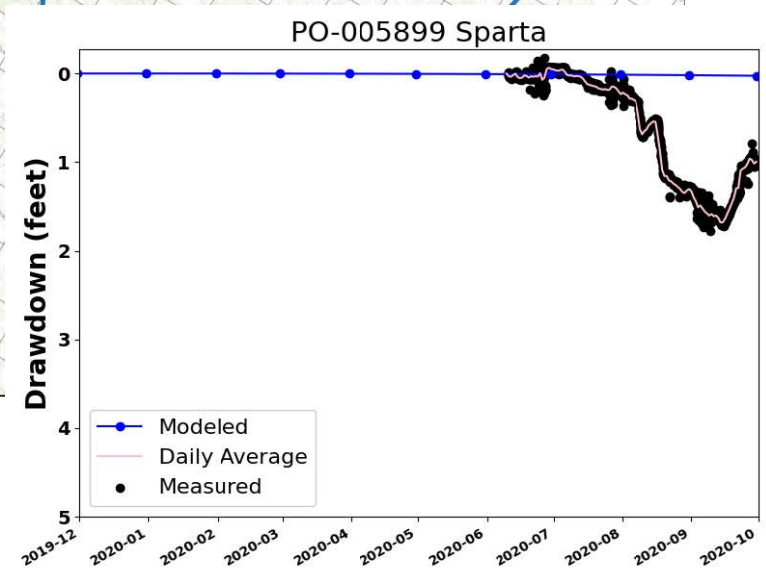
Sparta & Queen City (Dec 2019 to October 2020)



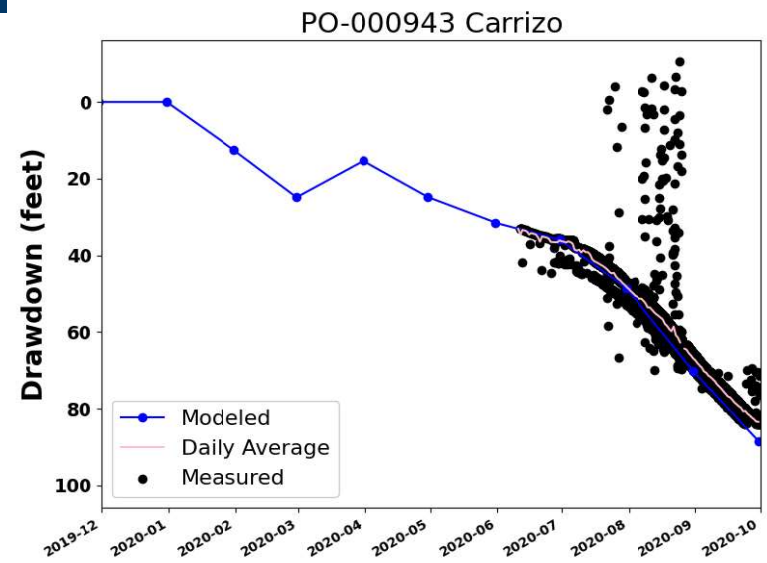


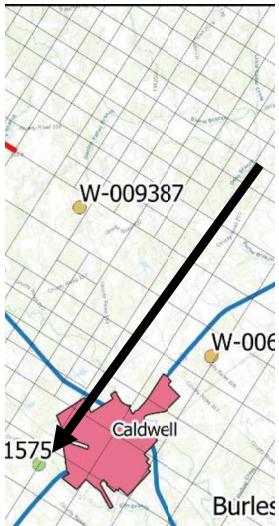


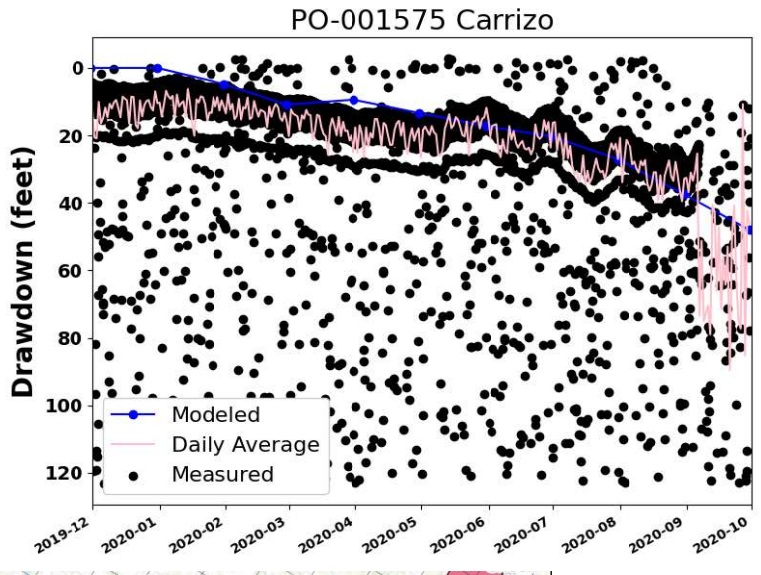


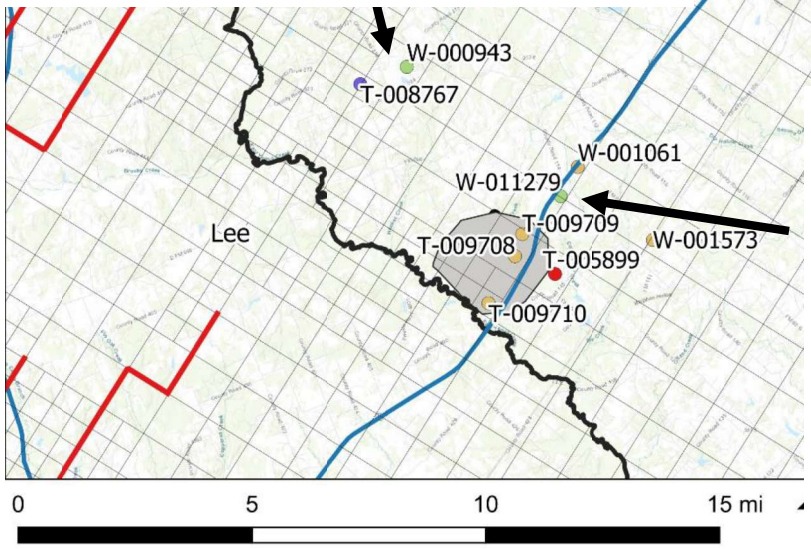


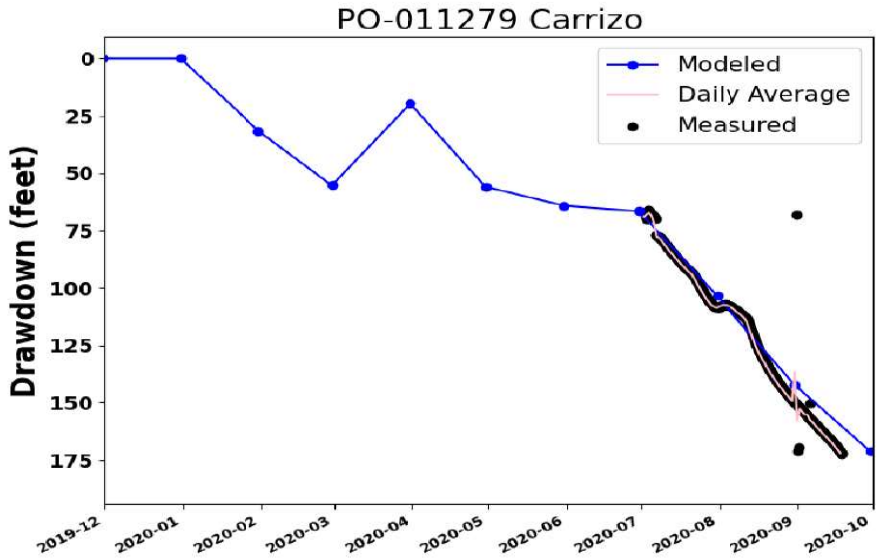
Carrizo (Dec 2019 to October 2020)



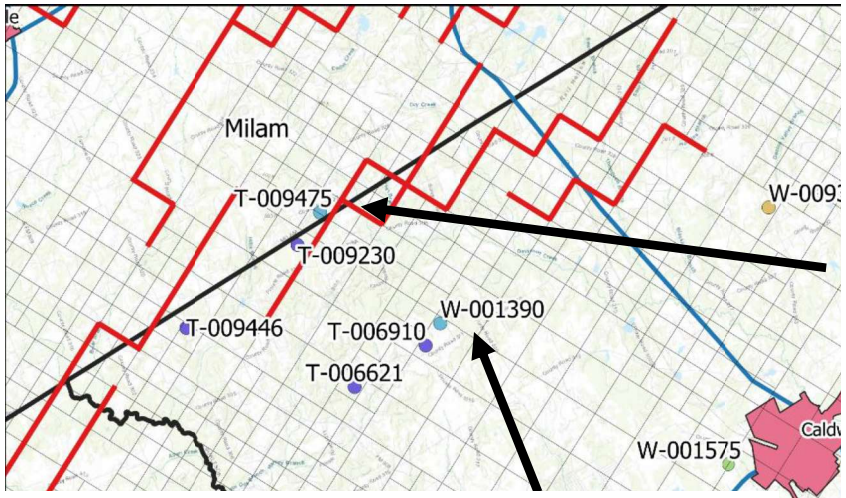


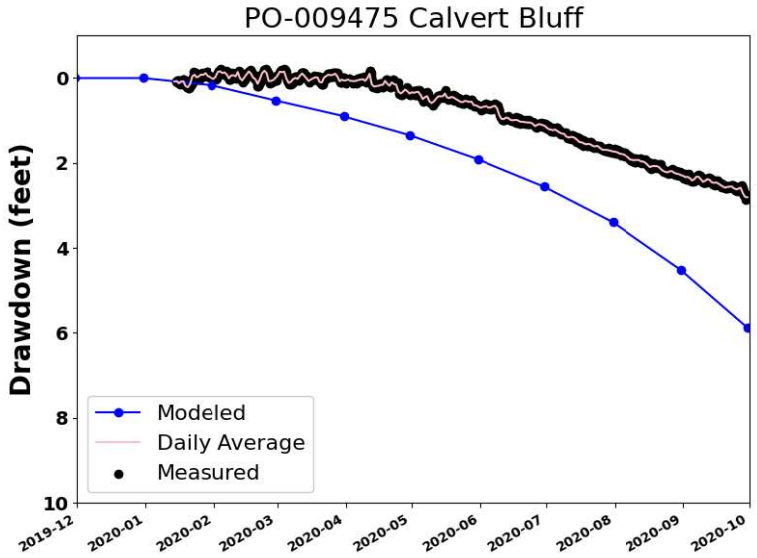


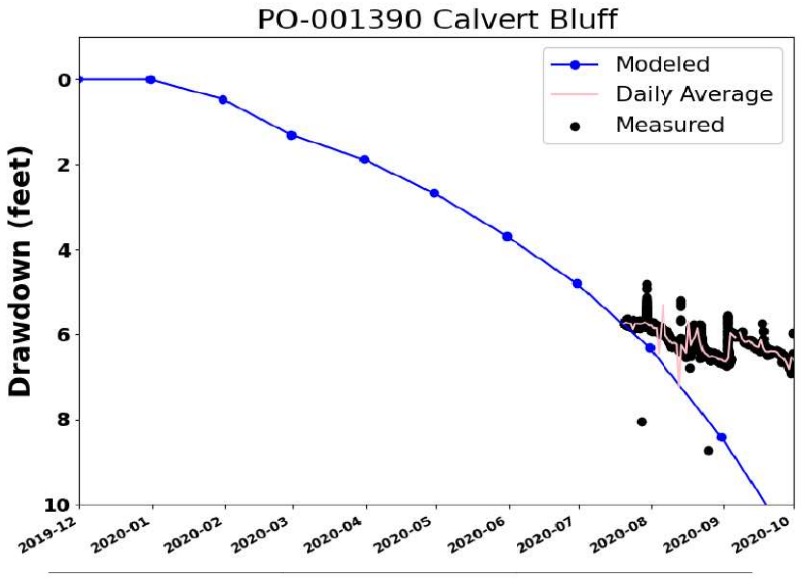


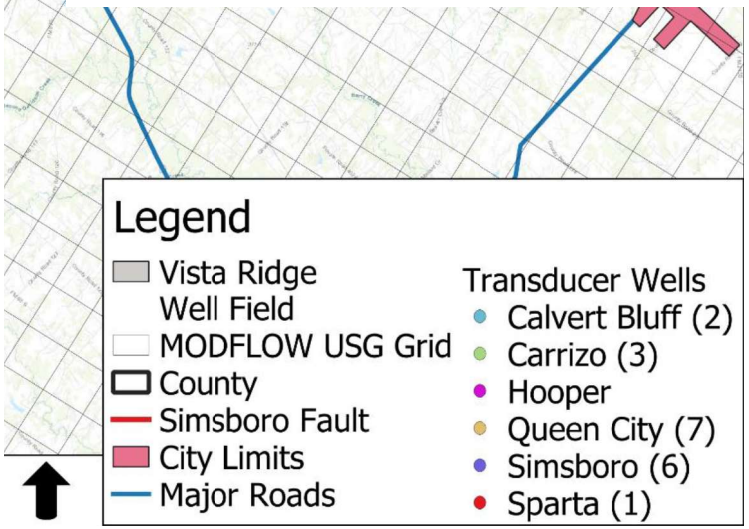


Calvert Bluff (Dec 2019 to October 2020)

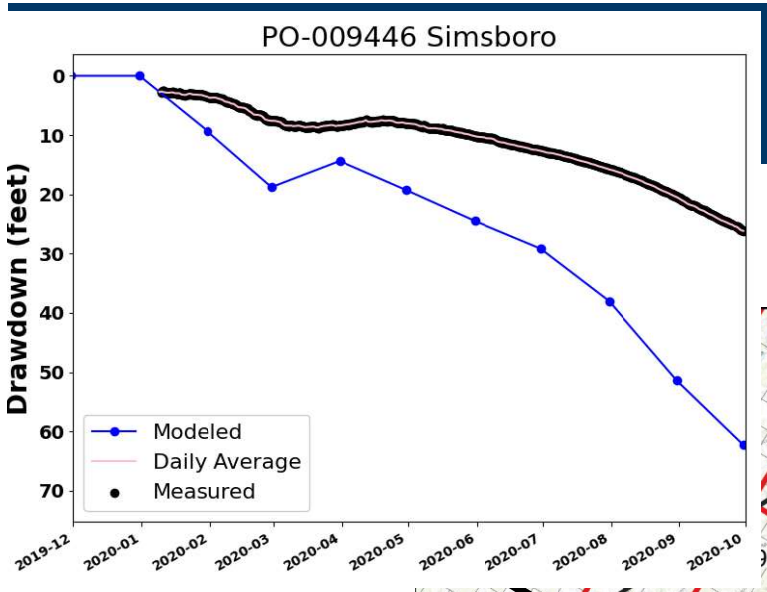


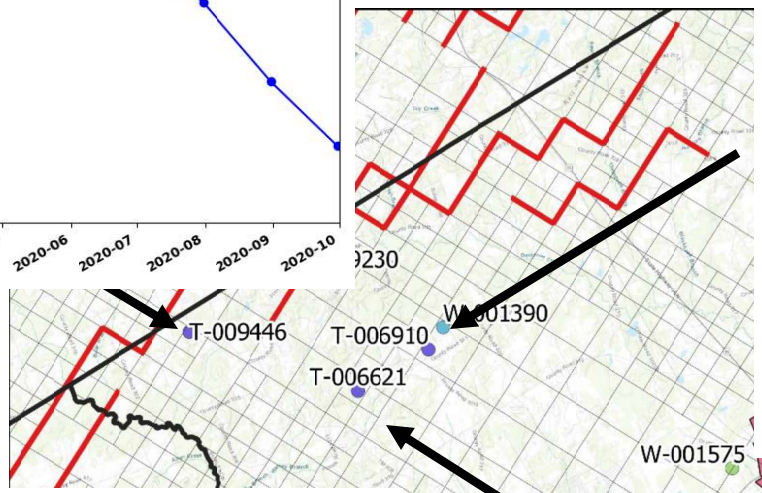


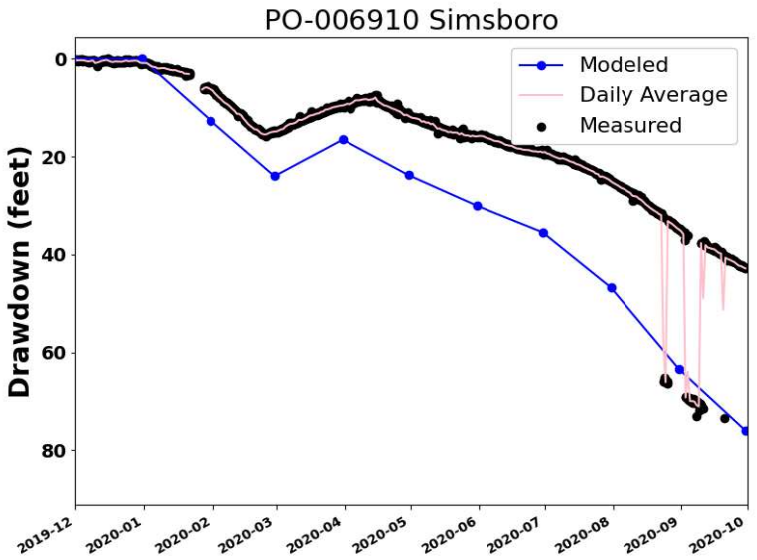


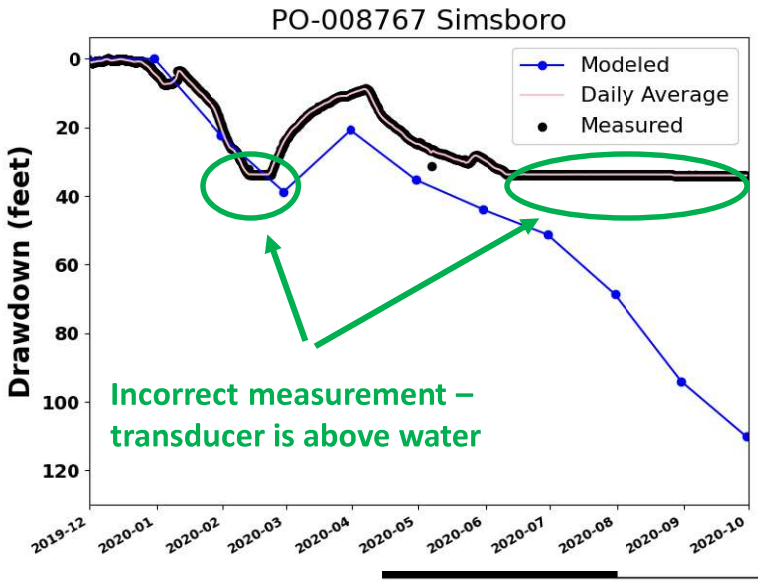


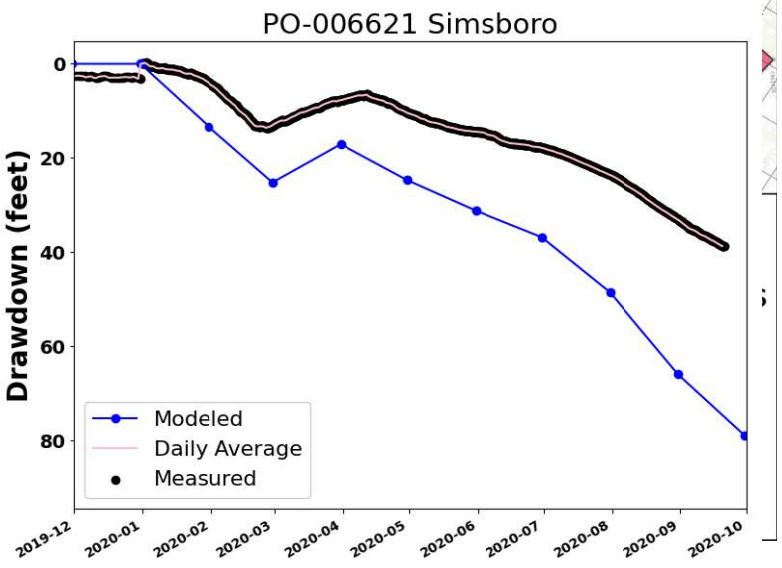
Simsboro (Dec 2019 to October 2020)











Observations

- Measured drawdowns are about the same or less than simulated by groundwater model - - no surprises
- No distinguishable drawdown impacts in Sparta or Queen City attributed to Vista Ridge Production
- Groundwater model simulated drawdowns
  - similar in magnitude than measured values in Carrizo Aquifer
  - greater in magnitude than measured values in Simsboro Aquifer
- Assumptions for groundwater model simulations
  - Monthly time step
  - Only considers pumping from Vista Ridge wells

GWAP Annual Needs Assessment(GANA) Report

GWAP Annual Needs Assessment(GANA) Report

GANA

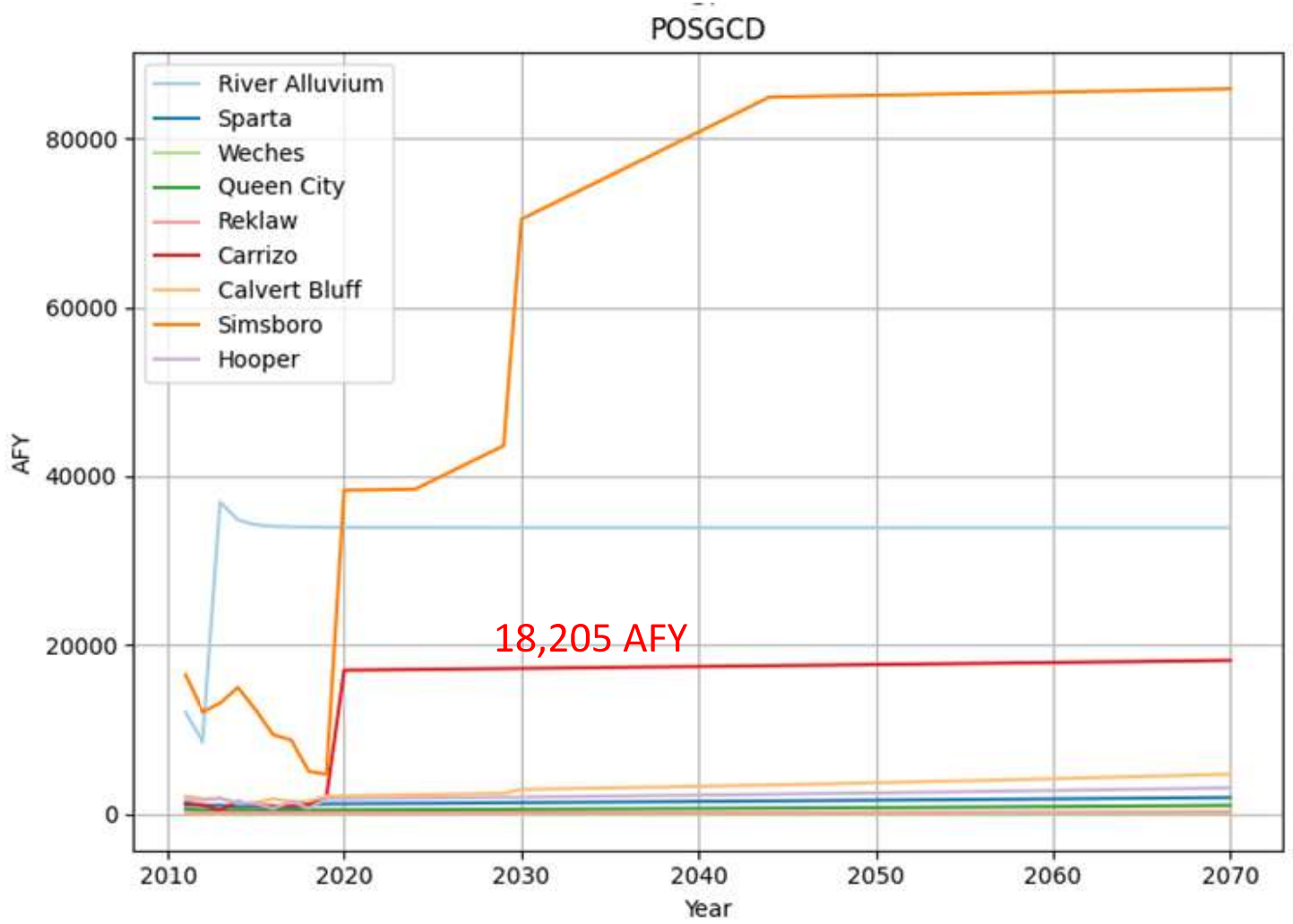
The objective of the GANA is to identify eligible wells where water levels are likely to decline below the elevation of the pump setting as a result of regional groundwater production in GMA 12 within the next 10 years.

Eligibility Requirements

- Located in Milam or Burleson counties
- Functional and registered with the District
- Accessible for monitoring water levels by POSGCD
- Owner must agree to allow monitoring by POSGCD
- Either a low-capacity permitted well that produces less than 50 gallons per minute (gpm) OR an exempt well used for domestic and/or livestock use as defined in the District's Rules
- Completed in any aquifer in the District other than the Trinity Aquifer, Yegua-Jackson Aquifer and river alluvial or terraced formations
- May not be covered by a mitigation agreement included in a permit issued by the District or required by the State of Texas

Approach

- Simulate water levels using recently modified SP/QC/CW GAM
- Future pumping using a slightly modified PS-7



High-Priority Wells

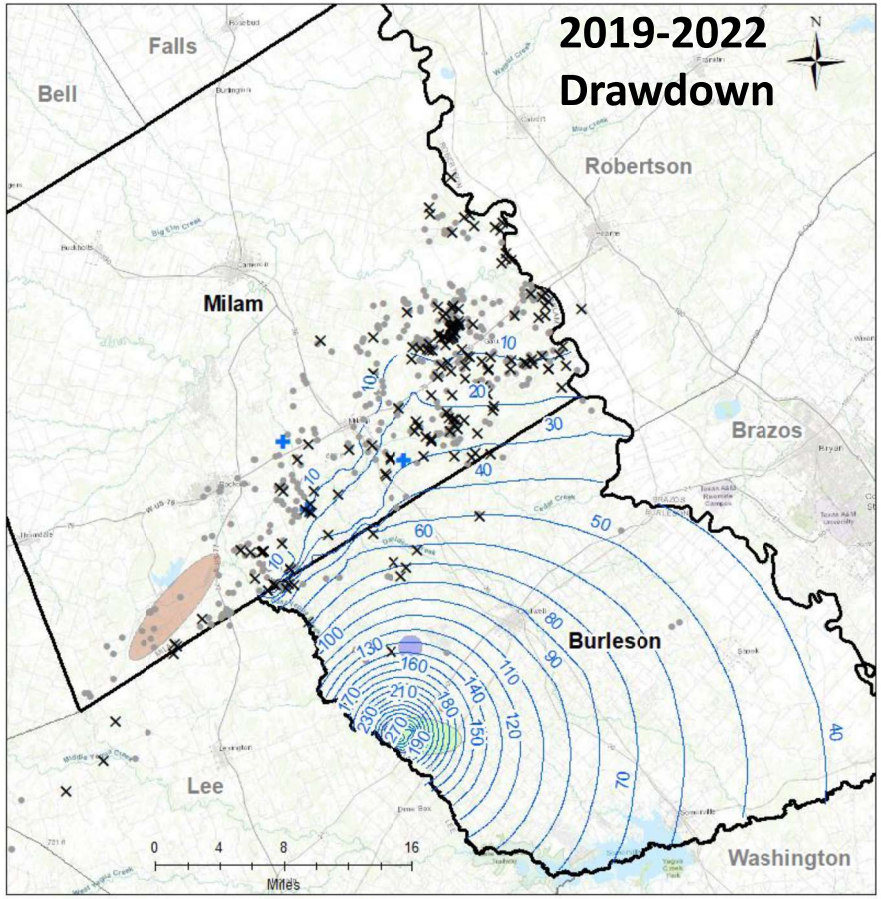
high-priority well meet the following two conditions:

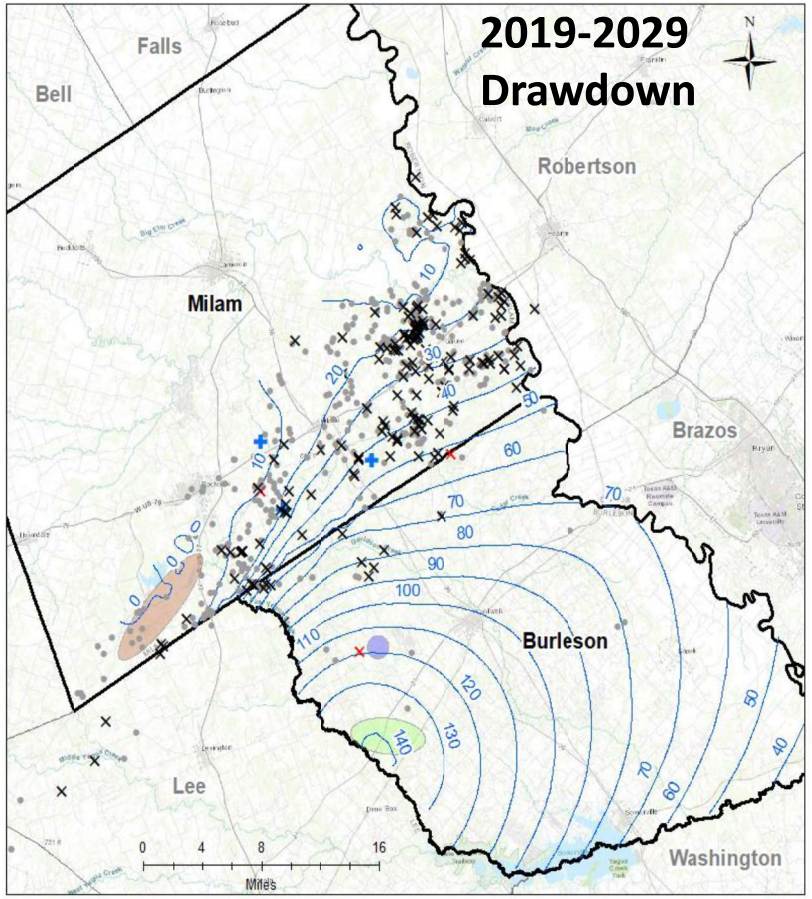
(1) the simulated water level is greater than 15 ft above the pump elevation in 2019, and
(2) the simulated water level is less than 15 ft above the pump elevation in 2029.

Aquifer	Eligible Wells w/Pump Info	Year	Simulated Water Level Elevation Relative to Pump Elevation							
			<15 ft above pump	<10 ft above pump	<5 ft above pump	> 5 ft below pump	>20 ft below pump	>25 ft below pump	>50 ft below pump	> 100 ft below pump
Sparta	116	2029	0	0	1	0	0	0	0	0
Queen City	127	2029	1	2	1	1	0	0	0	0
Carrizo	80	2029	36	36	35	30	28	24	13	3
Calvert Bluff	168	2029	3	4	2	2	1	1	0	0
Simsboro	44	2029	1	0	0	1	4	4	0	0
Hooper	140	2029	0	2	0	0	0	0	0	0

41 high-priority wells

Calvert Bluff

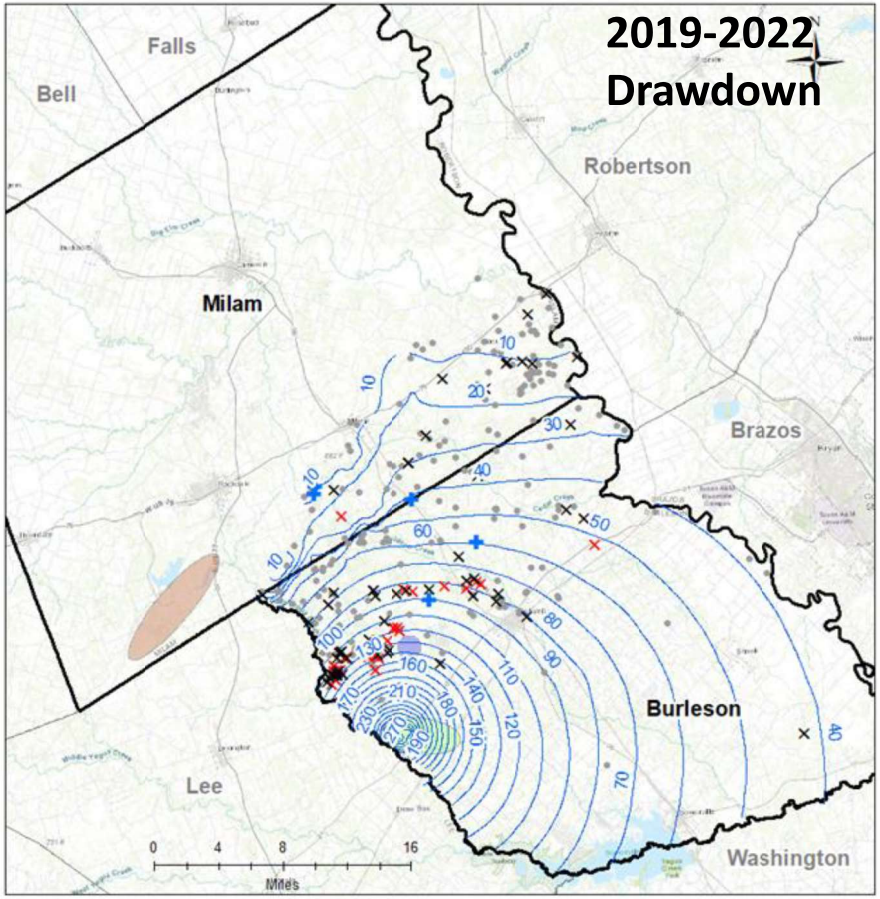




0 high-priority well

3 high-priority well

Carrizo



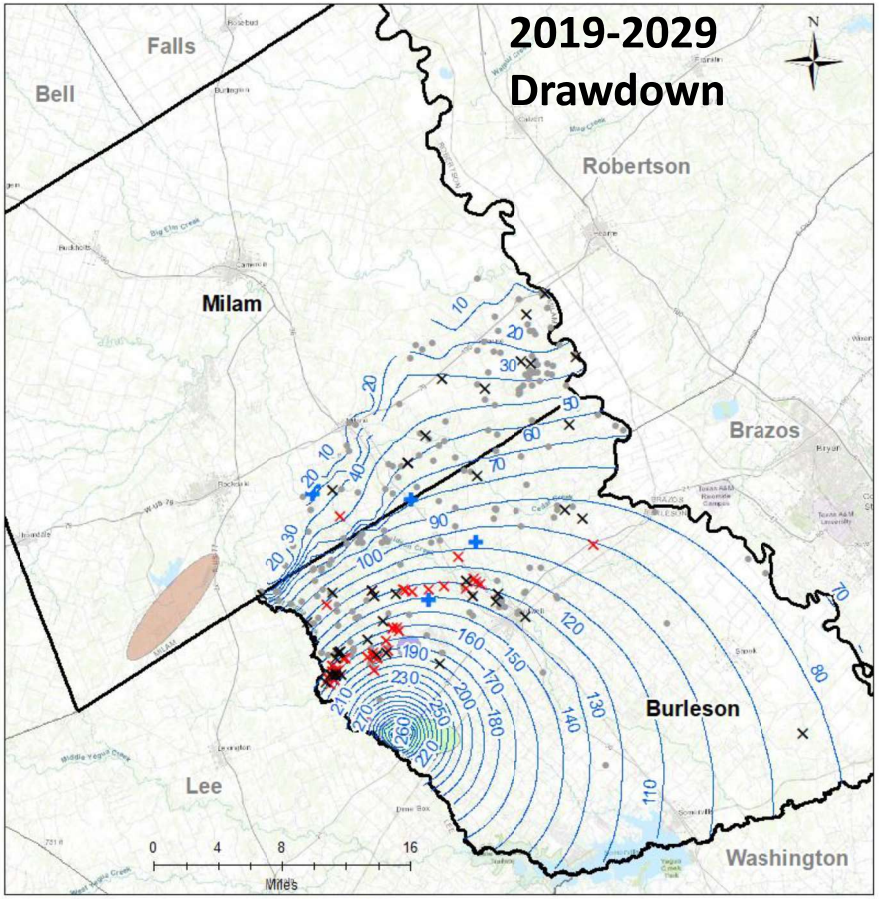
Carrizo

- 130 Well Field
- ALCOA Well Field
- Vista Ridge Well Field
- POSGCD Boundary
- County Line

Eligible Wells

- WL > 15 ft above pump in 2022 (n=54)
- WL < 15 ft above pump in 2022 (n=26)
- WL < 15 ft above pump in 2019 (n=5)
- No Pump Depth Information (n=202)
- 3 Year Drawdown

26 high-priority well



Carrizo

- 130 Well Field
- ALCOA Well Field
- Vista Ridge Well Field
- POSGCD Boundary
- County Line

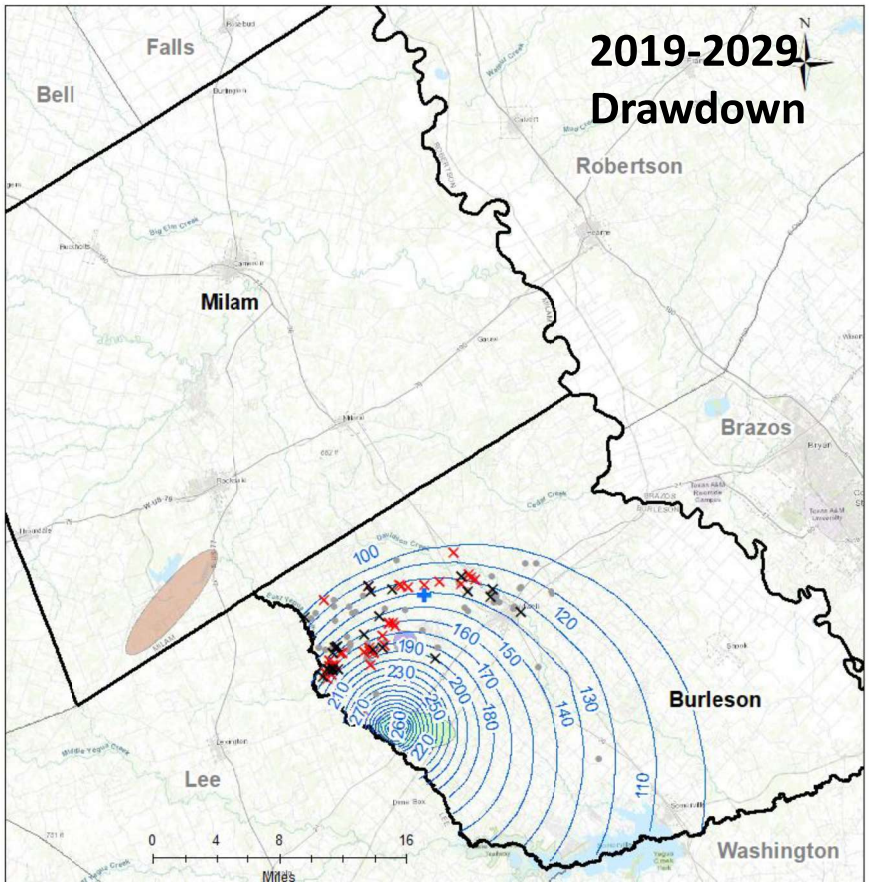
Eligible Wells

- WL > 15 ft above pump in 2029 (n=44)
- WL < 15 ft above pump in 2029 (n=36)
- WL < 15 ft above pump in 2019 (n=5)
- No Pump Depth Information (n=202)
- 10 Year Drawdown

36 high-priority well

Evaluation of Wells Without Pump Information

Number of Wells Encircled by the 100 ft Drawdown Contour in 2029*				
(a) Wells with Pump Information	(b) Number of High Priority Well	(c) Percent of Wells with Pump Information that are High-Priority Wells	(d) Number of Wells with No Pump Information	(e) Number of wells in Column (d) that are moderate-risk wells based on the percentage in Column (c)
58	34	59%	56	33



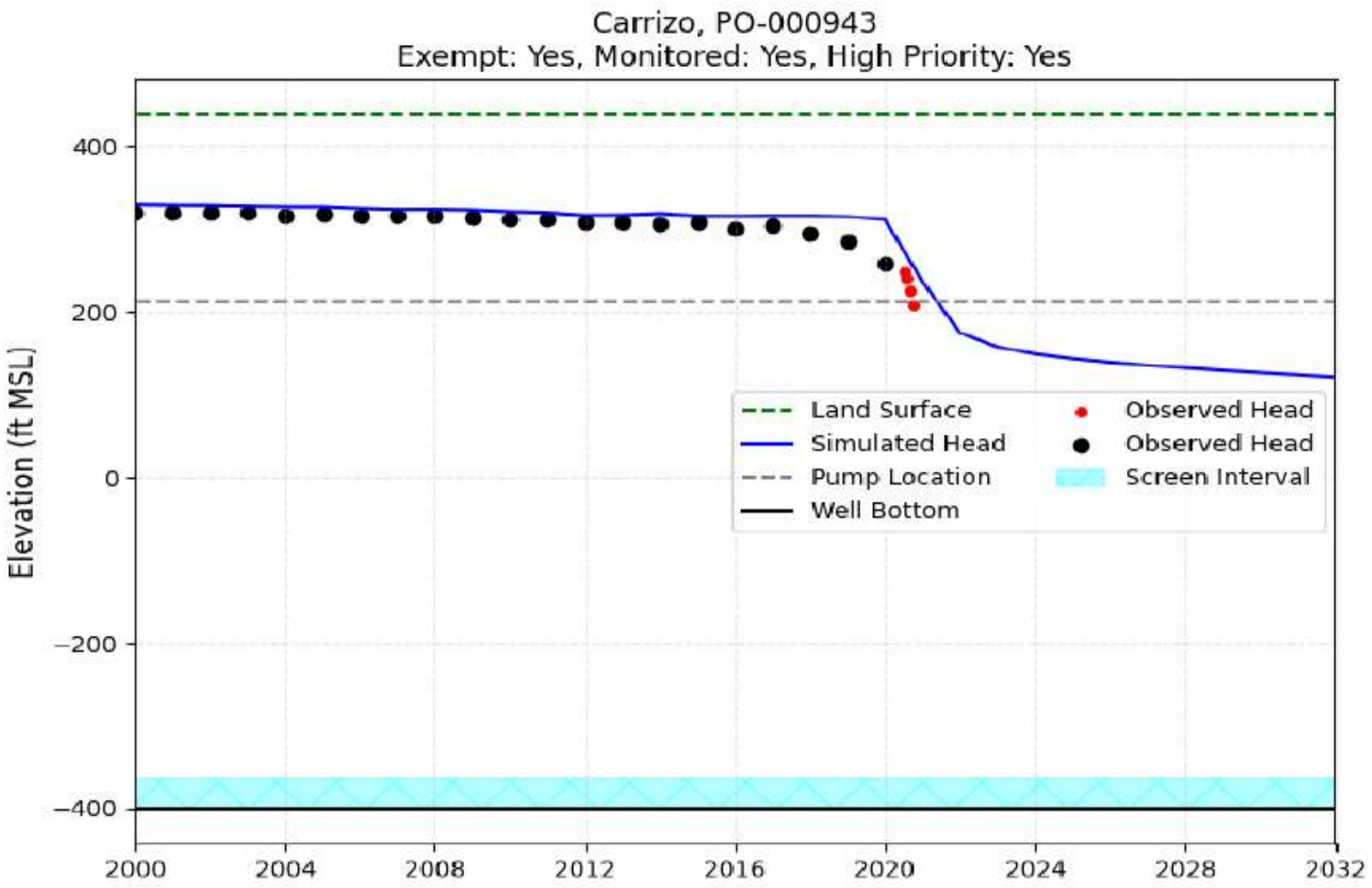
Carrizo

- 130 Well Field
- ALCOA Well Field
- Vista Ridge Well Field
- POSGCD Boundary
- County Line

Eligible Wells

- WL > 15 ft above pump in 2029 (n=24)
- WL < 15 ft above pump in 2029 (n=34)
- WL < 15 ft above pump in 2019 (n=1)
- No Pump Depth Information (n=56)
- 10 Year Drawdown

Example Hydrographs

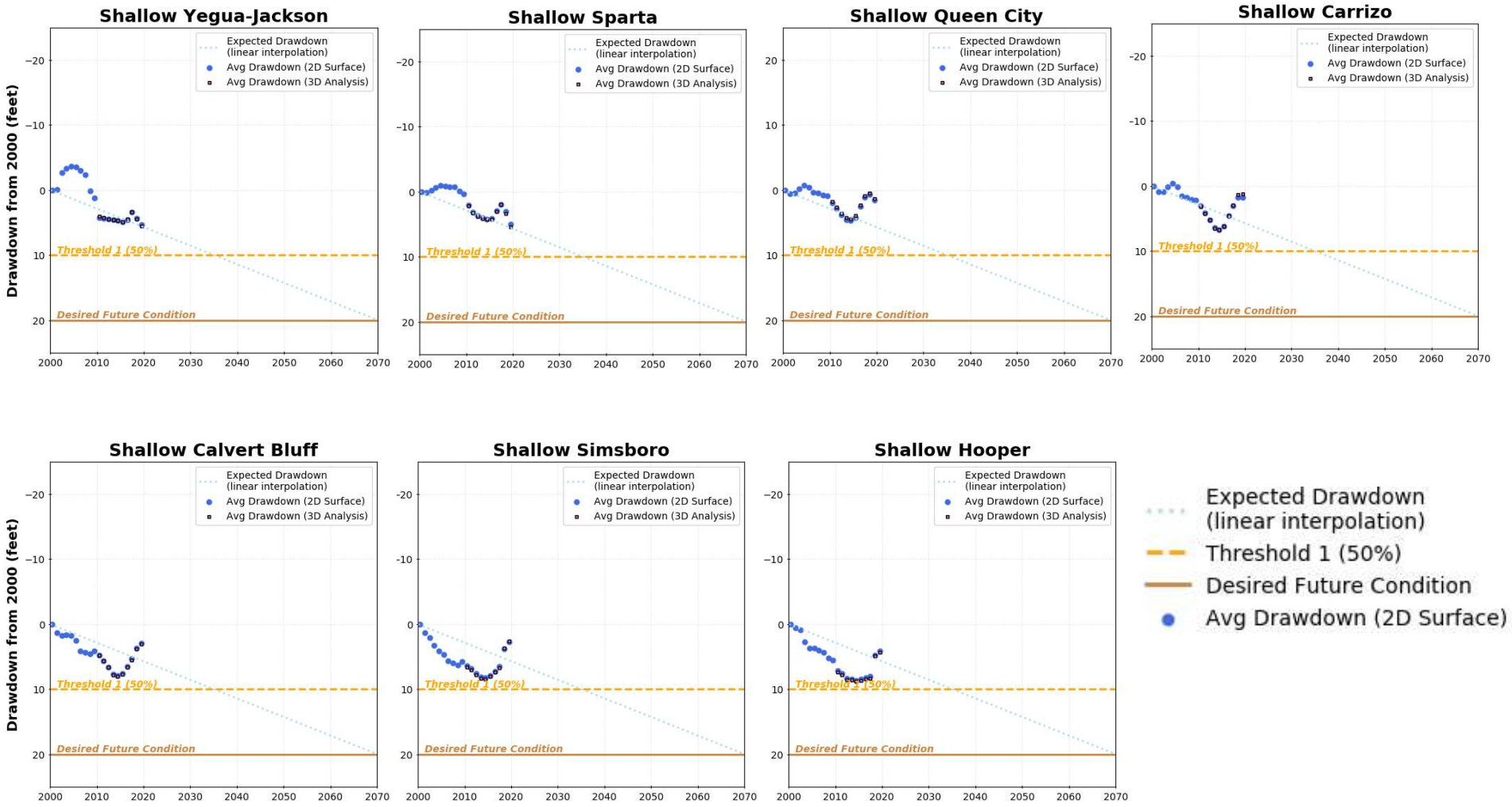


Summary of Carrizo Well Impacts

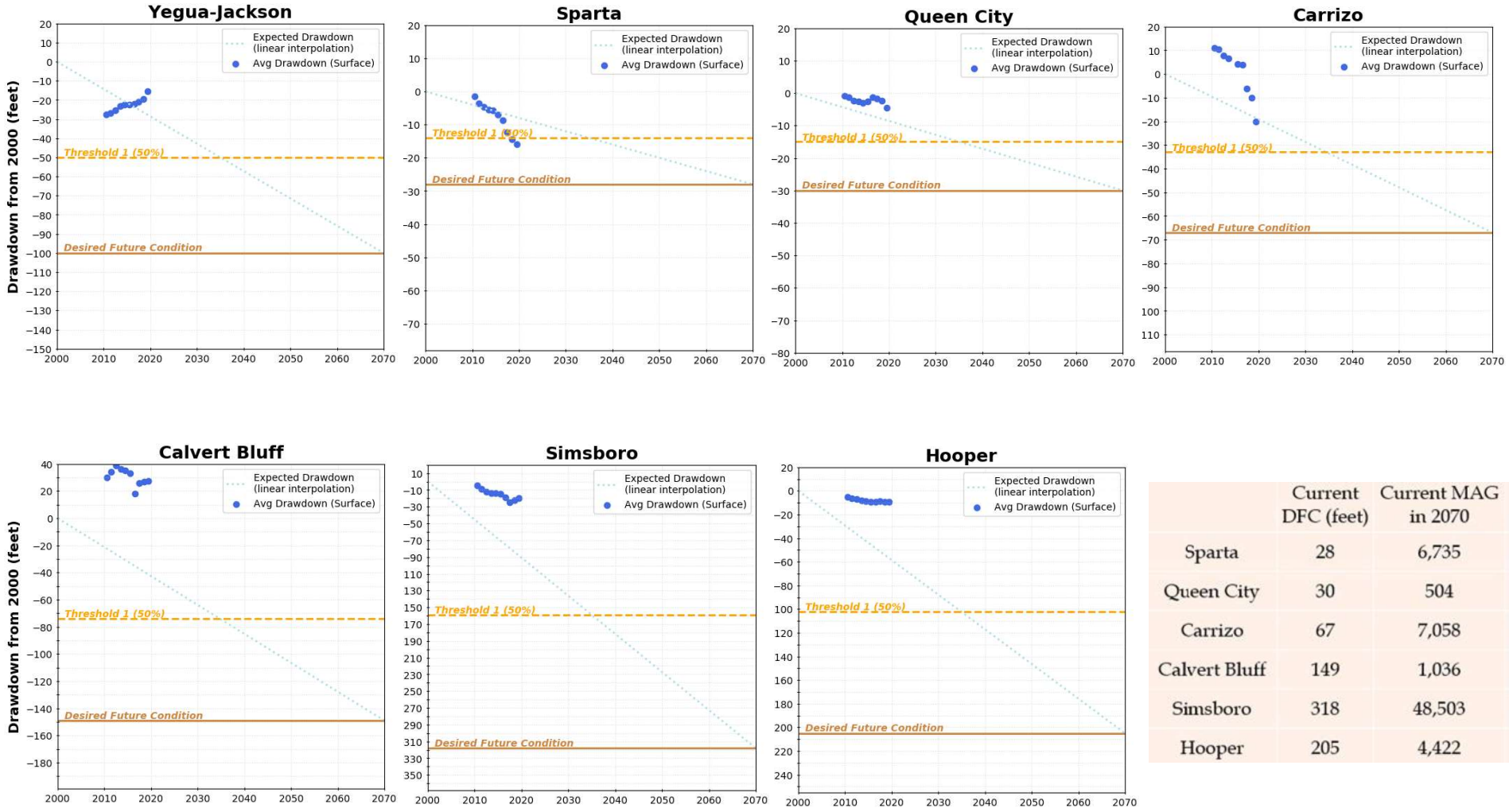
- Well with Pump Info
  - 36 high-priority wells (2029);
  - 26 estimated to have problems in 2022
- Wells without Pump Info
  - 56 wells with >100 ft drawdown from 2019 to 2029
  - 22 wells estimated to have low water levels in 2022
  - 33 wells estimated to have low water levels in 2029
- Total wells that may need corrective actions
  - 48 wells from 2019 to 2022
  - 69 wells from 2019 to 2029

Compliance for DFCs and PDLs

Compliance with POSGCD Shallow PDLs



Compliance with POSGCD DFCs



	Current DFC (feet)	Current MAG in 2070
Sparta	28	6,735
Queen City	30	504
Carrizo	67	7,058
Calvert Bluff	149	1,036
Simsboro	318	48,503
Hooper	205	4,422

Current Model Available Groundwater (MAGs)

GAM	Aquifer	Modeled available groundwater in acre-ft/year (AFY)					
		2010	2020	2030	2040	2050	2060
Brazos River Alluvium	GMA 8: Declared a Non-Relevant Aquifer	NA	NA	NA	NA	NA	NA
	GMA 12: Milam and Burleson County[1]	25,138	25,138	25,138	25,138	25,138	25,138
Aquifers in Trinity GAM	Paluxy[2]	0	0	0	0	0	0
	Glen Rose[2]	149	149	149	149	149	149
	Hensell[2]	36	36	36	36	36	36
	Hosston[2]	103	103	103	103	103	103
	Subtotal	*288*	*288*	*288*	*288*	*288*	*288*
Aquifers in the Queen City/ Sparta GAM	Sparta[3]	1,570	2,245	4,041	5,612	6,734	6,734
	Queen City[4]	430	468	502	502	502	502
	Carrizo[5]	4,025	4,706	5,177	6,118	6,353	7,059
	Upper Wilcox (Calvert	502	1,038	1,038	1,038	1,038	1,038
	Middle Wilcox	36,507	38,468	37,899	40,041	46,027	48,501
	Lower Wilcox (Hooper	899	2,960	4,139	4,433	4,433	4,422
	Subtotal	*43,933*	*49,885*	*52,796*	*57,744*	*65,087*	*68,256*
Yegua-Jackson Aquifer	Yegua-Jackson Aquifer[6]	12,923	12,923	12,923	12,923	12,923	12,923
	TOTAL	*82,282*	*88,234*	*91,145*	*96,093*	*103,43*	*106,605*

Section 16.4 Threshold Exceedances

Threshold	Description	Aquifer(s)
Level 1	> 50% of DFCs	**Sparta (28 ft)**
Level 1	> PDLs in 15 years	**Carrizo (20 ft), Calvert Bluff (20 ft), Simsboro (20 ft)**
Level 1	> 60% of MAG	**Simsboro (38,468 AFY)**
Level 2	> 70% of MAG	**Queen City (468 AFY), Carrizo(4,706 AFY)**

Note 1: Modeled Available Groundwater(MAG) is for 2020
Desired Future Conditions (DFC) is for 2070
Protective Drawdown Limit (PDL) is for 2070

Note 2: Green colored aquifers indicates exceedance anticipated before December 31, 2020

Rule 16.4. Actions Based on Monitoring Results

Threshold 1

1. Perform studies to improve quantification of pumping effects, characterization of aquifer, and prediction of changes in future water levels

2. Evaluate options for possible curtailment to achieve management goals

Threshold 2

1. Evaluate the Management Plan and rules regarding management zones, collection and analysis of monitoring data, and DFCs.

2. May notify well owners of possible curtailment of groundwater production

Threshold 3

1. Conduct public hearing to discuss aquifer conditions. Develop a Response Action Work Plan to achieve DFCs and PDLs.

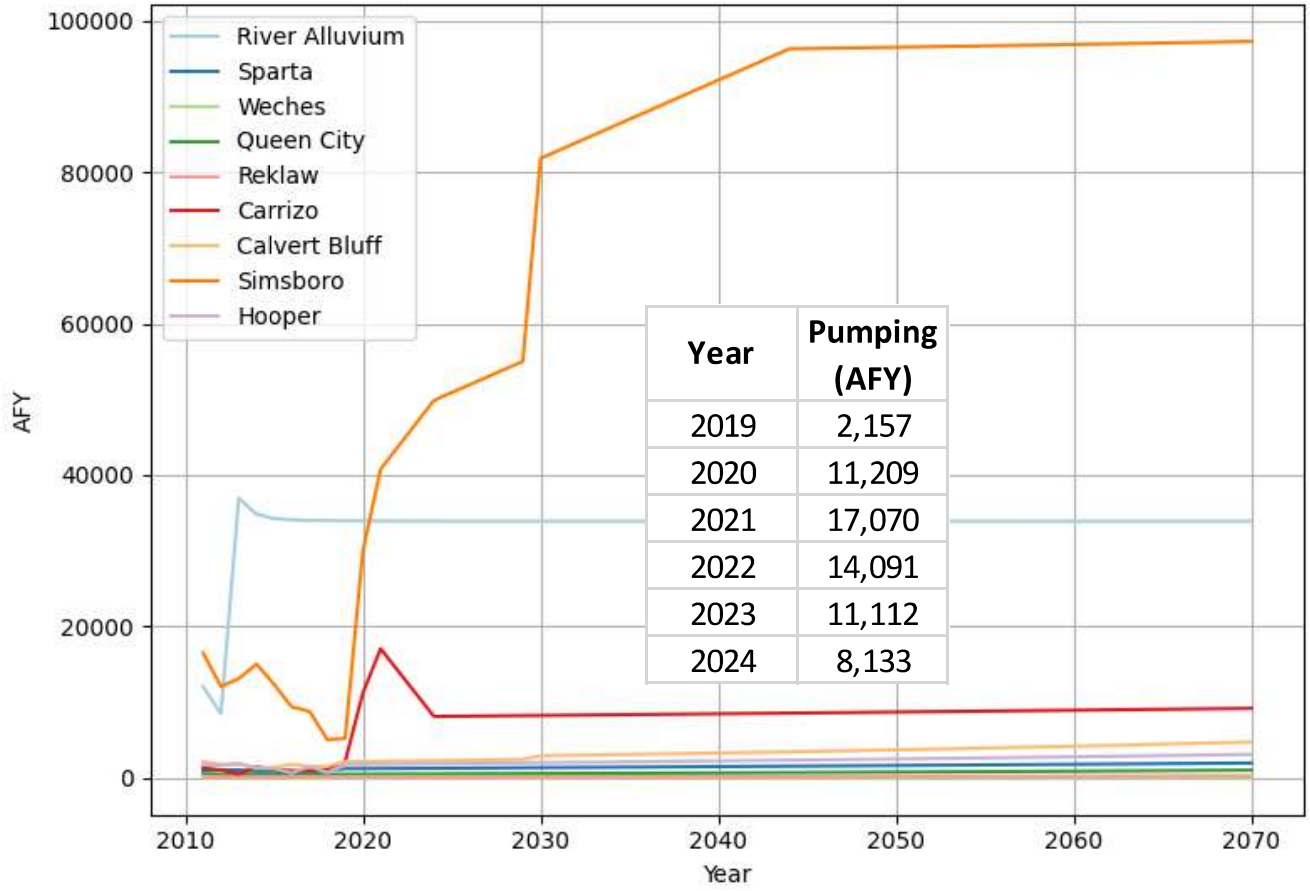
2. May reduce the maximum water production permitted per acre for the Management Zone and the water authorized to be produced under any permit issued by the District for that zone

Summary of Actions: Hydrogeologic Studies

- Hydrogeological Studies
  - Additional Groundwater Water Level Measurements
    - Fall 2020 monitoring event
    - Addition of approximately 25 InSitu/WellIntel equipment
  - Analysis of Water Level for PDL/DFC Compliance
    - Geostatistical investigations with UT at Austin
    - Developed alternative technique
  - Compliance Report for DFCs and PDLs
    - Documents using measured water levels to assess compliance
    - Schedule completion date is December 2020
  - Improved Prediction of Future Water Level Changes
    - GMA 12 update of GAM regarding Simsboro properties near Vista Ridge wells
    - 2021 project to continually improve the GAM
  - Developed Outline for Management Strategies Report
    - Assess effectiveness of current strategies for achieving goals
    - Identify changes in strategies to improve likelihood of achieving goals

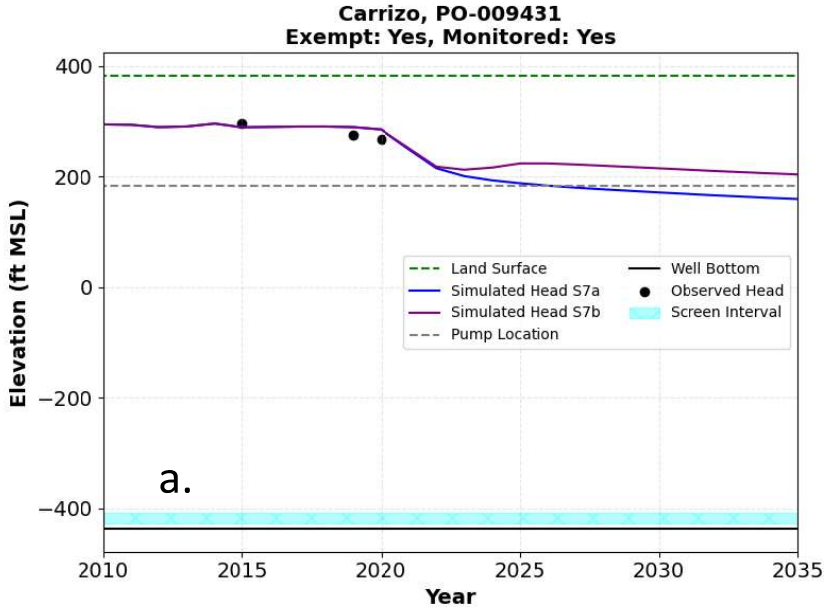
Summary of Actions: Curtailment Options

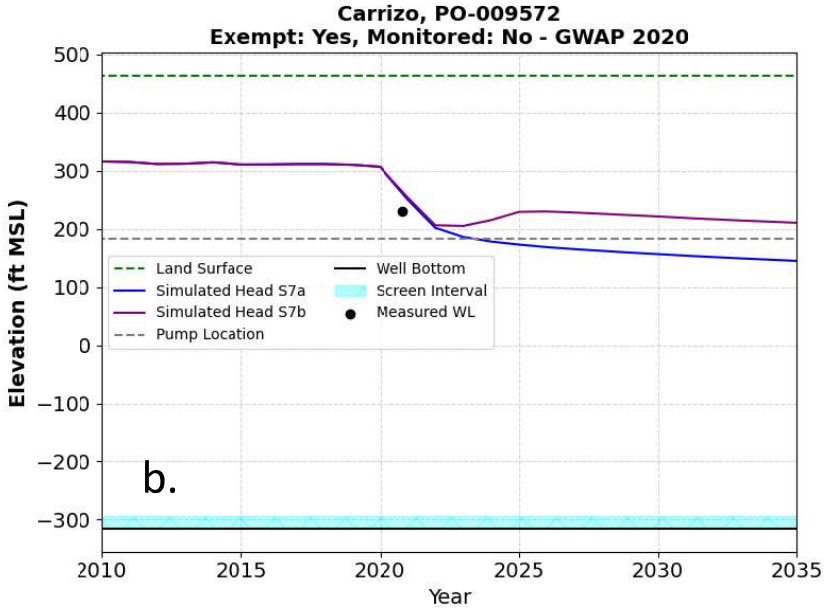
- Perform simulations investigating curtailment of permits in the Carrizo

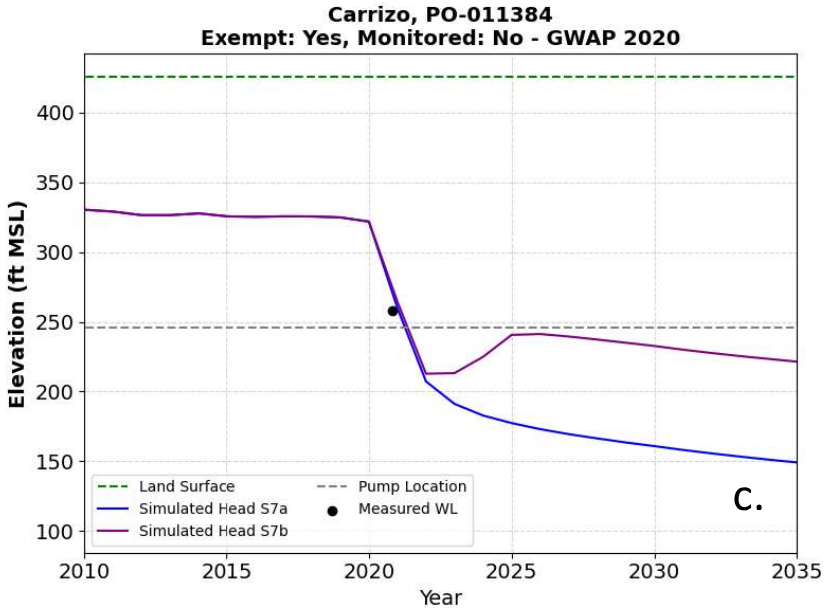


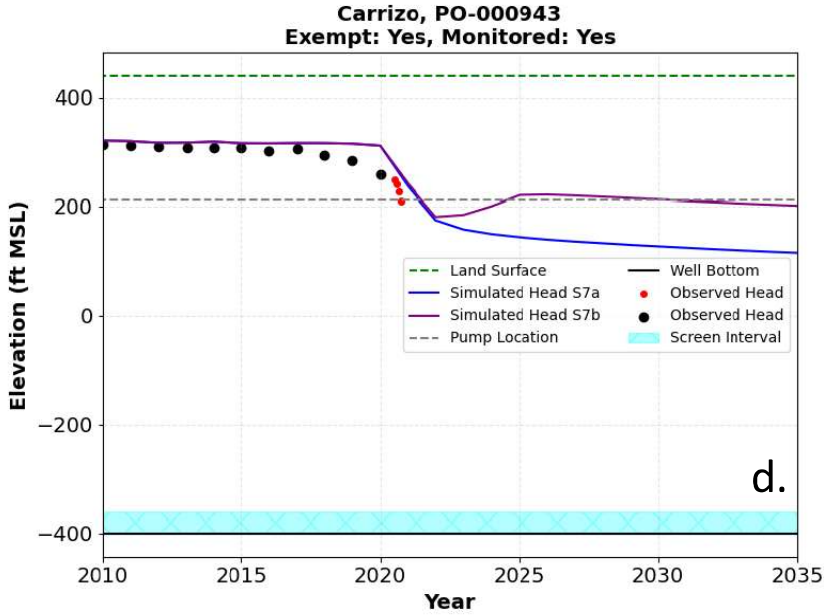
Year	Pumping (AFY)
2019	2,157
2020	11,209
2021	17,070
2022	14,091
2023	11,112
2024	8,133

Examples of Changes in Simulated Hydrographs

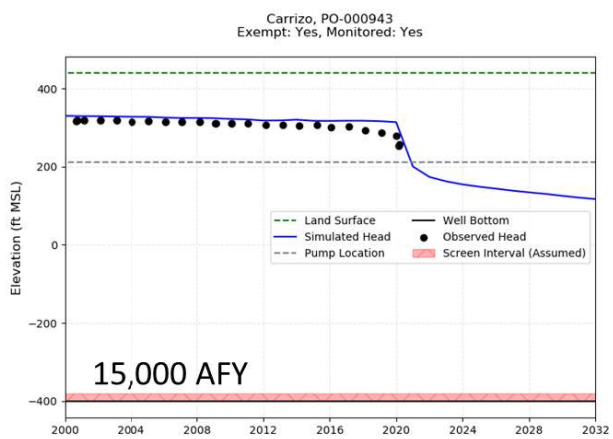


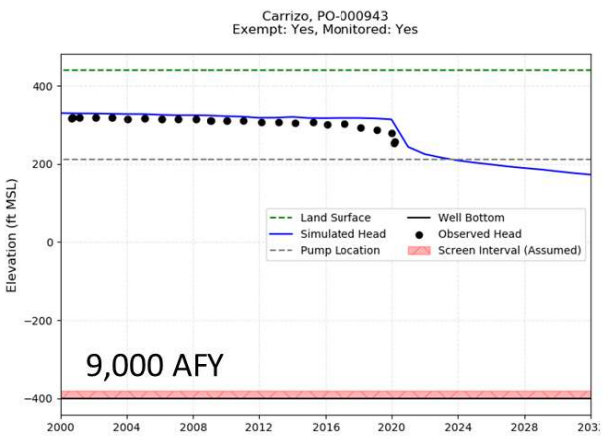


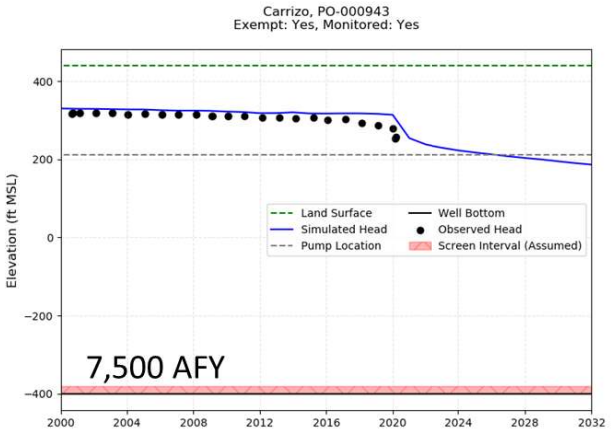


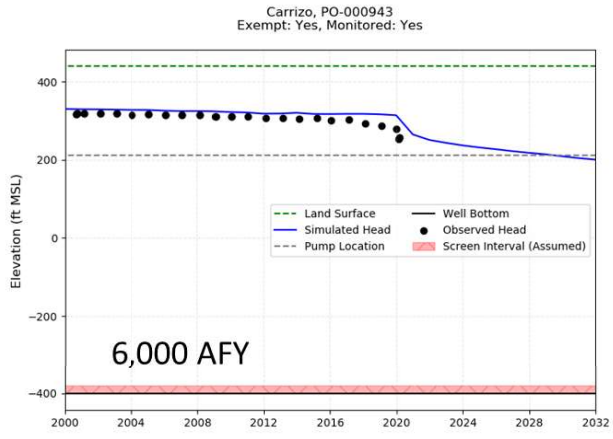


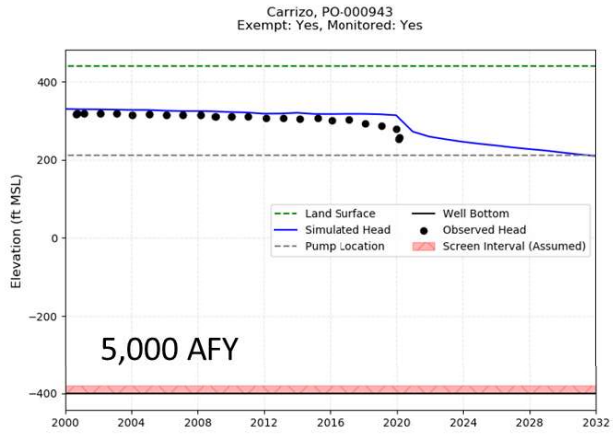
Summary of Actions: Curtailment Options

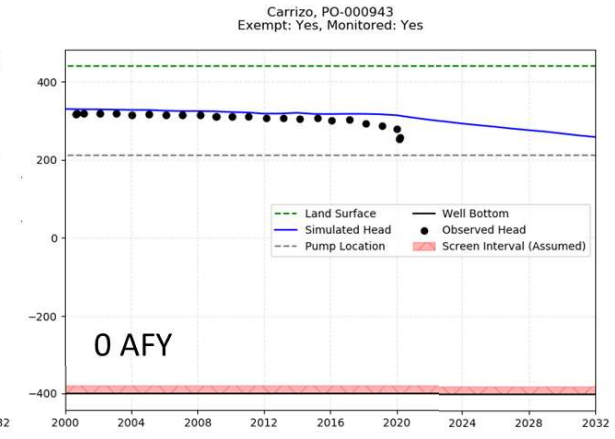










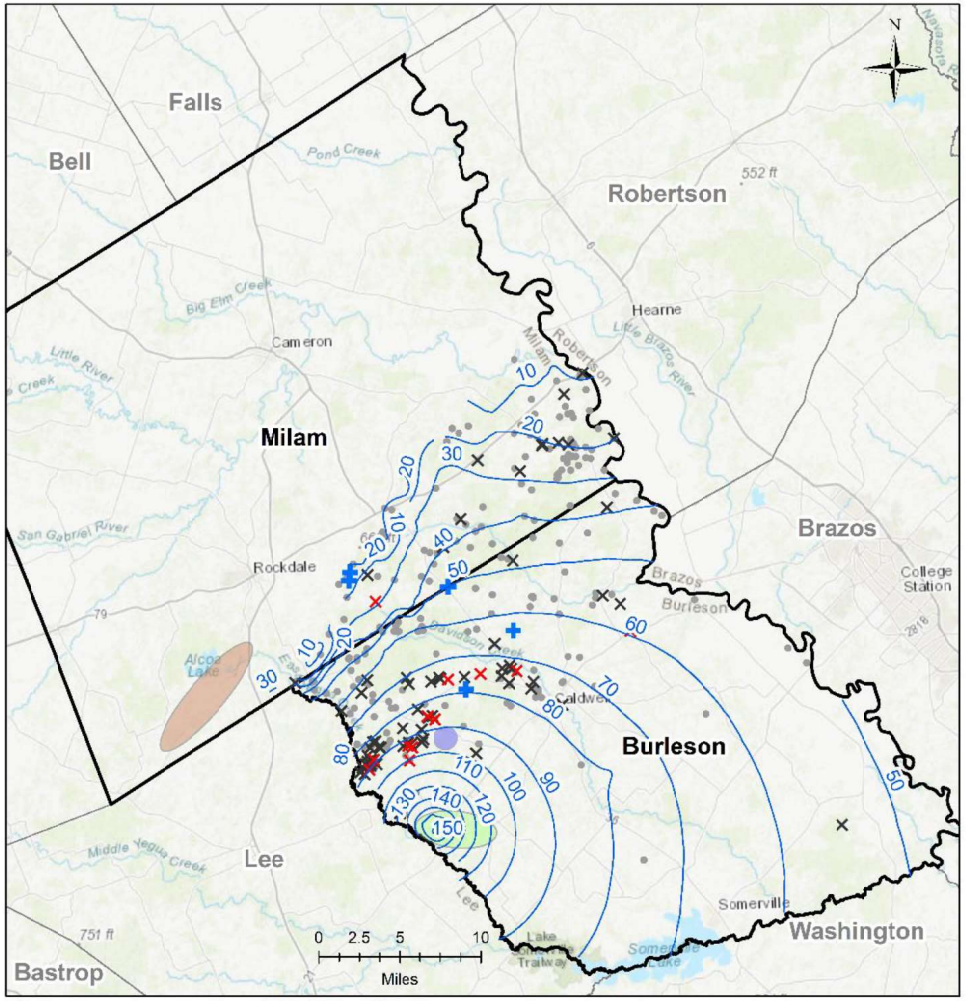


Summary of Actions: Curtailment Options

Vista Ridge Carrizo Pumping (AFY)	DFC (2010 - 2070)		
	Carrizo	Calvert Bluff	Simsboro
0	105	157	347
5,000	127	165	349
6,000	132	166	349
7,500	139	169	349
9,000	145	171	350
15,000	172	181	351

Effects of Curtailment: Reduction of Carrizo Pumping in PS-7 by 9,000 AFY in 2023

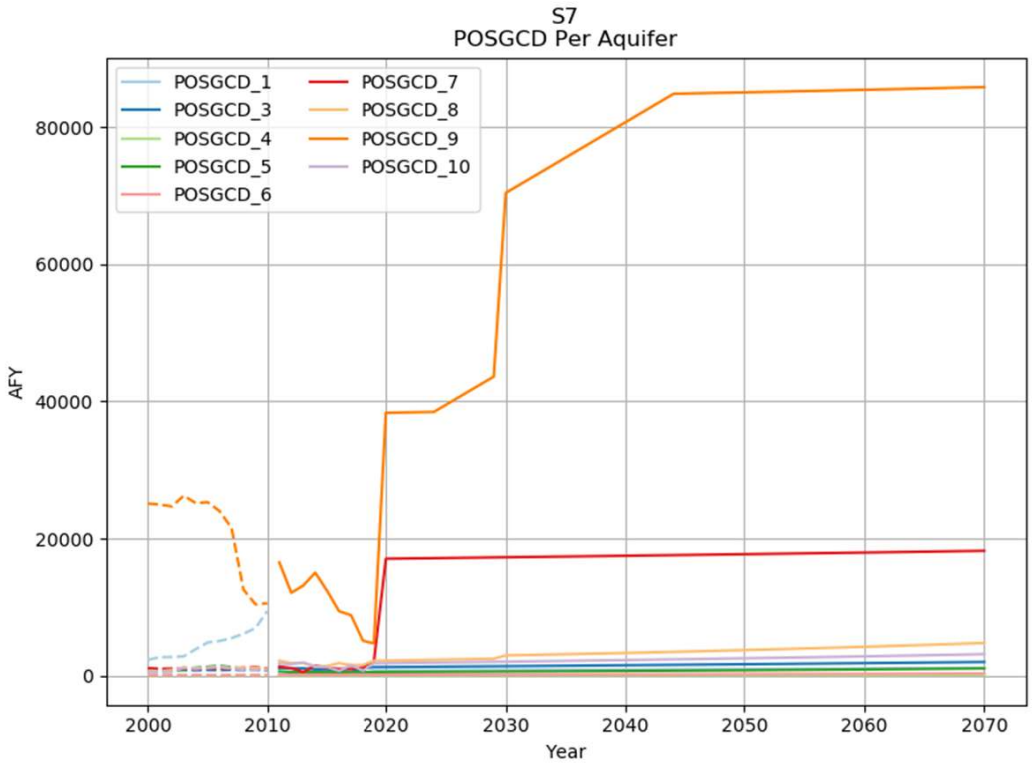
- DFC
  - 2070 DFC-drawdown from 172 ft to 123 ft
- PDL change
  - 2070 PDL-drawdown from 89 to 79
- Impacts to existing well owners
  - Wells likely to need corrective action is reduced from about 70 to 20 wells



Desired Future Conditions

POSGCD Pumping for PS-7*

	Current DFC (feet)	Current MAG in 2070	S-7 Drawdown from 2010 to 2070 (feet)	S-7 Pumpage in 2070 (acre-feet)
Sparta	28	6,735	17	1,983
Queen City	30	504	18	1,045
Carrizo	67	7,058	173	18,205
Calvert Bluff	149	1,036	184	4,761
Simsboro	318	48,503	352	85,855
Hooper	205	4,422	223	3,126



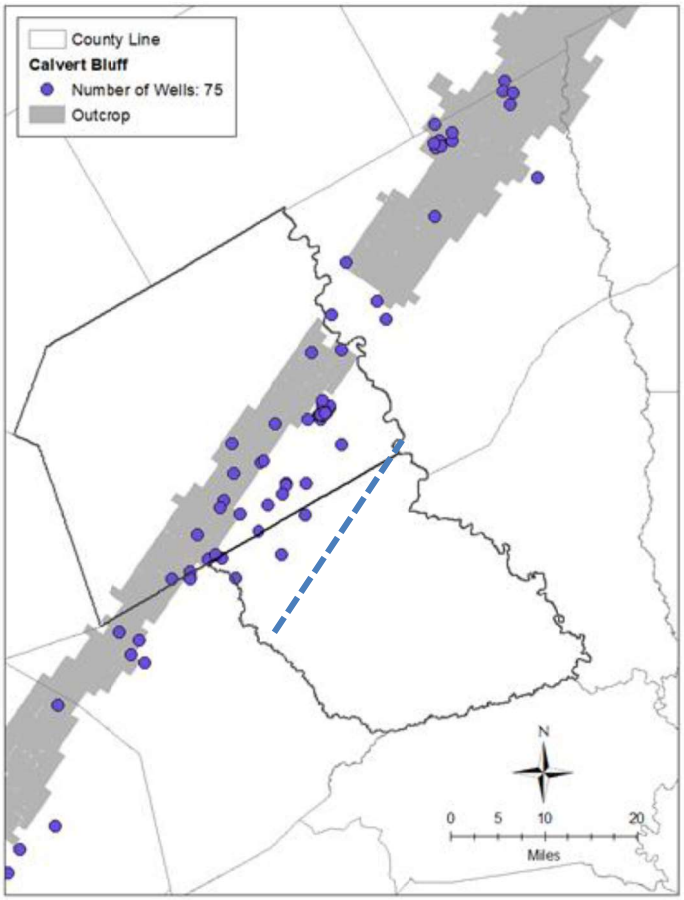
* Updated since Sept 2019

Consideration for Evaluating DFCs

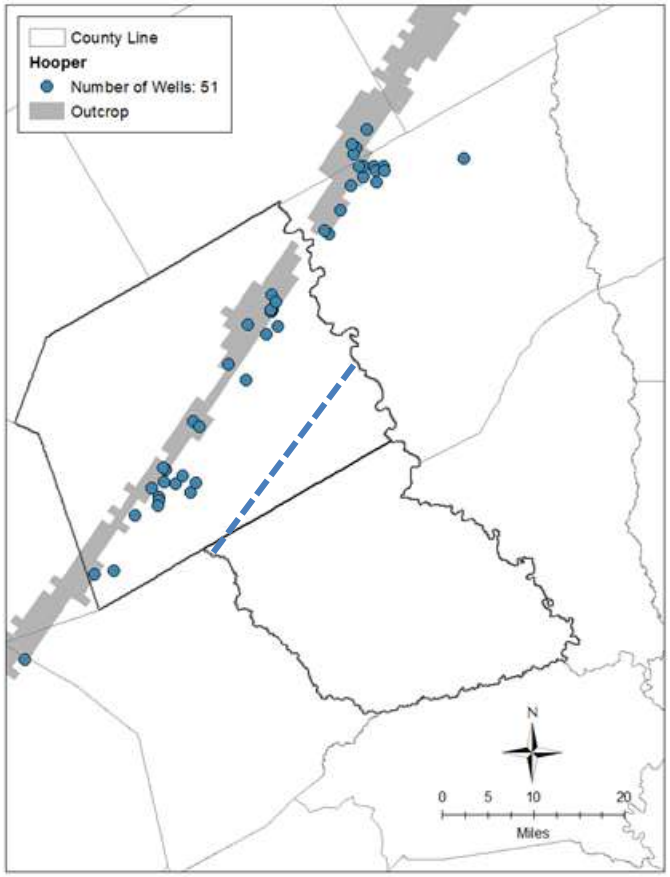
- Permitted Pumping
- Impact of Pumping on Water Levels at Existing Wells
- Compliance with existing DFCs and PDLs
- Existing Water Column above the Top of the Aquifer (Available drawdown)
- Impact on Pumping in Adjacent GCDs on DFCs in POSGCD
- Reported Pumping is Less than the Permitted Pumping
- Addition of Management Zones and Changes in DFC
- Uncertainty in model predictions (± 10%)
- Nine Factors Listed in TWC Section 36.108

Management Zones

Calvert Bluff



Hooper

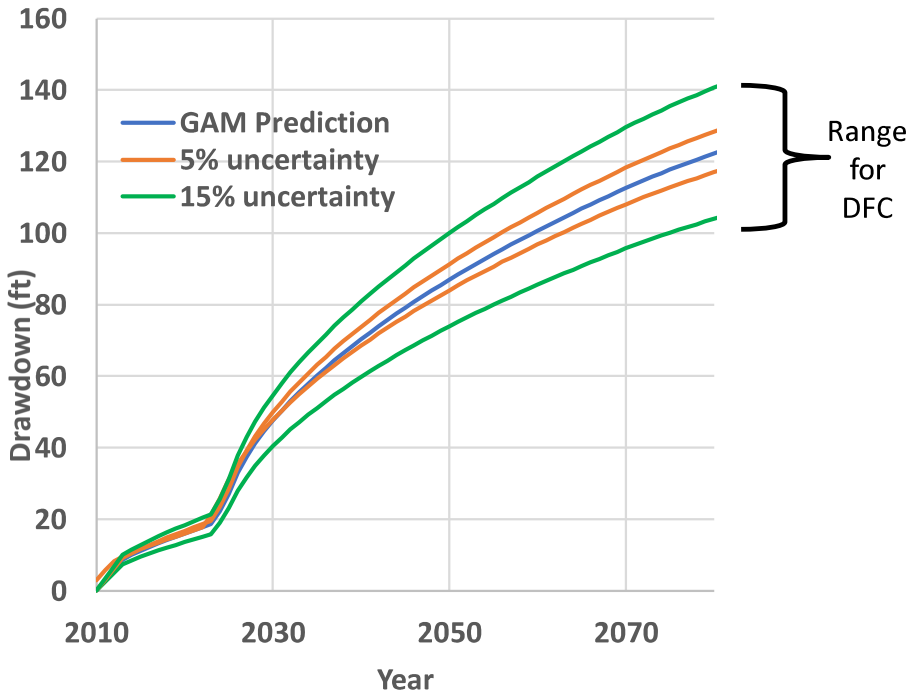


Uncertainty Associated with GAM Prediction

Sources of Uncertainty

- Model Error (aquifer properties, boundary conditions)
- Future Permitted Pumping Rates (exempt and non-exempt)
- Location of Pumping Rates (exempt and non-exempt)
- Recharge conditions

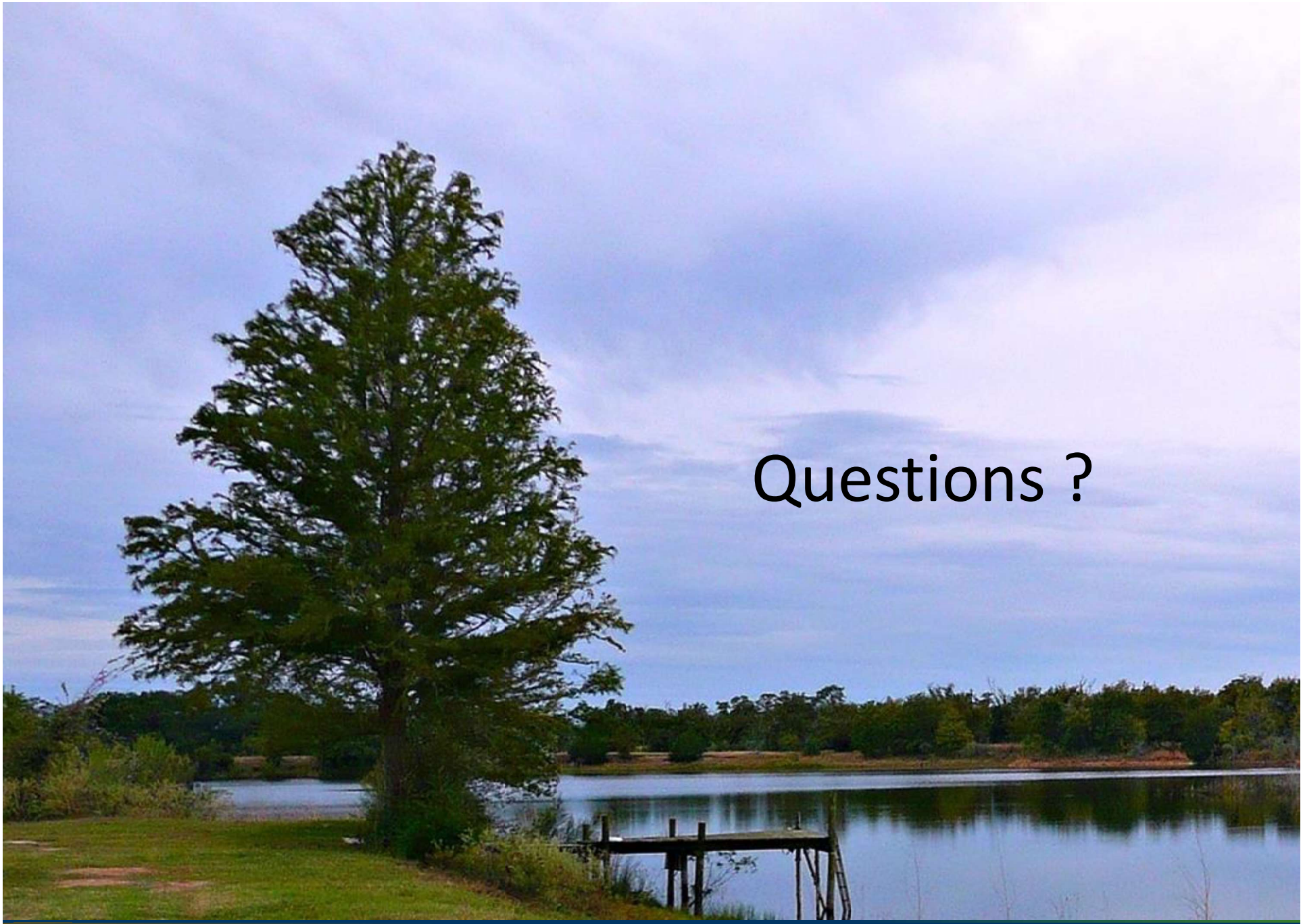
Uncertainty Associated with DFC Simulation



DFCs Discussion: Directions for Future Scenarios

- Ranges of POSGCD Pumping Rates by Aquifer
- Range of Average Drawdowns in POSGCD by Aquifer
- Impact on POSGCD wells
- Area for DFCs
- Level of Uncertainty

	Current DFC (feet)	Current MAG in 2070	S-7 Drawdown from 2010 to 2070 (feet)	S-7 Pumpage in 2070 (acre-feet)
Sparta	28	6,735	17	1,983
Queen City	30	504	18	1,045
Carrizo	67	7,058	173	18,205
Calvert Bluff	149	1,036	184	4,761
Simsboro	318	48,503	352	85,855
Hooper	205	4,422	223	3,126


Questions ?