Sandow Lakes Ranch

SLR Property I, LP ("SLR"),
Owner

Application
for a
New 9,000 af/yr Simsboro & Hooper Drilling & Operating Permit

April 2022

(Revised July 2022)

SLR Property I, LP
2825 Oak Lawn Ave #191577
Dallas, TX 75219

(512) 810-3584
alang@sandowlakesranch.com

July 27, 2022

Mr. Gary Westbrook, General Manager, and
Members of the Board of Directors
Post Oak Savannah Groundwater Conservation District
P. O. Box 92
Milano, Texas 76556

RE: SLR Property I, LP - Applications for Two New Permits

Dear Mr. Westbrook and Members of the Board:

On April 8, 2022, SLR Property I, LP ("SLR"), the purchaser of Sandow Lakes Ranch and successor to Alcoa's groundwater permits and rights, filed with the District applications for two new permits.

On May 20, 2022, representatives of SLR met with the General Manager and the District's geoscientist and its legal counsel, all of whom provided comments on the applications and suggestions that SLR make certain revisions to and clarifications of the applications. On June 14, 2022, SLR informally provided draft updated applications for review and comment by District, and the General Manager and the District's geoscientist and legal counsel subsequently provided additional comments and suggested revisions and clarifications on July 13 and 15, 2022.

This letter incorporates the suggested revisions and clarifications and by itself should be considered an update to and replacement of the previous version of this letter that was an attachment to each of the applications as they were initially filed. With this letter, SLR also submits other parts of the suggested revised and clarified applications. To the extent there is any conflict or inconsistency between this letter and anything contained in any other part of the revised applications, this letter shall control.

This letter is intended first to provide the General Manager and the Board an overall picture of SLR's long-term objectives relating to Sandow Lakes Ranch and descriptions of SLR's current groundwater permits issued by the District. This letter also is intended to state the authorizations requested by each of the two applications as the applications have been revised and clarified as suggested by the General Manager and the District's geoscientist and legal counsel.

SLR and Sandow Lakes Ranch

Sandow Lakes Ranch consists of nearly 32,000 acres of land and groundwater rights in Milam and Lee Counties, of which nearly 25,000 acres are in Milam County. SLR purchased Sandow Lakes Ranch in late October 2021. It intends to continue to develop the groundwater resources of Sandow Lakes Ranch and enter into long-term leases and water supply contracts with new tenants on the property, as well as long-term water supply contracts with suppliers and others in the area. SLR's objectives of course include significant long-term economic development of the Ranch that will also promote economic health for Milam and Burleson Counties.

Hydrologic Impact of the Two New Permits Requested by SLR

SLR currently holds POSGCD permits authorizing production of 40,000 af/yr from the Simsboro formation from the nearly 25,000 acres of lands and groundwater rights owned by SLR in Milam County. The two requested new permits, if granted, will increase the authorized production from SLR's Milam County property by 9,000 af/yr, to a total of not to exceed 49,000 af/yr. This is within the 2 acre-feet-per-acre limitation set forth in the POSGCD rules. A portion of the additional 9,000 af/yr authorized production likely will be from the Hooper, thereby reducing or attenuating impacts on the Simsboro.

POSGCD Permits Currently Held by SLR

Historic Use Permit No. 0330 *(Authorized production of 15,000 af/yr from the Simsboro)*

SLR holds Historic Use Permit No. 0330, which authorizes production of 15,000 af/yr from the Simsboro formation using a well system consisting of 61 authorized wells. When the permit was initially issued in 2007, a total of 60 wells were listed as authorized wells. The permit was amended in 2011 to 61 authorized wells: The Board approved Alcoa's application to amend the permit to add one existing well to the list of authorized wells; to remove from the list six existing wells proposed to be plugged and abandoned; and to add to the list six new wells as replacements for the wells proposed to be plugged and abandoned. The six new replacement wells are identified on Table 1-1; such replacement wells have not yet been drilled. (The Historic Use Permit explicitly authorizes the holder of the permit to apply for and the Board to authorize additional wells to produce water authorized to be produced under the Historic Use Permit: "Permittee is authorized to operate all Wells authorized under the Permit, including such additional wells that may be authorized by amendment, so long as the aggregate production from all Wells under the Permit does not exceed the maximum combined aggregate annual production specified above (15,000 AFY). Permittee may use this historical use permit water for industrial use within that area in Milam County defined in Attachment B.")

Of the 61 authorized wells, 32 are also authorized to produce water under SLR's Operating Permit No. 0148, discussed below.

Water produced under the Historic Use Permit is authorized to be used for industrial use, anywhere within the boundaries of SLR's Milam County property. Alcoa had always viewed the authorized production of 15,000 af/yr from the Simsboro under its Historic Use Permit as the primary supply of groundwater for its Milam County property, and SLR now does also.

Drilling and Operating Permit No. 0148 *(Authorized production of 25,000 af/yr from the Simsboro)*

SLR holds Drilling and Operating Permit No. 0148 (also referred to as D&O Permit No. 0148), which authorizes production of 25,000 af/yr from the Simsboro formation using a well system consisting of 56 wells, 32 of which are included in the 61 wells authorized under the Historic Use Permit, and 24 of which are authorized under Operating Permit No. 0148. Groundwater produced under Operating Permit No. 0148 is authorized to be used for municipal, industrial, manufacturing, and commercial uses, anywhere within Milam County (which is within the District) and anywhere within Williamson County and the three adjacent counties of Lee, Travis and Bell (all four of which are outside the District).

Transport Permit No. 0005 *(Authorized transport of the 25,000 af/yr produced under Drilling and Operating Permit No. 0148)*

SLR holds Transport Permit No. 0005, which authorizes the transport out of the District of 25,000 af/yr produced under Drilling and Operating Permit No. 0148 for use in Williamson, Lee, Travis and Bell Counties.

The Two New Permits Requested by SLR

(1) A new 15,000 af/yr Simsboro Operating Permit to be used in conjunction with SLR's 15,000 af/yr Simsboro Historic Use Permit No. 0330 *(This new operating permit would not increase SLR's current 40,000 af/yr total authorized production because the new permit would impose a cap of 15,000 af/yr on total combined production under both SLR's Historic Use Permit No. 0330 and the new operating permit)*

- SLR has applied for a new operating permit to produce 15,000 af/yr from the Simsboro formation using the same well system consisting of the 61 wells that are authorized under Historic Use Permit No. 0330. There would be a special condition in the new operating permit imposing a cap of 15,000 af/yr on total combined production under the historic use permit and the new operating permit, so the new operating permit would not increase SLR's current total authorized production from SLR's Milam County property of 40,000 af/yr.
- SLR requests that water produced under the new operating permit be authorized to be used for municipal, industrial, manufacturing, and commercial uses, anywhere within Milam and Burleson Counties.
- Upon issuance of the new 15,000 af/yr operating permit, the entire 15,000 af/yr will be assigned to the historic use permit and zero af/yr will be assigned to the operating

permit. From time to time thereafter, SLR will notify the District of the portion of the 15,000 af/yr assigned to the operating permit, and the remaining portion of the 15,000 af/yr will be the amount assigned to the historic use permit. SLR understands from the General Manager that SLR will only have the right to increase the amount assigned to the operating permit and to decrease the amount assigned to the historic use permit by an equal amount, and never to change the assigned amounts in the opposite direction; in other words, the amount assigned to the historic use permit may never be increased above the last amount assigned.

- SLR also understands from the General Manager that, if an historic use permit well does not meet the District's current spacing requirements for property line setback or spacing from an adjoining landowner's well when the historic use permit well is pumped at its approved production capacity, any water pumped from that well under the new operating permit may not be pumped at a rate in excess of the production capacity at which the well can be pumped based on those spacing requirements. Any available capacity above the production capacity at which water is being pumped at any time under the new operating permit may be used at that time to pump water under the historic use permit.
- This overlapping permits approach will allow SLR to maintain whatever special rights and benefits there may be under an historic use permit for whatever part of the currently authorized 15,000 af/yr production may be needed for industrial use within SLR's Milam County property, while providing SLR the flexibility to use the remaining part of the currently authorized 15,000 af/yr production under the new operating permit for authorized uses other than industrial use within SLR's Milam County property, and for all authorized uses anywhere within the District.
- SLR requests that the term of the new operating permit be 40 years from the date of issuance of the permit.
- The historic use permit currently has a term that extends through December 31, 2038. SLR is not at this time requesting an extension of the term of its historic use permit.

(2) A new 9,000 af/yr Simsboro & Hooper Drilling and Operating Permit *(This new drilling and operating permit will increase SLR's total authorized production from 40,000 af/yr to 49,000 af/yr)*

- SLR has applied for a new drilling and operating permit to produce 9,000 af/yr from the Simsboro & Hooper formations. SLR requests authorization to produce up to 9,000 af/yr from the Simsboro, and up to 4,500 af/yr from the Hooper, provided that the total production in any one year may not exceed 9,000 af. Upon issuance of the new 9,000 af/yr operating permit, the entire 9,000 af/yr will be assigned to the Simsboro and zero af/yr will be assigned to the Hooper. From time to time thereafter, SLR will notify the District of the portion of the 9,000 af/yr (up to but not to exceed 4,500 af/yr) assigned to the Hooper, and the remaining portion of the 9,000 af/yr will be the amount assigned to the Simsboro. SLR understands from the General Manager that, because the

maximum possible variation in assigned pumping from either formation is now only half of the 9,000 af/yr, SLR will have the right at any time to either increase or decrease the amount assigned to the Hooper (so long as such amount does not exceed 4,500 af/yr) and to decrease or increase the amount assigned to Simsboro by an equal amount.

- SLR requests authorization to drill up to 60 new wells at 30 defined well sites. Depending upon the conditions found at each well site, a well located at that well site could be designed and constructed to produce groundwater from either the Simsboro formation or the Hooper formation.
- If more than one well is constructed at a given well site, the wells will meet applicable spacing requirements for a given formation if they are screened into the same formation. SLR understands that there is no applicable spacing requirement between a well screened into the Simsboro and a well screened into the Hooper. The total combined maximum pumping rate of all wells constructed at a given site that are screened into the same formation will be less than or equal to the maximum pumping rate defined for production from that formation at that well site.
- SLR requests that the 9,000 af/yr produced under this new operating permit be authorized to be used for municipal, industrial, manufacturing, and commercial uses, anywhere within Milam and Burleson Counties.
- SLR requests that the term of the new drilling and operating permit be 40 years from the date of issuance of the permit.

Thank you for your consideration of these applications. Please let me know if you have any questions or need additional information.

Respectfully,

Alan Gardenhire
Vice President of Operations, SLR Property I, LP

Application Information

Section 1

SLR
SANDOW LAKES RANCH

POST OAK SAVANNAH GROUNDWATER CONSERVATION DISTRICT (POSGCD)

Permit Application to Drill or Alter and Operate a Non-Exempt Well

Return this completed form to: POSGCD, PO Box 92 (310 East Ave. C), Milano, TX 76556
Phone: 512-455-9900 **FAX:** 512-455-9909 **Email:** admin@posgcd.org
Please type or print legibly. Incomplete applications will be returned to applicant.

Application Date: _____ (Date received by POSGCD) Well Number: _____ (Assigned by POSGCD)

Is the property where this well is or will be located within a subdivision or city? ☐ Yes ☑ No

If yes, please write the name of the subdivision or city: _____

PURPOSE FOR THIS APPLICATION (*Choose one*)

☑ New well

☐ Replacement well; if selected, please briefly explain: _____

☐ Alter an existing well; if selected, please briefly explain: _____

☐ Operate an existing well

☑ Other; if selected, please briefly explain: See Summary of Application in Section 1

SECTION 1: APPLICANT

Name: SLR Property I, LP (First, Middle, Last) Phone: (512) 810-3584

Address: 2825 Oak Lawn Ave. #191577 Email: alang@sandowlakesranch.com

City: Dallas State: TX Zip: 75219

Are you requesting an exemption under Post Oak Savannah GCD Rule 7.10? ☐ Yes ☑ No

If yes, please cite applicable rule, or explain: _____

SECTION 2: FEE REQUIRED

If the applicant intends to drill a new well, increase the size of an existing well, increase the size of a pump on an existing well, or replace a permitted well, then a **$100 NON-REFUNDABLE FEE PER EXISTING, OR PROPOSED WELL** must accompany this application. The applicant may be required to submit any additional information identified by the board during the permitting process as reasonably required or beneficial to the Districts' decision. Additional funds may be required from the applicant if necessary to complete the District's cost of processing the application.

A charge of $25.00 will be assessed for all "returned" checks.

POST OAK SAVANNAH GROUNDWATER CONSERVATION DISTRICT (POSGCD)
Permit Application to Drill or Alter and Operate a Non-Exempt Well

SECTION 3: AUTHORIZATION TO DRILL

Has any part of the water rights of the property for this well been leased, sold, or transferred? ☐ Yes ☑ No

If yes, or if the name and address of the property owner is different than the person shown in Section 1, please complete this section and attach proof of authorization to drill and produce groundwater:

Name: _____ Phone: _____
(First, Middle, Last)

Address: _____ Email: _____

City: _____ State: _____ Zip: _____

Is a copy of authorization to drill on property attached according to Rule 7.4.4? ☐ Yes ☐ No

SECTION 4: MAP & SPACING

You must answer yes to each of the following for this application to be complete:

Is map of area accoring to Rule 7.4.4 attached? ☑ Yes

Is proof of satisfaction of spacing requirements according to Rule 4.1 attached? ☑ Yes

SECTION 5: PURPOSE FOR WATER USE

Type of well (Check one): ☐ Domestic ☑ Municipal ☐ Irrigation ☑ Other

If other, please explain: Municipal, Industrial, Manufacturing, and Commercial

List proposed usage of water produced from well and the amount of usage, including conjunctive use.

Use: Aggregated maximum amount of Amount Used: 9,000 acre-feet/year [redacted]

Use: _____ Amount Used: _____ gallons/day.

Use: _____ Amount Used: _____ gallons/day.

Total Amount to be used: _____ gallons/day.

Location of water usage: within Milam and Burleson Counties

Proposed rate at which water will be withdrawn: See Table 1-1 - Summary of Proposed Wells [redacted]

Aquifer & Formation water is to be drawn from: Carrizo-Wilcox Aquifer; Simsboro & Hooper Formations

The total number of acres that overlies the aquifer and formation listed above that is contiguous to the well listed and located above (Rule 7.4.4): See Responses to Rule 7.4 in Section 1 [redacted]

Total amount of water requested per year: aggregate of 9,000 acre feet (1 acre foot = 325,851 gallons)

POST OAK SAVANNAH GROUNDWATER CONSERVATION DISTRICT (POSGCD)
Permit Application to Drill or Alter and Operate a Non-Exempt Well

SECTION 6: PLANS

Please attach copies of the following studies or plans, or indicate:

☐ Well Closure Plan ☐ Alternative Supply Plan ☑ Conservation Plan ☑ Drought Contingency Plan

Aquifer Impact Study: See attached Section 4 - Response to Rule 7.4.5 - Aquifer Impact Study

☑ Declaration to abide by all Rules and the Management Plan of the District (found in Section 8).
*** In lieu of submitting these plans, the applicant may declare that he/she will abide by the District's Rules and Management Plan as they pertain to these items.*

SECTION 7: Well Information (*POSGCD can assist with this Section*)

Well location (*directions to well site from nearest state or federal highway*): See Note below.

Begin at _____ and then go _____

and then go _____ and then go _____

and then go _____ and then go _____

Well is located in: Milam County ☐ Burleson County ☐

Well coordinates: Latitude: _____ Longitude: _____

Please attach copies of the following schedules or logs, if available:

Driller's Schedule Driller's Log/Report Electric Log

Date well drilled:	Driller's name:	Driller's license number:
Well depth (feet):	Diameter of hole (inches):	Diameter of pipe (inches):
Pump set at (depth of lift in feet):	Depth to water (feet):	Pump size (horse power):
Well capacity (gallons/minute):	Pump power source:	Type of pump:

Request for well to be aggregate with other wells? ☑ Yes ☐ No If yes, list wells below:

Note: See Table 1-1 in Section 1 - Summary of Defined Well Sites at which up to New Wells would be Constructed

POST OAK SAVANNAH GROUNDWATER CONSERVATION DISTRICT (POSGCD)
Permit Application to Drill or Alter and Operate a Non-Exempt Well

SECTION 8: Attachments

Please list all items attached to this permit:

☑ Map of location showing spacing (REQUIRED)

☑ Unique property description (REQUIRED)

Other: _____

SECTION 9: Affirmation and Execution

I certify that all statements and information in this application are true and correct. If the name and address in Section 3 of this application is different than that in Section 1, I also certify that I have authorization to act on behalf of the person(s) in Section 2 and that I also have authorization to produce groundwater from this well. I further declare that all groundwater withdrawn will be put to beneficial use at all times. If I have chosen the Declaration option in Section 6, I here by declare that I will abide by all Rules and the Management Plan of the District according to the District's Rule 7.4.4 D, F, G, and H concerning these items.

Signature of Applicant

THE STATE OF **TEXAS**
COUNTY OF Milam

This instrument was acknowledged before me on (date) April 8, 2022

by (applicant) Alan Gardenhire (SLR Property I, LP).

KAROLYN K PUCCIO
(NOTARY SEAL)
Notary ID #7987139
My Commission Expires
July 18, 2023

Karolyn K. Puccio
Notary Signature

Can be notarized in the presence of any Notary of your choice. There is a Notary at the POSGCD office.

FOR OFFICE USE ONLY

Has appropriate fee been paid to District to process this application?	Yes	No	Amount Paid:
Is Applicant current with District Rules?	Yes	No	
Is application administratevely complete?	Yes	No	

Date of hearing (if applicable): _____

Notes: _____

Summary of Application, Responses to Post Oak Savannah Rule 7.4, and Response to the District's Request for a Description of Flow Measurements

Application by SLR Property I, LP ("SLR") for a New 9,000 af/yr Simsboro & Hooper Drilling and Operating Permit

SUMMARY OF APPLICATION:

By this application, SLR is applying for a new drilling and operating permit to produce 9,000 af/yr of groundwater from the Simsboro & Hooper formations.

SLR requests authorization to produce up to 9,000 af/yr from the Simsboro, and up to 4,500 af/yr from the Hooper, provided that the total production in any one year may not exceed 9,000 af. Upon issuance of the new 9,000 af/yr operating permit, the entire 9,000 af/yr will be assigned to the Simsboro and zero af/yr will be assigned to the Hooper, From time to time thereafter, SLR will notify the District of the portion of the 9,000 af/yr (up to but not to exceed 4,500 af/yr) assigned to the Hooper, and the remaining portion of the 9,000 af/yr will be the amount assigned to the Simsboro. SLR understands from the General Manager that, because the maximum possible variation in assigned pumping from either formation is now only half of the 9,000 af/yr, SLR will have the right at any time to either increase or decrease the amount assigned to the Hooper (so long as such amount does not exceed 4,500 af/yr) and to decrease or increase the amount assigned to Simsboro by an equal amount.

SLR requests authorization to drill and operate up to a total of 60 new wells, at 30 defined well sites. Depending upon the conditions found at each of the 30 well sites, a well located at that well site could be designed and constructed to produce groundwater from either the Simsboro formation or the Hooper formation. If more than one well is constructed at a given well site, the wells will meet applicable spacing requirements for a given formation if they are screened into the same formation. SLR understands that there is no applicable spacing requirement between a well screened into the Simsboro and a well screened into the Hooper. The total combined maximum pumping rate of all wells constructed at a given site that are screened into the same formation will be less than or equal to the maximum pumping rate defined for production from that formation at that well site.

SLR requests that the water produced under the new drilling and operating permit be authorized to be used for municipal, industrial, manufacturing, and commercial uses, anywhere within Milam and Burleson Counties.

SLR requests that the term of the new operating permit be 40 years from the date of issuance of the permit.

RESPONSES TO RULE 7.4. APPLICATION REQUIREMENTS FOR ALL PERMITS.

1. Each original application for a drilling permit, historic use permit, operating permit, transport permit, permit review or renewal, or permit amendment shall be on the form or forms required by the District. The forms will be furnished to the applicant upon request.

2. All permits are granted in accordance with the rules, and acceptance of a permit constitutes an acknowledgment of receipt of the rules and agreement that the permit holder will comply with all of the rules.

3. The application for a permit shall be in writing and sworn to.

   The POSGCD application form included in Section 1 includes a sworn statement, and the application is in writing.

4. The following shall be included in the permit application:

   a. the name and mailing address of the applicant and the owner of the land on which the well is or will be located;

      SLR Property I, LP
      2825 Oak Lawn Ave. #191577
      Dallas, TX 75219

   b. documentation establishing ownership of the land on which the well is or will be located; and, if the applicant is other than the owner of the property or if the water rights have been sold or leased, documentation establishing the applicable authority to construct and operate a well on such property for the proposed use; the documentation must be one or more documents recorded in the real property records of the County in which the land is located;

      See Table 1-1 in Section 1 for the location of each of the 30 well sites referred to in the Summary of Application, above, and unique property description. In Section 2, see Figure 2-1 for a map of property SLR owns in support of this application and Table 2-1 for property descriptions. See Figure 5-1 in Section 5 for a map of the location of each of the 30 well sites in relation to SLR property utilized in support of this application.

   c. a statement of the nature and purpose of the proposed use and the amount of groundwater to be used for each purpose, including, as applicable, any proposed conjunctive use;

      See Summary of Application, above.

   d. a water conservation plan or a declaration that the applicant will comply with the management plan;

See Section 3 for this information. All water will be used beneficially and consistent with the District management plan.

e. the maximum rate at which groundwater is proposed to be withdrawn from each well and a map showing the location of the well and the property owned or controlled by the applicant for the production of water; [Amended July 2, 2019]

See Table 1-1 in Section 1 for the location of each of the 30 well sites referred to in the Summary of Application, above, unique property description, and total combined maximum pumping rate for all wells located at each of the 30 well sites that are screened into the same formation. See Figure 5-1 in Section 5 for a map of the location of each of the 30 well sites and SLR property utilized in support of this application. If more than one well is constructed at a given well site, the wells will meet applicable spacing requirements for a given formation if they are screened into the same formation. SLR understands that there is no applicable spacing requirement between a well screened into the Simsboro and a well screened into the Hooper. The total combined maximum pumping rate of all wells constructed at a given site that are screened into the same formation will be less than or equal to the total combined maximum pumping rate defined for production from that formation at that well site.

The following information is common to all wells:

For each of the 30 well sites, no part of the water rights has been leased, sold, or transferred. SLR owns all rights to the surface estate and groundwater rights for each of the 30 well sites.

No exemption under POSGCD rule 7.10 is requested for any well.

Upon drilling, completing and testing of any well, within 90 days SLR will submit to the POSGCD the following:

1. **TDLR State Well Report**
2. **Geophysical Log**
3. **Results of Water Quality Testing**
4. **Results of Pump Testing**

f. a water well closure plan or a declaration that the applicant will comply with well plugging guidelines and report closure to the District;

SLR will comply with all TCEQ, Texas Department of Licensing and Regulation, and/or District well plugging guidelines. SLR will also furnish well plugging records to the POSGCD.

g. a drought contingency plan if required by state law;

See Section 3 for this information.

h. an alternative supply plan if required by state law or District Rule;

See Section 3 for this information.

i. a statement by the applicant that the groundwater withdrawn under the permit will be put to beneficial use at all times;

The groundwater will be put to beneficial use at all times.

j. the location of the use of the groundwater from the well;

The groundwater will be used within Milam and Burleson Counties.

k. the aquifer and formation or proposed depth from which the applicant intends to produce groundwater;

Depending upon the conditions found at each of the 30 well sites, each well constructed at that site could be designed and constructed to produce water from either the Simsboro formation or the Hooper formation.

l. the total acreage that overlies the aquifer and formation listed under ~~(j)~~(k) above, from which the applicant has the right to produce groundwater;

Summary of SLR property ownership in Milam County overlying the Simsboro Formation:

Full Ownership in Milam County Overlying Simsboro	Groundwater Rights Only in Milam County Overlying Simsboro	Total of Full Ownership plus Groundwater Rights in Milam County Overlying Simsboro
23,681.35 acres	906.4 acres	24,587.75 acres

Summary of SLR property ownership in Milam County overlying the Hooper Formation:

Full Ownership in Milam County Overlying Hooper	Groundwater Rights Only in Milam County Overlying Hooper	Total of Full Ownership plus Groundwater Rights in Milam County Overlying Hooper
23,668.02 acres	916.26 acres	24,584.28 acres

See Figure 2-1 in Section 2 for a map of these Milam County properties.

m. the total number of acres that overlies the aquifer and formation listed under (j) above and that is contiguous to the well(s) listed and located under (e) above; [Amended September 5, 2017]

Summary of SLR contiguous ownership in Milam County overlying the Simsboro Formation:

Full Ownership and Contiguous in Milam County Overlying Simsboro	Groundwater Rights Only and Contiguous in Milam County Overlying Simsboro	Total of Full Ownership plus Groundwater Rights and Contiguous in Milam County Overlying Simsboro
23,377.81 acres	906.4 acres	24,284.21 acres

Summary of SLR contiguous ownership in Milam County overlying the Hooper Formation:

Full Ownership and Contiguous in Milam County Overlying Hooper	Groundwater Rights Only and Contiguous in Milam County Overlying Hooper	Total of Full Ownership plus Groundwater Rights and Contiguous in Milam County Overlying Hooper
23,364.48 acres	916.26 acres	24,280.74 acres

5. Applications for permits for wells that will have a maximum pumping rate that equals or exceeds 500 gpm shall include:

   a. Predictions of pumping impacts on water levels over the next 30 years within a radial distance of 5 miles of the newly permitted well.

   See Section 4 for this information.

   b. The predictions will be based on the newly permitted well pumping it's fully permitted amount and will be submitted in report form that describes the assumptions used in the model run.

   See Section 4 for this information.

c. If a MAG exists for the aquifer from which water will be produced, then the predictions will include results based on using the Groundwater Availability Model run used to establish the MAG for the aquifer. [Amended July 2, 2019]

The new Carrizo-Wilcox, Queen City, Sparta GAM was utilized to simulate the operating permit production. See the Aquifer Impact Study in Section 4 for the assumptions used in the model runs.

d. Predictions made using models other than the GAMs will be accepted by the district.

N/A.

e. Prior to submitting the report, the applicant will meet with POSGCD to agree to the modeling assumptions and the required deliverables.

SLR representatives met with the District and its Hydrogeologist on November 30, 2021 and again on May 20, 2022.

f. Following submittal of the report, POSGCD will review and provide comments on the report and the well owner shall provide written responses to all comments.

g. Wells producing from the Brazos or Little River Alluviums, or wells used for seasonal irrigation (or less than 180 days per year) are exempt from this rule 7.4.5.
[Amended September 5, 2017]

6. Payment by the permittee of the appropriate application fee.

Also, a wire transfer was initiated on this date in the amount of $12,100 - $6,000 of which is for the District's processing of this application and $6,100 of which is for the District's processing of the application for a new 15,000 af/yr Simsboro Operating Permit.

RESPONSE TO THE DISTRICT'S REQUEST FOR A DESCRIPTION OF FLOW MEASUREMENTS.

In addition to the deliverables requested by the District to be included in the Aquifer Impact Study (submitted under Section 4), the District also requested that the application include a description of how production from each of SLR's wells will be metered and how the flow meter data will be analyzed so that the correct volumes will be reported for the amounts produced from each well under each of SLR's production permits. The requested description is set forth below:

(1) SLR holds Historic Use Permit No. 0330 (also referred to as "HUP No. 0330") authorizing production of 15,000 af/yr from the Simsboro formation from a system of 61 authorized wells. The water produced under the permit is authorized to be used for industrial use within the boundaries of SLR's Milam County property.

(2) SLR also holds Drilling and Operating Permit No. 0148 (also referred to as "D&OP No. 0148") authorizing production of 25,000 af/yr from the Simsboro formation from a total of 56 wells, 24 of which are authorized under Operating Permit No. 0148 but not yet constructed, and 32 of which are included in the 61 authorized wells under HUP No. 0330. The groundwater produced under D&OP No. 0148 is authorized to be used for municipal, industrial, manufacturing, and commercial uses anywhere within Milam County (which is within the District), and anywhere within Williamson County and the adjacent Counties of Lee, Travis and Bell (all of which are outside the District). Groundwater produced under D&OP No. 0148 is authorized to be transported for use outside the District under Transport Permit No. 00005.

(3) SLR has applied for a new operating permit to produce 15,000 af/yr from the Simsboro formation using the same 61 authorized wells under Historic Use Permit No. 0330, with a cap of 15,000 af/yr on total combined production under Historic Use Permit No. 0330 and the new operating permit so the current authorized production of 15,000 af/yr will not be increased. SLR requests that water produced under the new operating permit be authorized to be used for municipal, industrial, manufacturing and commercial uses, anywhere within Milam and Burleson Counties.

(4) Thus, if the new overlaying operating permit is granted by POSGCD, the currently authorized 15,000 af/yr production of groundwater from the Simsboro formation could be produced from the 61 authorized wells under either the 15,000 af/yr Historic Use Permit No. 0330 or the new overlaying 15,000 af/yr operating permit.

(5) SLR has also applied for a new drilling and operating permit to produce an additional 9,000 af/yr of groundwater from the Simsboro and Hooper formations. SLR requests authorization to drill up to 60 new wells at 30 defined well sites to produce the additional 9,000 af/yr of groundwater. SLR requests that the additional 9,000 af/yr be authorized to be used for municipal, industrial, manufacturing, and commercial uses, anywhere within Milam and Burleson Counties.

(6) The flow from each producing well will be metered. For each well other than the 61 authorized wells identified above, one meter is all that is needed to be able to assign the amount produced from that well to a particular permit, and to production from either the Simsboro formation or the Hooper formation.

(7) Additional meters will be added at appropriate points as necessary to determine the amount of water produced from any of the 61 wells to be assigned to the correct permit. For example, if all of the flow from a single, isolated well is being used only one permit, then no additional meter is needed for that well. If, however, the water produced from a single, isolated well is

being used under two permits, then one additional meter would be added for that well. One of the two meters for that well will measure the amount of water produced under one of the permits and, depending on how the two meters are arranged, the other meter will measure either the total amount of water produced from the well or the amount produced under the other permit. And, in the highly unlikely event that water from a single, isolated well is being used under all three permits, then a third meter will need to be added for that well. If a number of the 61 wells are operated as a well field, the same rules apply, except the well field then is treated as a single isolated well for purposes of arriving at the number of additional meters needed. For example, if a number of the 61 wells are operated as a well field to produce water used under two of the permits, then only one additional meter is needed for that well field, to measure the total amount produced by the well field under one of the permits; the sum of the metered amounts produced from each well in the well field is the total amount produced from the well field, and the difference between that sum and the measured amount produced by the well field under one of the permits is the amount produced under the other permit; and the amount produced by each well under each permit would be assigned proportionally. If that well field is operated to produce water used under only one of the permits, then no additional meter is needed for that well field.

(8) One or more additional meters will be added at appropriate points to measure the amount of water produced under D&OP No. 0148 that is transported for use outside the District under Transport Permit No. 00005.

(9) If the District desires that the amounts of water produced under any multi-use production permit for each of the authorized purposes of use be reported separately (instead of allowing all use under the permit to be reported as "municipal, industrial, manufacturing, and/or commercial"), the approach used to arrive at the amounts to be separately reported will depend upon various factors, including the number of customers or end users of each use and the amount of water used by each. For example, if all or most of the water supplied under a particular permit is used for one of the listed uses and there are relatively few customers or end users of that water that fall in the other categories, then the most logical approach might be as follows: Identify those relatively few end users that use water for a use other than the most prevalent use; the metered amounts of water supplied to each of those end users would be assigned the correct use for that end user and subtracted from the total production under the permit to arrive at the amount assigned to the most prevalent use.

Table 1-1. Summary of Proposed Simsboro Wells

Well Designation	Longitude	Latitude	Maximum Instantaneous Pumping Rate (GPM)	Well Location – Milam County Appraisal District Property ID
OP9-1	-97.010413	30.618638	300	10354
OP9-2	-97.010247	30.614427	300	10354
OP9-3	-97.008625	30.610151	300	10354
OP9-4	-97.007737	30.602159	300	10354
OP9-5	-97.007957	30.595463	300	10354
OP9-6	-97.011542	30.594079	600	10354
OP9-7	-97.008049	30.590424	300	10354
OP9-8	-97.012425	30.589417	600	10354
OP9-9	-97.015438	30.571389	500	20519072
OP9-10	-97.032990	30.556130	600	20519037
OP9-11	-97.030037	30.553561	600	20519037
OP9-12	-97.022179	30.555194	600	20519037
OP9-13	-97.020848	30.552580	600	20519037
OP9-14	-97.020988	30.548801	600	20519037
OP9-15	-97.044111	30.532258	600	20519037
OP9-16	-97.047234	30.529537	500	20519037
OP9-17	-97.051644	30.523327	500	20519037
OP9-18	-97.058235	30.522266	500	20519037
OP9-19	-97.058101	30.534307	500	20519037
OP9-20	-97.066085	30.527880	500	20519037
OP9-21	-97.072843	30.528557	300	10354
OP9-22	-97.078356	30.531653	300	10354
OP9-23	-97.083917	30.533874	300	10354
OP9-24	-97.069096	30.513067	500	20519037
OP9-25	-97.076719	30.502442	500	20519037
OP9-26	-97.088866	30.496775	500	11598
OP9-27	-97.110438	30.483316	500	11598
OP9-28	-97.112249	30.482408	300	11598
OP9-29	-97.114002	30.481291	300	11598
OP9-30	-97.115993	30.480531	300	11598

Note: All wells are located on tracts owned fully by SLR Property 1, LP. See Table 2-1 for more information.

Table 1-2. Construction Summary for Simsboro Wells

Well Designation	Longitude	Latitude	Ground Level (ft, amsl)	Estimated Depth	
				Top of Screen (ft, bgl)	Bottom of Screen (ft, bgl)
OP9-1	-97.010413	30.618638	481	244	503
OP9-2	-97.010247	30.614427	466	226	484
OP9-3	-97.008625	30.610151	440	185	497
OP9-4	-97.007737	30.602159	436	209	615
OP9-5	-97.007957	30.595463	440	269	648
OP9-6	-97.011542	30.594079	423	236	642
OP9-7	-97.008049	30.590424	410	239	641
OP9-8	-97.012425	30.589417	413	222	659
OP9-9	-97.015438	30.571389	431	330	796
OP9-10	-97.032990	30.556130	463	343	784
OP9-11	-97.030037	30.553561	466	355	819
OP9-12	-97.022179	30.555194	479	398	911
OP9-13	-97.020848	30.552580	470	404	940
OP9-14	-97.020988	30.548801	483	438	990
OP9-15	-97.044111	30.532258	449	335	895
OP9-16	-97.047234	30.529537	463	346	910
OP9-17	-97.051644	30.523327	462	369	936
OP9-18	-97.058235	30.522266	466	327	874
OP9-19	-97.058101	30.534307	509	307	793
OP9-20	-97.066085	30.527880	537	314	807
OP9-21	-97.072843	30.528557	506	221	685
OP9-22	-97.078356	30.531653	505	182	601
OP9-23	-97.083917	30.533874	521	147	536
OP9-24	-97.069096	30.513067	487	266	895
OP9-25	-97.076719	30.502442	522	379	971
OP9-26	-97.088866	30.496775	517	354	900
OP9-27	-97.110438	30.483316	467	211	733
OP9-28	-97.112249	30.482408	474	196	727
OP9-29	-97.114002	30.481291	476	171	711
OP9-30	-97.115993	30.480531	453	152	681

Note: Screen interval is estimated based on interpolation of regional data. Actual depths to be determined based on site-specific test drilling, and design coordination with the District regarding future stratigraphic assignments including any updates to the GAM.

Table 1-3. Well Spacing Information for Proposed Simsboro Wells

Well Designation	Maximum Instantaneous Pumping Rate (GPM)	Distance to Property Boundary (ft)	Distance to Closest Well (ft)	Closest Well Name	Closest Well Permitted Pumping Rate (gpm)
OP9-1	300	198	2,339	OP9-2	300
OP9-2	300	223	3,323	OP9-1	300
OP9-3	300	253	1,730	OP9-2	300
OP9-4	300	211	1,209	OP-3	1000
OP9-5	300	211	1,353	OP9-6	600
OP9-6	600	1,324	1,965	OP9-5	300
OP9-7	300	206	2,180	OP9-8	600
OP9-8	600	1,572	1,667	OP9-7	300
OP9-9	500	310	1,483	C-9-20	450
OP9-10	600	392	2,804	OP9-11	600
OP9-11	600	406	1,858	OP9-10	600
OP9-12	600	1,660	1,596	OP9-13	600
OP9-13	600	635	1,287	OP9-12	600
OP9-14	600	465	1,499	OP9-13	600
OP9-15	600	310	1,728	OP9-16	500
OP9-16	500	532	1,520	OP9-15	600
OP9-17	500	468	1,301	OP-16	1000
OP9-18	500	636	2,548	OP9-17	500
OP9-19	500	2,141	2,195	E-4	1000
OP9-20	500	1,358	1,839	F10 Sims	250
OP9-21	300	538	2,708	OP9-22	300
OP9-22	300	2,074	4,708	OP9-23	300
OP9-23	300	3,342	6,558	OP9-22	300
OP9-24	500	780	650	F5 Sims	250
OP9-25	500	296	1,518	OP-19	1000
OP9-26	500	582	1,310	OP-21	1000
OP9-27	500	2,316	659	OP9-28	300
OP9-28	300	1,827	659	OP9-27	500
OP9-29	300	1,539	685	OP9-28	300
OP9-30	300	1,201	685	OP9-29	300

Table 1-4. Summary of Proposed Hooper Wells

Well Designation	Longitude	Latitude	Proposed Maximum Instantaneous Pumping Rate (GPM)	Well Location – Milam County Appraisal District Property ID
OPH9-1	-97.010469	30.618767	150	10354
OPH9-2	-97.010303	30.614555	150	10354
OPH9-3	-97.008680	30.610280	150	10354
OPH9-4	-97.007734	30.602297	150	10354
OPH9-5	-97.007954	30.595601	150	10354
OPH9-6	-97.011539	30.594217	300	10354
OPH9-7	-97.008046	30.590561	150	10354
OPH9-8	-97.012422	30.589555	300	10354
OPH9-9	-97.015404	30.571523	250	20519072
OPH9-10	-97.033043	30.556259	300	20519037
OPH9-11	-97.030091	30.553691	300	20519037
OPH9-12	-97.022232	30.555323	300	20519037
OPH9-13	-97.020902	30.552710	300	20519037
OPH9-14	-97.021042	30.548931	300	20519037
OPH9-15	-97.044261	30.532212	300	20519037
OPH9-16	-97.047383	30.529491	250	20519037
OPH9-17	-97.051793	30.523281	250	20519037
OPH9-18	-97.058384	30.522220	250	20519037
OPH9-19	-97.058251	30.534260	250	20519037
OPH9-20	-97.066225	30.527945	250	20519037
OPH9-21	-97.072983	30.528622	150	10354
OPH9-22	-97.078496	30.531718	150	10354
OPH9-23	-97.084057	30.533939	150	10354
OPH9-24	-97.069245	30.513020	250	20519037
OPH9-25	-97.076868	30.502395	250	20519037
OPH9-26	-97.088947	30.496657	250	11598
OPH9-27	-97.098057	30.487739	250	11598
OPH9-28	-97.110243	30.481677	150	11598
OPH9-29	-97.112887	30.480248	150	11598
OPH9-30	-97.115531	30.478818	150	11598

Note: All wells are located on tracts owned fully by SLR Property 1, LP. See Table 2-1 for more information.

Table 1-5. Construction Summary for Proposed Hooper Wells

Well Designation	Longitude	Latitude	Ground Level (ft, amsl)	Estimated Depth	
				Top of Screen (ft, bgl)	Bottom of Screen (ft, bgl)
OPH9-1	-97.010469	30.618767	481	503	753
OPH9-2	-97.010303	30.614555	466	484	734
OPH9-3	-97.008680	30.610280	440	497	747
OPH9-4	-97.007734	30.602297	436	615	865
OPH9-5	-97.007954	30.595601	440	648	898
OPH9-6	-97.011539	30.594217	423	642	892
OPH9-7	-97.008046	30.590561	410	641	891
OPH9-8	-97.012422	30.589555	413	659	909
OPH9-9	-97.015404	30.571523	431	796	1046
OPH9-10	-97.033043	30.556259	463	784	1034
OPH9-11	-97.030091	30.553691	466	819	1069
OPH9-12	-97.022232	30.555323	479	911	1161
OPH9-13	-97.020902	30.552710	470	940	1190
OPH9-14	-97.021042	30.548931	483	990	1240
OPH9-15	-97.044261	30.532212	449	895	1145
OPH9-16	-97.047383	30.529491	463	910	1160
OPH9-17	-97.051793	30.523281	462	936	1186
OPH9-18	-97.058384	30.522220	466	874	1124
OPH9-19	-97.058251	30.534260	509	793	1043
OPH9-20	-97.066225	30.527945	537	807	1057
OPH9-21	-97.072983	30.528622	506	685	935
OPH9-22	-97.078496	30.531718	505	601	851
OPH9-23	-97.084057	30.533939	521	536	786
OPH9-24	-97.069245	30.513020	487	895	1145
OPH9-25	-97.076868	30.502395	522	971	1221
OPH9-26	-97.088947	30.496657	517	900	1150
OPH9-27	-97.110300	30.483385	440	723	983
OPH9-28	-97.112387	30.482339	458	726	976
OPH9-29	-97.114258	30.481400	463	711	961
OPH9-30	-97.116130	30.480462	440	668	918

Note: Screen interval is estimated based on interpolation of regional data. Actual depths to be determined based on site-specific test drilling, and design coordination with the District regarding future stratigraphic assignments including any updates to the GAM.

Table 1-6. Well Spacing Information for Proposed Hooper Wells

Well Designation	Proposed Maximum Instantaneous Pumping Rate (GPM)	Distance to Property Boundary (ft)	Distance to Closest Well (ft)	Closest Well Designations	Closest Well Proposed Maximum Pumping Rate (gpm)
OPH9-1	150	233	1,533	OPH9-2	150
OPH9-2	150	223	1,533	OPH9-1	150
OPH9-3	150	255	1,637	OPH9-2	150
OPH9-4	150	211	2,436	OPH9-5	150
OPH9-5	150	211	1,235	OPH9-6	300
OPH9-6	300	1,324	1,235	OPH9-5	150
OPH9-7	150	207	1,425	OPH9-8	300
OPH9-8	300	1,573	1,425	OPH9-7	150
OPH9-9	250	dist	6,271	OPH9-12	300
OPH9-10	300	440	1,318	OPH9-11	300
OPH9-11	300	456	1,318	OPH9-10	300
OPH9-12	300	1,709	1,039	OPH9-13	300
OPH9-13	300	683	1,039	OPH9-12	300
OPH9-14	300	515	1,375	OPH9-13	300
OPH9-15	300	311	1,395	OPH9-16	250
OPH9-16	250	582	1,395	OPH9-15	300
OPH9-17	250	510	2,111	OPH9-18	250
OPH9-18	250	636	2,111	OPH9-17	250
OPH9-19	250	2,169	3,403	OPH9-20	250
OPH9-20	250	1,308	2,142	OPH9-21	150
OPH9-21	150	574	2,069	OPH9-22	150
OPH9-22	150	2,121	1,928	OPH9-23	150
OPH9-23	150	3,292	1,928	OPH9-22	150
OPH9-24	250	830	4,549	OPH9-25	250
OPH9-25	250	337	4,339	OPH9-26	250
OPH9-26	250	622	4,330	OPH9-27	250
OPH9-27	250	2,357	759	OPH9-28	250
OPH9-28	150	1,795	681	OPH9-29	150
OPH9-29	150	1,452	681	OPH9-28	150
OPH9-30	150	1,171	681	OPH9-29	150

Land Ownership

Section 2

SLR
SANDOW LAKES RANCH

Table 2-1. SLR Property Ownership Overlying the Simsboro Formation

Milam County Appraisal District Property ID	Milam County Appraisal District Geographic_ID	SLR Ownership Type
10354	A207-321-001-00	Full Ownership
11236	A369-317-007-00	Full Ownership
11598	A414-318-002-00	Full Ownership
12630	A223-293-051-00	Full Ownership
14414	A378-304-014-00	Full Ownership
14547	A265-321-002-00	GW Rights Only
15510	A196-295-018-00	Full Ownership
17115	A228-321-001-00	GW Rights Only
19675	A340-295-001-00	Full Ownership
20126	A089-320-004-00	Full Ownership
25057	A288-302-001-00	Full Ownership
27832	A087-238-003-00	Full Ownership
20501277	A089-320-006-50	Full Ownership
20512490	A369-317-005-00	Full Ownership
20519037	A207-321-001-02	Full Ownership
20519071	A207-321-001-03	Full Ownership
20519072	A207-321-001-04	Full Ownership
20519948	A207-321-001-05	GW Rights Only
20519949	A207-321-001-06	GW Rights Only
20519950	A207-321-001-07	GW Rights Only
20519951	A207-321-001-08	GW Rights Only
20520283	A207-321-001-00	GW Rights Only
20520445	A207-321-001-09	GW Rights Only
20520844	A207-321-001-10	Full Ownership
20520847	A207-321-001-05	Full Ownership
20520848	A207-321-001-05	Full Ownership
20520849	A207-321-001-11	Full Ownership
20520850	A207-321-001-12	Full Ownership
20520851	A207-321-001-13	Full Ownership

Groundwater rights overlying the Simsboro Formation

Total Acres in Milam County: 24,585.95

Total Contiguous Acres in Milam County: 24,282.41

Note: Property acreages based on survey conducted by:
Bruce L. Bryan RPLS No. 4249
Bryan Technical Services, Inc. TBPLS Firm No. 10128500

Table 2-1 (con't). SLR Property Ownership Overlying the Hooper Formation

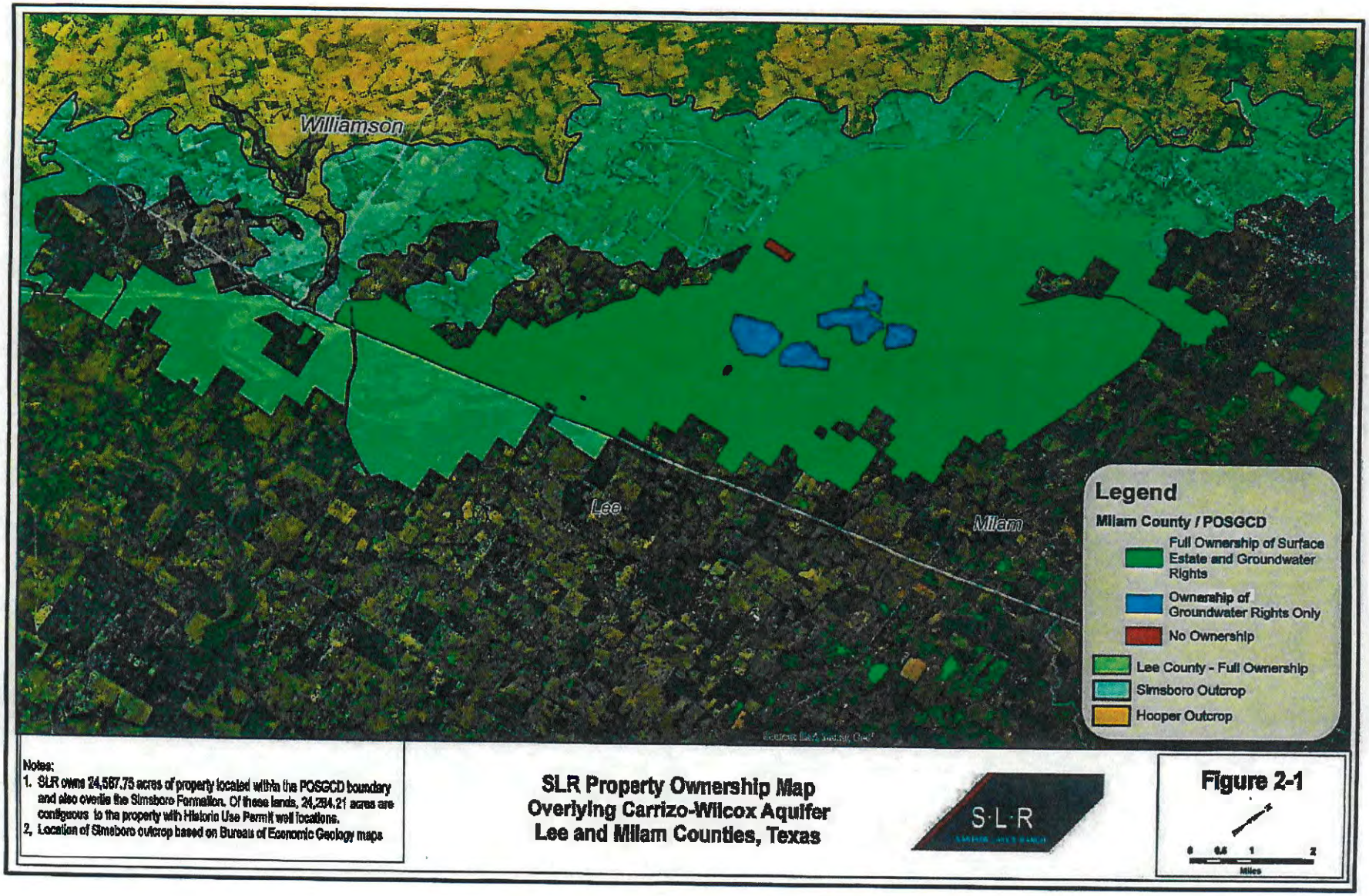
Milam County Appraisal District Property ID	Milam County Appraisal District Geographic_ID	SLR Ownership Type
10354	A207-321-001-00	Full Ownership
11236	A369-317-007-00	Full Ownership
11598	A414-318-002-00	Full Ownership
12630	A223-293-051-00	Full Ownership
14414	A378-304-014-00	Full Ownership
14547	A265-321-002-00	GW Rights Only
15510	A196-295-018-00	Full Ownership
17115	A228-321-001-00	GW Rights Only
19675	A340-295-001-00	Full Ownership
20126	A089-320-004-00	Full Ownership
25057	A288-302-001-00	Full Ownership
27832	A087-238-003-00	Full Ownership
20501277	A089-320-006-50	Full Ownership
20512490	A369-317-005-00	Full Ownership
20519037	A207-321-001-02	Full Ownership
20519071	A207-321-001-03	Full Ownership
20519072	A207-321-001-04	Full Ownership
20519948	A207-321-001-05	GW Rights Only
20519949	A207-321-001-06	GW Rights Only
20519950	A207-321-001-07	GW Rights Only
20519951	A207-321-001-08	GW Rights Only
20520283	A207-321-001-00	GW Rights Only
20520445	A207-321-001-09	GW Rights Only
20520844	A207-321-001-10	Full Ownership
20520847	A207-321-001-05	Full Ownership
20520848	A207-321-001-05	Full Ownership
20520849	A207-321-001-11	Full Ownership
20520850	A207-321-001-12	Full Ownership
20520851	A207-321-001-13	Full Ownership

Groundwater rights overlying the Hooper Formation

Total Acres in Milam County: 24,651.94

Total Contiguous Acres in Milam County: 24,348.40

Note: Property acreages based on survey conducted by:
Bruce L. Bryan RPLS No. 4249
Bryan Technical Services, Inc. TBPLS Firm No. 10128500



Notes:
1. SLR owns 24,587.75 acres of property located within the POSGCD boundary and also overlie the Simsboro Formation. Of these lands, 24,284.21 acres are contiguous to the property with Historic Use Permit well locations.
2. Location of Simsboro outcrop based on Bureau of Economic Geology maps

SLR Property Ownership Map
Overlying Carrizo-Wilcox Aquifer
Lee and Milam Counties, Texas

S·L·R

Figure 2-1

0 0.5 1 2
Miles

Water Conservation Drought Contingency

Section 3

SLR
SANDOW LAKES RANCH

WATER CONSERVATION
AND DROUGHT CONTINGENCY PLAN

For many decades, Alcoa and its predecessor entities utilized and conserved groundwater resources underlying Sandow Lakes Ranch. Prior groundwater use has been primarily in conjunction with lignite mining operations in Milam County and Lee County and industrial operations and power generation in Milam County. This past use includes significant groundwater pumping from the Milam County property within Sandow Lakes Ranch under permits issued by the Post Oak Savanah Groundwater Conservation District (POSGCD).

Looking forward with respect to Sandow Lakes Ranch, groundwater will be produced under amended and new permits issued by the POSGCD and used for municipal, industrial, manufacturing, and commercial uses where the new owner of Sandow Lakes Ranch, SLR Property I, LP (SLR), will not be the end user of the produced groundwater. Future groundwater use may involve the sale of groundwater to a wholesale water supplier and then the resale to one or more retail water utilities or industrial, manufacturing, or commercial users, or the direct sale to one or more retail water utilities or users. In each case, the wholesale water supplier, retail water utility, or user will have water conservation plans and drought contingency plans as required by Texas Administrative Code Title 30, Chapter 288.

Groundwater production will be monitored individually at each well head and at primary pump stations associated with any groundwater delivery contract. Groundwater production will be reported to POSGCD. Ultimately, produced groundwater may be delivered to retail water utilities or, industrial, manufacturing, or commercial users located within, oroutside, the boundaries of the POSGCD. The potential counties that groundwater may be delivered to include Milam, Burleson, Lee, Williamson, Travis, and Bell Counties. A transport permit will be sought for the transfer of any groundwater outside of the POSGCD boundaries.

Upon execution of a water supply contract, the applicable water conservation plans and drought contingency plans of a wholesale water provider, retail public utility or industrial, manufacturing, or commercial user (as applicable) will be provided to the POSGCD prior to production and delivery of supply. Per current requirements of Administrative Code Title 30, Chapter 288, these plans will have specific and quantified five-year and ten-year targets for water savings including, where appropriate, target goals for municipal use in gallons per capita per day for the delivery service area, maximum acceptable water loss, and the basis for the development of these goals. Any industrial, manufacturing, or commercial user will have a process design to minimize water use for the user's application. Where applicable, these plans will include details of conjunctive use of alternative supplies to optimize water savings and increase drought contingency.

Typically, the retail water utilities employ a stage-based drought contingency plan commensurate with the intensity and duration of drought conditions. Many of these drought contingency plans are triggered based on public health and safety concerns that arise when reductions in storage of surface water occur due to drought. When invoked, the stage-based restrictions can include specific water days for landscape irrigation, restrictions on filling of swimming pools, etc., and more heightened stage restrictions can include restriction on additional landscape plantings, vehicle washings, restaurant serving of water only on request and other restrictions.

A retail water utility that ultimately receives groundwater produced from SLR groundwater operating permits issued by the POSGCD shall have a record management system capable of reporting water use by residential, single and multi-family, commercial, institutional, industrial, manufacturing, and wholesale categories. The retail water utility shall utilize a water rate structure that is not promotional and does not encourage the excessive use of water. For any retail public water utility that serves a current

population of 5,000 or more and/or a projected population of 5,000 or more within the next ten years subsequent to the effective date of its water conservation plan, the utility shall have a program of leak detection, repair and water loss accounting for the water transmission, delivery, and distribution system. The utility's water conservation plan shall also address, as applicable or as required by the Texas Commission of Environmental Quality, conservation-oriented water rates and water rate structures; the adoption of ordinances, plumbing codes, and/or rules requiring water-conserving fixtures; the reuse or recycling of wastewater or graywater; a program and/or ordinance(s) for landscape water management; and a program for pressure control and/or reduction in the distribution system and/or customer connections.

As applicable, an industrial, manufacturing, or commercial water user will have a description of how the water is utilized, and the estimated quantity of water consumed in any process or operation and therefore not available for reuse or discharge. Water metering requirements will be identified, as well as a leak detection, repair and accounting for water loss in water distribution system. If applicable, the water conservation plan will describe the application of state-of-the-art equipment and/or process modifications to improve water efficiency.

Each wholesale water provider, retail public water utility, or industrial, manufacturing, or commercial water user will review and update its water conservation and its drought contingency plans (as applicable) every five years to coincide with regional water planning. These updated plans will be submitted to POSGCD for the life of the operating permit.

Groundwater would be provided to one or more public water suppliers or industrial, manufacturing, or commercial users who may engage in conjunctive use. Opportunities for conjunctive use are favorable, as groundwater from the Carrizo-Wilcox is a drought resistant supply that would reduce risk of water shortages during droughts for entities that currently rely solely on surface water. Implementation of these conjunctive use opportunities will likely require coordination and cooperation of different entities – both public water suppliers and wholesale water providers. These conjunctive use opportunities are long-term investments for improving safety and reliability of public water systems, and management of water resources.

Response to POSGCD Rule 7.4.5 Aquifer Impact Study

Section 4

SLR

SANDOW LAKES RANCH

Response to Post Oak Savannah Rule 7.4.5 - Aquifer Impact Study

SLR Property I, LP

Application for a 9,000 af/yr Simsboro / Hooper Operating Permit

Prepared by:

HARDEN
HYDROLOGY &
ENGINEERING

July 26, 2022

STATE OF TEXAS
ROBERT HARDEN
79290
LICENSED
PROFESSIONAL ENGINEER

Bob Harden

The seal appearing on this document was authorized
by Robert Harden, P.E. 79290
on July 26, 2022.
Firm Registration Number: F-19082

Response to Rule 7.4.5 - Aquifer Impact Study

SLR Property I, LP

Application for a 9,000 af/yr Simsboro / Hooper Operating Permit

At the request of Sandow Lakes Ranch I, LP (SLR), Harden Hydrology & Engineering, PLLC (HHE) has prepared this Aquifer Impact Study for purposes of addressing the requirements of Rule 7.4.5 of the Post Oak Savannah Groundwater Conservation District (District).

By this application, SLR is applying for a new drilling and operating permit to produce 9,000 af/yr of groundwater from the Simsboro & Hooper formations.

SLR requests authorization to produce up to 9,000 af/yr from the Simsboro, and up to 4,500 af/yr from the Hooper, provided that the total production in any one year may not exceed 9,000 af. Upon issuance of the new 9,000 af/yr operating permit, the entire 9,000 af/yr will be assigned to the Simsboro and zero af/yr will be assigned to the Hooper. From time to time thereafter, SLR will notify the District of the portion of the 9,000 af/yr (up to but not to exceed 4,500 af/yr) assigned to the Hooper, and the remaining portion of the 9,000 af/yr will be the amount assigned to the Simsboro. SLR understands from the General Manager that, because the maximum possible variation in assigned pumping from either formation is now only half of the 9,000 af/yr, SLR will have the right at any time to either increase or decrease the amount assigned to the Hooper (so long as such amount does not exceed 4,500 af/yr) and to decrease or increase the amount assigned to Simsboro by an equal amount.

SLR requests authorization to drill and operate up to a total of 60 new wells, at 30 defined well sites. Depending upon the conditions found at each of the 30 well sites, a well located at that site could be screened into either the Simsboro formation or into the Hooper formation. If more than one well is constructed at a given well site, the wells will meet applicable spacing requirements for a given formation if they are screened into the same formation. SLR understands that there is no applicable spacing requirement between a well screened into the Simsboro and a well screened into the Hooper. The total combined maximum pumping rate of all wells constructed at a given site that are screened into the same formation will be less than or equal to the maximum pumping rate defined for production from that formation at that well site.

SLR requests that the water produced under the new drilling and operating permit be authorized to be used for municipal, industrial, manufacturing, and commercial uses, anywhere within Milam and Burleson Counties.

SLR requests that the term of the new operating permit be 40 years from the date of issuance of the permit.

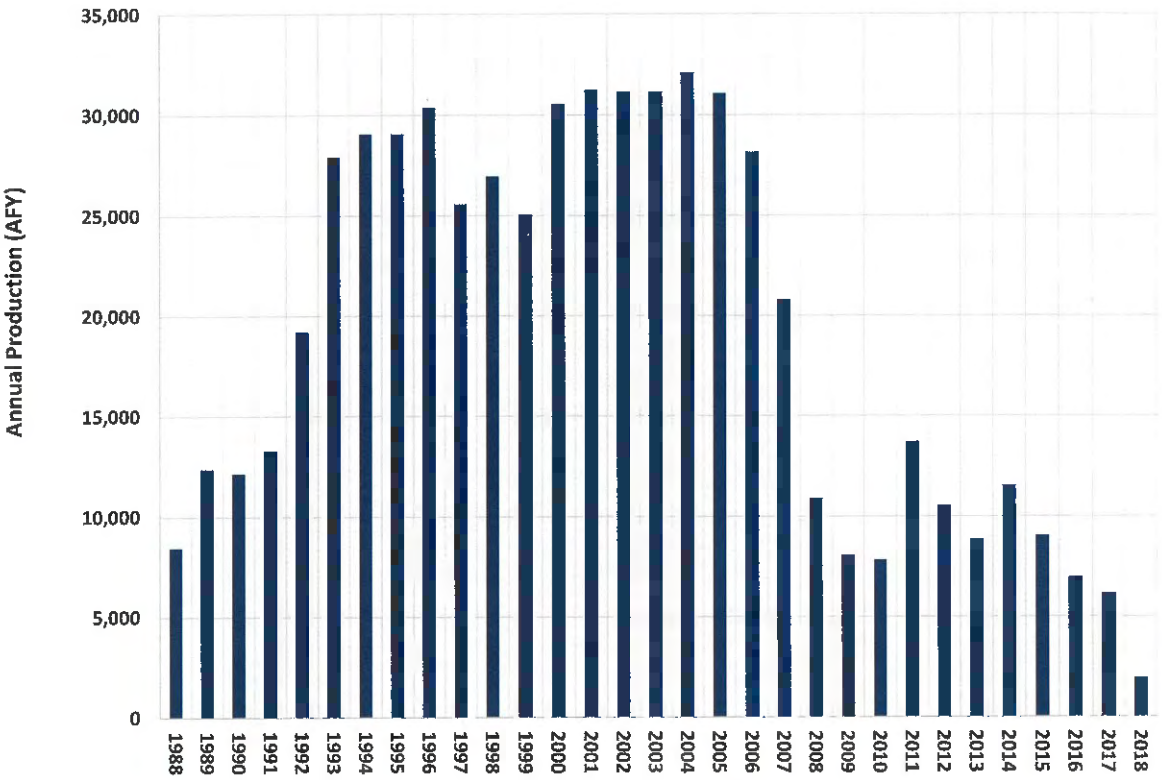
This report presents historical information collected by Alcoa regarding Alcoa's historical Simsboro production at its Sandow Mine and Rockdale Operations, as well as past well mitigation activities conducted by Alcoa in compliance with mining regulations. This report also

presents the results of modeling projections of future groundwater conditions through the requested 40-year term of the propsoed operating permit in response to District Rule 7.4.5.

Alcoa Historical Simsboro Production

Alcoa began producing Simsboro aquifer groundwater in significant quantities in the 1980s, in large part to depressurize the Simsboro aquifer for safe mining of lignite to fuel the electric generation units located at Alcoa's Rockdale Operations. Before then and thereafter, Simsboro water was also used for cooling and industrial processes. Figure 4-1 shows Alcoa's annual Simsboro production from wells located at the Sandow Mine during the period from 1988 through 2018. As shown, withdrawals during the late 1980s and early 1990s averaged about 12,000 af/yr. Average production increased as mining progressed at Sandow, where an average production rate of about 30,000 af/yr was maintained for about 14 years, peaking at about 33,000 af/yr. Simsboro production from the Sandow mine area started decreasing in 2007 as primary mining operations were transferred to the neighboring Three Oaks Mine. Reclamation activities at Sandow mine continued for 10+ years with total use of about 10,000 af/yr. Most recently, after the closure of Alcoa's primary aluminum smelter and the cessation of power generation at Alcoa's Rockdale Operations, groundwater use has declined further.

Figure 4-1. Estimated Historical Simsboro Production at Sandow Mine



Note: Simsboro production shown in Figure 4-1 reflects all industrial pumping from Simsboro Formation wells associated with the Sandow Mine in Milam and Lee Counties.

Four different model runs, and 16 specific deliverables, were prepared for this application. The model runs and their assumptions, and the deliverables, are listed below in Table 1.

Table 1. Modeling Assumptions and Deliverables for Simsboro / Hooper Operating Permit of 9,000 af/yr

Item	List of Assumptions for Groundwater Model Runs
A-1	The baseline GAM simulation is GMA 12 Pumping Scenario #19 (S-19), with small additional amounts of estimated Hooper production from City of Hutto wells. This simulation is called GAM A-1 (or GAM Run A-1). GAM Run A-1 period of simulation is from January 1, 2011 through December 31, 2070.
A-2	A modified GAM A-1 simulation that includes Simsboro Aquifer pumping up to 15,000 af/yr at 61 approved well locations associated with SLR's approved Historical Permit 0330, and up to 25,000 af/yr under SLR's 25,000 af/yr Operating Permit 0148 at the operating permit's 56 approved wells from Jan 1, 2023 to Dec 31, 2062, and then continuing through December 31, 2070 to align with GAM Run A-1. This simulation is called GAM Run B-2 (or Model Run B-2).
A-3	A modified GAM Run B-2 simulation that includes up to 9,000 af/yr of Simsboro Aquifer production at 30 proposed well locations from January 1, 2025 to December 31, 2062, and then continuing through December 31, 2020 to align with GAM Run B-2. This simulation is called GAM Run B-3 (or Model Run B-3).
A-4	A modified GAM Run B-2 simulation that includes up to 9,000 af/yr of production from the Hooper Aquifer at 30 proposed well locations from January 1, 2025 to December 31, 2062, and then continuing through December 31, 2070 to align with GAM Run B-2. This simulation is called GAM Run B-4 (or Model Run B-4).
	List of Deliverables for Groundwater Model Runs
D-1	A table that contains the following information for the 30 proposed Simsboro Aquifer production wells: (1) latitude; (2) longitude; (3) estimated ground elevation; (4) proposed depth of top of well screen below current ground elevation; and (5) proposed depth of bottom of screen below current ground elevation.
D-2	A table that contains the following information for the 30 proposed Hooper Aquifer production wells: (1) latitude; (2) longitude; (3) estimated ground elevation; (4) proposed depth of top of well screen below current ground elevation; and (5) proposed depth of bottom of screen below current ground elevation.
D-3	A table that lists the maximum pumping rate and the distance to the nearest approved or proposed well in the Simsboro Aquifer for the 30 proposed well sites.
D-4	A table that lists the maximum pumping rate and the distance to the nearest proposed well in the Hooper Aquifer for the 30 proposed well sites.
D-5	A table listing of the annual pumping rates assigned to the 30 Simsboro Aquifer proposed wells from Jan 1, 2025 to December 31, 2070 for GAM Run B-3.
D-6	A table listing of the annual pumping rates assigned to the 30 Hooper Aquifer proposed wells from Jan 1, 2025 to December 31, 2070 for GAM Run B-4.
D-7	A table that lists the average drawdown for the entire Simsboro Aquifer (GAM Layer 9) within POSGCD for GAM Runs A-1, B-2, B-3, and B-4 for time periods: 2010 to 2020, 2010 to 2030, 2010 to 2040, 2010 to 2050, 2010 to 2060, and 2010 to 2070.
D-8	A table that lists the average drawdown for the entire Hooper Aquifer within POSGCD for GAM Runs A-1, B-2, B-3, and B-4 for time periods: 2010 to 2020, 2010 to 2030, 2010 to 2040, 2010 to 2050, 2010 to 2060, and 2010 to 2070.

Table 1. Modeling Assumptions and Deliverables for Simsboro / Hooper Operating Permit of 9,000 af/yr (con't)

D-9	A table that includes the average drawdown that occurs in model layer 2 for the Simsboro Aquifer outcrop and for entire Carrizo-Wilcox Aquifer (combined Hooper, Simsboro, Calvert Bluff and Carrizo) outcrop for GAM Runs A-1, B-2, B-3, and B-4. For each GAM Run, the average drawdowns for the two outcrop sections is provided for: 2010 to 2020, 2010 to 2030, 2010 to 2040, 2010 to 2050, 2010 to 2060, and 2010 to 2070.
D-10	A table that includes the average drawdown that occurs in model layer 2 for the Hooper Aquifer outcrop and for entire Carrizo-Wilcox Aquifer (combined Hooper, Simsboro, Calvert Bluff and Carrizo) outcrop for GAM Runs A-1, B-2, B-3, and B-4. For each GAM Run, the average drawdowns for the two outcrop sections is provided for: 2010 to 2020, 2010 to 2030, 2010 to 2040, 2010 to 2050, 2010 to 2060, and 2010 to 2070.
D-11	A table that includes differences between GAM Runs B-2, B-3, and B-4.
D-12	A contour map of predicted drawdown in the Hooper, Simsboro, and Calvert Bluff aquifers, and in the outcrop of the Carrizo-Wilcox aquifer from January 1, 2020 to December 31, 2062 for GAM Run B-3. In addition, a second set of contours that show the difference in drawdowns between GAM Runs B-2 and B-3 in the Hooper, Simsboro, Calvert Bluff aquifers, and in the outcrop of the Carrizo-Wilcox aquifer. Registered wells within five miles of any SLR production well should be shown in the figures.
D-13	A contour map of predicted drawdown in the Hooper and Simsboro aquifers and in the outcrop of the Carrizo-Wilcox aquifer from January 1, 2020 to December 31, 2062 for GAM Run B-4. In addition, a second set of contours that show the difference in drawdowns between GAM Runs B-2 and B-4 in the Hooper and Simsboro aquifers, and in the outcrop of the Carrizo-Wilcox aquifer. Registered wells within five miles of any SLR production well should be shown in the figures.
D-14	An assessment of changes in land subsidence that will occur from the difference in drawdown between GAM Runs A-1, B-2, B-3, and B-4. The assessment needs to discuss the applicability of the recent TWDB tool for estimating risk associated with land subsidence.
D-15	An assessment of changes in surface water -groundwater interaction that will occur from the difference in drawdown between GAM Runs A-1, B-2, B-3, and B-4.
D-16	Electronic files for model inputs and outputs for GAM Runs A-1, B-2, B-3, and B-4.

SLR representatives met with the District and its Hydrogeologist on November 30, 2021. Based on the results of this meeting, SLR provided the District, via email dated December 14, 2021, with suggested assumptions and deliverables for this permit application. SLR representatives again met with District representatives on May 20, 2022, and based on the results of this meeting SLR made certain revisions to the application.

Pumping Input Specific to Sandow Lakes Property

The first step in assembling the assumed model runs, was to assign annual production for GAM Run B-2, GAM Run B-3, and GAM Run B-4. Table 2 is a listing of the annual production simulated for GAM Run A-1 (GMA Run S-19), GAM Run B-2 (the 15,000 af/yr authorized production under the 15,000 af/yr Historic Use Permit 0330 and the 15,000 af/yr proposed new operating permit; and the 25,000 af/yr authorized production under Operating Permit 0148), and GAM Runs B-3 & B-4 (the combination of the 15,000 af/yr authorized production under the 15,000 af/yr Historic Use Permit 0330 and the 15,000 af/yr proposed new operating permit; the

25,000 af/yr authorized production under Operating Permit 0148; and the 9,000 production under the proposed new Simsboro/Hooper 9,000 af/yr operating permit).

Table 2. Simulated Pumping Schedule by Year for GAM Runs A-1, B-2, B-3 and B-4 for SLR Milam County Property

		MODEL PUMPING BY YEAR (af/yr)					
		GAM Run A-1	GAM Run B-2		GAM Run B-3 / B-4		
Stress Period	Year	GMA 12 Run S-19	25,000 af/yr Production (currently authorized under Operating Permit 0148)	15,000 af/yr Production (proposed to be authorized under new Operating Permit and Historic Permit 0330)	25,000 af/yr Production (currently authorized under Operating Permit 0148)	15,000 af/yr Production (proposed to be authorized under new Operating Permit and Historic Permit 0330)	Proposed 9,000 af/yr Operating Permit
1	2011	13,139	0	0	0	0	0
2	2012	8,638	0	0	0	0	0
3	2013	8,665	0	0	0	0	0
4	2014	11,365	0	0	0	0	0
5	2015	8,489	0	0	0	0	0
6	2016	5,794	0	0	0	0	0
7	2017	4,837	0	0	0	0	0
8	2018	913	0	0	0	0	0
9	2019	47	0	0	0	0	0
10	2020	48	0	0	0	0	0
11	2021	48	0	0	0	0	0
12	2022	44	0	0	0	0	0
13	2023	45	0	2,000	0	2,000	0
14	2024	45	14,000	3,000	14,000	3,000	0
15	2025	45	17,000	5,000	17,000	5,000	4,000
16	2026	46	17,000	7,000	17,000	7,000	5,000
17	2027	46	20,000	9,000	20,000	9,000	6,000
18	2028	47	21,000	12,000	21,000	12,000	7,000
19	2029	47	23,000	13,000	23,000	13,000	8,000
20 - 60	2030 - 2070	23,609 to 23,626	25,000	15,000	25,000	15,000	9,000

Since the 15,000 af/yr Historic Use permit term is through December 31, 2038 and the requested new 15,000 af/yr operating permit term is through approximately 2062, Model Run B-2 assumes the 15,000 af/yr production authorization would be continued through 2070. Likewise, since the 25,000 af/yr operating permit term is through November 13, 2052, for modeling purposes it is assumed this authorized production would be continued through 2070. These assumptions of production through 2070 allow comparison with GAM Run A-1.

The next step in preparing Model Run B-2 was to inspect the A-1 model run and identify the amount of assumed historical Alcoa pumping and future SLR pumping in the model simulation that could be attributed to the Milam County portion of SLR's Sandow Lakes Ranch. SLR's Milam County property (which consists of nearly 25,000 acres) supports currently permitted production of 40,000 af/yr (15,000 af/yr under SLR's Historic Permit 0330 and 25,000 af/yr under SLR's Operating Permit 0148). This work effort indicates that assumed pumping of approximately 23,600 af/yr is assigned in the model nodes associated with SLR's Milam County property.[1] The assumed SLR future pumping in Model Run A-1 (23,600 af/yr) is less than SLR's currently permitted production (40,000 af/yr), and it is not documented what the basis of distributing SLR pumping was used in the pumping assumptions for GAM Run A-1. Table 3 is a summary of the assumed SLR pumping assigned by decade in GAM Run A-1 in the model nodes associated with SLR's Milam County property.

To construct Model Run B-2 pumping input, the first step was to remove the assigned SLR production from 2020 through 2070 from GAM Run A-1, and then SLR pumping was substituted for each permitted Historic Permit 0330 and Operating Permit 0148 well location considering the well's hydrogeologic location, and approved production capacity and the total of the individual permitted well approved production capacities, for each permit's wells. This ratio was then multiplied by the ratio of the simulated annual production divided by the permitted annual limit (15,000 af/yr for the new 15,000 af/yr operating permit and the 15,000 af/yr Historic Permit 0330, and 25,000 af/yr for Operating Permit 0148) to arrive at an annual production associated with each permitted well location. This creates a pumping file for GAM Run B-2 equal to SLR's currently permitted 40,000 af/yr. Table 4 shows assumed Model Run B-2 production rate for the 29 wells associated with Historic Permit 0330, the 31 dual permit wells associated with Historic Permit 330 and Operating Permit 0148, and the 24 proposed wells approved under Operating Permit 0148. Table 5 is summary of the assumed SLR pumping assigned by decade in GAM Run B-2 in the model nodes associated with SLR's Milam County property.

To construct Model Run B-3 pumping input, each proposed Simsboro well's production capacity was considered versus the total of the individual permitted well production capacities for 9,000 af/yr of Simsboro pumping. This was then multiplied by the ratio of the simulated annual production divided by the proposed annual limit of 9,000 af/yr to assign an annual production associated with each proposed Simsboro well location. This creates pumping assignments for each proposed Simsboro well. Table 6 shows the assumed Model Run B-3 production rate for each of the 30 proposed Simsboro wells. Table 7 shows a summary of the simulated 9,000 af/yr assigned by decade for each model node assuming all production is from the Simsboro aquifer. The assumed production depicted in Table 7 is aggregated with the Model Run B-2 production (Table 5) to complete the Model Run B-3 pumping file.

---

[1] Based on permitted well locations, it also appears there is about 45 to 65 af/yr of assumed pumping placed in the model in nodes 156238, 156239, 156888, and 157595. It is believed that pumping in nodes 156238 and 156239 represent Rockdale Country Club pumping, and it is assumed pumping in nodes 156888 and 157595 are small amounts of exempt use.

A similar approach was used for Model Run B-4 using the Hooper well characteristics, and Model Run B-4 assumes half of the proposed production limit of 9,000 af/yr would be produced in the Hooper aquifer. Table 8 is the assumed Model Run B-4 production rates for the 30 proposed Hooper wells, and Table 9 is a summary of the model input by decade assuming 4,500 af/yr were to be produced from the Hooper and 4,500 af/yr from the Simsboro. Table 9 model input is combined with Model Run B-2 (Table 5) to produce the model pumping input for Model Run B-4.

All groundwater model files (GAM Run A-1, B-2, B-3, and B-4) have been provided to the POSGCD.

Table 3. Pumping by Decade for Model Nodes Associated with Sandow Lakes Property in Milam County Model Run A-1

Model Node	MODEL A-1 PUMPING BY DECADE (af/yr)					
	2020	2030	2040	2050	2060	2070
156215		394.79	394.79	394.79	394.79	394.79
156217		394.79	394.79	394.79	394.79	394.79
156222		394.79	394.79	394.79	394.79	394.79
156225		789.58	789.58	789.58	789.58	789.58
156226		394.79	394.79	394.79	394.79	394.79
156238	22.62	22.33	24.31	26.29	28.26	30.24
156239	22.62	22.33	24.31	26.29	28.26	30.24
156888	1.29	1.42	1.57	1.73	1.91	2.11
156890		789.58	789.58	789.58	789.58	789.58
156892		394.79	394.79	394.79	394.79	394.79
156894		789.58	789.58	789.58	789.58	789.58
156898		394.79	394.79	394.79	394.79	394.79
156901		689.87	689.87	689.87	689.87	689.87
156902		789.58	789.58	789.58	789.58	789.58
157595	1.29	1.42	1.57	1.73	1.91	2.11
157597		3,947.88	3,947.88	3,947.88	3,947.88	3,947.88
157598		1,579.15	1,579.15	1,579.15	1,579.15	1,579.15
157599		394.79	394.79	394.79	394.79	394.79
157601		789.58	789.58	789.58	789.58	789.58
157604		394.79	394.79	394.79	394.79	394.79
157607		789.58	789.58	789.58	789.58	789.58
157608		394.79	394.79	394.79	394.79	394.79
157609		1,973.94	1,973.94	1,973.94	1,973.94	1,973.94
157610		1,184.36	1,184.36	1,184.36	1,184.36	1,184.36
157612		394.79	394.79	394.79	394.79	394.79
157614		394.79	394.79	394.79	394.79	394.79
157615		1,973.94	1,973.94	1,973.94	1,973.94	1,973.94
158242		368.47	368.47	368.47	368.47	368.47
158247		789.58	789.58	789.58	789.58	789.58
158248		1,973.94	1,973.94	1,973.94	1,973.94	1,973.94
Totals:	47.81	23,608.75	23,613.00	23,617.28	23,621.60	23,625.95

Table 4.
Assumed Pumping Rate by Approved Wells for Model Run B-2

Well Designation	Approved Permit	Model Node	Approved Production Capacity (GPM)	Assumed Rate for Model Run B-2 (gpm)	(ft3/day)
58-32-502	Dual HUP - OP	156226	500	443	85,331.89
58-32-503	Dual HUP - OP	156225	500	443	85,331.89
58-32-504	HUP	156225	500	209	40,289.86
58-32-505	HUP	156225	500	209	40,289.86
A-9-2	HUP	157601	540	226	43,513.05
A-9-3	HUP	157601	540	226	43,513.05
AT-1	Dual HUP - OP	157599	500	290	85,331.89
AT-2	HUP	157610	500	209	40,289.86
C4052A	Dual HUP - OP	157608	300	267	51,391.63
C4245	Dual HUP - OP	157609	240	214	41,113.31
C4246	Dual HUP - OP	157609	250	222	42,665.94
C4247	Dual HUP - OP	157609	240	214	41,113.31
C4248A	Dual HUP - OP	157609	230	205	39,368.17
C4250A	Dual HUP - OP	157609	290	259	49,838.99
C4440A	HUP	157612	440	184	35,455.08
C5245B	Dual HUP - OP	157614	410	361	69,433.15
C-9-12	Dual HUP - OP	157607	440	390	75,053.56
C-9-13	Dual HUP - OP	157610	320	283	54,496.91
C-9-14	Dual HUP - OP	157607	420	374	71,948.28
C-9-15	HUP	158247	250	105	20,144.93
C-9-16	HUP	158248	420	176	33,843.48
C-9-17	HUP	158248	260	109	20,950.73
C-9-18	HUP	158248	510	213	41,095.66
C-9-19	HUP	157615	460	193	37,066.67
C-9-20	Dual HUP - OP	158247	450	398	76,606.20
C-9-23	HUP	157610	420	176	33,843.48
C-9-26	HUP	157615	620	260	49,959.43
C-9-27	HUP	157615	500	209	40,289.86
C-9-29	HUP	158248	370	155	29,814.50
C-9-30	HUP	158248	420	176	33,843.48
C-9-31	HUP	157615	450	188	36,260.88
DP-S-A-3	Dual HUP - OP	156902	250	222	42,665.94
DP-S-A-4	Dual HUP - OP	156902	250	222	42,665.94
DP-S-A-5	Dual HUP - OP	156901	250	222	42,665.94
DP-S-A-6	Dual HUP - OP	156901	250	222	42,665.94
DP-S-A-7	Dual HUP - OP	156898	250	222	42,665.94
E-1	Dual HUP - OP	157613	1000	580	170,663.77
E-2	HUP	156894	1000	419	80,579.72
E-3	HUP	156894	1000	419	80,579.72
E-4	HUP	156894	1000	419	80,579.72
F1 Sims	HUP	157597	560	234	45,124.64
F10 Sims	Dual HUP - OP	157598	250	222	42,665.94

Table 4.
Assumed Pumping Rate by Approved Wells for Model Run B-2(con't)

Well Designation	Approved Permit	Model Node	Approved Production Capacity (GPM)	Assumed Rate for Model Run B-2 (gpm)	(ft3/day)
F11 Sims	Dual HUP - OP	157598	250	222	42,665.94
F12 Sims	Dual HUP - OP	156892	250	222	42,665.94
F13 Sims	Dual HUP - OP	157597	250	222	42,665.94
F14 Sims	Dual HUP - OP	157597	250	222	42,665.94
F15 Sims	Dual HUP - OP	157597	250	222	42,665.94
F2 Sims	Dual HUP - OP	157597	250	222	42,665.94
F3 Sims	HUP	157597	250	105	20,144.93
F4 Sims	Dual HUP - OP	157597	250	222	42,665.94
F5 Sims	HUP	157597	250	105	20,144.93
F5222A	HUP	156890	500	209	40,289.86
F5222B	HUP	156890	200	84	16,115.94
F6 Sims	Dual HUP - OP	157597	250	222	42,665.94
F8 Sims	Dual HUP - OP	157598	250	222	42,665.94
F9 Sims	Dual HUP - OP	157598	250	222	42,665.94
NFD-02 Sims	HUP	157597	500	209	40,289.86
P-5	Dual HUP - OP	157615	500	443	85,331.89
South Crusher	HUP	156217	500	209	40,289.86
Storm Shelter	HUP	156215	500	209	40,289.86
Wash Rack	HUP	156222	500	209	40,289.86
OP-1	OP	156916	1000	120	23,100.00
OP-2	OP	156911	1000	160	30,800.00
OP-3	OP	157617	1000	180	34,650.00
OP-4	OP	157614	1000	250	48,125.00
OP-5	OP	157614	1000	265	51,012.50
OP-6	OP	158246	1000	500	96,249.99
OP-7	OP	158246	1000	500	96,249.99
OP-8	OP	158246	1000	500	96,249.99
OP-9	OP	158245	1000	500	96,249.99
OP-10	OP	158245	1000	500	96,249.99
OP-11	OP	158245	1000	500	96,249.99
OP-12	OP	158245	1000	500	96,249.99
OP-13	OP	158245	1000	500	96,249.99
OP-14	OP	158244	1000	500	96,249.99
OP-15	OP	158244	1000	500	96,249.99
OP-16	OP	158244	1000	500	96,249.99
OP-17	OP	158243	1000	500	96,249.99
OP-18	OP	157597	1000	420	80,849.99
OP-19	OP	157596	1000	350	67,375.00
OP-20	OP	157596	1000	330	63,525.00
OP-21	OP	157595	1000	330	63,525.00
OP-22	OP	157595	1000	325	62,562.50
OP-23	OP	156889	1000	325	62,562.50
OP-24	OP	156889	1000	300	57,750.00

Table 5. Pumping by Decade for Model Nodes Associated with Sandow Lakes Property in Milam County - Model Runs B-2

Model Node	MODEL B-2 PUMPING BY YEAR (af/yr)						
	2020	2024	2030	2040	2050	2060	2070
156215		67.52	337.60	337.60	337.60	337.60	337.60
156217		67.52	337.60	337.60	337.60	337.60	337.60
156222		67.52	337.60	337.60	337.60	337.60	337.60
156225		446.44	1,390.21	1,390.21	1,390.21	1,390.21	1,390.21
156226		311.40	715.02	715.02	715.02	715.02	715.02
156238	22.62	21.15	22.33	24.31	26.29	28.26	30.24
156239	22.62	21.15	22.33	24.31	26.29	28.26	30.24
156888	1.29	1.34	1.42	1.57	1.73	1.91	2.11
156889		564.55	1,008.13	1,008.13	1,008.13	1,008.13	1,008.13
156890		94.53	472.64	472.64	472.64	472.64	472.64
156892		155.70	357.51	357.51	357.51	357.51	357.51
156894		405.12	2,025.59	2,025.59	2,025.59	2,025.59	2,025.59
156898		155.70	357.51	357.51	357.51	357.51	357.51
156901		311.40	715.02	715.02	715.02	715.02	715.02
156902		311.40	715.02	715.02	715.02	715.02	715.02
156911		144.53	258.08	258.08	258.08	258.08	258.08
156916		108.39	193.56	193.56	193.56	193.56	193.56
157595	1.29	592.99	1,057.94	1,058.09	1,058.25	1,058.43	1,058.63
157596		614.23	1,096.84	1,096.84	1,096.84	1,096.84	1,096.84
157597		1,524.24	3,875.82	3,875.82	3,875.82	3,875.82	3,875.82
157598		622.80	1,430.03	1,430.03	1,430.03	1,430.03	1,430.03
157599		311.40	715.02	715.02	715.02	715.02	715.02
157601		145.84	729.21	729.21	729.21	729.21	729.21
157607		536.69	1,231.76	1,231.76	1,231.76	1,231.76	1,231.76
157608		187.74	430.62	430.62	430.62	430.62	430.62
157609		782.12	1,793.99	1,793.99	1,793.99	1,793.99	1,793.99
157610		322.99	1,077.82	1,077.82	1,077.82	1,077.82	1,077.82
157612		59.42	297.09	297.09	297.09	297.09	297.09
157613		622.80	1,430.03	1,430.03	1,430.03	1,430.03	1,430.03
157614		718.01	1,412.50	1,412.50	1,412.50	1,412.50	1,412.50
157615		585.53	2,085.67	2,085.67	2,085.67	2,085.67	2,085.67
157617		162.59	290.34	290.34	290.34	290.34	290.34
158243		451.64	806.50	806.50	806.50	806.50	806.50
158244		1,354.92	2,419.51	2,419.51	2,419.51	2,419.51	2,419.51
158245		2,258.21	4,032.51	4,032.51	4,032.51	4,032.51	4,032.51
158246		1,354.92	2,419.51	2,419.51	2,419.51	2,419.51	2,419.51
158247		313.12	810.70	810.70	810.70	810.70	810.70
158248		267.38	1,336.89	1,336.89	1,336.89	1,336.89	1,336.89
Totals:	**47.81**	**17,044.95**	**40,047.49**	**40,051.74**	**40,056.02**	**40,060.33**	**40,064.69**

Table 6.
Assumed Pumping Rate for Proposed Simsboro Wells for Model Run B-3

Well Designation	Model Node	Proposed Production Capacity (GPM)	Assumed Rate for Model Run B-3	
			(gpm)	(ft3/day)
OP9-1	156913	300	125	24,030.16
OP9-2	156914	300	125	24,030.16
OP9-3	156914	300	125	24,030.16
OP9-4	157617	300	125	24,030.16
OP9-5	157616	300	125	24,030.16
OP9-6	157616	600	250	48,060.31
OP9-7	157618	300	125	24,030.16
OP9-8	157613	600	250	48,060.31
OP9-9	157611	500	208	40,050.26
OP9-10	157606	600	250	48,060.31
OP9-12	158246	600	250	48,060.31
OP9-11	157606	600	250	48,060.31
OP9-13	158246	600	250	48,060.31
OP9-14	158246	600	250	48,060.31
OP9-19	157599	600	208	40,050.26
OP9-23	156218	500	125	24,030.16
OP9-15	158244	500	250	48,060.31
OP9-22	156893	500	125	24,030.16
OP9-16	157599	500	208	40,050.26
OP9-21	156893	500	125	24,030.16
OP9-20	157598	300	208	40,050.26
OP9-17	157598	300	208	40,050.26
OP9-18	157598	300	208	40,050.26
OP9-24	157597	500	208	40,050.26
OP9-25	157596	500	208	40,050.26
OP9-26	157596	500	208	40,050.26
OP9-27	156889	500	208	40,050.26
OP9-28	156889	300	125	24,030.16
OP9-29	156889	300	125	24,030.16
OP9-30	156889	300	125	24,030.16

Table 7. Pumping by Decade for Model Nodes Associated with Sandow Lakes Property in Milam County - Model Run B-3, Simsboro 9,000 af/yr

Model Node	MODEL RUN B-3 PROPOSED OPERATING PERMIT SIMSBORO PUMPING BY YEAR (af/yr)						
	2020	2025	2030	2040	2050	2060	2070
156218		89.55	201.49	201.49	201.49	201.49	201.49
156889		417.91	940.30	940.30	940.30	940.30	940.30
156893		179.10	402.99	402.99	402.99	402.99	402.99
156913		89.55	201.49	201.49	201.49	201.49	201.49
156914		179.10	402.99	402.99	402.99	402.99	402.99
157596		298.51	671.64	671.64	671.64	671.64	671.64
157597	22.62	149.25	335.82	335.82	335.82	335.82	335.82
157598	22.62	447.76	1,007.46	1,007.46	1,007.46	1,007.46	1,007.46
157599	1.29	298.51	671.64	671.64	671.64	671.64	671.64
157606		358.21	805.97	805.97	805.97	805.97	805.97
157611		149.25	335.82	335.82	335.82	335.82	335.82
157613		179.10	402.99	402.99	402.99	402.99	402.99
157616		268.66	604.48	604.48	604.48	604.48	604.48
157617		89.55	201.49	201.49	201.49	201.49	201.49
157618		89.55	201.49	201.49	201.49	201.49	201.49
158244		179.10	402.99	402.99	402.99	402.99	402.99
158246		537.31	1,208.96	1,208.96	1,208.96	1,208.96	1,208.96
Totals:	46.52	4,000.00	9,000.00	9,000.00	9,000.00	9,000.00	9,000.00

Note: Model Run B-3 also includes Simsboro pumping shown in Table 5.

Table 8.
Assumed Pumping Rate for Proposed Hooper Wells for Model Run B-4

Well Designation	Model Node	Proposed Production Capacity (GPM)	Assumed Rate for Model Run B-4	
			(gpm)	(ft3/day)
OPH9-1	156913	150	62	12,015.08
OPH9-2	156914	150	62	12,015.08
OPH9-3	156914	150	62	12,015.08
OPH9-4	157617	150	62	12,015.08
OPH9-5	157616	150	62	12,015.08
OPH9-6	157616	300	125	24,030.16
OPH9-7	157618	150	62	12,015.08
OPH9-8	157613	300	125	24,030.16
OPH9-9	157611	250	104	20,025.13
OPH9-10	157606	300	125	24,030.16
OPH9-12	158246	300	125	24,030.16
OPH9-11	157606	300	125	24,030.16
OPH9-13	158246	300	125	24,030.16
OPH9-14	158246	300	125	24,030.16
OPH9-19	157599	300	104	20,025.13
OPH9-23	156218	250	62	12,015.08
OPH9-15	158244	250	125	24,030.16
OPH9-22	156893	250	62	12,015.08
OPH9-16	157599	250	104	20,025.13
OPH9-21	156893	250	62	12,015.08
OPH9-20	157598	150	104	20,025.13
OPH9-17	157598	150	104	20,025.13
OPH9-18	157598	150	104	20,025.13
OPH9-24	157597	250	104	20,025.13
OPH9-25	157596	250	104	20,025.13
OPH9-26	157596	250	104	20,025.13
OPH9-27	156889	250	104	20,025.13
OPH9-28	156889	150	62	12,015.08
OPH9-29	156889	150	62	12,015.08
OPH9-30	156889	150	62	12,015.08

Table 9. Pumping by Decade for Model Nodes Associated with Sandow Lakes Property in Milam County - Model Run B-4

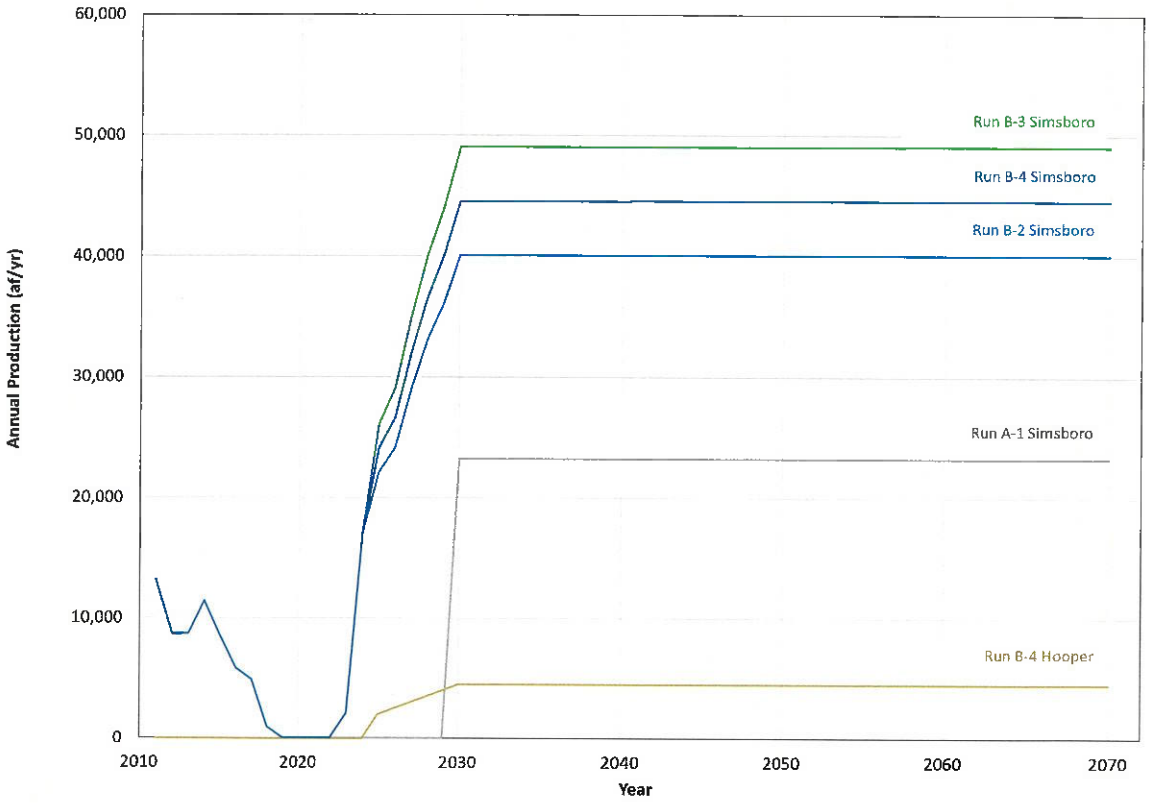
Model Node	MODEL RUN B-4 PROPOSED OPERATING PERMIT HOOPER PUMPING BY YEAR (af/yr)						
	2020	2025	2030	2040	2050	2060	2070
156218		44.78	100.75	100.75	100.75	100.75	100.75
156889		208.96	470.15	470.15	470.15	470.15	470.15
156893		89.55	201.49	201.49	201.49	201.49	201.49
156913		44.78	100.75	100.75	100.75	100.75	100.75
156914		89.55	201.49	201.49	201.49	201.49	201.49
157596		149.25	335.82	335.82	335.82	335.82	335.82
157597		74.63	167.91	167.91	167.91	167.91	167.91
157598		223.88	503.73	503.73	503.73	503.73	503.73
157599		149.25	335.82	335.82	335.82	335.82	335.82
157606		179.10	402.99	402.99	402.99	402.99	402.99
157611		74.63	167.91	167.91	167.91	167.91	167.91
157613		89.55	201.49	201.49	201.49	201.49	201.49
157616		134.33	302.24	302.24	302.24	302.24	302.24
157617		44.78	100.75	100.75	100.75	100.75	100.75
157618		44.78	100.75	100.75	100.75	100.75	100.75
158244		89.55	201.49	201.49	201.49	201.49	201.49
158246		268.66	604.48	604.48	604.48	604.48	604.48
Totals:	0.00	2,000.00	4,500.00	4,500.00	4,500.00	4,500.00	4,500.00

Model Node	MODEL RUN B-4 PROPOSED OPERATING PERMIT SIMSBORO PUMPING BY YEAR (af/yr)						
	2020	2025	2030	2040	2050	2060	2070
156218		44.78	100.75	100.75	100.75	100.75	100.75
156889		208.96	470.15	470.15	470.15	470.15	470.15
156893		89.55	201.49	201.49	201.49	201.49	201.49
156913		44.78	100.75	100.75	100.75	100.75	100.75
156914		89.55	201.49	201.49	201.49	201.49	201.49
157596		149.25	335.82	335.82	335.82	335.82	335.82
157597	22.62	74.63	167.91	167.91	167.91	167.91	167.91
157598	22.62	223.88	503.73	503.73	503.73	503.73	503.73
157599	1.29	149.25	335.82	335.82	335.82	335.82	335.82
157606		179.10	402.99	402.99	402.99	402.99	402.99
157611		74.63	167.91	167.91	167.91	167.91	167.91
157613		89.55	201.49	201.49	201.49	201.49	201.49
157616		134.33	302.24	302.24	302.24	302.24	302.24
157617		44.78	100.75	100.75	100.75	100.75	100.75
157618		44.78	100.75	100.75	100.75	100.75	100.75
158244		89.55	201.49	201.49	201.49	201.49	201.49
158246		268.66	604.48	604.48	604.48	604.48	604.48
Totals:	46.52	2,000.00	4,500.00	4,500.00	4,500.00	4,500.00	4,500.00

Note: Model Run B-4 also includes Simsboro pumping shown in Table 5.

Figure 4-2 shows the timing and magnitude of the pumping input for GAM Runs A-1, B-2, B-3 and B-4 for Simsboro and Hooper aquifer production from SLR property in Milam County.

Figure 4-2. Simulated SLR Milam County Production by GAM Run



Regional Pumping in GAM Run A-1

As stated earlier in this report, GAM Run A-1 is a model run scenario that was developed during the current 2022 GMA 12 Joint Planning activities. GAM Run A-1 contains the base regional pumping assumptions that are carried forward into Model Run B-2, and subsequent model runs GAM Run B-3 and GAM Run B-4. GAM Run A-1 contains increases in future pumping distributed within Bastrop, Lee, Milam, Burleson, Brazos, and Robertson counties. Tables 10, 11, 12, and 13a present the total Simsboro pumping in the Brazos Valley Groundwater Conservation District (BVGCD), the Lost Pines Groundwater Conservation District (LPGCD), and the POSGCD for GAM Runs A-1, B-2, B-3 and B-4. Table 13b presents the total Hooper pumping in the Brazos Valley Groundwater Conservation District (BVGCD), the Lost Pines Groundwater Conservation District (LPGCD), and the POSGCD for GAM Run B-4.

Table 10. Simsboro Aquifer Pumping for Model Run A-1 by Decade for Lost Pines, Post Oak Savanah, and Brazos Valley Groundwater Conservation Districts (af/yr)

GCD	2020	2030	2040	2050	2060	2070
BVGCD	76,936	91,284	105,633	119,982	134,331	147,245
LPGCD	21,274	65,845	69,941	74,045	78,161	81,875
POSGCD	40,774	66,469	75,763	78,776	79,111	79,435

Table 11. Simsboro Aquifer Pumping for Model Run B-2 by Decade for Lost Pines, Post Oak Savanah, and Brazos Valley Groundwater Conservation Districts (af/yr)

GCD	2020	2030	2040	2050	2060	2070
BVGCD	76,936	91,284	105,633	119,982	134,331	147,245
LPGCD	21,274	65,845	69,941	74,045	78,161	81,875
POSGCD	40,774	83,276	92,570	95,583	95,918	96,242

Table 12. Simsboro Aquifer Pumping for Model Run B-3 by Decade for Lost Pines, Post Oak Savanah, and Brazos Valley Groundwater Conservation Districts (af/yr)

GCD	2020	2030	2040	2050	2060	2070
BVGCD	76,936	91,284	104,198	118,547	132,896	147,245
LPGCD	21,274	65,845	69,941	74,045	78,161	81,875
POSGCD	40,774	91,348	100,640	104,551	104,883	105,242

Table 13a. Simsboro Aquifer Pumping for Model Run B-4 by Decade for Lost Pines, Post Oak Savanah, and Brazos Valley Groundwater Conservation Districts (af/yr)

GCD	2020	2030	2040	2050	2060	2070
BVGCD	76,936	91,284	104,198	118,547	132,896	147,245
LPGCD	21,274	65,845	69,941	74,045	78,161	81,875
POSGCD	40,774	86,848	96,140	100,051	100,383	100,742

Table 13b. Hooper Aquifer Pumping for Model Run B-4 by Decade for Lost Pines, Post Oak Savanah, and Brazos Valley Groundwater Conservation Districts (af/yr)

GCD	2020	2030	2040	2050	2060	2070
BVGCD	798	1,066	1,334	1,603	1,871	2,139
LPGCD	1,716	2,027	2,349	2,680	3,024	3,381
POSGCD	1,806	6,527	6,764	7,023	7,309	7,626

In tabulating Tables 10, 11, and 12, pumping in model nodes 156889, 156890, 157595, 157596, 157597, 158243, and 158244 was attributed to Milam County where the approved Operating

Permit 0148 wells, and the proposed Simsboro 9,000 af/yr operating permit wells, are located. In tabulating Table 13, pumping in model nodes 191012, 191719, 191720, and 192367 was attributed to Milam County where the proposed Hooper 4,500 af/yr operating permit wells are located.

Model Simulations

New GAM for Carrizo-Wilcox Aquifer

Groundwater Management Area 12 (GMA 12) originally adopted a new groundwater availability model (GAM) for the Central Portion of the Sparta, Queen City, and Carrizo-Wilcox Aquifers for use in the third round of joint planning activities (Ewing, Jigmond, Jones & Young, 2018). This model was updated in October 2020 (D.B. Stephens, et al). Rule 7.4.5.c of the POSGCD states "if a MAG exists for the aquifer from which the water will be produced, then the predictions will include results based on using the Groundwater Availability Model run used to establish the MAG for the aquifer". Per POSGCD requirements, the new updated GAM be used to simulate the required analysis.

Existing GAM Representation of Hooper Aquifer

At the request of the POSGCD, the following technical evaluation of the GAM's representation of the Carrizo-Wilcox Aquifer and specifically the Hooper Aquifer is included as part of SLR's application.

The Hooper Aquifer is the deepest zone of the Carrizo-Wilcox Aquifer group. Correspondingly, the Hooper zone is relatively undeveloped throughout Milam County, because of the abundance of groundwater resources in overlying and shallower portions of the Carrizo-Wilcox Aquifer. Throughout the area covered by the model, most wells are constructed in either the Carrizo, Calvert Bluff, or Simsboro aquifers. The lack of well development in the Hooper limits the number of data points from which estimations of aquifer parameters were derived for the model. Thus, the current model inputs for the aquifer are relatively coarse estimates.

Based on test drilling conducted to date on the SLR property, there are sequences of interbedded clays and sands through the Simsboro, and the lowest sands in such sequences should be considered to be Simsboro sands. At some test hole locations, the lowest Simsboro sands exhibit thin sand thickness and low resistivity similar to, or even lower than, deeper sands of the Hooper. In other locations, the lowest Simsboro sands are thicker and more massive. As such, there is not always a clear stratigraphic boundary between the base of the Simsboro and top of the Hooper.

Estimates of transmissivity of lower sands encountered thus far at SLR range from less than 1,000 gpd/ft to 3,000 gpd/ft, while the GAM currently represents transmissivity of 5,000 gpd/ft to 8,000 gpd/ft. However, the SLR testholes to date do not penetrate the full thickness of the Hooper as represented in the GAM. Based on review of scattered oil and gas logs, it is currently believed the most productive sands occur in the upper 200 feet of the Hooper.

It is likely with additional test drilling, well drilling, groundwater pumping, and water level measurements that much greater heterogeneity of the aquifer characteristics will be discovered. This is a normal experience with GAMs even with more developed aquifer zones. GAMs are regional models and continuously undergo modification as additional data become available.

Required Deliverables

As shown in Table 1, a series of drawdown tabulations and contour maps are provided to satisfy the requirements of District Rule 7.4.5.

Drawdown Tabulations

Table 14 lists the average drawdown for Model Layer 9 (the confined portion) of the Simsboro aquifer within POSGCD, for GAM model runs A-1, B-2, B-3, and B-4 and for time periods: 2010 to 2020, 2010 to 2030, 2010 to 2040, 2010 to 2050, 2010 to 2060, and 2010 to 2070.

Table 14. Average Drawdown in Model Layer 9 (confined portion) of the Simsboro Aquifer (feet)

Area	GAM Run#	2010 to 2020	2010 to 2030	2010 to 2040	2010 to 2050	2010 to 2060	2010 to 2070
POSGCD	A-1	57	152	207	244	271	295
POSGCD	B-2	57	163	219	258	286	313
POSGCD	B-3	57	166	224	265	294	321
POSGCD	B-4	57	165	224	264	293	321

Table 15 lists the average drawdown for Model Layer 10 (the confined portion) of the Hooper aquifer within POSGCD, for GAM model runs A-1, B-2, B-3, and B-4 and for time periods: 2010 to 2020, 2010 to 2030, 2010 to 2040, 2010 to 2050, 2010 to 2060, and 2010 to 2070.

Table 15. Average Drawdown in Model Layer 10 (confined portion) of the Hooper Aquifer (feet)

Area	GAM Run#	2010 to 2020	2010 to 2030	2010 to 2040	2010 to 2050	2010 to 2060	2010 to 2070
POSGCD	A-1	20	76	117	147	170	190
POSGCD	B-2	20	82	124	156	180	201
POSGCD	B-3	20	83	127	160	185	207
POSGCD	B-4	20	89	133	166	191	214

Table 16 lists the average drawdown for Model Layer 2 (the outcrop portion) of the Simsboro aquifer within POSGCD, for GAM model runs A-1, B-2, B-3, and B-4 and for time periods: 2010 to 2020, 2010 to 2030, 2010 to 2040, 2010 to 2050, 2010 to 2060, and 2010 to 2070.

Table 16. Average Drawdown in Model Layer 2 (outcrop portion) of the Simsboro Aquifer (feet)

Area	GAM Run#	2010 to 2020	2010 to 2030	2010 to 2040	2010 to 2050	2010 to 2060	2010 to 2070
POSGCD	A-1	3	6	11	16	22	28
POSGCD	B-2	3	6	12	19	25	31
POSGCD	B-3	3	7	13	20	26	32
POSGCD	B-4	3	7	13	20	27	33

Table 17 lists the average drawdown for Model Layer 2 (the outcrop portion) of the Hooper aquifer within POSGCD, for GAM model runs A-1, B-2, B-3, and B-4 and for time periods: 2010 to 2020, 2010 to 2030, 2010 to 2040, 2010 to 2050, 2010 to 2060, and 2010 to 2070.

Table 17. Average Drawdown in Model Layer 2 (outcrop portion) of the Hooper Aquifer (feet)

Area	GAM Run#	2010 to 2020	2010 to 2030	2010 to 2040	2010 to 2050	2010 to 2060	2010 to 2070
POSGCD	A-1	1	3	5	7	9	12
POSGCD	B-2	1	3	5	7	10	13
POSGCD	B-3	1	3	5	8	10	13
POSGCD	B-4	1	3	5	8	11	14

Table 18 lists the average drawdown for Model Layer 2 for the entire Carrizo-Wilcox Aquifer (combined Hooper, Simsboro, Calvert Bluff, and Carrizo) outcrop within POSGCD, for GAM model runs A-1, B-2, B-3, and B-4 and for time periods: 2010 to 2020, 2010 to 2030, 2010 to 2040, 2010 to 2050, 2010 to 2060, and 2010 to 2070.

Table 18. Average Drawdown in Model Layer 2 for the Entire Carrizo-Wilcox Aquifer Outcrop (feet)

Area	GAM Run#	2010 to 2020	2010 to 2030	2010 to 2040	2010 to 2050	2010 to 2060	2010 to 2070
POSGCD	A-1	1	3	6	9	12	15
POSGCD	B-2	1	4	7	10	14	17
POSGCD	B-3	1	4	7	11	14	18
POSGCD	B-4	1	4	7	11	15	18

For the area of the POSGCD, Table 19 through Table 23 show the differences in changes in drawdown, between GAM Run B-2 (the 15,000 af/yr authorized production under the Historic Permit 0330 and the proposed new 15,000 operating permit; the 25,000 af/yr authorized production under Operating Permit 0148), and the 9,000 af/yr Simsboro pumping under the proposed new 9,000 af/yr Simsboro/Hooper operating permit (Model Run B-3), and the 4,500 af/yr Hooper pumping and 4,500 af/yr Simsboro pumping under that 9,000 af/yr permit (Model Run B-4), all previously described. In each table, the changes in drawdown are provided for time periods: 2010 to 2020, 2010 to 2030, 2010 to 2040, 2010 to 2050, 2010 to 2060, and 2010 to 2070. Table 19 lists the differences in drawdown for Model Layer 9 (the confined portion) of the Simsboro aquifer, Table 20 lists the average drawdown for Model Layer 10 (the confined portion) of the Hooper aquifer, Table 21 lists the average drawdown for Model Layer 2 (the outcrop portion) of the Simsboro aquifer, Table 22 lists the average drawdown for Model Layer 2 (the outcrop portion) of the Hooper aquifer, and Table 23 list the average drawdown for Model Layer 2 for the entire Carrizo-Wilcox Aquifer (combined Hooper, Simsboro, Calvert Bluff, and Carrizo) outcrop.

Table 19. Changes in Drawdown in Model Layer 9 (confined portion) of the Simsboro Aquifer (feet)

Area	GAM Run Difference	2010 to 2020	2010 to 2030	2010 to 2040	2010 to 2050	2010 to 2060	2010 to 2070
POSGCD	B-2 and B-3	0	3	5	7	8	9
POSGCD	B-2 and B-4	0	3	5	6	7	8

Table 20. Changes in Drawdown in Model Layer 10 (confined portion) of the Hooper Aquifer (feet)

Area	GAM Run Difference	2010 to 2020	2010 to 2030	2010 to 2040	2010 to 2050	2010 to 2060	2010 to 2070
POSGCD	B-2 and B-3	0	1	3	4	5	6
POSGCD	B-2 and B-4	0	7	9	10	12	12

Table 21. Changes in Drawdown in Model Layer 2 (outcrop portion) of the Simsboro Aquifer (feet)

Area	GAM Run Difference	2010 to 2020	2010 to 2030	2010 to 2040	2010 to 2050	2010 to 2060	2010 to 2070
POSGCD	B-2 and B-3	0	0	0	1	1	1
POSGCD	B-2 and B-4	0	0	1	1	2	2

Table 22. Changes in Drawdown in Model Layer 2 (outcrop portion) of the Hooper Aquifer (feet)

Area	GAM Run Difference	2010 to 2020	2010 to 2030	2010 to 2040	2010 to 2050	2010 to 2060	2010 to 2070
POSGCD	B-2 and B-3	0	0	0	0	0	0
POSGCD	B-2 and B-4	0	0	1	1	1	1

Table 23. Changes in Drawdown in Model Layer 2 for the Entire Carrizo-Wilcox Aquifer Outcrop (feet)

Area	GAM Run Difference	2010 to 2020	2010 to 2030	2010 to 2040	2010 to 2050	2010 to 2060	2010 to 2070
POSGCD	B-2 and B-3	0	0	0	1	1	1
POSGCD	B-2 and B-4	0	0	0	1	1	1

Contour Maps of Drawdown and Differences in Drawdown

Two series of maps reflect the changes in water levels (drawdown) for the period January 1, 2021 through December 31, 2062 (Model Run B-3 and Model Run B-4). For naming simplicity, these maps are designated as declines in piezometric surface from Year 2020 to Year 2062, and are intended to demonstrate effects over the proposed operating permit term. Two additional set of maps are for the period January 1, 2021 through December 31, 2062, and one set of maps represents the difference in simulated piezometric head for GAM Run B-2 and GAM Run B-3, and a second set of maps represents the difference in simulated piezometric head for GAM Run B-2 and GAM Run B-4. These maps are labeled with the descriptive timeframe of Year 2020 to Year 2062.

For GAM Run B-3, contour maps of the declines in piezometric surface are provided for the model layers corresponding to the confined portions of the Simsboro, Hooper, and Calvert Bluff aquifers, as well as the shallow portion of the combined outcrop areas of the Carrizo-Wilcox group which comprise portions of model layer 2. Figures 4-3 through 4-6 show these maps for the period of Year 2020 to Year 2062 (Model Run B-3), and Figures 4-7 through 4-10 depict the differences between GAM Run B-2 and GAM Run B-3 in piezometric surface from the Year

2020 to 2062, and for the confined portions of the Simsboro, Hooper, and Calvert Bluff aquifers, as well as the shallow portion of the combined outcrop areas of the Carrizo-Wilcox group.

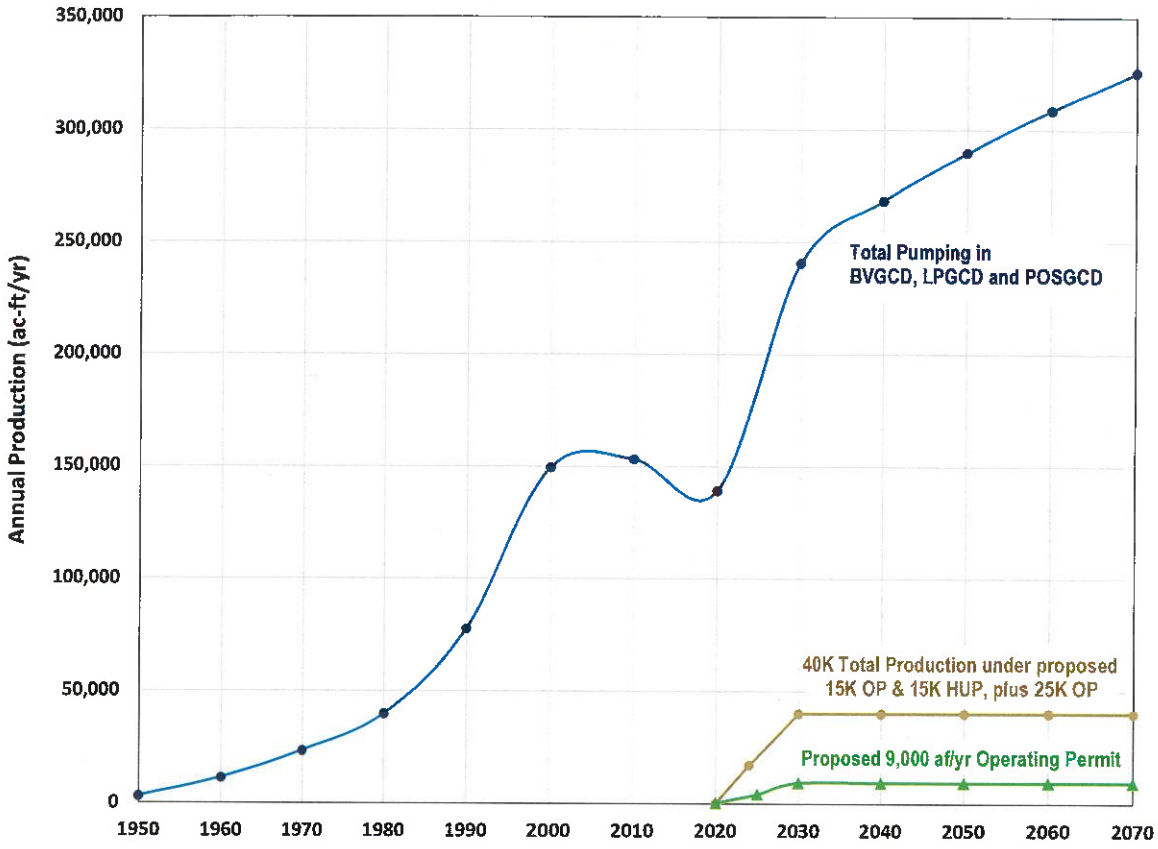
For GAM Run B-4, contour maps of the declines in piezometric surface are provided for the model layers corresponding to the confined portions of the Simsboro and Hooper aquifers, as well as the shallow portion of the combined outcrop areas of the Carrizo-Wilcox group which comprise portions of model layer 2. Figures 4-11 through 4-13 show these maps for the period of Year 2020 to Year 2062 (Model Run B-4), and Figures 4-14 through 4-16 depict the differences between GAM Run B-2 and GAM Run B-4 in piezometric surface from the Year 2020 to 2062, and for the confined portions of the Simsboro and Hooper aquifers, as well as the shallow portion of the combined outcrop areas of the Carrizo-Wilcox group.

Discussion of Modeling Results

The model results indicate the regional effects of pumping on reductions in artesian pressure and water table decline. Model results shown on Figures 4-3 through 4-5, Figures 4-7 through 4-9, Figures 4- 11 and 4-12, and Figures 4-14 and 4-15 are largely changes in artesian pressure, while changes shown on Figures 4-6, 4-10. 4-13, and 4-16 represent smaller changes in water table decline (GAM Layer 2). These predicted changes are the result of: 1) the assumed continuation of regional existing pumping, 2) assumed increases in future regional pumping, and 3) the assumed future pumping by SLR as discussed above under Pumping Input Specific to Sandow Lakes Property.

Figure 4-17 shows the total historical and future Simsboro aquifer production assumed in the model through 2060 for the POSGCD, the LPGCD and the BVGCD. Also shown is SLR's current authorized production of 40,000 af/yr from the Simsboro consisting of the 15,000 af/yr production under the proposed new 15,000 af/yr operating permit and Historic Use Permit 0330, together with the 25,000 af/yr production under Operating Permit 0148. And also shown is the 9,000 af/yr production from the Simsboro and Hooper under the proposed new 9,000 af/yr Simsboro/Hooper operating permit. Figure 4-17 demonstrates that the 9,000 af/yr production under the proposed new operating permit is quite small compared to both the historical pumping that has occurred regionally, and the total future production rates assumed in GAM Run A-1 in the LPGCD, BVGCD, and the POSGCD.

Figure 4-17. Estimated Historical and Future Simulated Simsboro Production in BVGCD, LPGCD, and POGCD - GAM Run B-2



Future increases in pumping will cause regional effects that are primarily reductions in artesian pressure, and as these pressure reductions propagate to the shallower zones of the Simsboro outcrop, then subsequent reductions in the water table can occur. The degree and magnitude of these responses is largely dependent on the aquifer's vertical hydraulic conductivity, recharge rates, the amount of groundwater that is naturally discharged via direct evaporation, transpiration by plants, and seeps and springs, and the degree of capture of the natural discharge that occurs in response to aquifer pumping. Each of these components of the groundwater system are difficult to measure directly. Nevertheless, the subsequent response of the capture of recharge will naturally occur, and this can reduce wasteful discharge to the extent it is occurring, and will naturally increase the sustainability of water supplies.

Experience has shown that any reductions in the water table zones will be very slow to occur or will occur in a very gradual, mostly unnoticeable manner. For example, groundwater pumping from the Carrizo aquifer in the Wintergarden Area occurred for many decades with total pumping rates between 200,000 to over 300,000 af/yr. Long-term water level records in shallow, water table wells exhibited little or relatively small response. Similar experience has been

documented over the past century of pumping in the Northern Trinity aquifer and the Gulf Coast aquifer, as well.

Analysis of Potential for Land-Surface Subsidence

Land-surface subsidence is known to occur in some groundwater settings. Groundwater pumping from sand and gravel zones can cause seepage of water from adjacent clay or silt zones. The loss of pore water pressure in the clay or silt reduces the load bearing capacity of the clays or silts, and the overbearing weight of soil, groundwater and buildings causes the clay or silt zones to compact. This compaction occurs at the depth of the clays or silts, and some amount of this compaction can translate into subsidence at land surface.

In Texas, subsidence is documented to have occurred in the greater Houston area (Gabrysch, 1984). Near Pecos, Texas (Chi and Reilinger, 1984), and in the area of El Paso, Texas (Land and Armstrong, 1985).

TWDB Subsidence Risk Study

In 2016, the TWDB contracted with LRE Water, LLC "to identify and characterize areas within Texas' major and minor aquifers that are susceptible to land subsidence related to groundwater pumping" (TWDB, 2020). In 2017, a report was issued and titled "Final Report: Identification of the Vulnerability of the Major and Minor Aquifers of Texas to Subsidence with Regard to Groundwater Pumping", and an EXCEL analytical model was released for assigning a risk factor for subsidence based on lithologic, geotechnical, water level change and other factors (Furnans et al. 2017).

Based on the risk methodology employed, the authors state that of the 9 major aquifers in Texas, 5 of these aquifers are classified with a "high subsidence risk over large areas of the aquifer" (Furnans, 2017). The major aquifers of Texas with a high-risk subsidence rating are the Gulf Coast, Pecos Valley, Hueco-Mesilla Bolson, Ogallala, and Carrizo-Wilcox aquifers. Two minor aquifers, the Yegua-Jackson, and the Brazos River Alluvium are ranked as high risk for subsidence.

It is helpful to look at the underlying technique and data the authors used to determine the subsidence risk rating for an aquifer. The factors used to calculate the subsidence risk are saturated clay thickness, an estimate of clay compressibility, the assumed type of aquifer lithology, historic water levels compared to current water levels (pre-consolidation water level), and the potential of for future water level declines. Of these factors, the authors state they were unable to gather actual geotechnical data on clays, and instead relied on generalized values of clay compressibility based on aquifer lithology.

Factors not considered in the study are the permeability, depth, age, or lateral continuity of the clays, nor the degree of compaction at depth that may translate to actual land surface subsidence. The study also does not try to calibrate the methodology utilized in the report with known data on clay thickness, water level change, and measured subsidence.

Past Experience in the Carrizo-Wilcox

As addressed previously, Alcoa has conducted groundwater pumping in Milam County for the safe mining of lignite reserves, and for power generation and industrial processes. The largest amounts of this pumpage were related to depressurization of the Simsboro aquifer for mining operations. Pressure declines in the Simsboro occurred over a multi-decade period with maximum pressure decline of about 200 feet occurring. Numerous high-capacity wells were originally constructed prior to this depressurization pumping, and the construction included cementing of steel casing and stainless steel screen at the depths of the Simsboro aquifer. If land-surface subsidence had occurred due to compaction of overlying sediments, then the well casings and foundations would have been noticeably higher relative to adjoining ground level. No land-surface subsidence was ever detected or revealed as a result of the Alcoa pumping.

Groundwater pumping has also occurred in the Carrizo-Wilcox aquifer in Texas for many decades. Production has historically occurred in the Wintergarden Area of Southwest Texas, the Tyler area of Northeast Texas, and the Bryan-College Station area in Central Texas. Numerous Texas Water Development Board (TWDB) groundwater availability reports from early 1960 to the near present and spanning the extents of the Carrizo-Wilcox in Texas have studied the groundwater conditions, and/or effects of groundwater pumping (Ex: Reports 4, 032, 109, 110, 150, 160, 210, 327, 332). No concerns of land-surface subsidence resulting from pumping groundwater from the Carrizo-Wilcox are presented in these historical reports.

The Explanatory Report developed by GMA 12 during the second round of joint planning (Ewing et al., 2017) states subsidence has not been detected anywhere within GMA 12 despite large-scale pumping and associated drawdowns, and concluded the risk for land-surface subsidence is negligible.

The TWDB GAM for the Gulf Coast aquifer in southeast Texas, known as the Houston Area Groundwater Model (HAGM), was developed for an area of Texas where land-surface subsidence is a known issue. The HAGM specifically includes a subsidence modeling package for purposes of simulating land-surface subsidence due to groundwater pumping (Kasmarek, 2012). In contrast, the new GAM for the Central Portion of the Sparta, Queen City, and Carrizo-Wilcox Aquifers does not include a subsidence modeling package (Ewing et al., 2018). Similarly, other historic and current GAMs of the Carrizo-Wilcox, including all Southern, Central and Northern portion models, have not included a subsidence modeling package. This is empirical evidence that across the State of Texas, subsidence has not been a concern in the Carrizo-Wilcox over the many decades of actual groundwater development experience.

The natural conditions of the Carrizo-Wilcox, and past experience with development and documented long-term effects, support the position there are little concerns for subsidence being a factor in limiting development of the resource.

Analysis of Effect on Surface and Groundwater Interaction

POSGCD Rule 7.6(3) requires consideration of what impact a permit application will have on surface water resources. As described by C.V. Theis, the source of the produced water from a well follows a natural dynamic from 1) a reduction of artesian storage to the extent artesian conditions exist at the well site, 2) subsequent propagation of the cone of depression laterally and possibly vertically until the cone of influence encounters water table conditions, at which time pore water storage is reduced, 3) the reduction of pore water storage causes a redirection towards the pumping well of groundwater that previously was discharged naturally through evaporation, transpiration, seepage, or larger springflow (Theis, 1940). This natural, dynamic response to pumping has been occurring in the Carrizo-Wilcox for many decades.

Alcoa, in conjunction with its prior mining operations at both the Sandow Mine and the Three Oaks Mine near Elgin, Texas, conducted numerous surveys related to surface and groundwater interaction. Both surface water resources and groundwater resources were surveyed and studied. Studies included aerial surveys stretching from the Colorado River to the Brazos River, ground surveys along creek beds to identify areas of groundwater seepage and springflow prior to mining, as well as surface water flow monitoring in area creeks to identify the nature of rainfall-runoff and baseflow characteristics of local drainages.

These studies indicate there were no large springs present in eastern Bastrop, Lee or Milam Counties, and no State parks are designated throughout this area to recognize culturally or environmentally important springflows. Area streams are classified as intermittent yet with the headwaters classified as ephemeral where the stream channel is above the local water table. Areas of seepage and wet, muddy locations were observed in low-lying areas, of the intermittent streams, and many of which would be dry in summer months. Additionally, many stock ponds have been built throughout the area. All of these features increase discharge of groundwater via transpiration plants and/or direct evaporation.

Due to the location of historic and likely future pumping in combination with the regional transmissivity and artesian pressure conditions, a regional response spanning many counties and GCDs will occur. Figure 4-3 indicates any effects of Simsboro groundwater pumping on surface water resources in the Central portions of GMA 12 will be attributable to groundwater production in numerous counties including groundwater production located in the LPGCD, the POSGCD, and the BVGCD. This includes both any affects which have occurred to date, and any long-term effects into the future.

Most importantly for review of this permit application, any effects on surface water resources due to the proposed operating permit , or the renewal of the historic use permit through 2062 would necessarily be small considering the past history of Alcoa production, the comparatively low amount of HUP and proposed operating permit pumping compared to total regional aquifer pumping, and the regional response of pumping that can span across many counties of GMA 12.

Past Mitigation Activities of Alcoa

A large part of Alcoa's historical Simsboro pumping levels shown in Figure 4-1 were necessary to safely and successfully mine the lignite reserves at the Sandow mine. Alcoa historically produced up to 33,000 af/yr from the Simsboro and demonstrated the aquifer response and groundwater availability characteristics of this production. Groundwater production associated with mining operations at the Sandow Mine was permitted and regulated by the Railroad Commission of Texas, which required monitoring of the ongoing, regional impacts associated with that pumpage and mitigation of any affected water supplies. The monitoring and mitigation program was conducted for more than 20 years and included:

- Conducting field inventories/assessments of over 1,600 well sites in order to document both pre-mining, active-mining, and post-mining hydrogeologic conditions,
- Monitoring of an extensive network of both Alcoa and private wells specifically to document and establish mitigation responsibility under the regulations of the Railroad Commission,
- Lowering of pumps or other modifications in more than 360 wells in which water level declines due mining-related pumping were observed or predicted to occur, and
- Construction of over 125 deeper, replacement wells for landowners whose original wells were completed in the shallowest, upper portions of the Simsboro Formation.

The locations of past well mitigations are coincident with the area of primary effects from the approved historic use permit and proposed operating permit production of 15,000 af/yr. Consequently, many existing users in the area are uniquely protected from adverse hydrologic impacts due to past mitigations efforts of Alcoa. In addition, since cessation of mine reclamation and monitoring activities, Alcoa assisted the POSGCD to convert Alcoa's regional monitoring well program to be incorporated into the POSGCD monitoring well network.

Summary

The proposed operating permit production will partially replicate the effects of historic pumping conducted by Alcoa for mining operations beginning in 1988. The primary effect of this production is the reduction of artesian pressure, and the amount of reduction is largely related to the peak pumping rate. Alcoa mining production reached a peak rate of about 33,000 af/yr, and the same type of effects associated with this past pumping will re-occur upon a return to this pumping rate. Unique to this area, Alcoa has also conducted extensive mitigation efforts to address these effects, and the benefit of these past efforts will continue into the future.

The proposed operating permit production is much smaller than known, existing, and potential future pumping located in Bastrop, Lee, Burleson, Robertson, and Brazos Counties. Cumulative hydrologic effects will occur throughout a large part of GMA 12 due to current and future collective pumping primarily in LPGCD, POSGCD, and BVGCD, and the regional, continuous extent of the sands of the Simsboro. The effects of pumping are primarily reductions in artesian pressure, with subsequent reductions in the water table. Any effects on the water table will be very slow and gradual compared to the changes in artesian pressure, and the water table effects will be quite small compared to aquifer storage.

Overall, it is most likely that further development of the groundwater resources will occur, and in some cases modifications to existing wells will be required to sustain the supplies in the region. As demonstrated by past efforts of Alcoa, this is very feasible to conduct, and the Post Oak Savanah Groundwater District is one of the few groundwater districts in Texas with an established mitigation program. From a State Water planning perspective, the potential increase in regional Simsboro production can provide meaningful, drought-proof groundwater supplies useful for enhancing supply reliability and increasing conjunctive use on a regional basis for a growing area of the State.

References

Alexander, W., White, D., (1966) Report 32 Ground-Water Resources of Atascosa and Frio Counties, Texas; Texas Water Development Board

Chi, S. and Reilinger, R., (1984) Geodetic evidence for subsidence due to groundwater withdrawal in many parts of the United States of America; Journal of Hydrology, 67, 155-182.

D.B. Stephens, Groundwater Consultants, LLC, Intera Inc., (2020) GAM Update to the Groundwater Availability Model for the Central Portion of the Sparta, Queen City, and Carrizo-Wilcox Aquifers; Texas Water Development Board.

Donnelly, A, Harding, J., Seifert, W., Uliana, M., Young S., (2017), Desired Future Condition Explanatory Report for Groundwater Management Area 12.

Donnelly, A, Seifert, W., Uliana, M., Young S., (2022), Desired Future Condition Explanatory Report for Groundwater Management Area 12.

Ewing, T., Jigmond, M., Jones, T., Young, S., (2018) Final Report: Groundwater Availability Model for the Central Portion of the Sparta, Queen City, and Carrizo-Wilcox Aquifers; Texas Water Development Board.

Follet, C. (1970), Report No. 109 Ground-Water Resources of Bastrop County, Texas; Texas Water Development Board (reprinted 1972).

Gabrysch, R., (1984), Ground-water withdrawals and land-surface subsidence in the Houston-Galveston region, Texas, 1906-80; Texas Department of Water Resources Report 287.

Kasmarek, M.C., (2012), Hydrogeology and simulation of groundwater flow and land-surface subsidence in the northern part of the Gulf Coast aquifer system, Texas, 1891–2009 (ver. 1.1, November 2013): U.S. Geological Survey Scientific Investigations Report 2012–5154, http://pubs.usgs.gov/sir/2012/5154/.

Klempt, W.B., Duffin, G.L., Elder, G.R., Report 210 Groundwater Resources of the Carrizo Aquifer in the Winter Garden Area of Texas, Volume 1, Texas Water Development Board.

Land, L.F, and Armstrong, C.A. (1985), A Preliminary Assessment of Land-Surface Subsidence in the El Paso Ares, Texas, U.S. Geological Survey Water-Resources Investigations Report 85-4155.

Price, R., Thorkildsen, D. (1991), Report No. 332 Groundwater Resources of the Carrizo-Wilcox Aquifer in the Central Texas Region; Texas Water Development Board.

References (con't)

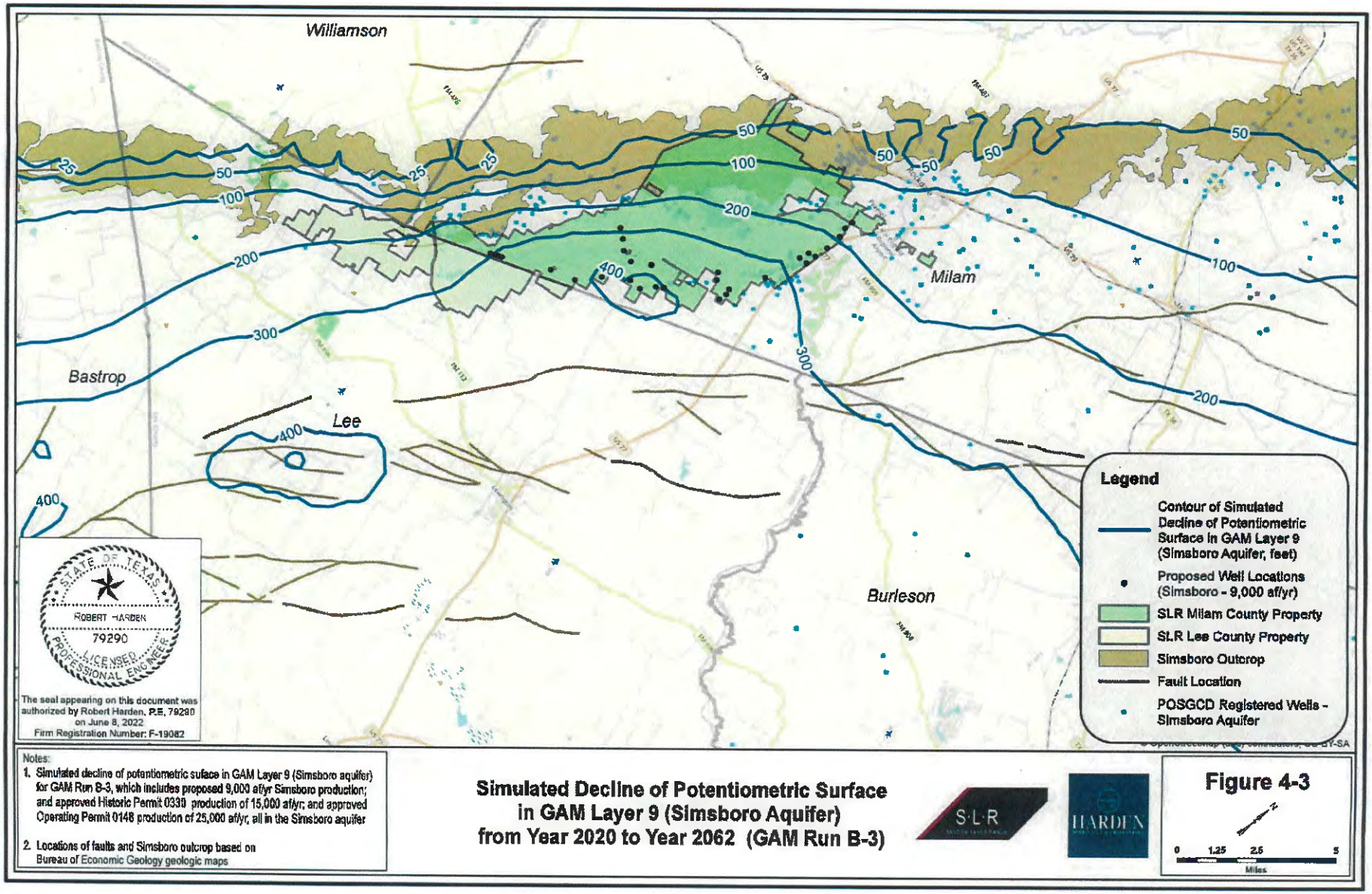
Shafer, G. (1965, Reprinted 1978), Report 4 Ground-Water Resources of Gonzales County, Texas; Texas Water Development Board (2020), http://www.twdb.texas.gov/groundwater/models/research/subsidence/subsidence.asp

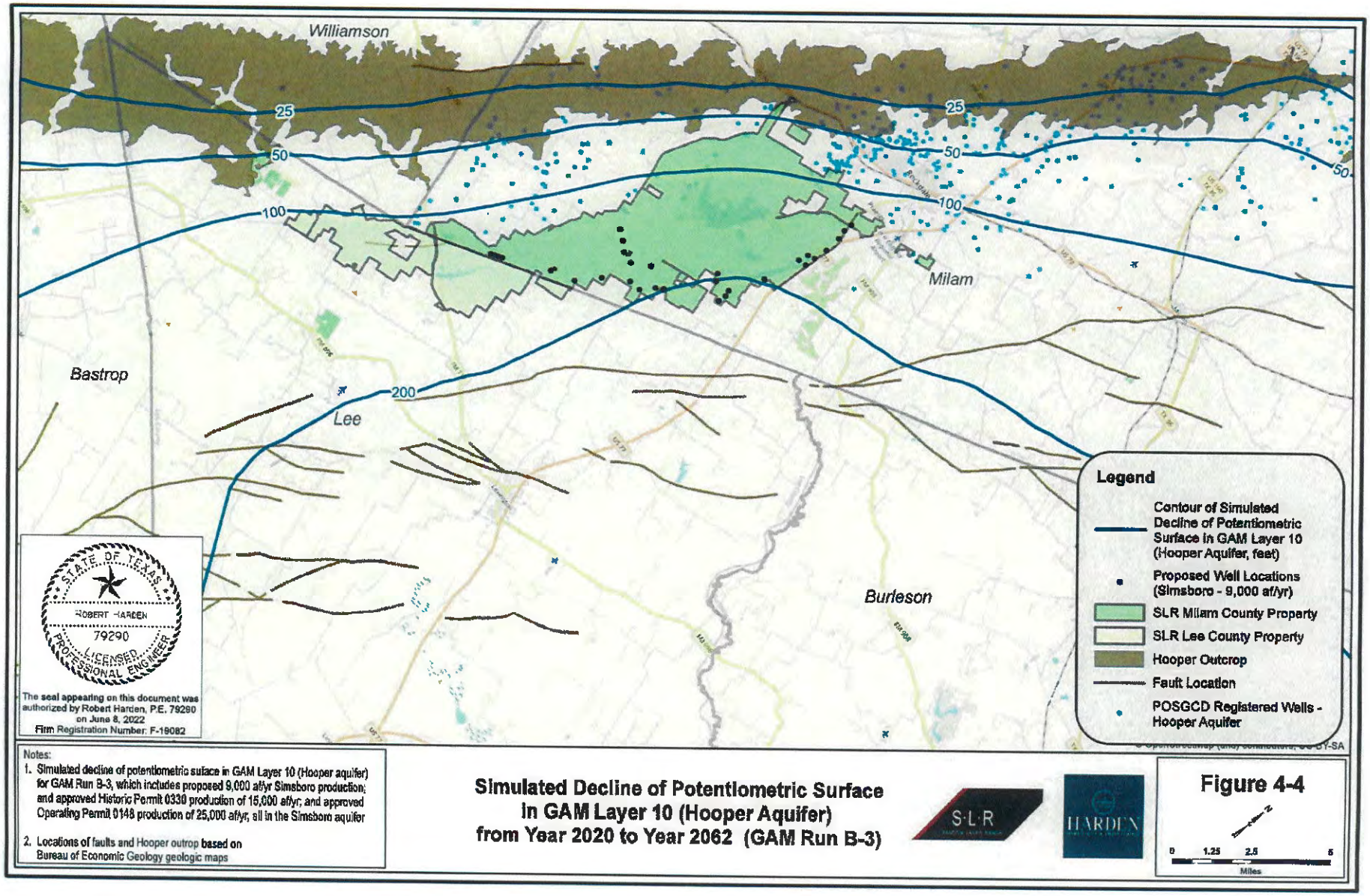
Theis, C.V. (1940), The Source of Water Derived from Wells, American Society of Civil Engineers.

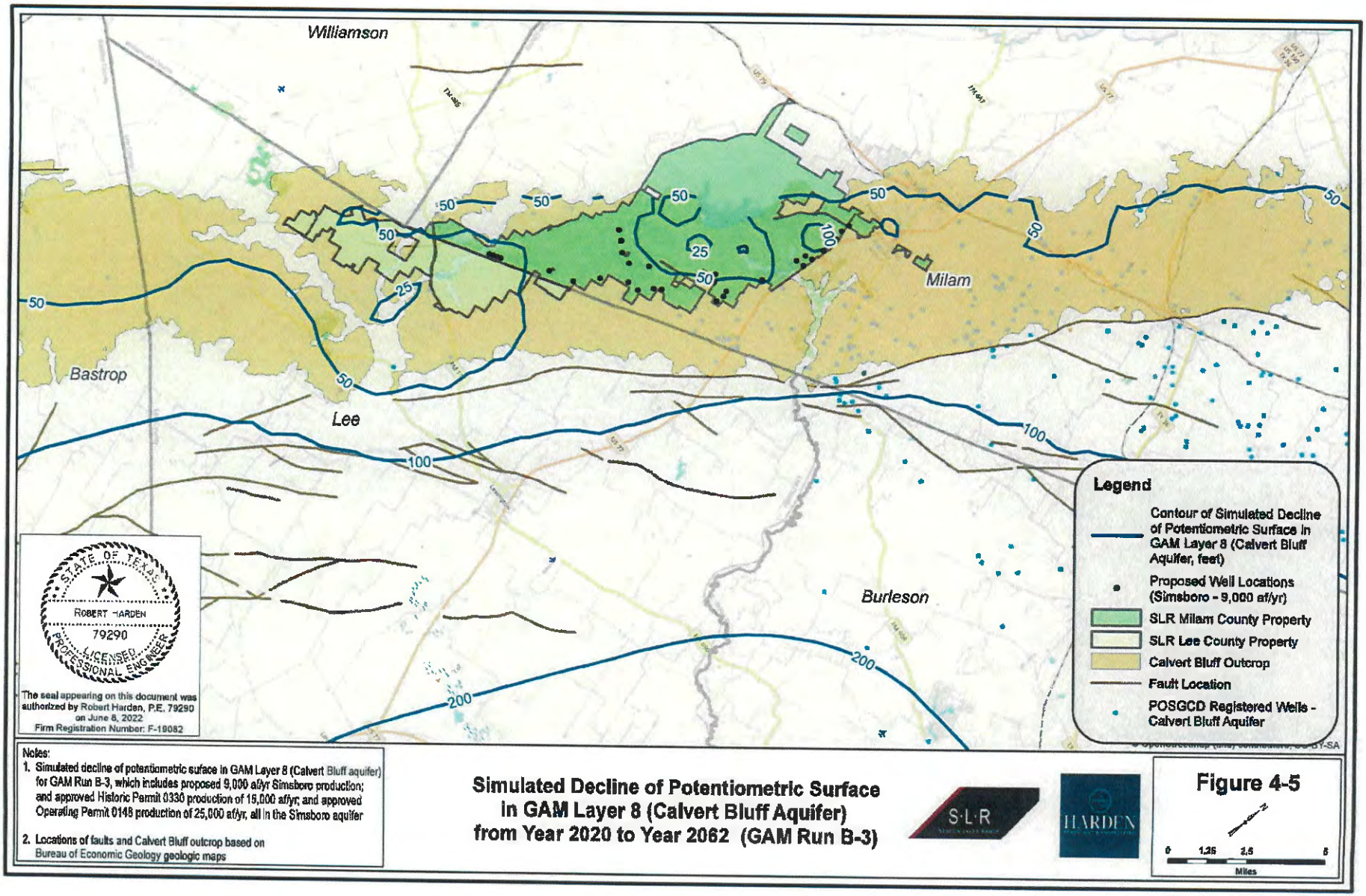
Thompson, G. (1972, Reprinted 1987), Report No. 160 Groundwater Resources of Navarro County; Texas Water Development Board.

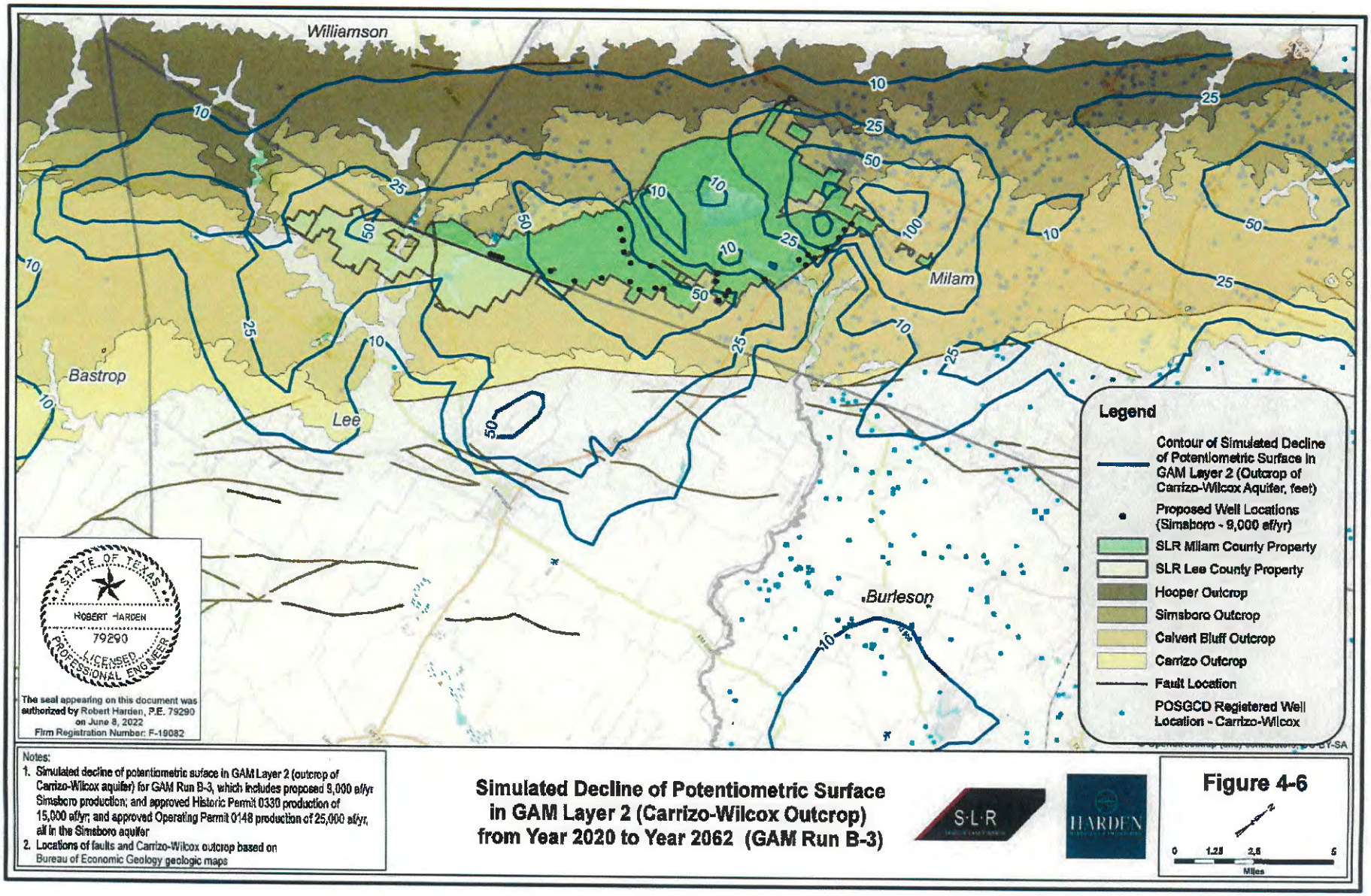
William F. Guyton & Associates, (1970), Report No. 150 Ground-Water Conditions in Anderson, Cherokee, Freestone, and Henderson Counties, Texas; Texas Water Development Board.

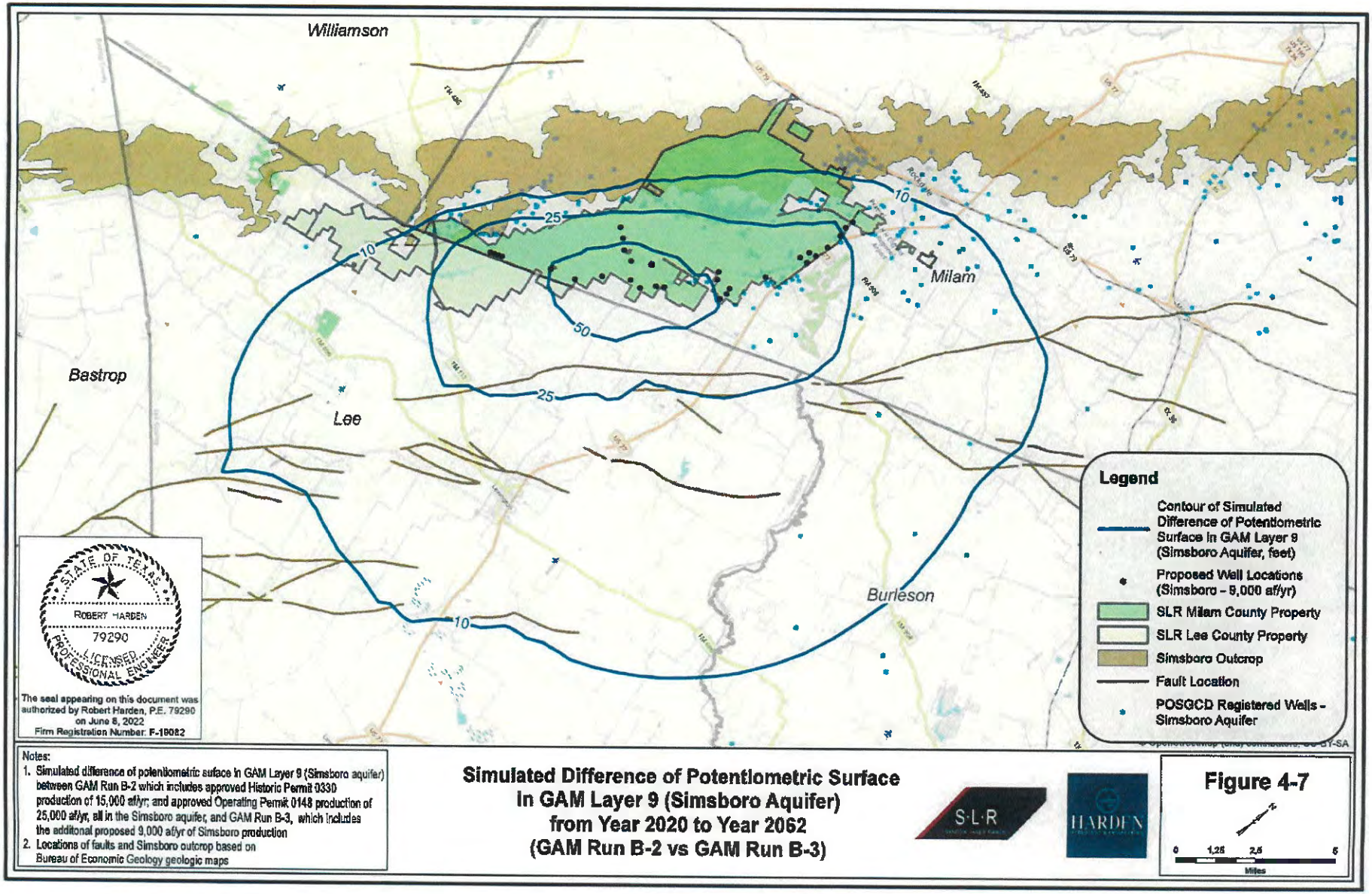
William F. Guyton & Associates, (1970), Report No. 110 Ground-Water Conditions in Angelina and Nacogdoches Counties, Texas; Texas Water Development Board.

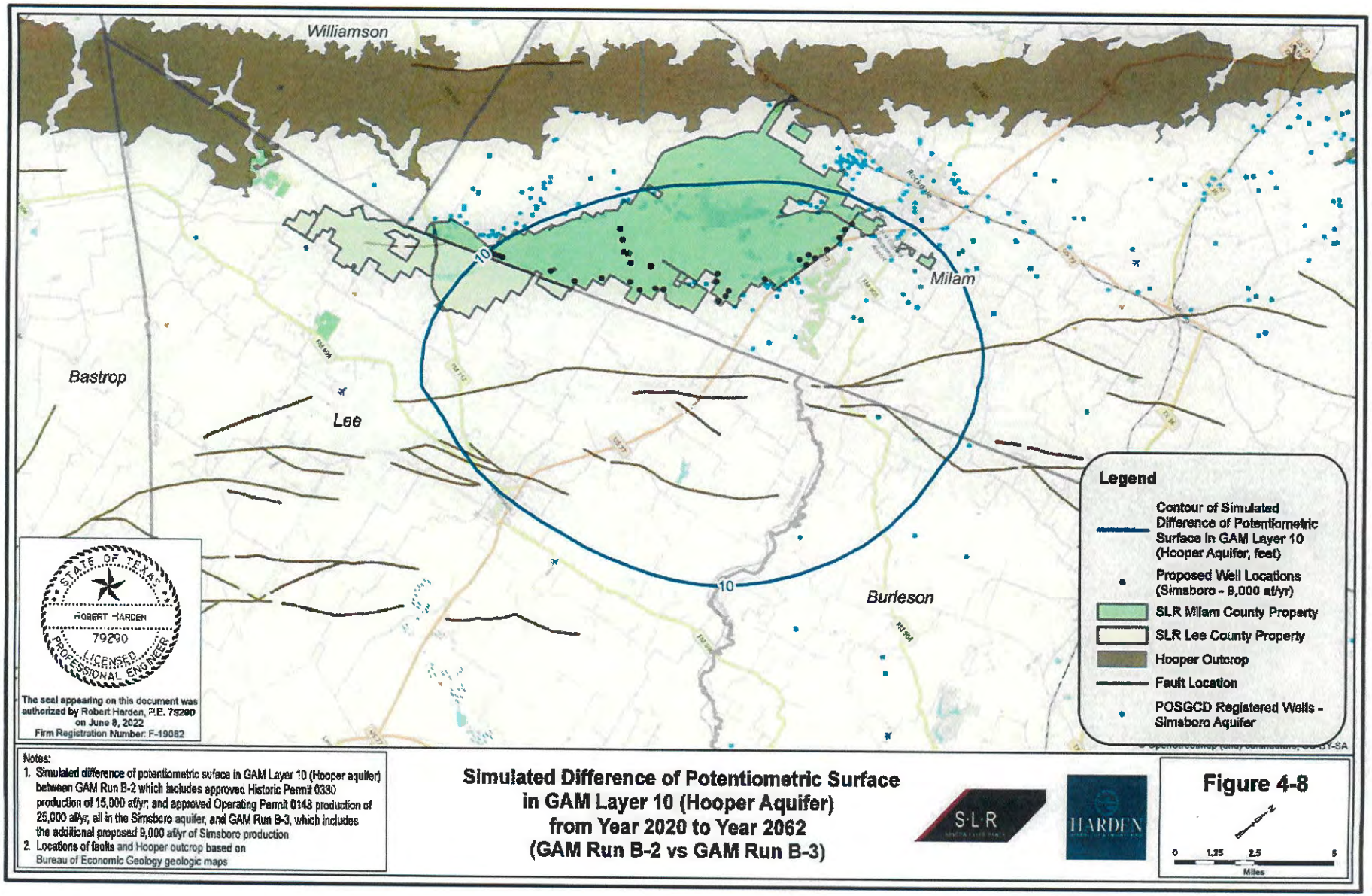

Williamson
Milam
Bastrop
Lee
Burleson
25
50
100
200
300
400
Legend
Contour of Simulated Decline of Potentiometric Surface in GAM Layer 9 (Simsboro Aquifer, feet)
Proposed Well Locations (Simsboro - 9,000 af/yr)
SLR Milam County Property
SLR Lee County Property
Simsboro Outcrop
Fault Location
POSGCD Registered Wells - Simsboro Aquifer
STATE OF TEXAS
ROBERT HARDEN
79290
LICENSED PROFESSIONAL ENGINEER
The seal appearing on this document was authorized by Robert Harden, P.E, 79290 on June 8, 2022
Firm Registration Number: F-19082
Notes:
1. Simulated decline of potentiometric suface in GAM Layer 9 (Simsboro aquifer) for GAM Run B-3, which includes proposed 9,000 af/yr Simsboro production; and approved Historic Permit 0339 production of 15,000 af/yr; and approved Operating Permit 0148 production of 25,000 af/yr; all in the Simsboro aquifer
2. Locations of faults and Simsboro outcrop based on Bureau of Economic Geology geologic maps
Simulated Decline of Potentiometric Surface in GAM Layer 9 (Simsboro Aquifer) from Year 2020 to Year 2062 (GAM Run B-3)
S·L·R
HARDEN
Figure 4-3
N
0 1.25 2.5 5
Miles

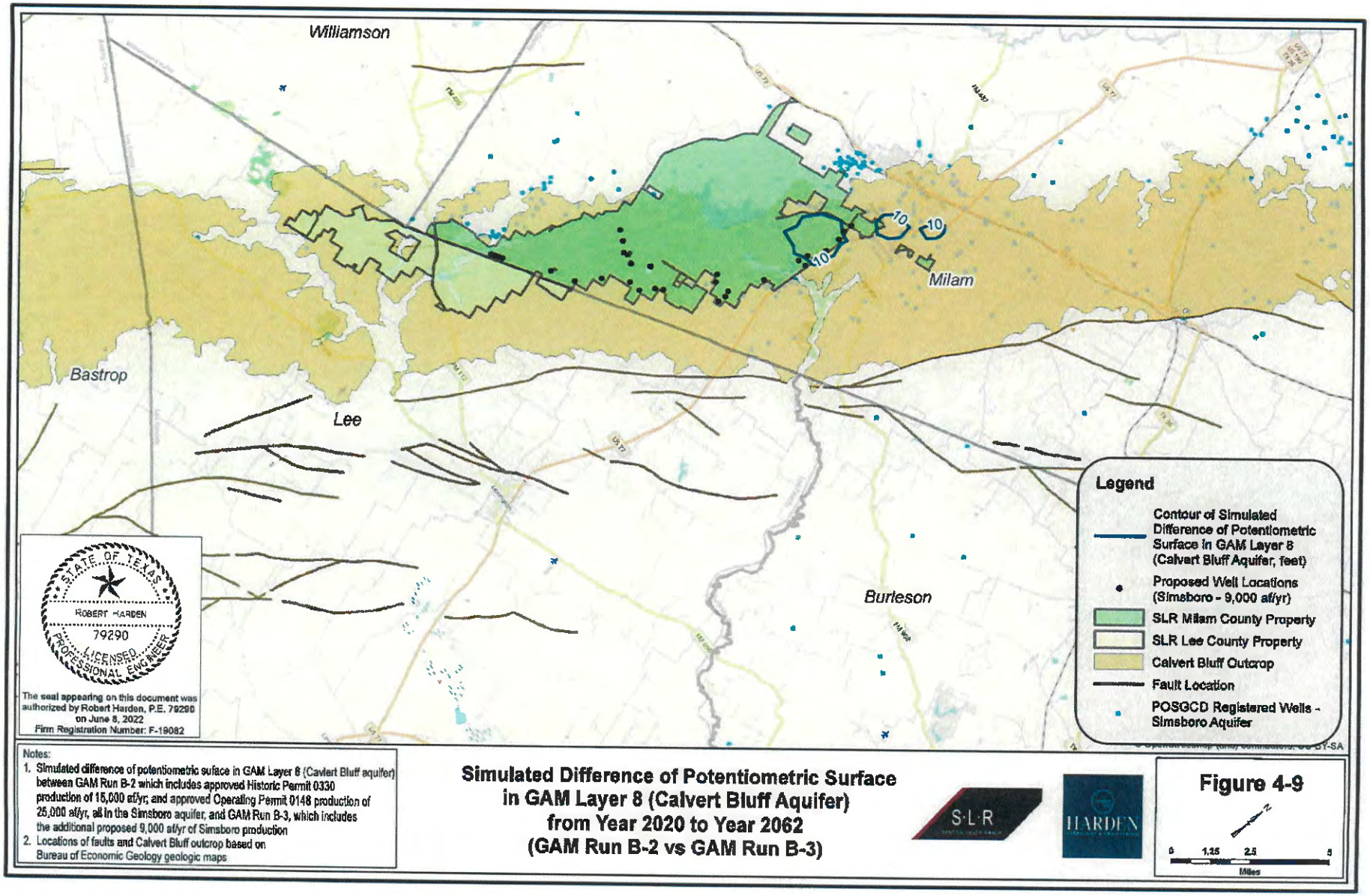

Williamson
Milam
Bastrop
Lee
Burleson
25
50
100
200
Legend
Contour of Simulated Decline of Potentiometric Surface in GAM Layer 10 (Hooper Aquifer, feet)
Proposed Well Locations (Simsboro - 9,000 af/yr)
SLR Milam County Property
SLR Lee County Property
Hooper Outcrop
Fault Location
POSGCD Registered Wells - Hooper Aquifer
STATE OF TEXAS
ROBERT HARDEN
79290
LICENSED
PROFESSIONAL ENGINEER
The seal appearing on this document was authorized by Robert Harden, P.E. 79290 on June 8, 2022
Firm Registration Number: F-19082
Notes:
1. Simulated decline of potentiometric suface in GAM Layer 10 (Hooper aquifer) for GAM Run B-3, which includes proposed 9,000 af/yr Simsboro production; and approved Historic Permit 0330 production of 15,000 af/yr; and approved Operating Permit 0148 production of 25,000 af/yr, all in the Simsboro aquifer
2. Locations of faults and Hooper outrop based on Bureau of Economic Geology geologic maps
Simulated Decline of Potentiometric Surface in GAM Layer 10 (Hooper Aquifer) from Year 2020 to Year 2062 (GAM Run B-3)
S·L·R
HARDEN
Figure 4-4
0 1.25 2.5 5
Miles

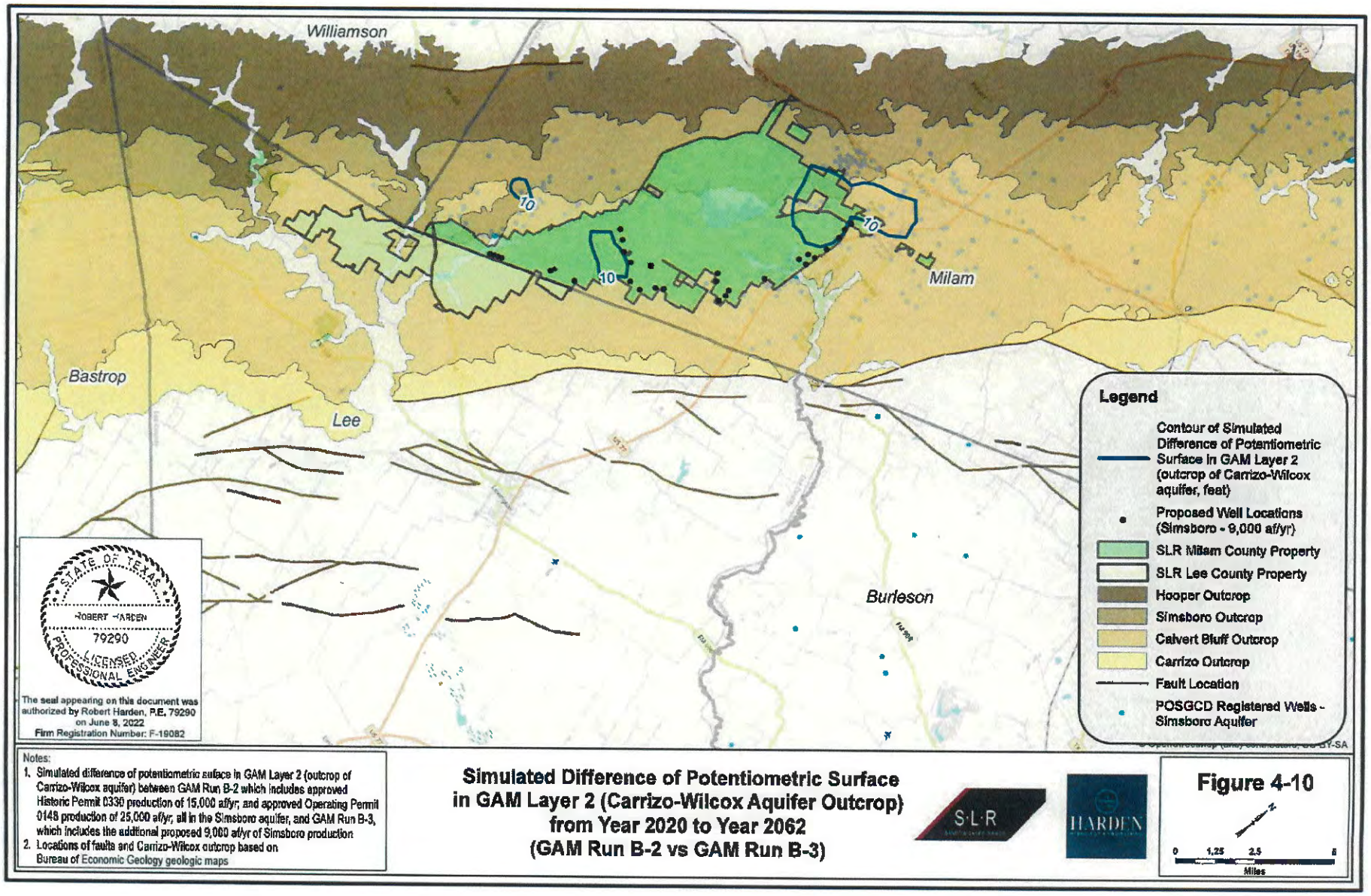

Williamson
Milam
Bastrop
Lee
Burleson
50
25
100
200
Legend
Contour of Simulated Decline of Potentiometric Surface in GAM Layer 8 (Calvert Bluff Aquifer, feet)
Proposed Well Locations (Simsboro - 9,000 af/yr)
SLR Milam County Property
SLR Lee County Property
Calvert Bluff Outcrop
Fault Location
POSGCD Registered Wells - Calvert Bluff Aquifer
STATE OF TEXAS
ROBERT HARDEN
79290
LICENSED PROFESSIONAL ENGINEER
The seal appearing on this document was authorized by Robert Harden, P.E. 79290 on June 8, 2022
Firm Registration Number: F-19082
Notes:
1. Simulated decline of potentiometric surface in GAM Layer 8 (Calvert Bluff aquifer) for GAM Run B-3, which includes proposed 9,000 af/yr Simsboro production; and approved Historic Permit 0338 production of 15,000 af/yr; and approved Operating Permit 0148 production of 25,000 af/yr, all in the Simsboro aquifer
2. Locations of faults and Calvert Bluff outcrop based on Bureau of Economic Geology geologic maps
Simulated Decline of Potentiometric Surface in GAM Layer 8 (Calvert Bluff Aquifer) from Year 2020 to Year 2062 (GAM Run B-3)
S·L·R
HARDEN
Figure 4-5
0 1.25 2.5 5
Miles

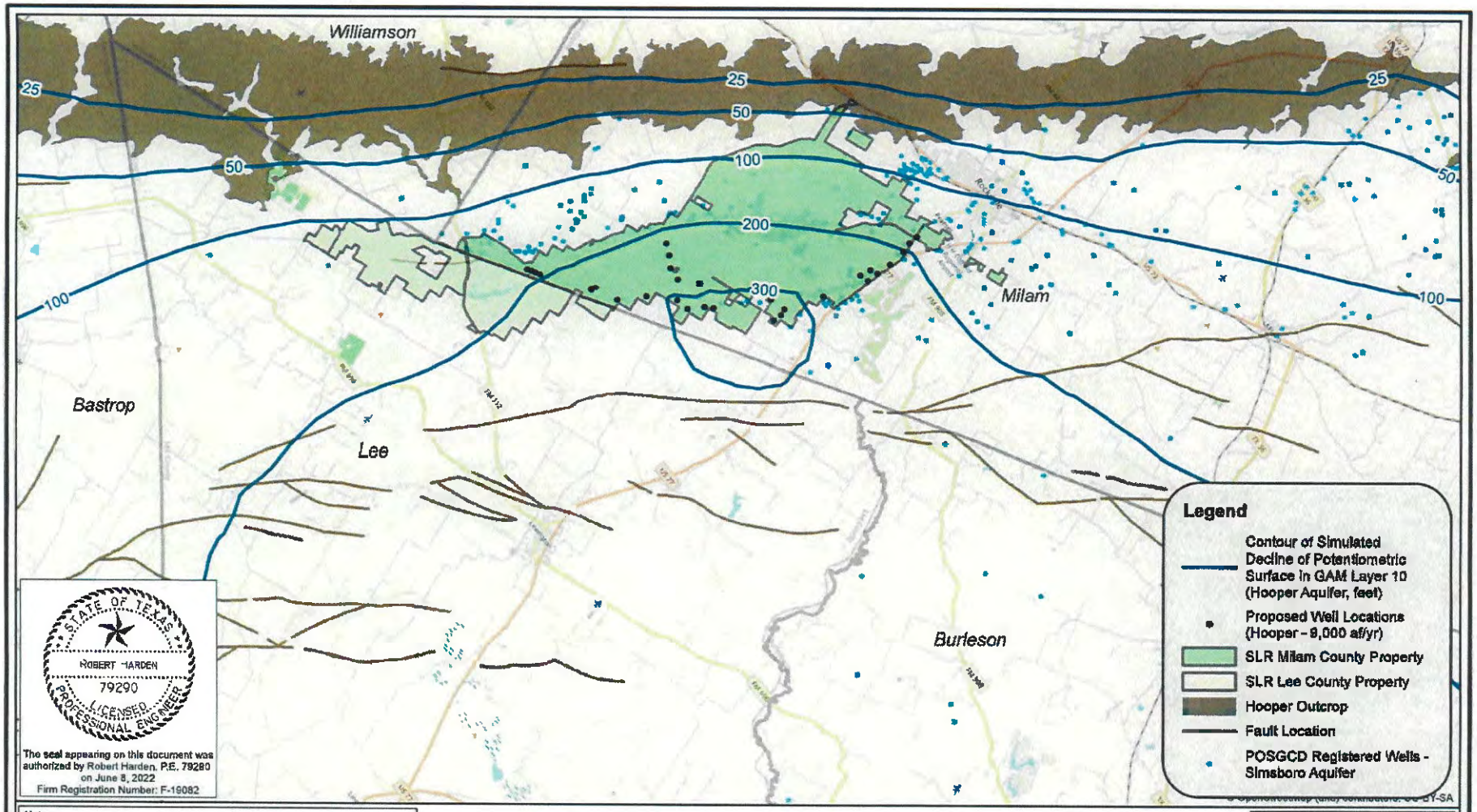

Williamson
Milam
Bastrop
Lee
Burleson
10
25
50
100
Legend
Contour of Simulated Decline of Potentiometric Surface in GAM Layer 2 (Outcrop of Carrizo-Wilcox Aquifer, feet)
Proposed Well Locations (Simsboro - 9,000 af/yr)
SLR Milam County Property
SLR Lee County Property
Hooper Outcrop
Simsboro Outcrop
Calvert Bluff Outcrop
Carrizo Outcrop
Fault Location
POSGCD Registered Well Location - Carrizo-Wilcox
STATE OF TEXAS
ROBERT HARDEN
79290
LICENSED
PROFESSIONAL ENGINEER
The seal appearing on this document was authorized by Robert Harden, P.E. 79290 on June 8, 2022
Firm Registration Number: F-19082
Notes:
1. Simulated decline of potentiometric surface in GAM Layer 2 (outcrop of Carrizo-Wilcox aquifer) for GAM Run B-3, which includes proposed 9,000 af/yr Simsboro production; and approved Historic Permit 0330 production of 15,000 af/yr; and approved Operating Permit 0148 production of 25,000 af/yr, all in the Simsboro aquifer
2. Locations of faults and Carrizo-Wilcox outcrop based on Bureau of Economic Geology geologic maps
Simulated Decline of Potentiometric Surface in GAM Layer 2 (Carrizo-Wilcox Outcrop) from Year 2020 to Year 2062 (GAM Run B-3)
S·L·R
HARDEN
Figure 4-6
N
0 1.25 2.5 5
Miles

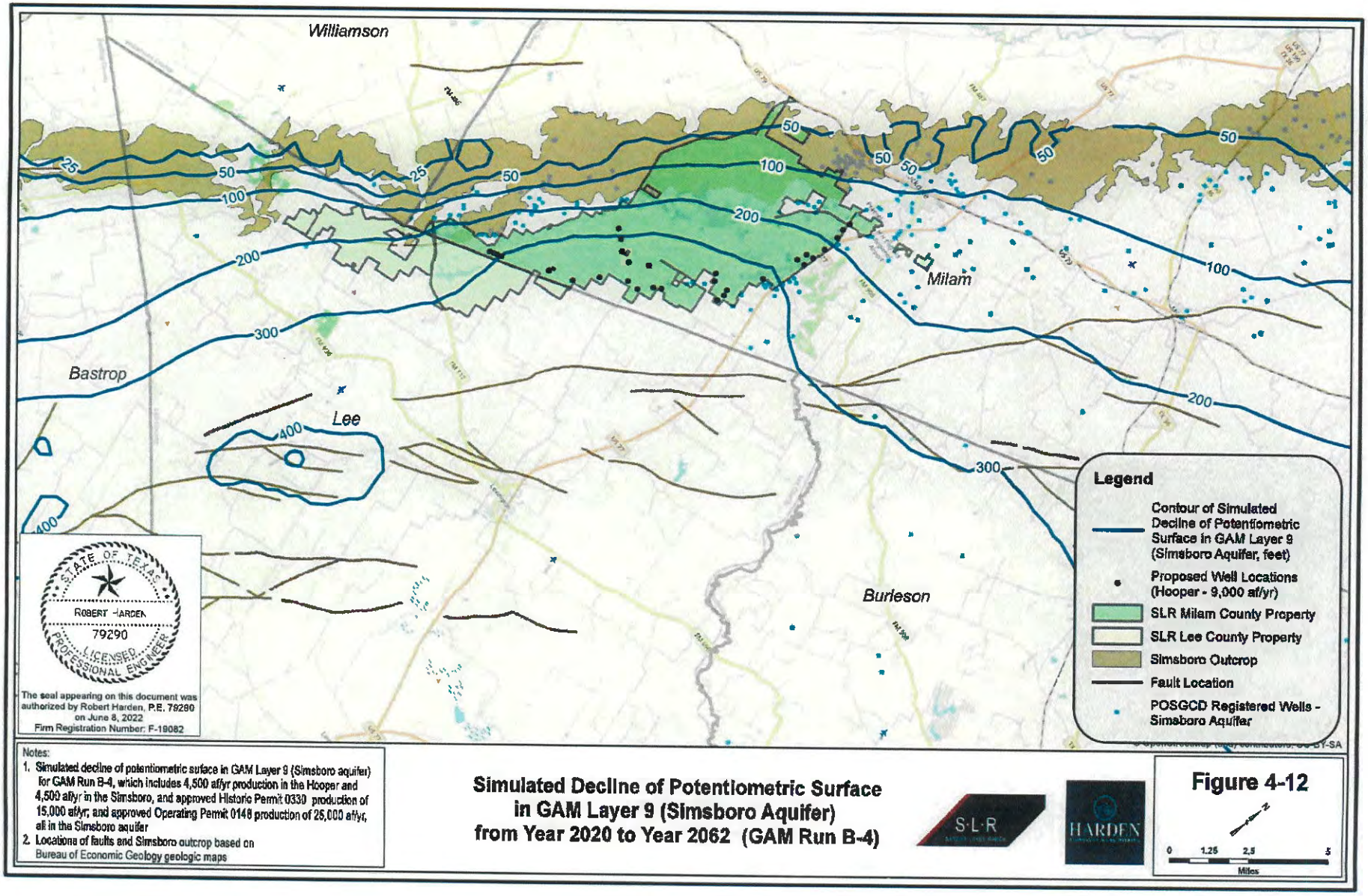

Williamson
Milam
Bastrop
Lee
Burleson
10
25
50
25
10
Legend
Contour of Simulated Difference of Potentiometric Surface in GAM Layer 9 (Simsboro Aquifer, feet)
Proposed Well Locations (Simsboro - 9,000 af/yr)
SLR Milam County Property
SLR Lee County Property
Simsboro Outcrop
Fault Location
POSGCD Registered Wells - Simsboro Aquifer
STATE OF TEXAS
ROBERT HARDEN
79290
LICENSED
PROFESSIONAL ENGINEER
The seal appearing on this document was authorized by Robert Harden, P.E. 79290 on June 8, 2022
Firm Registration Number: F-19082
Notes:
1. Simulated difference of potentiometric surface in GAM Layer 9 (Simsboro aquifer) between GAM Run B-2 which includes approved Historic Permit 0330 production of 15,000 af/yr; and approved Operating Permit 0148 production of 25,000 af/yr, all in the Simsboro aquifer, and GAM Run B-3, which includes the additional proposed 9,000 af/yr of Simsboro production
2. Locations of faults and Simsboro outcrop based on Bureau of Economic Geology geologic maps
Simulated Difference of Potentiometric Surface in GAM Layer 9 (Simsboro Aquifer) from Year 2020 to Year 2062 (GAM Run B-2 vs GAM Run B-3)
S·L·R
HARDEN
Figure 4-7
0 1.25 2.5 5
Miles

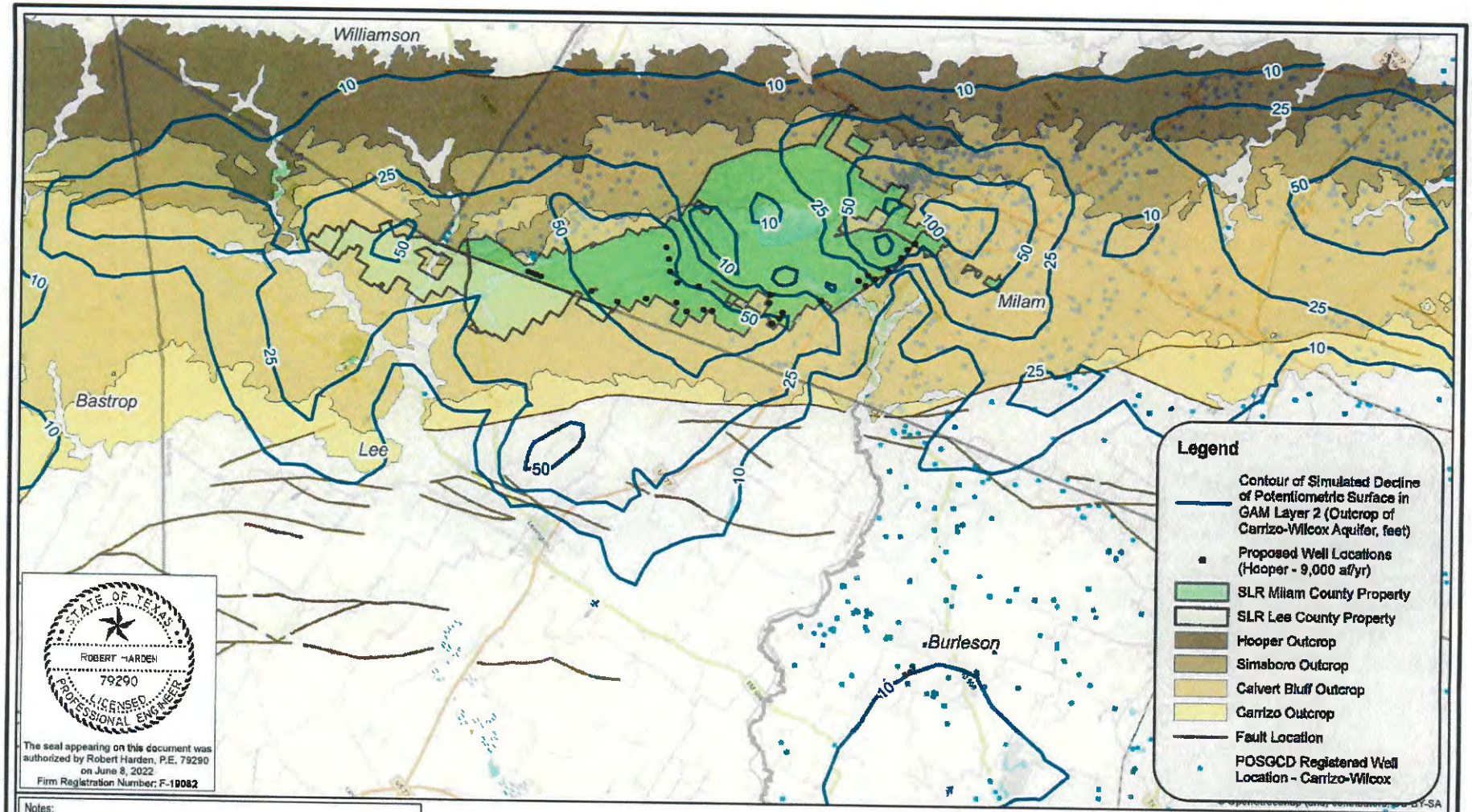

Williamson
Milam
Bastrop
Lee
Burleson
10
10
Legend
Contour of Simulated Difference of Potentiometric Surface in GAM Layer 10 (Hooper Aquifer, feet)
Proposed Well Locations (Simsboro - 9,000 af/yr)
SLR Milam County Property
SLR Lee County Property
Hooper Outcrop
Fault Location
POSGCD Registered Wells - Simsboro Aquifer
STATE OF TEXAS
ROBERT HARDEN
79290
LICENSED
PROFESSIONAL ENGINEER
The seal appearing on this document was authorized by Robert Harden, P.E. 79290 on June 8, 2022
Firm Registration Number: F-19082
Notes:
1. Simulated difference of potentiometric surface in GAM Layer 10 (Hooper aquifer) between GAM Run B-2 which includes approved Historic Permit 0330 production of 15,000 af/yr, and approved Operating Permit 0148 production of 25,000 af/yr, all in the Simsboro aquifer, and GAM Run B-3, which includes the additional proposed 9,000 af/yr of Simsboro production
2. Locations of faults and Hooper outcrop based on Bureau of Economic Geology geologic maps
Simulated Difference of Potentiometric Surface in GAM Layer 10 (Hooper Aquifer) from Year 2020 to Year 2062 (GAM Run B-2 vs GAM Run B-3)
S·L·R
HARDEN
Figure 4-8
0 1.25 2.5 5
Miles


Williamson
Milam
Bastrop
Lee
Burleson
10
10
10
Legend
Contour of Simulated Difference of Potentiometric Surface in GAM Layer 8 (Calvert Bluff Aquifer, feet)
Proposed Well Locations (Simsboro - 9,000 af/yr)
SLR Milam County Property
SLR Lee County Property
Calvert Bluff Outcrop
Fault Location
POSGCD Registered Wells - Simsboro Aquifer
STATE OF TEXAS
ROBERT HARDEN
79290
LICENSED PROFESSIONAL ENGINEER
The seal appearing on this document was authorized by Robert Harden, P.E. 79290 on June 8, 2022
Firm Registration Number: F-19082
Notes:
1. Simulated difference of potentiometric suface in GAM Layer 8 (Cavlert Bluff aquifer) between GAM Run B-2 which includes approved Historic Permit 0330 production of 15,000 af/yr; and approved Operating Permit 0148 production of 25,000 af/yr, all in the Simsboro aquifer, and GAM Run B-3, which includes the additional proposed 9,000 af/yr of Simsboro production
2. Locations of faults and Calvert Bluff outcrop based on Bureau of Economic Geology geologic maps
Simulated Difference of Potentiometric Surface in GAM Layer 8 (Calvert Bluff Aquifer) from Year 2020 to Year 2062 (GAM Run B-2 vs GAM Run B-3)
S·L·R
HARDEN
Figure 4-9
N
0 1.25 2.5 5
Miles


Williamson
Milam
Bastrop
Lee
Burleson
10
10
10
Legend
Contour of Simulated Difference of Potentiometric Surface in GAM Layer 2 (outcrop of Carrizo-Wilcox aquifer, feet)
Proposed Well Locations (Simsboro - 9,000 af/yr)
SLR Milam County Property
SLR Lee County Property
Hooper Outcrop
Simsboro Outcrop
Calvert Bluff Outcrop
Carrizo Outcrop
Fault Location
POSGCD Registered Wells - Simsboro Aquifer
STATE OF TEXAS
ROBERT HARDEN
79290
LICENSED
PROFESSIONAL ENGINEER
The seal appearing on this document was authorized by Robert Harden, P.E. 79290 on June 8, 2022
Firm Registration Number: F-19082
Notes:
1. Simulated difference of potentiometric surface in GAM Layer 2 (outcrop of Carrizo-Wilcox aquifer) between GAM Run B-2 which includes approved Historic Permit 0330 production of 15,000 af/yr; and approved Operating Permit 0148 production of 25,000 af/yr; all in the Simsboro aquifer, and GAM Run B-3, which includes the additional proposed 9,000 af/yr of Simsboro production
2. Locations of faults and Carrizo-Wilcox outcrop based on Bureau of Economic Geology geologic maps
Simulated Difference of Potentiometric Surface in GAM Layer 2 (Carrizo-Wilcox Aquifer Outcrop) from Year 2020 to Year 2062 (GAM Run B-2 vs GAM Run B-3)
S·L·R
HARDEN
Figure 4-10
N
0 1.25 2.5 5
Miles


Williamson
Bastrop
Lee
Milam
Burleson
25
50
100
200
300
Legend
Contour of Simulated Decline of Potentiometric Surface in GAM Layer 10 (Hooper Aquifer, feet)
Proposed Well Locations (Hooper - 9,000 af/yr)
SLR Milam County Property
SLR Lee County Property
Hooper Outcrop
Fault Location
POSGCD Registered Wells - Simsboro Aquifer
STATE OF TEXAS
ROBERT HARDEN
79290
LICENSED
PROFESSIONAL ENGINEER
The seal appearing on this document was authorized by Robert Harden, P.E., 79290 on June 8, 2022
Firm Registration Number: F-19082
Notes:
1. Simulated decline of potentiometric surface in GAM Layer 10 (Hooper aquifer) for GAM Run B-4, which includes 4,500 af/yr production in the Hooper and 4,500 af/yr in the Simsboro, and approved Historic Permit 0330 production of 15,000 af/yr, and approved Operating Permit 0148 production of 25,000 af/yr, all in the Simsboro aquifer
2. Locations of faults and Hooper outcrop based on Bureau of Economic Geology geologic maps
Simulated Decline of Potentiometric Surface in GAM Layer 10 (Hooper Aquifer) from Year 2020 to Year 2062 (GAM Run B-4)
SLR
HARDEN
Figure 4-11
N
0 1.25 2.5 5
Miles


Williamson
Milam
Bastrop
Lee
Burleson
25
50
100
200
300
400
Legend
Contour of Simulated Decline of Potentiometric Surface in GAM Layer 9 (Simsboro Aquifer, feet)
Proposed Well Locations (Hooper - 9,000 af/yr)
SLR Milam County Property
SLR Lee County Property
Simsboro Outcrop
Fault Location
POSGCD Registered Wells - Simsboro Aquifer
STATE OF TEXAS
ROBERT HARDEN
79290
LICENSED PROFESSIONAL ENGINEER
The seal appearing on this document was authorized by Robert Harden, P.E. 79290 on June 8, 2022
Firm Registration Number: F-19082
Notes:
1. Simulated decline of potentiometric surface in GAM Layer 9 (Simsboro aquifer) for GAM Run B-4, which includes 4,500 af/yr production in the Hooper and 4,500 af/yr in the Simsboro, and approved Historic Permit 0330 production of 15,000 af/yr, and approved Operating Permit 0148 production of 25,000 af/yr, all in the Simsboro aquifer
2. Locations of faults and Simsboro outcrop based on Bureau of Economic Geology geologic maps
Simulated Decline of Potentiometric Surface in GAM Layer 9 (Simsboro Aquifer) from Year 2020 to Year 2062 (GAM Run B-4)
S·L·R
HARDEN
Figure 4-12
N
0 1.25 2.5 5
Miles



STATE OF TEXAS
ROBERT HARDEN
79290
LICENSED PROFESSIONAL ENGINEER

The seal appearing on this document was authorized by Robert Harden, P.E. 79290 on June 8, 2022
Firm Registration Number: F-19082

Notes:
1. Simulated decline of potentiometric suface in GAM Layer 2 (outcrop of Carrizo-Wilcox aquifer) for GAM Run B-4, which includes 4,500 af/yr production in the Hooper and 4,500 af/yr in the Simsboro, and approved Historic Permit 0330 production of 15,000 af/yr; and approved Operating Permit 0148 production of 25,000 af/yr, all in the Simsboro aquifer
2. Locations of faults and Carrizo-Wilcox outcrop based on Bureau of Economic Geology geologic maps

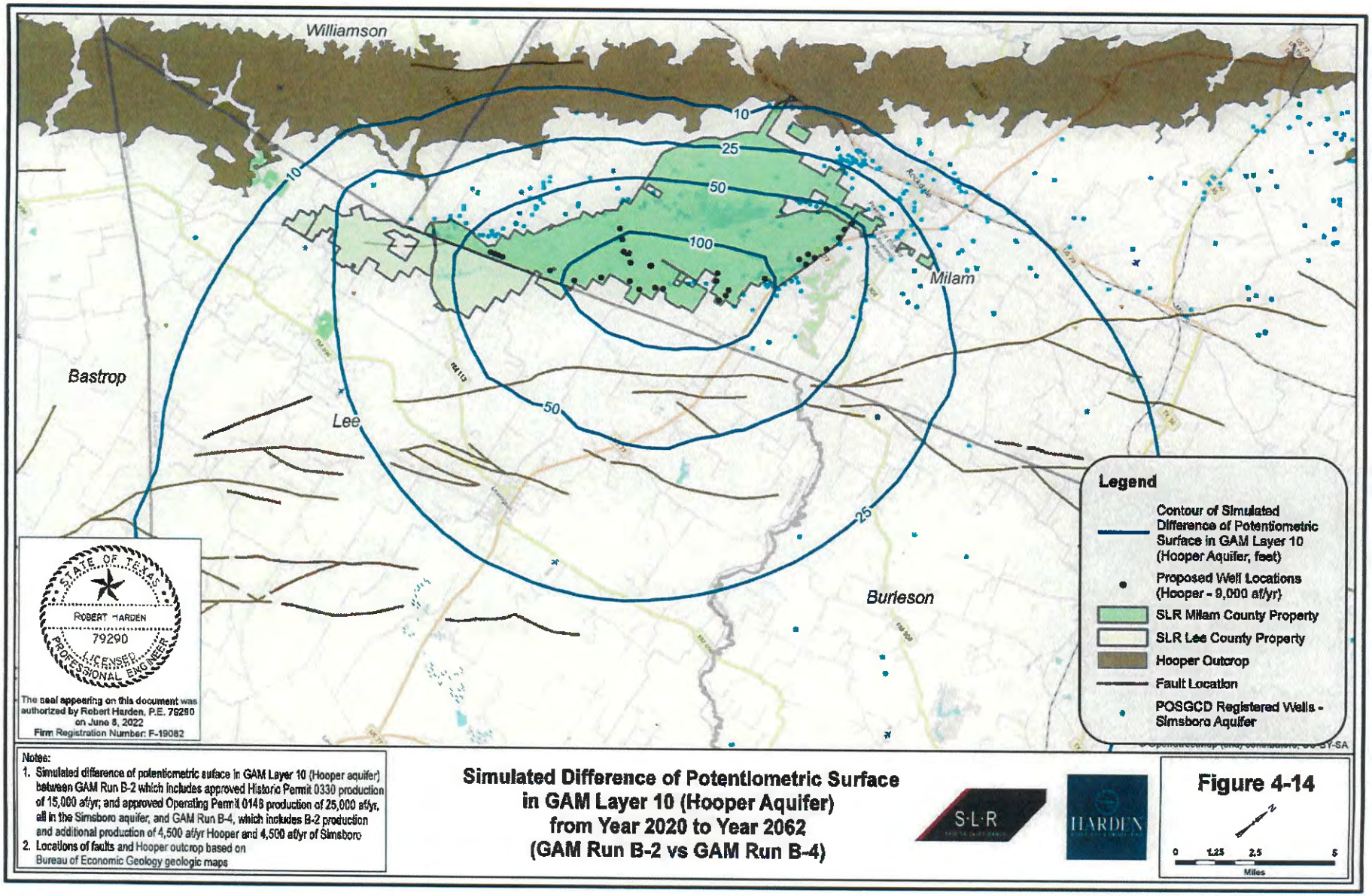
Simulated Decline of Potentiometric Surface in GAM Layer 2 (Carrizo-Wilcox Outcrop) from Year 2020 to Year 2062 (GAM Run B-4)

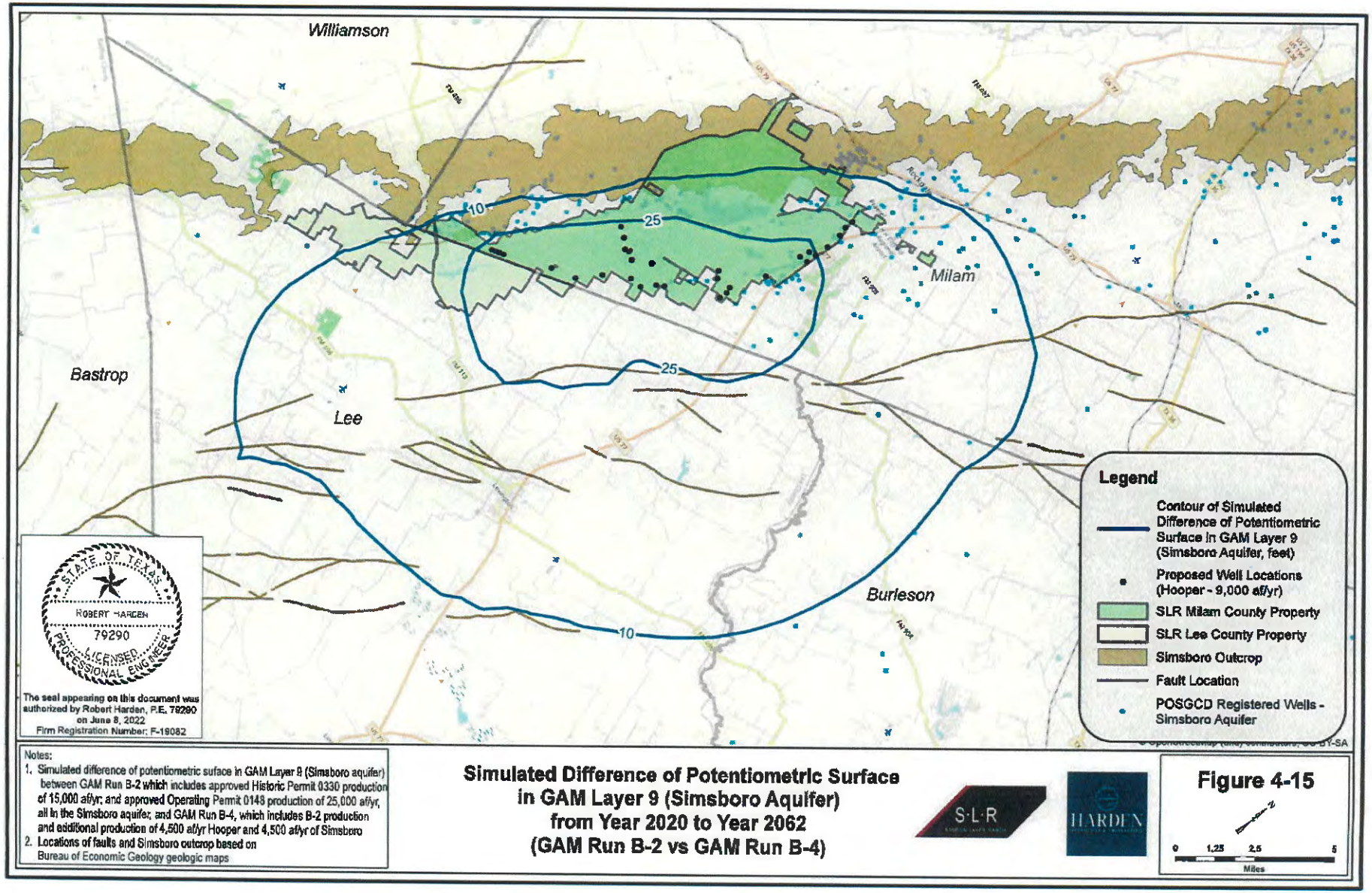
S·L·R

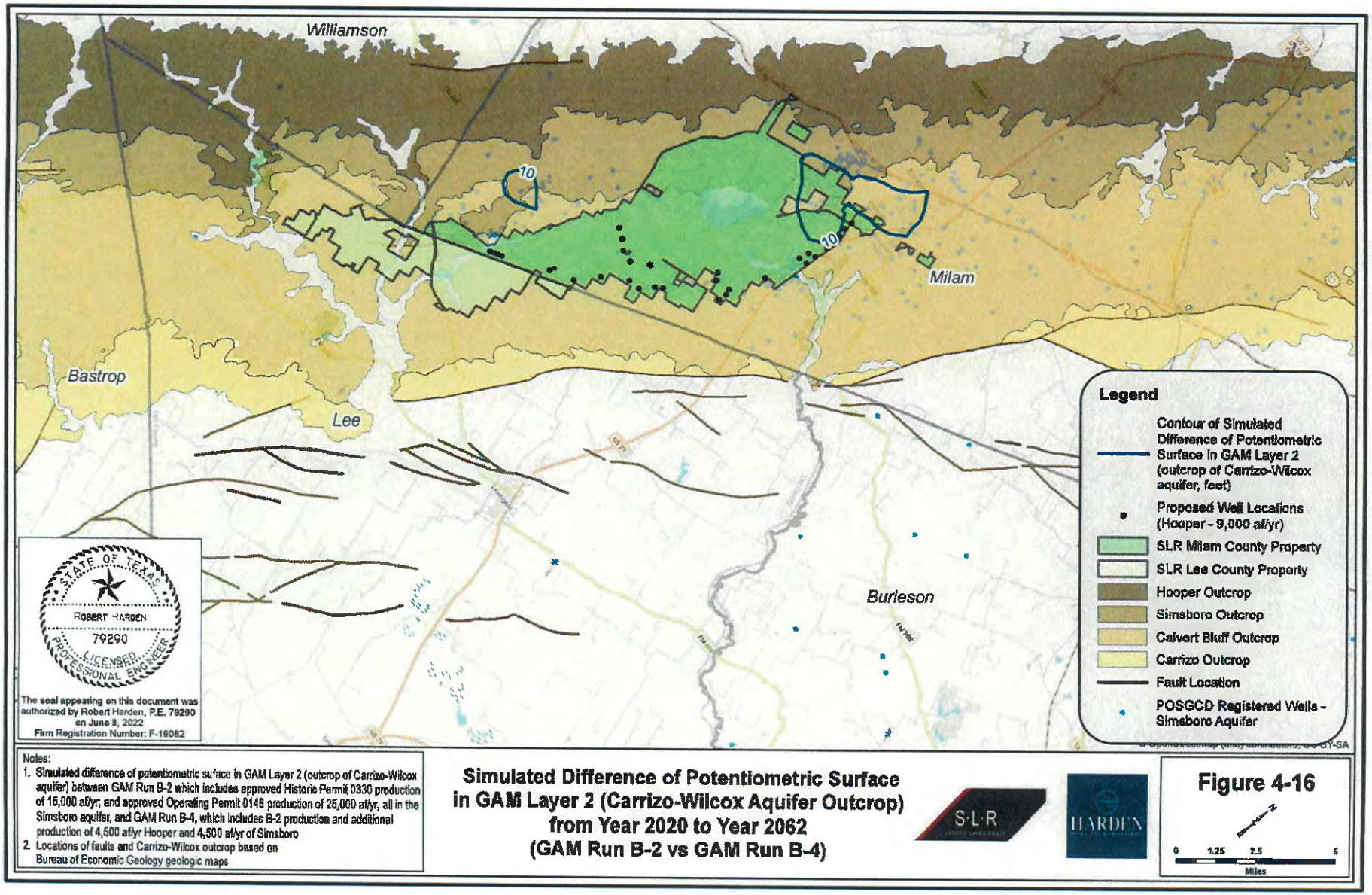
HARDEN

Figure 4-13

0 1.25 2.5 5
Miles


Williamson
Bastrop
Lee
Milam
Burleson
10
25
50
100
10
50
25
Legend
Contour of Simulated Difference of Potentiometric Surface in GAM Layer 10 (Hooper Aquifer, feet)
Proposed Well Locations (Hooper - 9,000 af/yr)
SLR Milam County Property
SLR Lee County Property
Hooper Outcrop
Fault Location
POSGCD Registered Wells - Simsboro Aquifer
STATE OF TEXAS
ROBERT HARDEN
79290
LICENSED
PROFESSIONAL ENGINEER
The seal appearing on this document was authorized by Robert Harden, P.E. 79290 on June 8, 2022
Firm Registration Number: F-19082
Notes:
1. Simulated difference of potentiometric suface in GAM Layer 10 (Hooper aquifer) between GAM Run B-2 which includes approved Historic Permit 0330 production of 15,000 af/yr; and approved Operating Permit 0148 production of 25,000 af/yr, all in the Simsboro aquifer, and GAM Run B-4, which includes B-2 production and additional production of 4,500 af/yr Hooper and 4,500 af/yr of Simsboro
2. Locations of faults and Hooper outcrop based on Bureau of Economic Geology geologic maps
Simulated Difference of Potentiometric Surface in GAM Layer 10 (Hooper Aquifer) from Year 2020 to Year 2062 (GAM Run B-2 vs GAM Run B-4)
S·L·R
HARDEN
Figure 4-14
N
0 1.25 2.5 5
Miles

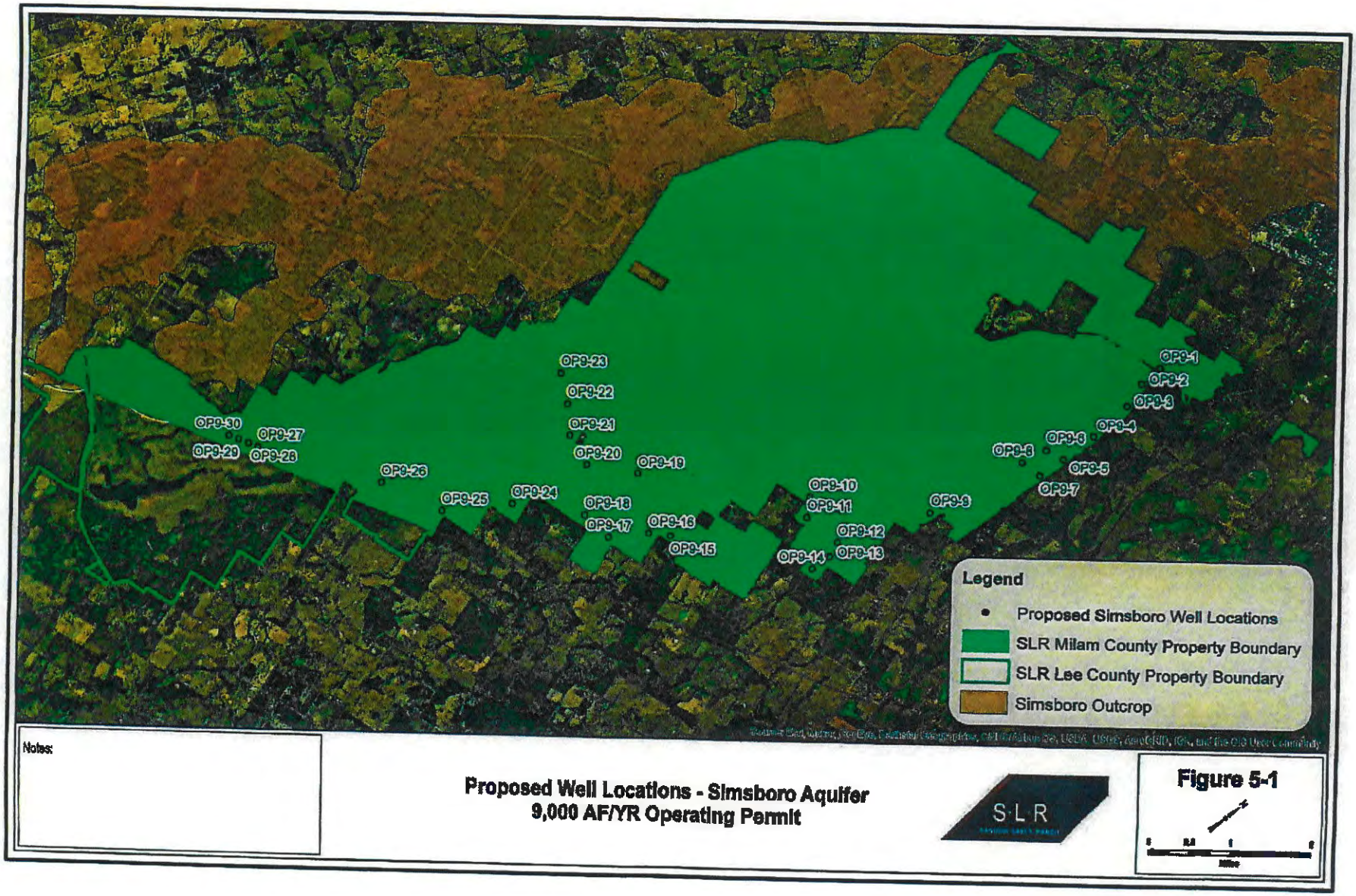

Williamson
Bastrop
Lee
Milam
Burleson
10
25
25
10
Legend
Contour of Simulated Difference of Potentiometric Surface in GAM Layer 9 (Simsboro Aquifer, feet)
Proposed Well Locations (Hooper - 9,000 af/yr)
SLR Milam County Property
SLR Lee County Property
Simsboro Outcrop
Fault Location
POSGCD Registered Wells - Simsboro Aquifer
STATE OF TEXAS
ROBERT HARDEN
79290
LICENSED PROFESSIONAL ENGINEER
The seal appearing on this document was authorized by Robert Harden, P.E. 79290 on June 8, 2022
Firm Registration Number: F-19082
Notes:
1. Simulated difference of potentiometric suface in GAM Layer 9 (Simsboro aquifer) between GAM Run B-2 which includes approved Historic Permit 0330 production of 15,000 af/yr; and approved Operating Permit 0148 production of 25,000 af/yr, all in the Simsboro aquifer; and GAM Run B-4, which includes B-2 production and additional production of 4,500 af/yr Hooper and 4,500 af/yr of Simsboro
2. Locations of faults and Simsboro outcrop based on Bureau of Economic Geology geologic maps
Simulated Difference of Potentiometric Surface in GAM Layer 9 (Simsboro Aquifer) from Year 2020 to Year 2062 (GAM Run B-2 vs GAM Run B-4)
S·L·R
HARDEN
Figure 4-15
0 1.25 2.5 5
Miles

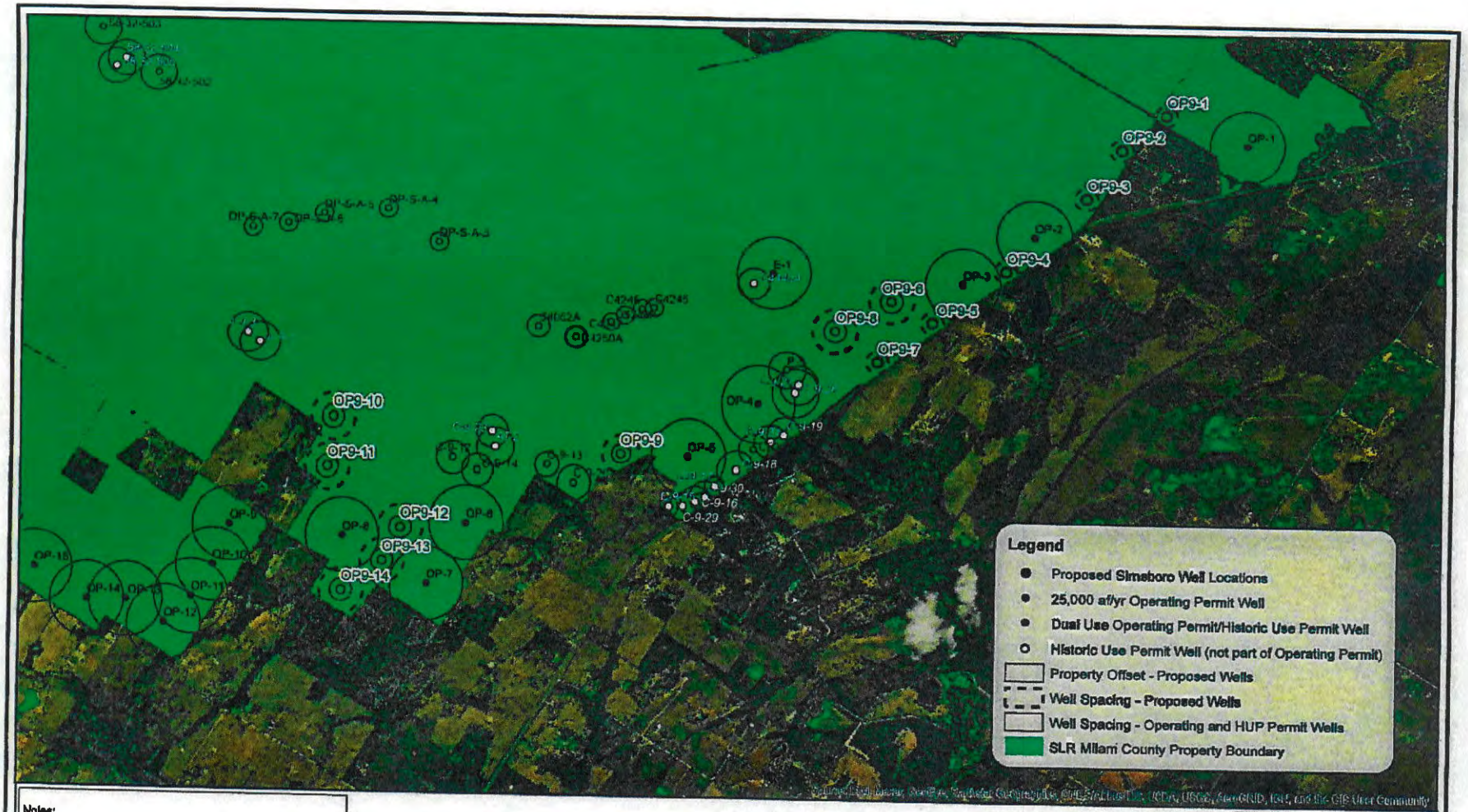

Williamson
Milam
Bastrop
Lee
Burleson
10
10
Legend
Contour of Simulated Difference of Potentiometric Surface in GAM Layer 2 (outcrop of Carrizo-Wilcox aquifer, feet)
Proposed Well Locations (Hooper - 9,000 af/yr)
SLR Milam County Property
SLR Lee County Property
Hooper Outcrop
Simsboro Outcrop
Calvert Bluff Outcrop
Carrizo Outcrop
Fault Location
POSGCD Registered Wells - Simsboro Aquifer
STATE OF TEXAS
ROBERT HARDEN
79290
LICENSED
PROFESSIONAL ENGINEER
The seal appearing on this document was authorized by Robert Harden, P.E. 79290 on June 8, 2022
Firm Registration Number: F-19082
Notes:
1. Simulated difference of potentiometric surface in GAM Layer 2 (outcrop of Carrizo-Wilcox aquifer) between GAM Run B-2 which includes approved Historic Permit 0330 production of 15,000 af/yr; and approved Operating Permit 0148 production of 25,000 af/yr, all in the Simsboro aquifer, and GAM Run B-4, which includes B-2 production and additional production of 4,500 af/yr Hooper and 4,500 af/yr of Simsboro
2. Locations of faults and Carrizo-Wilcox outcrop based on Bureau of Economic Geology geologic maps
Simulated Difference of Potentiometric Surface in GAM Layer 2 (Carrizo-Wilcox Aquifer Outcrop) from Year 2020 to Year 2062 (GAM Run B-2 vs GAM Run B-4)
S·L·R
HARDEN
Figure 4-16
0
1.25
2.5
5
Miles

Production Well Information

Section 5

SLR
SANDOW LAKES RANCH


OP9-1
OP9-2
OP9-3
OP9-4
OP9-6
OP9-8
OP9-5
OP9-7
OP9-9
OP9-10
OP9-11
OP9-12
OP9-13
OP9-14
OP9-15
OP9-16
OP9-17
OP9-18
OP9-19
OP9-20
OP9-21
OP9-22
OP9-23
OP9-24
OP9-25
OP9-26
OP9-27
OP9-28
OP9-29
OP9-30
Legend
Proposed Simsboro Well Locations
SLR Milam County Property Boundary
SLR Lee County Property Boundary
Simsboro Outcrop
Notes:
Proposed Well Locations - Simsboro Aquifer
9,000 AF/YR Operating Permit
S·L·R
Figure 5-1



Notes:

POSGCD Well Spacing Requirements
Proposed Well Locations - Simsboro Aquifer
9,000 AF/YR Operating Permit

S·L·R

Figure 5-2

Notes:

POSGCD Well Spacing Requirements
Proposed Well Locations - Simsboro Aquifer
9,000 AF/YR Operating Permit

S·L·R

Figure 5-3

Notes:

Proposed Well Locations - Hooper Aquifer
9,000 AF/YR Operating Permit

S·L·R

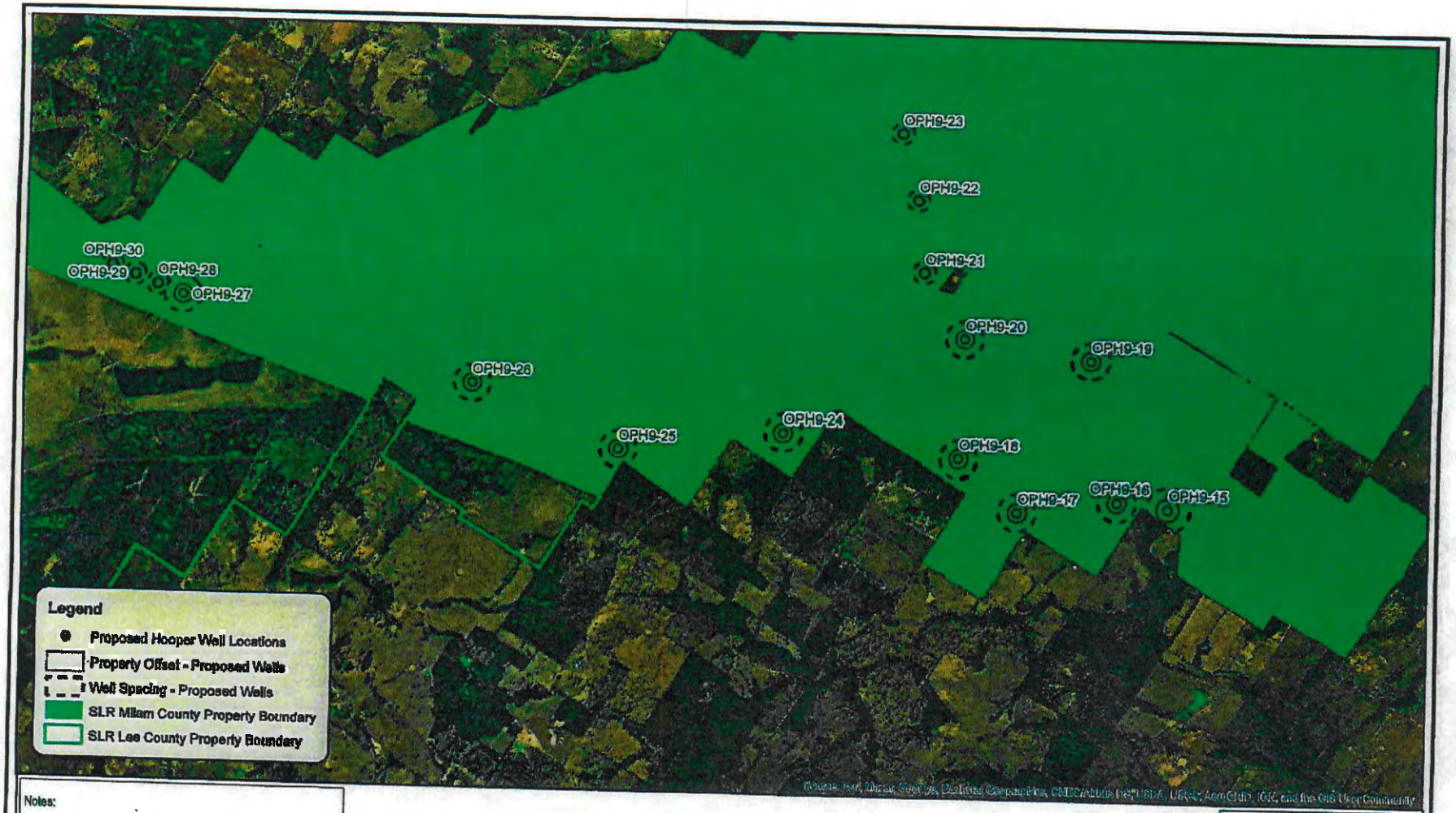
Figure 5-4

Notes:

POSGCD Well Spacing Requirements
Proposed Well Locations - Hooper Aquifer
9,000 AF/YR Operating Permit

SLR

Figure 5-5



Notes:

POSGCD Well Spacing Requirements
Proposed Well Locations - Hooper Aquifer
9,000 AF/YR Operating Permit

S·L·R

Figure 5-6