

## Technical Memorandum

**TO:** Mr. Alan Day, General Manager  
Brazos Valley Groundwater Conservation District

**FROM:** Christopher Drabek, P.G., and James Beach, P.G.

**SUBJECT:** Review of Wellborn SUD Lightsey Property Well Simsboro Aquifer Evaluation Report

**DATE:** September 1, 2023

### Introduction

On behalf of the Brazos Valley Groundwater Conservation District (BVGCD, District), Advanced Groundwater Solutions, LLC (AGS) has reviewed the Aquifer Evaluation Report (AER) prepared by Carollo Engineers (Carollo) in support of a permit application from Wellborn Special Utility District (SUD) for the proposed Lightsey Property Well (Lightsey Well) to be completed in the Simsboro Aquifer with a withdrawal amount of 1,972 acre-feet per year (ac-ft/yr). The AER was submitted to BVGCD on August 2, 2023 to address BVGCD Rule 8.4(b)(7)(B) for wells capable of producing 800 or more acre-feet per year and discusses the potential impacts of groundwater production from the proposed well screening the Simsboro Aquifer in the south part of Robertson County.

The AER identifies the Wellborn SUD Lightsey Well with a maximum pumping rate of 2,000 gallons per minute (gpm) and an annual permit allocation of 1,972 acre-feet. The proposed location of the Lightsey Well is shown on Figure 1 below. The well is located about 0.4 miles to the south-southwest of the intersection of Mumford Benchley Road and Old Hearne Road in Robertson County.

AGS has evaluated the hydrogeological conditions, mapping of BVGCD permitted and registered Simsboro wells within one mile of the proposed Wellborn SUD Lightsey Well and the water level drawdown estimates developed using the Texas Water Development Board (TWDB) Groundwater Availability Model (GAM) presented in the submitted aquifer evaluation reports.

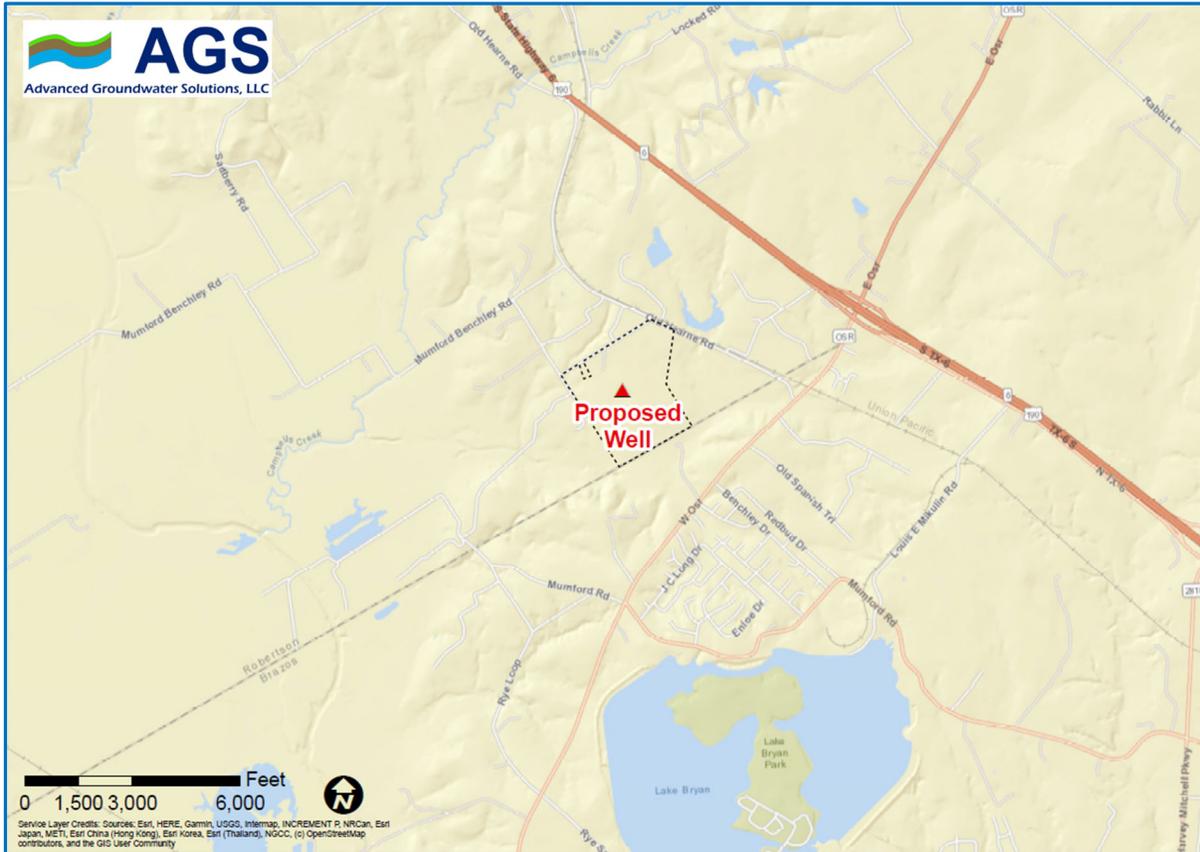


Figure 1. Well Location Map

## Hydrogeologic Conditions

### Rule 8.4(b)(7)(B)(1)

AGS has evaluated the hydrogeological conditions presented in the AER and generally agrees with the information presented in this section.

The AER identifies the top of the Simsboro Aquifer at the proposed Lightsey Well to be about 2,234 feet below land surface (bls) and Carollo estimates the total thickness of the Simsboro Aquifer to be about 500 feet. Review of local electric logs indicates that the Carollo Simsboro Aquifer estimates appear to be reasonable.

## Simsboro Aquifer Wells Within 1-mile of the Proposed Wells

### Rule 8.4(b)(7)(B)(2)

Table 2 from the AER includes information on 23 wells identified within 1-mile of the proposed Lightsey Well. Wellborn SUD Well 7 (BVDO-0285) and the City of Bryan Well 18 (BVDO-0003) are the only BVGCD permitted or registered wells within 1-mile of the proposed Lightsey Well that are completed in the Simsboro Aquifer. Wellborn SUD Well 7 is located about 3,800 to 3,820 feet to the north-northeast of the proposed Lightsey Well. The City of Bryan Well 18 is

located about 5,270 to 5,290 feet to the south of the proposed Lightsey Well. A map showing the location of the proposed Lightsey Well and the existing wells, including all BVGCD registered or permitted wells, within one mile of the proposed well is included as Figure 2 in the AER.

## Interference Drawdown Estimates

### Rule 8.4(b)(7)(B)(3)

BVGCD Rule 8.4(b)(7)(B)(3) requires an estimate of water level drawdown caused by the well(s) pumping at the permitted rate for 1 year and 10 years at a distance of five miles from the well(s) using Version 3.02 of the Central Portion of the Sparta, Queen City and Carrizo-Wilcox Aquifers GAM (INTERA Incorporated and others, 2020). An estimate of the drawdown at locations of existing registered and permitted wells in the BVGCD database that are located within one mile and screen the same aquifer as the well(s) is required to be developed using an analytical tool.

Appropriate analytical models are generally used to provide estimates of pumping effects at or near the well(s) over shorter time horizons. Regional numerical models like the TWDB GAMs are generally used to account for regional variability in the aquifer such as changes in transmissivity and faulting as well as recharge, leakage between aquifers, stream-aquifer interaction, other pumping, and other factors impacting water levels. Appropriate numerical models can provide more reliable estimates of pumping effects on a more regional scale and over longer time horizons.

### Groundwater Availability Model Simulation

#### *Carollo GAM Simulations*

Carollo used the TWDB Central Portion of the Sparta, Queen City and Carrizo-Wilcox Aquifer GAM to estimate drawdown that results from continuously pumping the proposed well at 1,972 ac-ft/yr for 1-year and 10-years. Carollo isolated the pumping effects of the proposed Lightsey Well by evaluating the differences in simulated water levels between the historical baseline scenario and the baseline scenario plus the proposed Lightsey Well pumping. AGS considers this to be a reasonable approach.

A copy of the Carollo 1-year and 10-year GAM simulated interference drawdown illustrations from the AER (Carollo Figures 4 and 5) are attached to this memorandum. Table 3 in the AER shows GAM simulated 1-year and 10-year drawdown estimates at Wellborn SUD Well 7 (BVDO-0285) and the City of Bryan Well 18 (BVDO-0003), which are the only BVGCD permitted and registered Simsboro wells within 1-mile of the proposed well.

#### *AGS GAM Verification*

AGS performed GAM simulations to verify the Carollo GAM simulations and results show drawdown estimates that are consistent with results presented in the AER. AGS was able to replicate the drawdowns at distance after 1-year of pumping (about 7 and 8 of drawdown at 5 miles and about 8 to 10 feet of drawdown at 1 mile) and 10-years of pumping (about 8 to 9 feet drawdown at 5 miles and about 11 to 14 feet of drawdown at 1 mile).

The GAM estimated drawdown contours at distance appear to be influenced by faults included in the GAM, which are in the same general area as faults that have been mapped by GWC and AGS using local geophysical logs and other hydrogeologic data.

AGS has reviewed this AER based on the hydrogeologic information available today, the information provided by the applicant, and the models and tools available at this time. New scientific or hydrogeologic information or updated models may change the findings of this review.

#### Analytical Model Simulation

The Carollo AER did not include an estimate of the drawdown developed with an analytical tool at locations of existing registered and permitted wells in the BVGCD database that are located within one mile and screen the same aquifer as the proposed well.

AGS estimated the drawdown at the pumping well using a Theis analytical model and estimated the drawdown at the proposed Lightsey Well and at Wellborn SUD Well 7 (BVDO-0285) and the City of Bryan Well 18 (BVDO-0003). A transmissivity value of 118,490 gallons per day per foot (gpd/ft) and storativity value of 0.00012 from the Central Portion of the Sparta, Queen City and Carrizo-Wilcox Aquifers GAM Simsboro model cell corresponding to the proposed Lightsey Well location were used in the analytical simulation.

AGS simulated about 30 feet and 33 feet of drawdown at the proposed Lightsey Well after pumping 1,972 ac-ft/yr for 1-year and 10-years, respectively. Resulting drawdown estimates of about 11 feet (1-year) and 13 feet (10-years) were observed at Wellborn SUD Well 7 (BVDO-0285) and about 10 feet (1-year) and 12 feet (10-years) were observed at the City of Bryan Well 18 (BVDO-0003).

#### Estimated Long-term Impacts at the Proposed Lightsey Well Based on the GMA 12 2021 DFC Run

As a way of evaluating potential long-term estimated water level decline at the proposed Lightsey Well, AGS plotted the simulated water level decline at the proposed well location based on the 2021 Groundwater Management Area 12 (GMA 12) Desired Future Conditions (DFC)/Modeled Available Groundwater (MAG) projections for the Simsboro Aquifer as shown in Figure 2 below. The water level projections shown in Figure 2 are from the TWDB approved DFC/MAG run known as GMA 12 “S-19”, but do not include the local impacts from the proposed well, nor do they include all of the pumping from the Simsboro Aquifer that has been permitted in the area in the past year. The DFC run includes pumping estimates from the Groundwater Conservation Districts in GMA 12 as of about December 2021 that yield DFCs so that the TWDB can estimate the MAG. The detailed assumptions for the DFC simulation can be found in the GMA 12 Explanatory Report (Daniel B. Stephens & Associates and others, 2022) and documentation of the TWDB MAG run can be found in GAM Run 21-017 MAG: Modeled Available Groundwater for the Aquifers in Groundwater Management Area 12 (Shi and Harding, 2022).

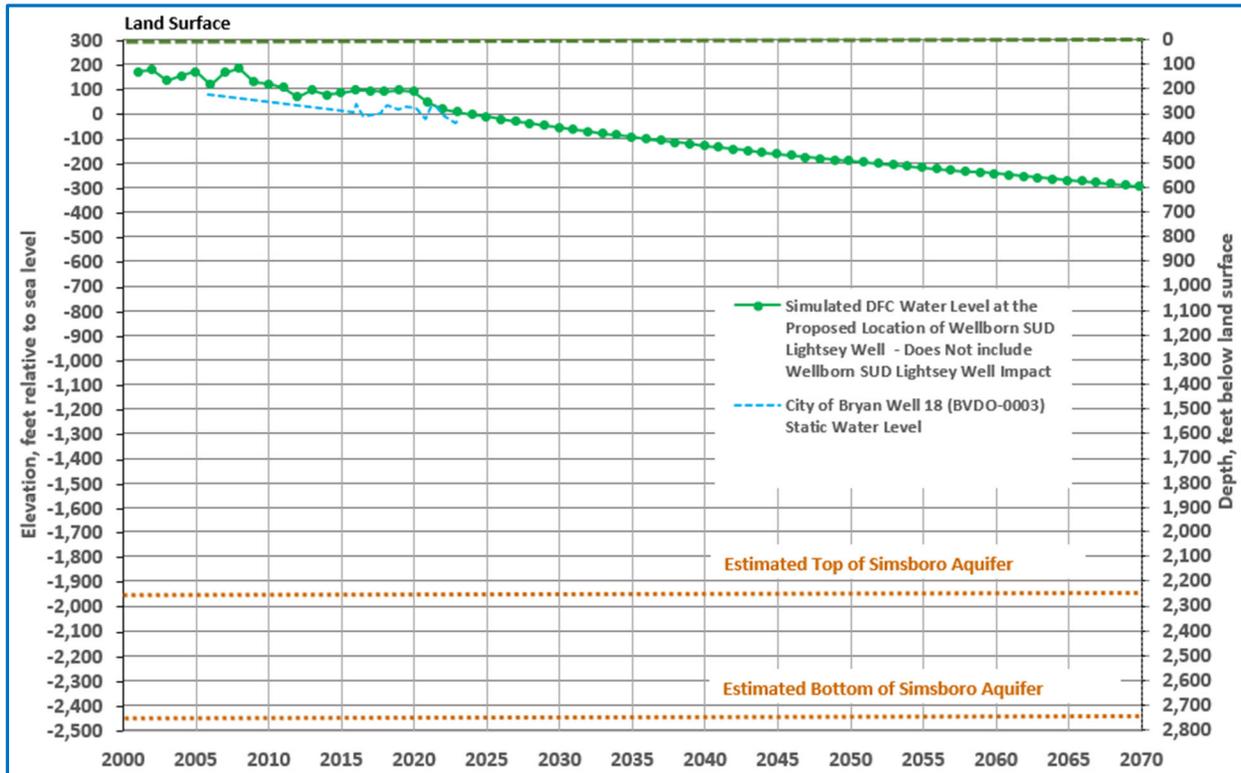


Figure 2. Projected GMA 12 2021 Planning Cycle DFC Water Level Decline at the Proposed Lightsey Well.

The graph illustrates the relationship between the land surface, estimated static water level through time, and the estimated top and bottom of the Simsboro Aquifer at the proposed Lightsey Well location. Static water level measurements for the City of Bryan Well 18 (BVDO-0003) are also shown on Figure 2.

Available drawdown in wells in the Simsboro Aquifer will decline over time based on the DFC simulation. In other words, the line with the green dots does not include the impact of the proposed well. Although not evaluated or discussed in detail herein, these levels of water level decline in wells and artesian head decline in the aquifer will have some impact on vertical leakage, intercepted discharge, reduction in confined and unconfined storage, and potential flow directions in the aquifer.

## Conclusions

The submitted AER generally addresses the requirements defined by BVGCD Rule 8.4(b)(7)(B) for wells capable of producing 800 or more acre-feet per year.

The Carollo GAM simulation results look reasonable. AGS performed analytical model simulations to estimate the potential proposed well pumping effects near the proposed well.

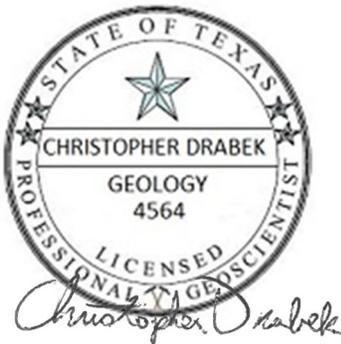
## References

Daniel B. Stephens & Associates, INTERA Incorporated, and Ground Water Consultants, LLC, 2022, Desired Future Condition Explanatory Report for Groundwater Management Area 12, 859 p.

INTERA Incorporated, D.B. Stephens & Associates, and Ground Water Consultants, LLC, 2020, GMA 12 Update to the Groundwater Availability Model for the Central Portion of the Sparta, Queen City, Carrizo-Wilcox Aquifers: Update to Improve Representation of the Transmissive Properties of the Simsboro Aquifer in the Vicinity of the Vista Ridge Well Field, 30 p.

Shi, J. and Harding, J., 2022, GAM RUN 21-017 MAG: Modeled Available Groundwater for the Aquifers in Groundwater Management Area 12, 36 p.

## Geoscientist's Seal:



The seal appearing on this document was authorized by Christopher Drabek, P.G. 4564 on 9/1/2023.  
Advanced Groundwater Solutions, LLC (TBPB Firm Registration No. 50639)



HYDROGEOLOGIC EVALUATION FOR PROPOSED LIGHTSEY PROPERTY SIMSBORO WELL  
AUGUST 2023 / FINAL / CAROLLO

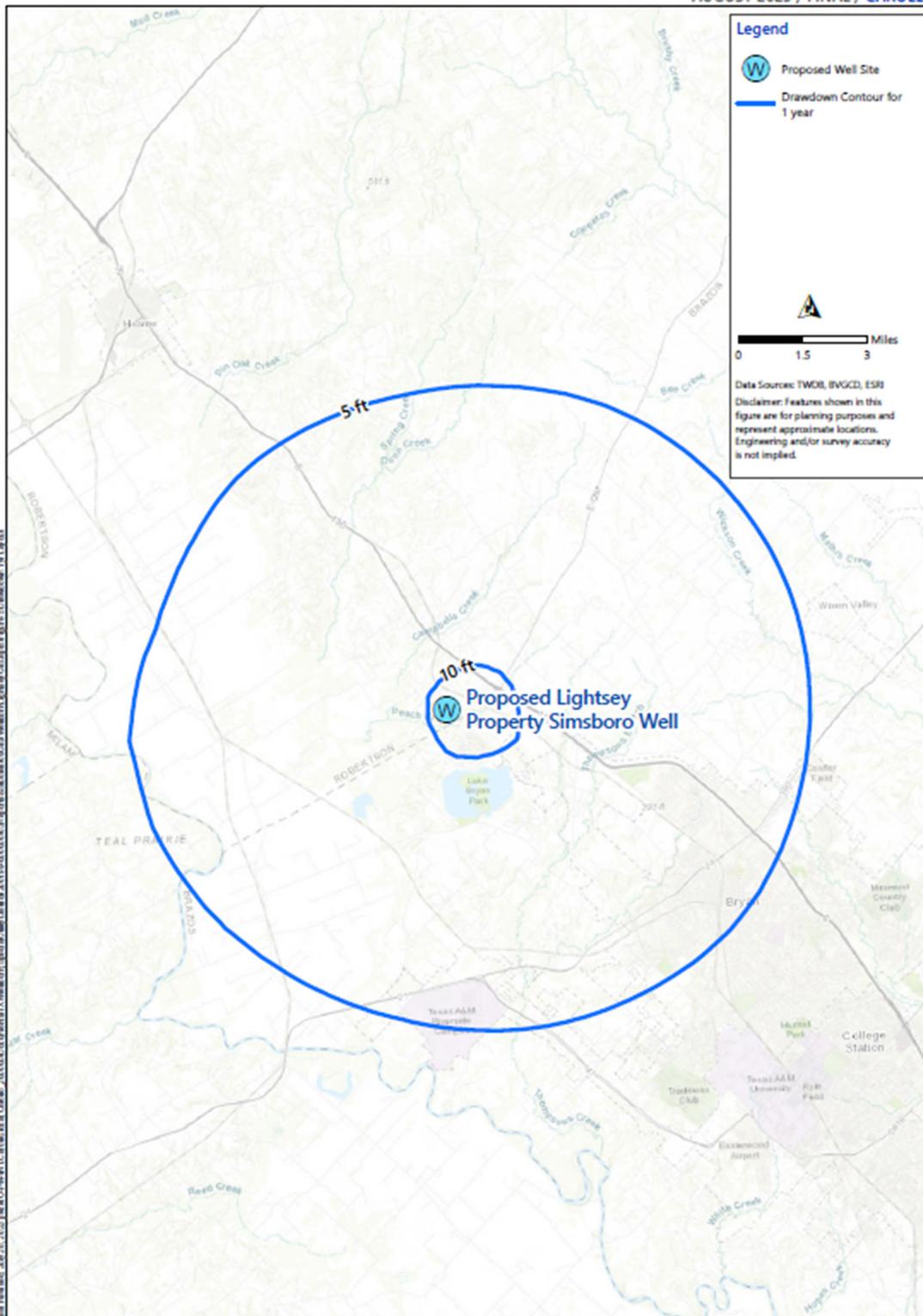


Figure 4 Simulated Additional Drawdown in the Simsboro Formation after 1 Year  
WELLBORN SUD  
PROPOSED LIGHTSEY PROPERTY SIMSBORO WELL

