Advanced Groundwater Solutions, LLC
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Technical Memorandum

TO: Mr. Alan Gardenhire, Sandow Lakes Ranch

FROM: Mr. James Beach, P.G. and Mr. Ye Hong Chen, PhD, E.I.T.

SUBJECT: Preliminary Well Mitigation Assessment for Exempt Wells Completed in the Simsboro Aquifer within Lost Pines Groundwater Conservation District and Post Oak Savannah Groundwater Conservation District

DATE: November 5, 2026

Introduction

Advanced Groundwater Solutions, LLC (AGS) completed a preliminary assessment of mitigation that could be conducted on exempt wells completed in the Simsboro Aquifer within the Lost Pines Groundwater Conservation District (LPGCD) and Post Oak Savannah Groundwater Conservation District (POSGCD). The analysis evaluated potential mitigation needs and associated well mitigation costs under potential, projected, future water-level conditions.

A total of 91 exempt wells were included in a dataset provided to Sandow Lakes Ranch (SLR) by LPGCD on October 15, 2024. An additional 413 exempt wells were included in a dataset SLR obtained from POSGCD on October 22, 2025. Wells lacking depth information and wells located outside the two groundwater conservation districts (GCDs) were excluded. The final dataset used in the analysis includes 459 exempt wells: 59 wells within LPGCD and 400 wells within POSGCD.

Simulated water levels were obtained from the Texas Water Development Board (TWDB) Central Carrizo–Wilcox Groundwater Availability Model (GAM) (Young and others, 2020) using Groundwater Management Area 12 (GMA 12) predictive run PS4-2. Pumping for the wells within the SLR property in POSGCD and LPGCD were refined for this conceptual mitigation exercise based on projected operations, as shown in Figure 1 and Figure 2, respectively. Annual water levels from 2025 through 2080 at each well location were reviewed according to the criteria described below. To account for anticipated seasonal variability and pumping in exempt wells, each simulated annual water level was adjusted downward by 20 feet, resulting in a 20-foot deeper water level. The 20-foot adjustment represents a conservative estimate of potential additional water-level decline during summer pumping season and when the exempt well's pump is operating.

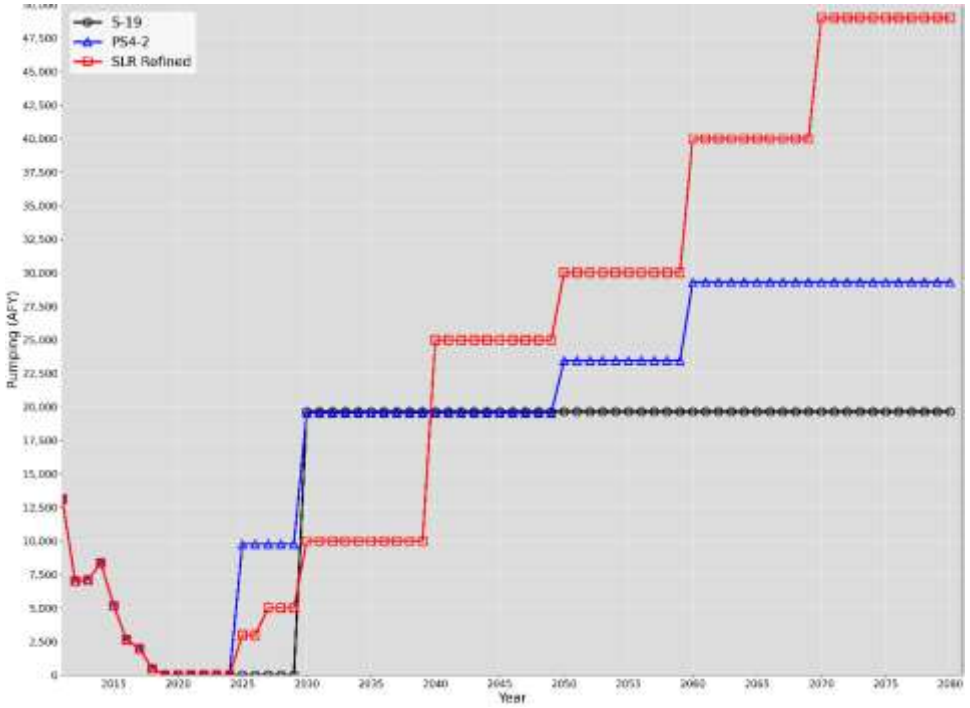


Figure 1. Annual anticipated pumping within SLR property in POSGCD.

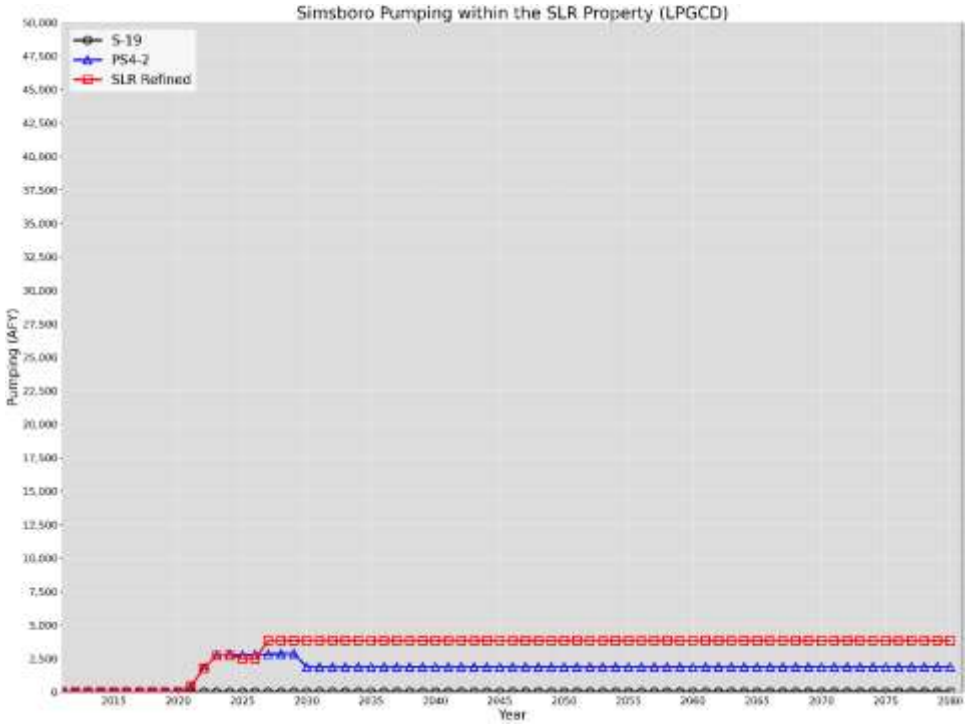


Figure 2. Annual anticipated pumping within SLR property in LPGCD.

Mitigation Criteria and Cost Assumptions

In the interest of developing a useful framework for conceptualizing mitigation costs, two mitigation methods were considered in response to declines in simulated water levels: (1) lowering the exempt well's pump, and (2) redrilling the exempt well. For each well, only one mitigation method, either pump lowering or redrilling, is implemented in response to the simulated worst-case condition. When a well meets both criteria, redrilling is the selected mitigation method. The mitigation year is the earliest year that any criterion is met. For example, if pump-lowering criteria are met in 2025 but redrilling criteria are met in 2050, the final recommendation is redrilling in 2025. This, again, embeds conservatism in the exercise.

Pumping Lowering

A well is assumed to require pump lowering if the simulated water level drops to 20 feet above the reported pump setting. The total depth of the well is evaluated relative to simulated water-level decline if the pump depth is unavailable. Pump lowering is assumed to occur if the simulated water decline exceeds 20 feet below the 2025 water level and the water level remains more than 20 feet above the total depth of the well.

A fixed cost of $5,000 per well was assigned for pump lowering. The pump lowering cost estimate and the 20-foot threshold for lowering pumps is based on AGS experience and recent estimates obtained from local drillers.

Well Redrilling

Redrilling is assumed if the simulated water level falls to within 20 feet of the bottom depth of the well, as lowering the pump would not be anticipated to provide adequate additional lift in that scenario.

The target aquifer for redrilling depends on the simulated water level. If the simulated water level remains 20 feet above the bottom of the Simsboro Aquifer, redrilling depth is set to the Simsboro bottom. If the simulated water level falls to within 20 feet of the Simsboro bottom, the well is assumed to be redrilled to the bottom of the Hooper Aquifer. The base of the Simsboro and Hooper Aquifers were estimated using the GAM layer bottom elevation at each well location.

As with the pump-lowering mitigation assumptions, if a well is initially triggered for redrilling to the Simsboro bottom (in 2040, for example), but the water level is projected to fall below the Simsboro bottom by 2070, the recommended action becomes redrilling to the Hooper bottom at the earlier time (here, 2040). AGS also confirmed that, according to the modeling, water levels in the underlying Hooper aquifer were sufficient to support drilling new wells, where needed.

AGS estimated redrilling costs of $89 per foot plus a fixed cost of $26,698 for additional well construction costs. The estimated well cost is based on information available from Version 3.0.1 of the Texas Water Development Board Uniform Costing Model for Regional Planning (2024).

Summary of Results

Table 1 summarizes the number of wells in LPGCD and POSGCD that, under these simulated circumstances, would be estimated to require mitigation in the form of pump lowering or well redrilling, and associated costs. Figure 3 and Figure 4 show the 5-year histogram for the number of wells that would trigger mitigation and mitigation costs, by district. Figure 5 shows the cumulative number of wells assumed to trigger mitigation, by method and district. Figure 6 presents the theoretical, cumulative mitigation costs, by method and district. The histogram in Figure 7 illustrates the number of wells in each cost category for all wells in both districts.

The analysis indicates that, under the assumptions of this exercise, 45 exempt wells in LPGCD would require pump lowering and 2 wells would require redrilling in response to simulated water level declines. The total estimated cost in LPGCD for these mitigation efforts is approximately $419,000. POSGCD is estimated to have 159 wells that, under these conditions, would trigger pump lowering and 241 wells that would trigger redrilling, with an estimated cost of approximately $18,576,483. The combined estimated mitigation cost associated with the identified mitigation measures, for both districts, is approximately $18,995,529.

Table 1. Summary of wells and mitigation costs.

	LPGCD	POSGCD	Total
Total Number of Wells	59 (13%)	400 (87%)	459 (100%)
Number of Wells for Lowering	45 (10%)	159 (34%)	204 (44%)
Number of Wells for Redrilling	2 (1%)	241 (53%)	243 (53%)
Number of Wells for No Action	12 (3%)	0 (0%)	12 (3%)
Cost of Lowering Pumps	$225,000 (1%)	$795,000 (4%)	$1,020,000 (5%)
Cost of Redrilling Wells	$194,000 (1%)	$17,781,483 (94%)	$17,975,529 (95%)
Cost of Lowering and Redrilling	$419,000 (2%)	$18,576,483 (98%)	$18,995,529 (100%)

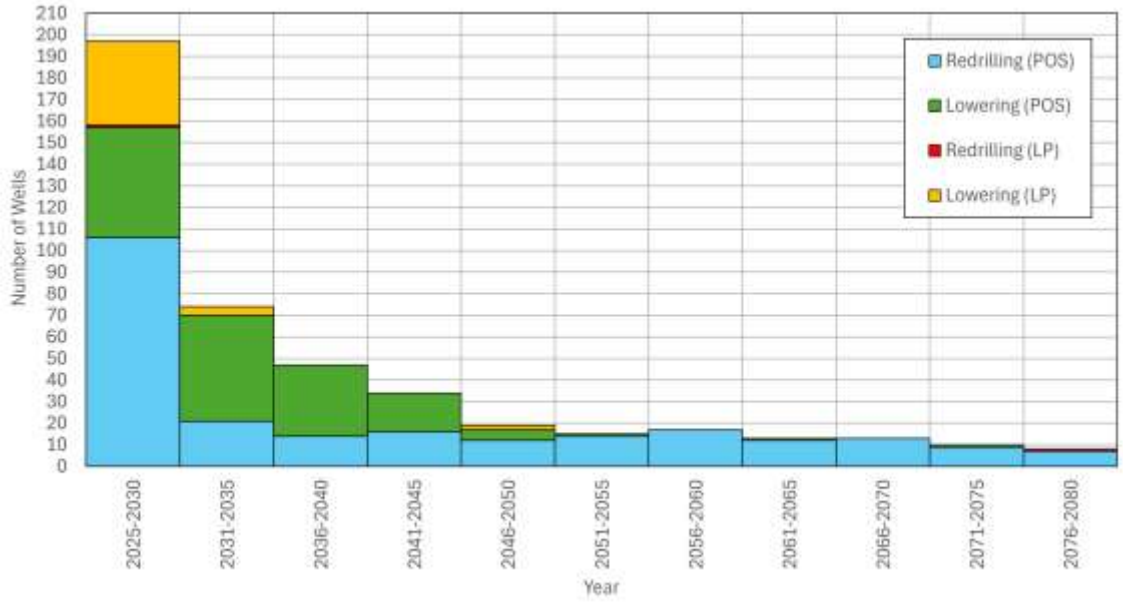


Figure 3. 5-Year Histogram for mitigating LPGCD and POSGCD wells.

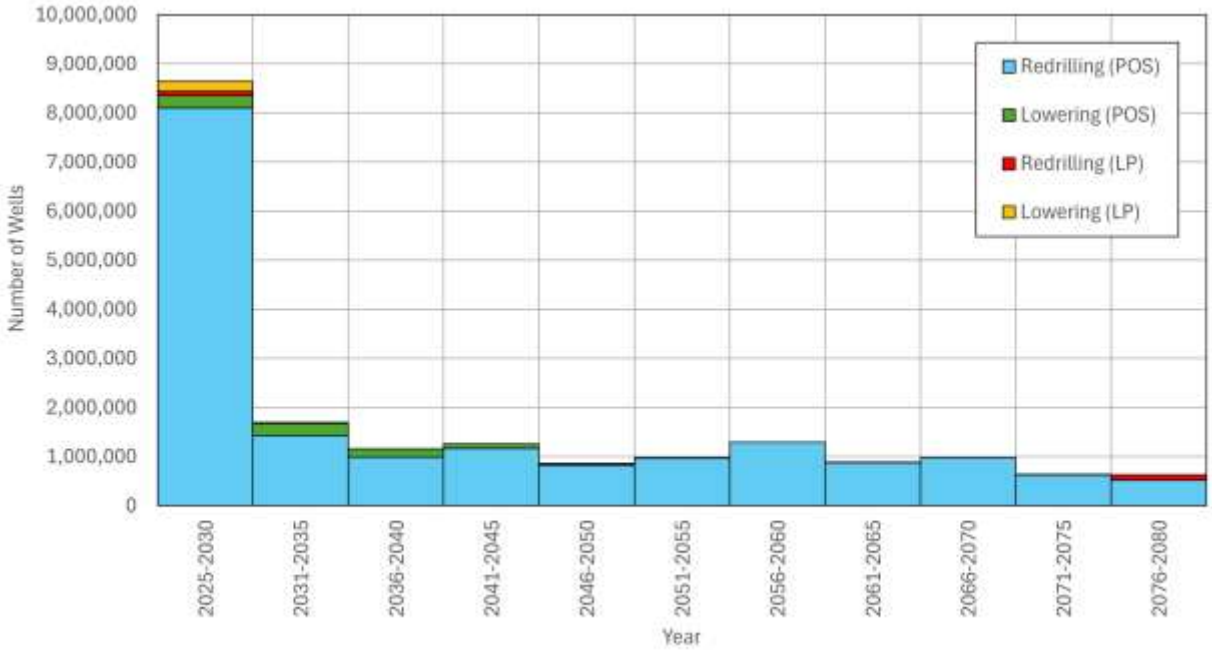


Figure 4. 5-Year Histogram for cost of mitigating LPGCD and POSGCD wells.

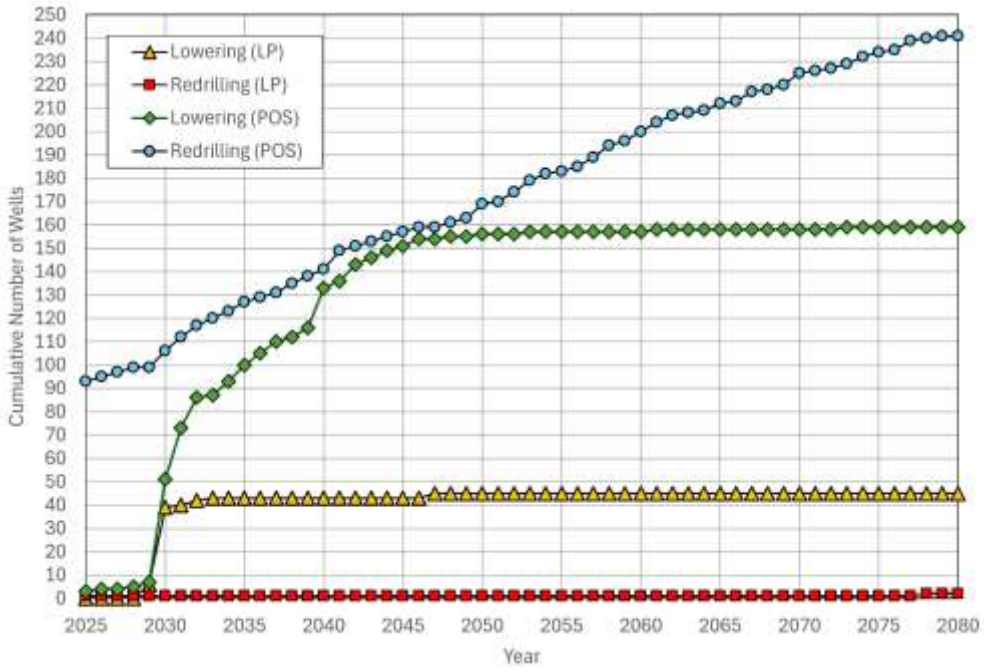


Figure 5. Cumulative number of mitigated LPGCD and POSGCD wells.

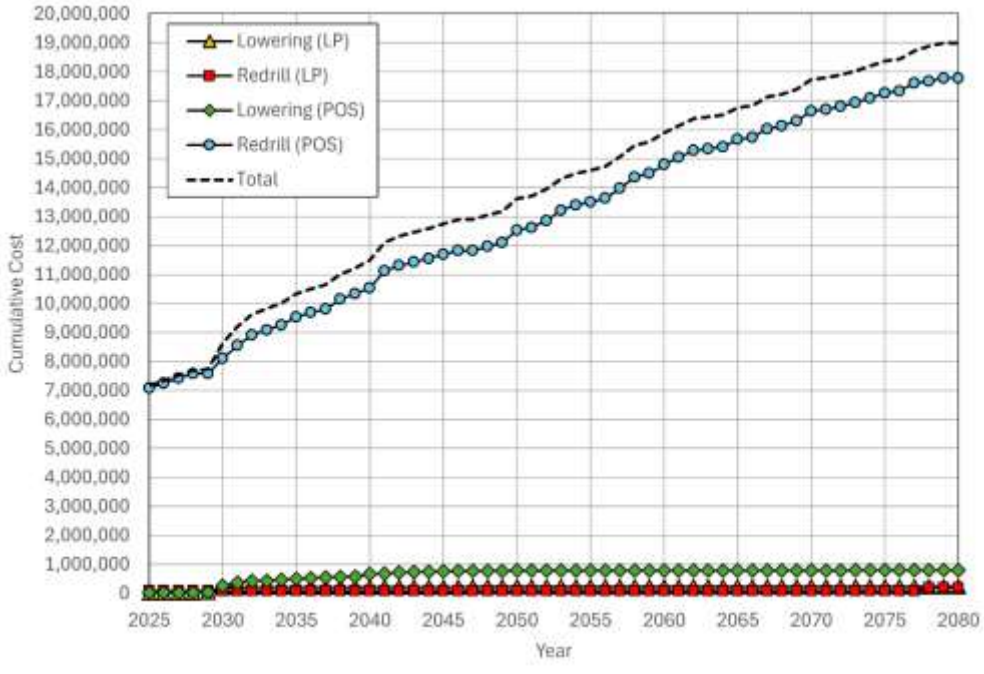


Figure 6. Cumulative mitigation cost for LPGCD and POSGCD wells.

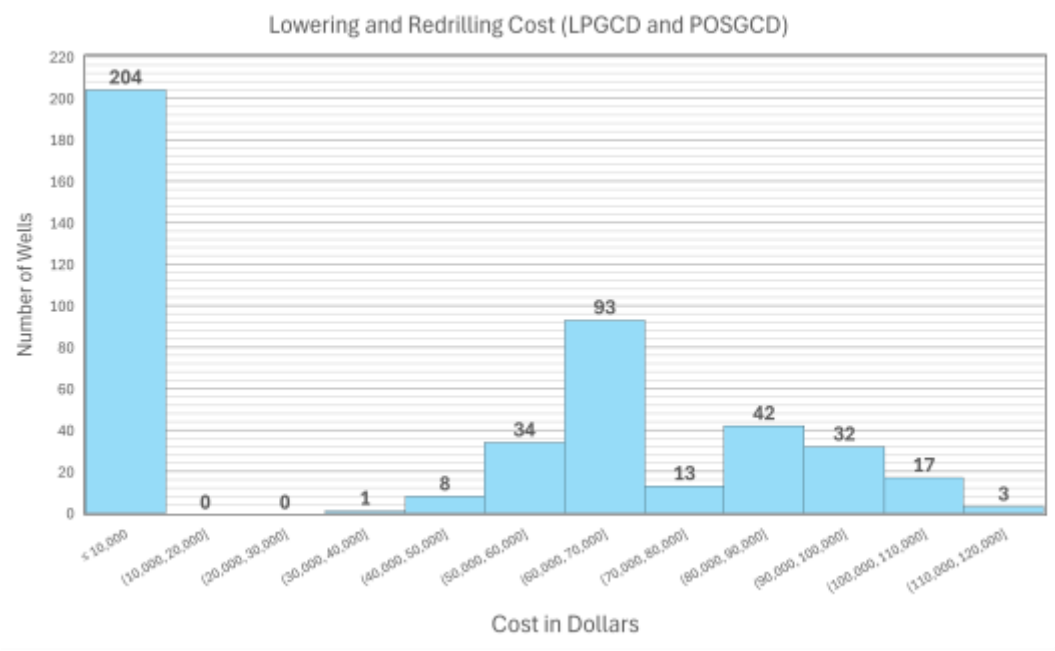


Figure 7. Histogram of mitigation cost for LPGCD and POSGCD wells.

Limitations of the Evaluation

This evaluation is preliminary in nature and not designed to be an exhaustive assessment of mitigation issues. The study was limited to the exempt wells in the Simsboro Aquifer in POSGCD and LPGCD. Limitations of the assessment include variations in hydrogeologic conditions not represented by the TWDB GAM, modeling errors associated with predicted water levels at well locations, inaccurate or missing well data, errors in predictive pumping assumptions, uncertainty associated with the assumed costs of well redrilling and pump lowering, and other factors. Some wells included in the analysis may have already been mitigated. This analysis did not assess the possibility of obtaining water from a public water supply in lieu of well mitigation.

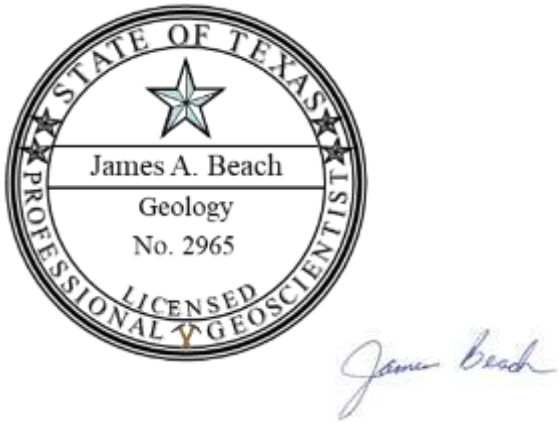
References

Texas Water Development Board (2024), Uniform Costing Model for Regional Planning Version 3.0.01, Sixth Cycle Regional Water Planning Documents, Task 5. Contributors: HDR, Freese and Nichols, CAS Consulting, and Intera.

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.

Young, S., Jigmond, M., Jones, T., & Ewing, T. (2020). Final report: Groundwater Availability Model for the Central Portion of the Sparta, Queen City, and Carrizo-Wilcox Aquifers. Contributors: S. Panday, R. W. Harden, & D. Lupton. Prepared for the Texas Water Development Board.

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