R W HARDEN &ASSOCIATES INC
GROUNDWATER RESOURCE PROFESSIONALS
9009 Mountain Ridge Dr • Suite 100 • Austin Texas 78759 • ph (512) 345-2379

TECHNICAL MEMORANDUM

Updated Evaluation of Potential Impacts from Groundwater Production
Leander Springs Project, Williamson County, Texas

Date: August 17, 2026

To: Ravi Katta, Reit Group Leander Springs Holdings, LLC

From: Liz Ferry, P.G., R. W. Harden & Associates, Inc.

Introduction and Background

On behalf of Leander Springs, LLC, on November of 2020, R. W. Harden & Associates, Inc. (RWH&A) prepared a report detailing the results of a preliminary hydrogeologic assessment of the development area located along Highway 183A and FM 2243 in Williamson County, Texas. RWH&A evaluated the potential long-term production demand rates to fill and maintain lagoon levels with consideration of treatment and under the average annual and maximum annual, worst-case scenarios of evaporation loss and precipitation. Additionally, RWH&A conducted a groundwater availability study to identify potential target aquifer(s) beneath the proposed that could support the demand rates, which was the lower-most portion of the Trinity Group aquifer. The results of this study documenting the demand rates is provided in detail in our report to Leander Springs, LLC dated November 10, 2020.

In June of 2022, RWH&A oversaw the drilling and construction of a new irrigation well on the Leander Springs property. During pilot hole drilling, RWH&A personnel collected measurements of field water quality parameters of the produced water and noted that during air-drilling through the middle portion of the Trinity Group aquifer and into the lower portion, the conductivity of produced water increased with depth. Because the groundwater from the lower portion was not suitable for the intended use, the lower interval was plugged and the final production well is completed in the middle portion of the Trinity Group aquifer screened between the depths of 572 feet to 737 feet below ground level (bgl) as documented in the State of Texas Well Report #609529. Therefore, the completed well produces from the geologic units comprising the middle portion of the Trinity Group aquifer, specifically, from youngest (shallowest) to oldest (deepest): the Lower Glen Rose, Hensell Sand, and Cow Creek Limestone. However, as a result of drilling, logging, and testing, it is likely that the primary groundwater production zone for this well is from the Hensell Sand and Cow Creek members, which are present between the depths of approximately 640 feet to 740 feet. Following well completion and development, RWH&A oversaw a constant-rate pumping test to document the well and aquifer properties at the well site. The results of the exploration drilling, logging, well construction, and aquifer testing program are provided in detail within our report to Leander Springs, LLC dated February 10, 2023.

In continuation of that work, RWH&A understands this project is being considered at the City of Leander's upcoming City Council meeting on August 20, 2026. Additionally, RWH&A understands information regarding potential impacts as a result of pumping from the Leander Springs well on the property has been requested. As such, in conjunction with previously conducted work on this project, RWH&A provides the following information in response to questions provided by Leander Springs to RWH&A on July 27, 2026.

For clarity, within this technical memorandum, the italicized bullets and text are cited from the list of questions provided and are subsequently followed by RWH&A's responses.

Section I: Hydrogeology, Aquifer Identification, & Pumping Impacts

1. *What drawdown impacts are predicted for surrounding residential wells during:*
   - i. *Initial lagoon filling?*
   - ii. *Normal lagoon operations?*
   - iii. *Drought conditions?*

Based on previous work and well and aquifer conditions at the time of testing, RWH&A estimated the following conservative demand rates under various climate and operational conditions:

- Initial lagoon fill rate – the well could yield 100 gallons per minute (gpm) to 120 gpm over a 3- to 5-month period, or less.
- Under normal lagoon operations – to maintain lagoon levels under average climatic conditions and with consideration of operation and treatment, a demand rate of approximately 6 gpm is required.
- Drought conditions – to maintain lagoon levels under extreme drought conditions (i.e., maximum evaporation loss and no rainfall) and with consideration of operation and treatment, a demand rate of approximately 28 gpm is required.

As discussed in our 2023 report, the maximum potential production rate from the well for lagoon filling is dependent upon the current aquifer conditions at the time pumping begins. Therefore, for conservative purposes, RWH&A assumed a lagoon fill rate of 100 gpm, and under the two scenarios the estimated lagoon fill would take approximately 102 days (average conditions) up to 120 days (drought conditions).

To estimate potential impacts to surrounding wells completed in the same target production zone, RWH&A performed analytical groundwater modeling using the Theis non-equilibrium equation to estimate artesian pressure change (i.e., drawdown) as a result of pumping from the production well (#609529) under the various conditions listed above, and over a long-term period of 30 years. Table 1 summarizes the model parameters and assumptions for this analysis.

Table 1. Analytical Model Parameters and Assumptions

Model Parameter	*Value*
Artesian Pressure (feet)	180
Transmissivity (gal/day/ft)	1,500
Storage Coefficient	10^{-4}
Initial Fill Rate (gpm)	100
Avg. Rate under Normal Conditions (gpm)	6
Avg. Rate under Drought (gpm)	28

The aquifer is a confined system with water levels rising above the top of the aquifer with artesian pressure levels of approximately 180 feet above the top of the aquifer. Therefore, an aquifer storage coefficient of 10^{-4} was applied to the model for purposes of simulating confined aquifer conditions. Site-specific aquifer transmissivity was estimated from time-drawdown data measured during the constant-rate pumping test performed on the well that ranged up to 1,500 gallons per day per foot (gal/day/ft) and is consistent with the regional groundwater availability model input values for the Hensell and Cow Creek aquifer layers.

Using the hydraulic information compiled, RWH&A performed two model simulations to estimate long-term impacts:

- Scenario 1 – assumed normal, or average conditions with an initial lagoon fill of 100 gpm for nearly 3.5 months (102 days), followed by long-term average climate conditions requiring approximately 6 gpm, pumping continuously for 30 years.
- Scenario 2 – assumed worst-case 30-year extreme drought conditions with an initial lagoon fill duration of nearly 4 months (120 days) at a continuous pumping rate of 100 gpm followed by continuous pumping of 28 gpm over the next 30 years.

Table 2 summarizes the range of simulated artesian pressure declines (i.e., drawdown) near the well site out to 3-mile radius as a result of the various pumping demand rates under the conditions defined above.

Table 2. Model Simulated Drawdown over a 3-Mile Radius

	Scenario 1 30-Year Average Conditions	***Scenario 2 30-Year Drought Conditions***
Minimum Drawdown	< 0.1 ft	< 0.1 ft
Maximum Drawdown	10 ft	16 ft

Simulated drawdown decreases with distance from the site, ranging from approximately 10 feet to 16 feet near the project well to less than 0.1 foot at the outer extent of the evaluated 3-mile radius. With artesian pressure levels rising above the top of the aquifer, the results show that after 30 years of continuous production from the project well, the aquifer remains completely saturated with artesian pressures levels rising above the top of the formation. It should be noted that the model assumptions are conservative as it does not account for inter-aquifer leakage, recharge to the aquifer, and assumes non-stop continuous pumping operations, which is not likely. Therefore, the impacts to surrounding wells as a result of pumping from the Leander Springs well are likely to be less than what is presented herein.

2. *What evidence supports the conclusion that pumping from the target deep aquifer will not negatively impact existing Trinity Aquifer users?*

The site-specific analytical modeling indicates that pumping from the Leander Springs well will cause a reduction in artesian pressure within the target aquifer interval. Under the modeled conditions, pressure declines at surrounding reported well locations are estimated to range from negligible to approximately 10 feet under average conditions and up to approximately 16 feet under the long-term 30-year modeled extreme-drought conditions after 30 years of continuous pumping.

Despite these modeled pressure declines, simulated artesian pressure remains above the top of the target aquifer, indicating that the aquifer remains fully saturated under the modeled pumping conditions. Therefore, based on the site-specific aquifer testing and analytical modeling performed, pumping from the project well is not anticipated to adversely affect groundwater availability to nearby users producing groundwater from wells completed within the same hydraulically connected aquifer interval. Actual impacts at an individual well will vary depending on its location, construction, well efficiencies, completion interval, and local hydrogeologic conditions.

3. *Has a site-specific hydrogeologic study been completed?*

As stated, RWH&A performed a site-specific study using the results of the pilot hole drilling including

evaluation of drill cuttings and formation sampling, geophysical logging, and performance of a constant-rate pumping test followed by a 12-hour recovery test. Detailed information regarding the results of this program is provided within the 2023 report.

4. *What is the predicted drawdown at the project well after:*
   - i. *1 year*
   - ii. *5 years*
   - iii. *10 years*
   - iv. *30 years*

The model-simulated artesian pressure declines within the wellbore using the Theis nonequilibrium equation and site-specific aquifer parameters and pumping conditions described above for each scenario are summarized in Table 3.

Table 3. Model Simulated Drawdown at the Well Site in Feet (ft)

Model Duration	*Scenario 1 Average Conditions*	*Scenario 2 Drought Conditions*
1 Year	11.7 ft	44.8 ft
5 Years	10.5 ft	46.3 ft
10 Years	10.6 ft	47.4 ft
30 Years	10.9 ft	48.7 ft

These scenarios indicate that the model-simulated artesian pressure declines, assuming worst-case extreme drought conditions over a 30-year continuous pumping period, is nearly 50 feet of artesian pressure decline within the wellbore (i.e., a distance of 1 foot). Therefore, modeled results indicate that during continuous production under extreme drought conditions, the primary groundwater production zone will remain full of groundwater with artesian pressures rising above the top of the formation. The slightly greater modeled drawdown during the first year under Scenario 1 reflects the initial high-rate lagoon filling period followed by lower average flow rates resulting in lower modeled drawdown thereafter.

5. *How many existing wells are expected to fall within the projected cone of depression.*

RWH&A obtained information from the Texas Water Development Board (TWDB) database and identified approximately 140 reported wells within a 3-mile radius of the well site that may potentially fall within the area of influence and may be completed in the same target interval. RWH&A identified the cone of depression as a 3-mile radius because of nearby mapped faults presented by the Bureau of Economic Geology (BEG) and radial extent to the outcrop areas of the aquifer. It is important to note that the presence of a well reported by the TWDB as located within the projected cone of depression does not necessarily indicate that it will be adversely affected by pumping from the project well. The TWDB database information regarding well location, completion interval, current use, and plugging status has not been independently verified as part of this evaluation. In addition, some of the reported wells may not be completed within the same aquifer or hydraulically connected interval as the project well. Therefore, the actual number of existing, active wells completed within the same aquifer interval and potentially affected by the proposed pumping cannot be reliably determined from the available database information and is beyond the scope of this evaluation.

6. *Please identify impacts to:*
    i. *Residential wells*
    ii. *Exempt wells*
    iii. *Other groundwater users*

As stated above, the range of impacts over the two scenarios under average conditions and worst-case extreme drought conditions to TWDB-reported wells identified within a 3-mile radius of the project well is projected up to 16 feet of artesian pressure decline after 30 years of continuous pumping. This modeled hydraulic impact depends on completion interval, distance, and hydraulic connection rather than classification of well use.

Summary and Conclusions

RWH&A evaluated the potential impacts to TWDB-reported nearby wells as a result of production from the Leander Springs well. Based on the estimated water demand, site-specific aquifer testing, and analytical groundwater modeling, the anticipated short-term lagoon fill and long-term pumping requirement were modeled under two scenarios: an average and worst-case drought scenario. Under the modeled average-condition scenario, simulated artesian pressure declines at surrounding locations range from negligible to approximately 10 feet after 30 years of continuous pumping from the Leander Springs well. Under the conservative extreme-drought scenario, modeled pressure declines range from negligible to approximately 16 feet, both within a 3-mile radius.

Additionally, as the production well is cycled on and off the aquifer artesian pressure levels will rise and fall, which is characteristic of a confined-aquifer system. Understanding the actual impacts as a result of pumping from a regional aquifer system and understanding long-term availability of groundwater is more reliably documented in outcrop, unconfined aquifer areas. Based on the site-specific data and modeling assumptions described herein, groundwater production from the Leander Springs well is not anticipated to affect the availability of groundwater from the middle portion of the Trinity Group aquifer and to nearby users. Actual effects at individual well sites may vary depending on well location, construction, completion interval, hydraulic connectivity, and local hydrogeologic conditions.

RWH&A appreciates this opportunity to provide you with this evaluation to assist in discussions with the City of Leander and its City Council members. If you have any questions or would like to discuss these results further, please do not hesitate to contact us.

Sincerely,

Elizabeth Ferry, P. G.
President
R. W. Harden & Associates, Inc.

The seal appearing on this document was authorized by Elizabeth Ferry, P.G. No. 11011 on August 7, 2026. R. W. Harden & Associates, Inc. TBPG Firm No. 50033.