

# TECHNICAL MEMORANDUM



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|                 |                                                                        |
|-----------------|------------------------------------------------------------------------|
| <b>TO:</b>      | Ashley Greuter, PG<br>Harris-Galveston Subsidence District             |
| <b>FROM:</b>    | Vince Clause, PG<br>Freese and Nichols, Inc.                           |
| <b>SUBJECT:</b> | Review of GMA 14 Alternative Pumping Scenarios                         |
| <b>PROJECT:</b> | HGS26232 – On Call Groundwater Services                                |
| <b>DATE:</b>    | June 5, 2026                                                           |
| <b>CC:</b>      | Michael Turco, General Manager<br>Harris-Galveston Subsidence District |



## 1.00 INTRODUCTION

Freese and Nichols, Inc. (FNI) reviewed and analyzed four proposed Groundwater Management Area 14 (GMA 14) pumping scenarios to support Harris-Galveston Subsidence District's (HGSD's) review of the Northern Portion of the Gulf Coast Aquifer System Groundwater Availability Model, Version 4.1 (TWDB, 2026). FNI compared the pumping inputs to these scenarios with groundwater demand projections from HGSD Joint Regulatory Planning Review (JRPR) Scenarios B6 and E14<sup>1</sup> (Ellis & Osborne, 2025). The comparison identified differences between pumping under each scenario and the JRPR estimated groundwater demands. FNI limited this comparison to counties included in both the alternative simulations and the JRPR study area.

## 2.00 PUMPING SCENARIOS

FNI analyzed four pumping scenarios based on GMA 14 Scenario 14.3, which was developed by Lone Star Groundwater Conservation District (LSGCD) consultants. Dr. Hutchison, who represents the Bluebonnet, Lower Trinity, and Southeast Texas GCDs, later modified this scenario (Hutchison, 2026). Dr. Hutchison's technical memorandum defines the alternative simulations as follows:

- Scenario 14.3 SD B6 – Assumes implementation of all planned future surface water conversions from the HGSD and Fort Bend Subsidence District (FBSD) regulatory plans.
- Adjusted Scenario 14.3 SD B6 – Matches Scenario 14.3 SD B6 but caps pumping increases from 2018 to 2080 at a factor of 3.5. Within the JRPR study area, this adjustment only affects pumping in Austin and Liberty counties; pumping in other counties is the same as in Scenario 14.3 SD B6.
- Scenario 14.3 SD E7 – Assumes implementation of planned 2025 conversions in HGSD but no subsequent conversions in HGSD nor FBSD.
- Adjusted Scenario 14.3 SD E7 – Matches Scenario 14.3 SD E7 but caps pumping increases from 2018 to 2080 at a factor of 3.5. Within the JRPR study area, this adjustment only affects pumping in Austin and Liberty counties; pumping in other counties is the same as in Scenario 14.3 SD B6.

<sup>1</sup> JRPR Scenario E14 refers to a revised version of JRPR Scenario E7. In Scenario E14, agricultural demands were updated to be consistent with Scenario B6; all other demands from Scenario E7 are unchanged in Scenario E14.

### 3.00 RESULTS

Figure 1 through 4 illustrate the decadal differences between Scenario 14.3 SD B6 and the JRPR projections from 2030 through 2080 for Fort Bend, Galveston, Harris, and Montgomery counties. Table 1 presents the differences between Scenario 14.3 SD B6 and JRPR B6 in acre-feet per year, while Table 2 presents the differences as percentages.

#### **Fort Bend County**

All GMA 14 scenarios include Fort Bend County pumping at nearly the same volume as the corresponding JRPR demands. Differences are less than 1% in each decade.

#### **Galveston County**

All GMA 14 scenarios include Galveston County pumping that is approximately 1,000 acre-feet per year less than JRPR groundwater demands in each decade. Although this difference accounts for approximately 34% of JRPR projected demand by 2080, the volumetric difference is small.

#### **Harris County**

All GMA 14 scenarios include Harris County pumping that is approximately 4,000 to 5,000 acre-feet per year less than JRPR demands, representing an approximately 2% difference in each decade.

#### **Montgomery County**

JRPR demands for Montgomery County increase over time based on expected growth in population and water use. The GMA 14 scenarios apply a constant pumping amount in all counties except for the subsidence district counties. As a result, Montgomery County pumping in variations of Scenario 14.3 is approximately double the JRPR groundwater demands in earlier decades and are consistent across all four scenarios. The difference closes to approximately 13% by 2080, and the constant pumping included in the GMA 14 scenarios is within 2% of the JRPR groundwater demand projection for Montgomery County in 2100.

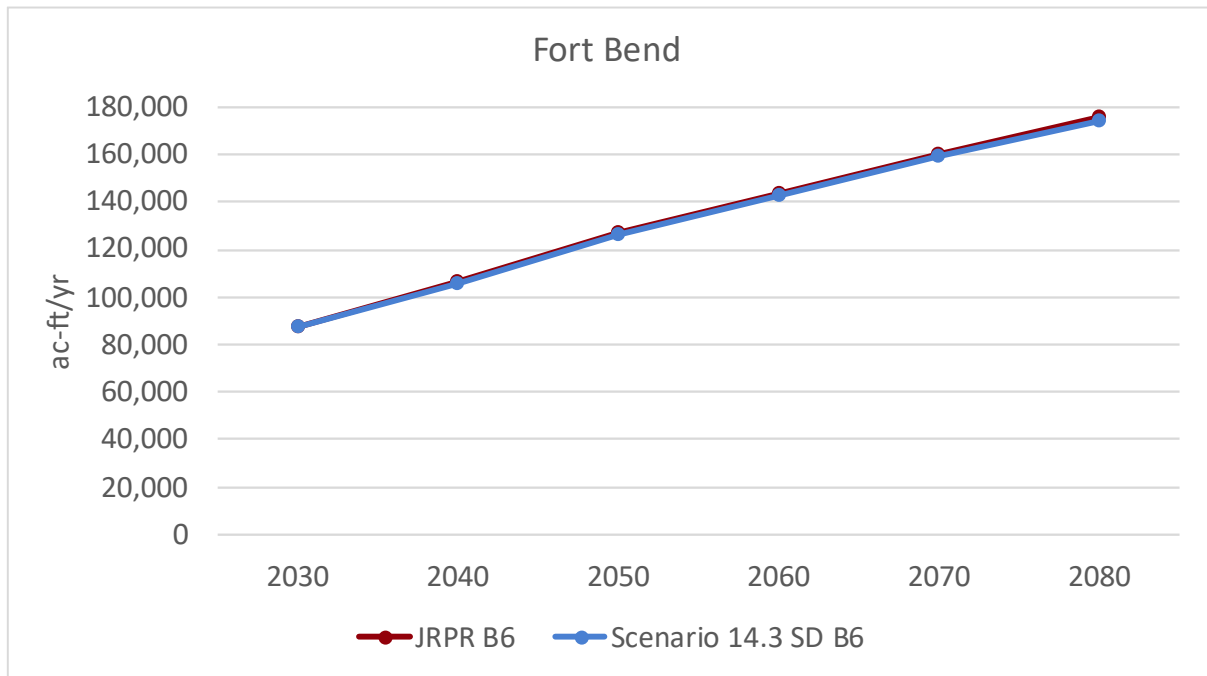


Figure 1. Comparison of Scenario 14.3 SD B6 and JRPR demand projections in Fort Bend County, 2030 - 2080.

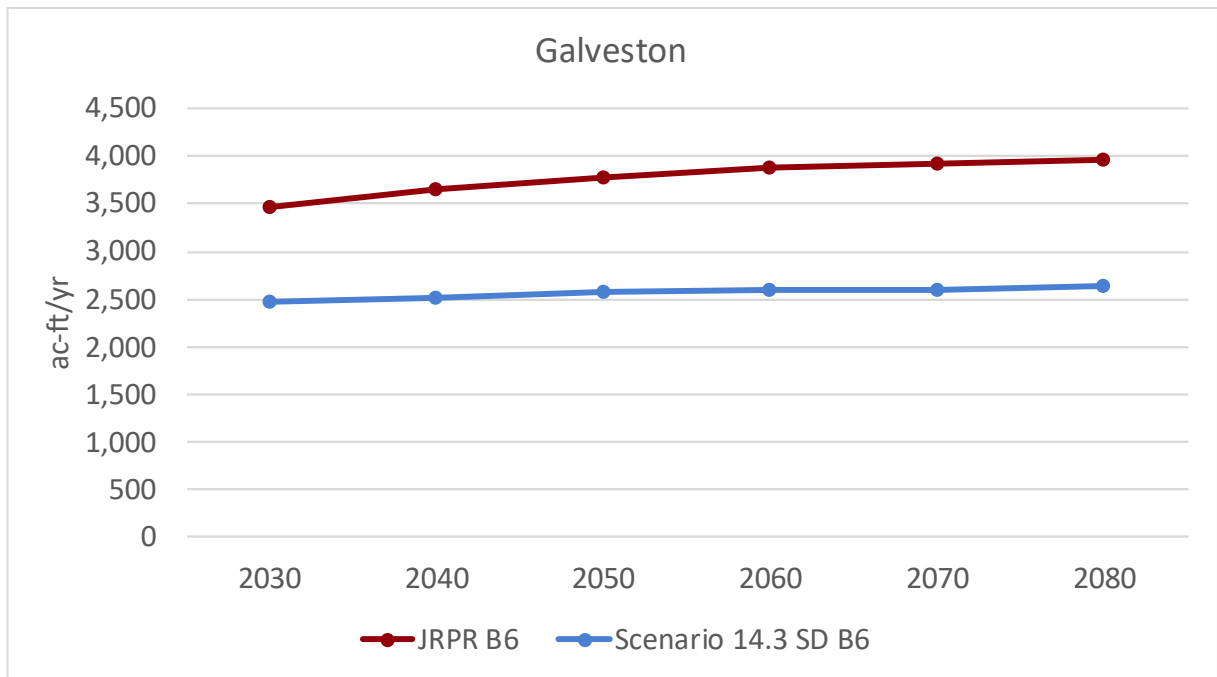


Figure 2. Comparison of Scenario 14.3 SD B6 and JRPR demand projections in Galveston County, 2030 - 2080.

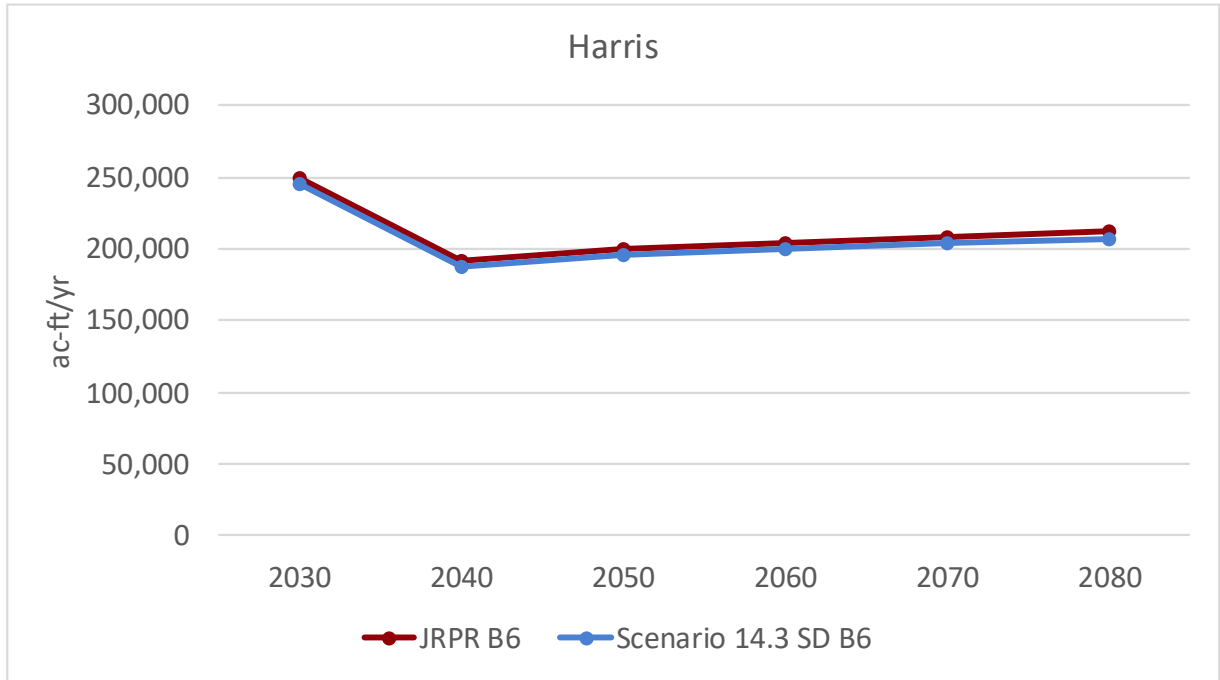


Figure 3. Comparison of Scenario 14.3 SD B6 and JRPR demand projections in Harris County, 2030 - 2080.

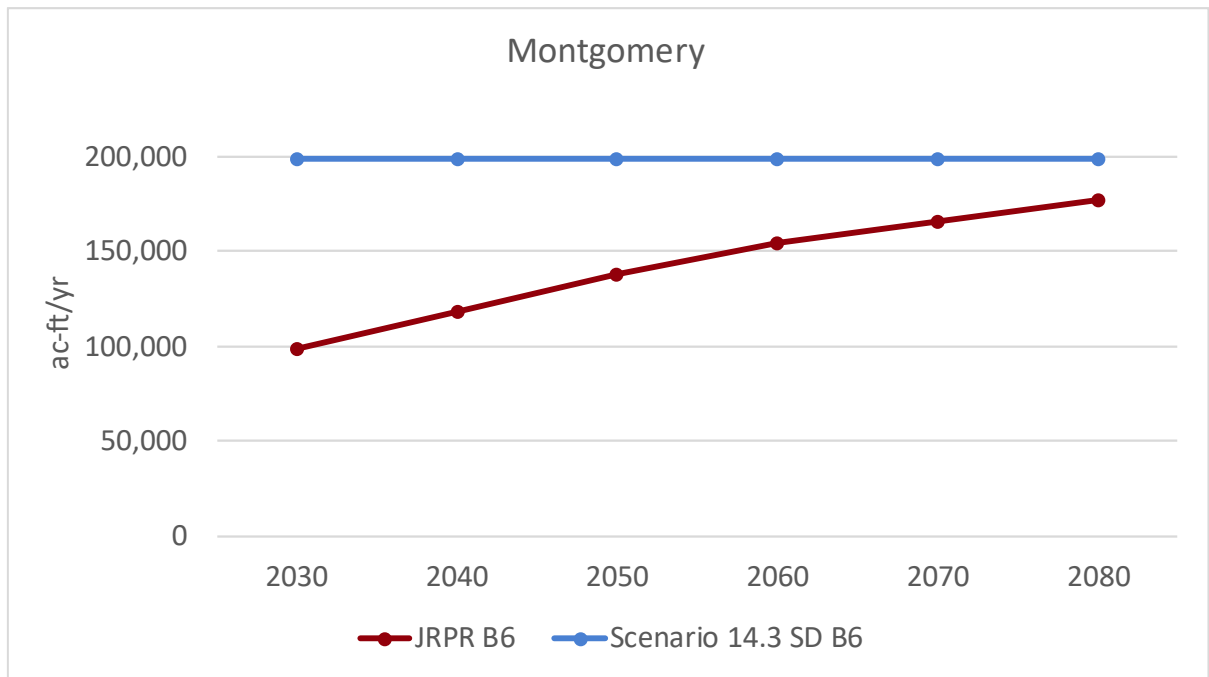


Figure 4. Comparison of Scenario 14.3 SD B6 and JRPR demand projections in Montgomery County, 2030 - 2080.

Table 1. Difference in Scenario 14.3 SD B6 pumping and JRPR B6 Groundwater Demand Projection in ac-ft/yr.

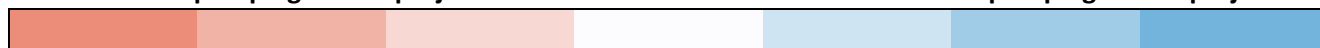
| County                   | 2030    | 2040   | 2050   | 2060   | 2070   | 2080   |
|--------------------------|---------|--------|--------|--------|--------|--------|
| Austin                   | 40,434  | 40,289 | 40,145 | 40,081 | 40,034 | 39,988 |
| <i>Austin adjusted*</i>  | 30,269  | 30,124 | 29,980 | 29,916 | 29,869 | 29,823 |
| Brazoria                 | 17,997  | 15,416 | 13,160 | 11,935 | 10,795 | 9,776  |
| Chambers                 | 12,684  | 10,193 | 7,725  | 4,496  | 1,017  | -2,944 |
| Fort Bend                | -513    | -868   | -1,021 | -1,076 | -1,223 | -1,459 |
| Galveston                | -986    | -1,138 | -1,214 | -1,286 | -1,333 | -1,340 |
| Harris                   | -4,124  | -4,284 | -4,541 | -4,765 | -4,966 | -5,197 |
| Liberty                  | 56,288  | 52,678 | 48,775 | 44,772 | 40,877 | 36,706 |
| <i>Liberty adjusted*</i> | 22,053  | 18,443 | 14,540 | 10,537 | 6,642  | 2,471  |
| Montgomery               | 100,738 | 80,451 | 61,091 | 45,179 | 33,401 | 22,361 |
| Waller                   | 44,250  | 43,427 | 41,826 | 39,941 | 37,883 | 35,752 |

Table 2. Difference in Scenario 14.3 SD B6 pumping and JRPR B6 Groundwater Demand Projection as a percentage.

| County                   | 2030 | 2040 | 2050 | 2060 | 2070 | 2080 |
|--------------------------|------|------|------|------|------|------|
| Austin                   | 744% | 722% | 701% | 692% | 686% | 680% |
| <i>Austin adjusted*</i>  | 557% | 540% | 524% | 517% | 512% | 507% |
| Brazoria                 | 49%  | 39%  | 32%  | 28%  | 24%  | 22%  |
| Chambers                 | 131% | 84%  | 53%  | 25%  | 5%   | -12% |
| Fort Bend                | -1%  | -1%  | -1%  | -1%  | -1%  | -1%  |
| Galveston                | -29% | -31% | -32% | -33% | -34% | -34% |
| Harris                   | -2%  | -2%  | -2%  | -2%  | -2%  | -2%  |
| Liberty                  | 366% | 278% | 213% | 167% | 133% | 105% |
| <i>Liberty adjusted*</i> | 143% | 97%  | 64%  | 39%  | 22%  | 7%   |
| Montgomery               | 102% | 68%  | 44%  | 29%  | 20%  | 13%  |
| Waller                   | 369% | 339% | 290% | 245% | 206% | 175% |

Scenario 14.3 pumping > JRPR projection

Scenario 14.3 pumping < JRPR projection



\*Values for Austin and Liberty counties from Adjusted Scenario 14.3 SD B6, the only counties within the JRPR study area affected by the 3.5 cap implemented in this scenario.

## **4.00 REFERENCES**

- Hutchison, W. R. (2026, March 9). Alternative predictive simulations with the GMA 14 model in support of the 2026 joint planning process [Draft report]. Prepared for Bluebonnet Groundwater Conservation District, Lower Trinity Groundwater Conservation District, and Southeast Texas Groundwater Conservation District.
- Ellis, J., & Osborne, A. (2025, June 10). 2023 Joint Regulatory Plan Review Task D – Conversion Scenarios [Technical memorandum]. Harris-Galveston Subsidence District and Fort Bend Subsidence District.
- Texas Water Development Board. (2026). Numerical model report for the northern portion of the Gulf Coast Aquifer System groundwater availability model (Version 4.1). Texas Water Development Board.