Dear GMA 14 Member Districts and Lone Star Groundwater Conservation District:

My name is Laura Norton, and I am a resident of The Woodlands in Montgomery County, Texas. Please accept these comments as supplemental public comments regarding the proposed Desired Future Conditions for Groundwater Management Area 14.

I am submitting these additional comments in light of the presentation, “Investigation of Aquifer Compaction Potential in Montgomery County,” by Philip Webster of KT Groundwater. https://www.youtube.com/watch?v=SGFozO5_a-s The coauthors were Mike Keester of KT Groundwater and James Beach and Chris Drabek of Advanced Groundwater Solutions. The study was funded by the Lone Star Groundwater Conservation District and used core samples collected at a Porter Special Utility District site.

The study provides important new, locally measured evidence about the risks associated with groundwater pumping in Montgomery County. Its findings should be carefully considered before the District supports any Desired Future Condition that would permit substantial additional drawdown or subsidence.

The researchers collected samples extending from the Chicot Aquifer through the Evangeline, Burkeville, and Jasper formations. Laboratory testing confirmed that the clay layers within Montgomery County’s aquifer system have measurable compaction potential. The study also found that the formations do not all respond to increased stress in the same way.

Of particular concern, the measured vertical hydraulic conductivity at the Porter site was approximately one order of magnitude lower than values obtained from older subsidence-study sites in Harris and Galveston counties. Lower vertical hydraulic conductivity means that pressure changes within clay layers may occur slowly. As a result, land subsidence can lag behind groundwater-level declines and may continue for years after pumping has been reduced.

This delayed response creates a serious groundwater-management risk. Current subsidence measurements may not show the full consequences of pumping that is occurring today. By the time the complete effects become visible, some of the compaction may already be permanent.

The study also distinguishes between elastic and inelastic compaction. When groundwater levels remain above the preconsolidation threshold, some sediment deformation may be recoverable. When groundwater levels fall below that threshold, however, the clay structure can be permanently compressed. That permanent compaction can cause irreversible land subsidence and a permanent loss of aquifer-system storage capacity.

This means that restoring groundwater levels at a later date may not restore either the lost land elevation or the aquifer storage that existed before the excessive drawdown occurred. Waiting until damage is clearly visible is therefore not a prudent management strategy.

The study does not establish a single countywide subsidence number, and it was not intended to do so. It was based primarily on one deeply investigated site. However, that limitation supports more cautious management—not less cautious management. The research demonstrates that Montgomery County's subsurface properties differ in important ways from values historically measured farther south and that additional local sampling and higher-resolution modeling are needed.

Until that work is completed, it is risky to assume that the aquifer system can safely tolerate large amounts of additional groundwater pumping.

I am particularly concerned about the consequences of differential subsidence. Montgomery County contains numerous active and historically active faults, as well as major water pipelines, roads, drainage facilities, homes, businesses, and other infrastructure. Variations in clay thickness, groundwater drawdown, hydraulic conductivity, pumping concentration, and groundwater pressure across faults can cause different areas to subside at different rates.

Even modest regional subsidence can become damaging when the movement is uneven. Differential movement can contribute to fault displacement, alter drainage gradients, increase flood risk, and place stress on pipelines and other rigid infrastructure.

The District should therefore manage groundwater not only to prevent wells from going dry, but also to protect the physical integrity of the aquifer system and the land and infrastructure above it.

The findings presented by Mr. Webster and his colleagues reinforce several important principles that should guide the District's evaluation of the proposed DFCs:

1. Groundwater drawdown can produce permanent consequences before the full amount of subsidence becomes visible.
2. Subsidence may continue after pumping is reduced because clay layers can respond slowly to pressure changes.
3. Montgomery County-specific measurements should be given greater weight than generalized assumptions based on studies conducted in other counties.
4. A Desired Future Condition should not treat substantial subsidence as acceptable merely because it occurs gradually or is averaged across a large geographic area.
5. Groundwater-management decisions should include appropriate margins of safety because permanent aquifer compaction cannot simply be reversed later.
6. Additional groundwater pumping should not be authorized on the assumption that future monitoring or future corrective action will prevent damage after critical thresholds have been crossed.

For these reasons, I respectfully ask the Lone Star Groundwater Conservation District Board to take a more proactive and precautionary approach to groundwater management.

Specifically, I ask the District to:

• Give substantial weight to the Porter compaction study when evaluating the proposed DFCs.

• Avoid supporting DFCs that would allow excessive groundwater-level decline or significant additional subsidence.

• Establish measurable groundwater-level, compaction, and subsidence safeguards that can trigger management action before permanent damage occurs.

• Account for delayed compaction when interpreting recent subsidence-monitoring results.

• Expand core sampling and aquifer-compaction testing to additional locations across Montgomery County.

• Develop a higher-resolution local subsidence model that addresses known faults, concentrated pumping areas, critical infrastructure, and differences among the Chicot, Evangeline, Burkeville, and Jasper formations.

• Require groundwater availability and permitting decisions to consider cumulative pumping, rather than evaluating each proposed well or permit in isolation.

• Reevaluate pumping authorizations when monitoring indicates that water levels are approaching thresholds associated with permanent compaction.

The District funded this study, and its findings should now be reflected in the District's policies. It would be inconsistent to invest in local scientific research showing measurable compaction potential and delayed subsidence risk, but then adopt groundwater-management goals that permit substantial drawdown without an adequate margin of safety.

Montgomery County should not wait for widespread subsidence, increased fault movement, drainage problems, infrastructure damage, or permanent aquifer-storage loss before acting. The scientific evidence supports earlier and more protective management.

I respectfully request that these comments be included in the official record concerning the proposed Desired Future Conditions.

Respectfully submitted,

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