Electro Purification, LLC
Water Supply Project

Presentation to:
Austin County Commissioners
Waller County Commissioners
February 25, 2013

Electro Purification, LLC
Water Supply Project

- Introduction
  - Current and Future Compliance with Bluebonnet GCD
    - Phase 1 Hydrogeology Study and Report (Permit Application)
    - Phase 2 Study – Testing Program and Validation
    - Pumping ALWAYS subject to management – as data dictate
  - Maintain the Aquifer and Land Surface
    - Aquifer will remain full of water
    - Water levels will show minimal local/regional declines
    - Minimal effect to land surface elevations due to EP project
  - Benefits and Assurances
    - Sustainable, reliable, affordable, quality water for region
    - Commitment and resources for aquifer monitoring
    - Continually subject to BGCD – can be reduced if warranted
    - MUST be provable – huge investment for Rosenberg's and Richmond's future

Electro Purification, LLC
Water Supply Project

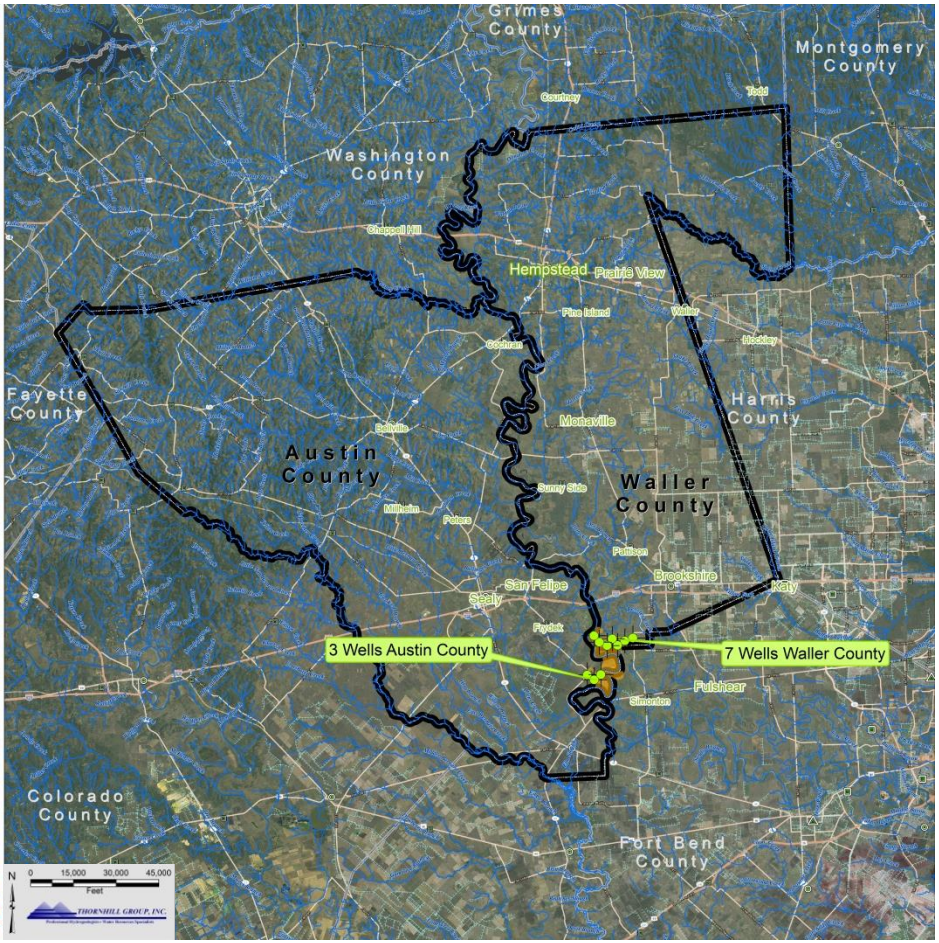
- Permit Application and Requirements - BGCD
  - Phase 1 Hydrogeology Study and Report (Permit Application)
    - Based on available data and information (we'll talk about today)
    - (More than) specific required calculations and analyses
    - Must generally comply with certain aquifer conditions – 50 years
    - Forms the basis for permitted production
    - Forms the basis for Phase 2 testing
  - Phase 2 Hydrogeology Study – Specific Field Testing/Validation
    - Drill, log and complete pilot wells and monitoring wells
    - Conduct aquifer (i.e., pumping) tests – measure drawdown
    - Detailed analyses – storage, permeability, transmissivity
    - Compare to Phase 1 results
    - If different – BGCD may adjust the permitted production

Electro Purification, LLC
Water Supply Project

- Results of Phase 1 – Aquifer, Well Owners, Land Protected
  - Basic concepts – details submitted to BGCD professionals
    - Location and description of the proposed project
    - How artesian aquifers act
    - Good information from previous studies available
    - Example well diagram
    - Locations of proposed well field and nearby wells
    - Schematic of local Gulf Coast aquifer and wells
  - Aquifer will remain full – storage reduction too small to detect
  - Artesian head (i.e., water levels) within the well field
  - Will not significantly affect water levels in local and area wells
    - Aquifer conditions and modeling
    - Selected producing zones separate from most local wells
  - Minimal, if any, subsidence expected due to the EP project
    - Hydrogeologic conditions much different than counties to east
    - USGS/TWDB model overstates local compaction of clay layers
    - Historically, subsidence not a concern – water levels have declined

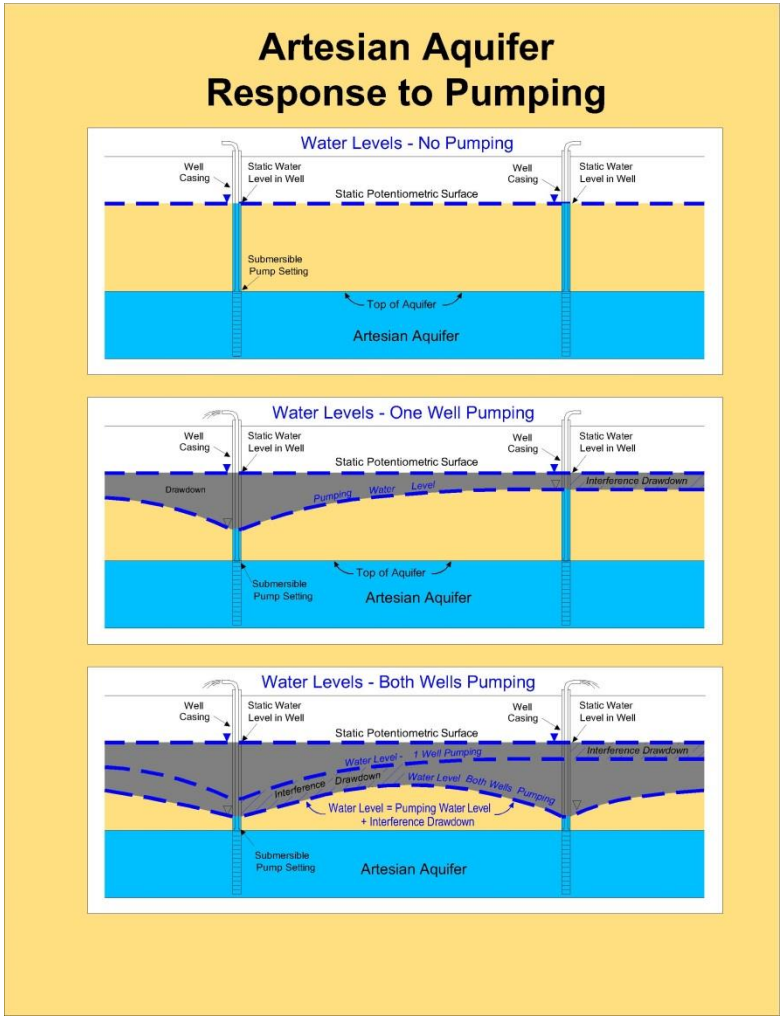
Electro Purification, LLC
Water Supply Project

- Results of Phase 1 – Aquifer, Well Owners, Land Protected
  - Location and description of the project



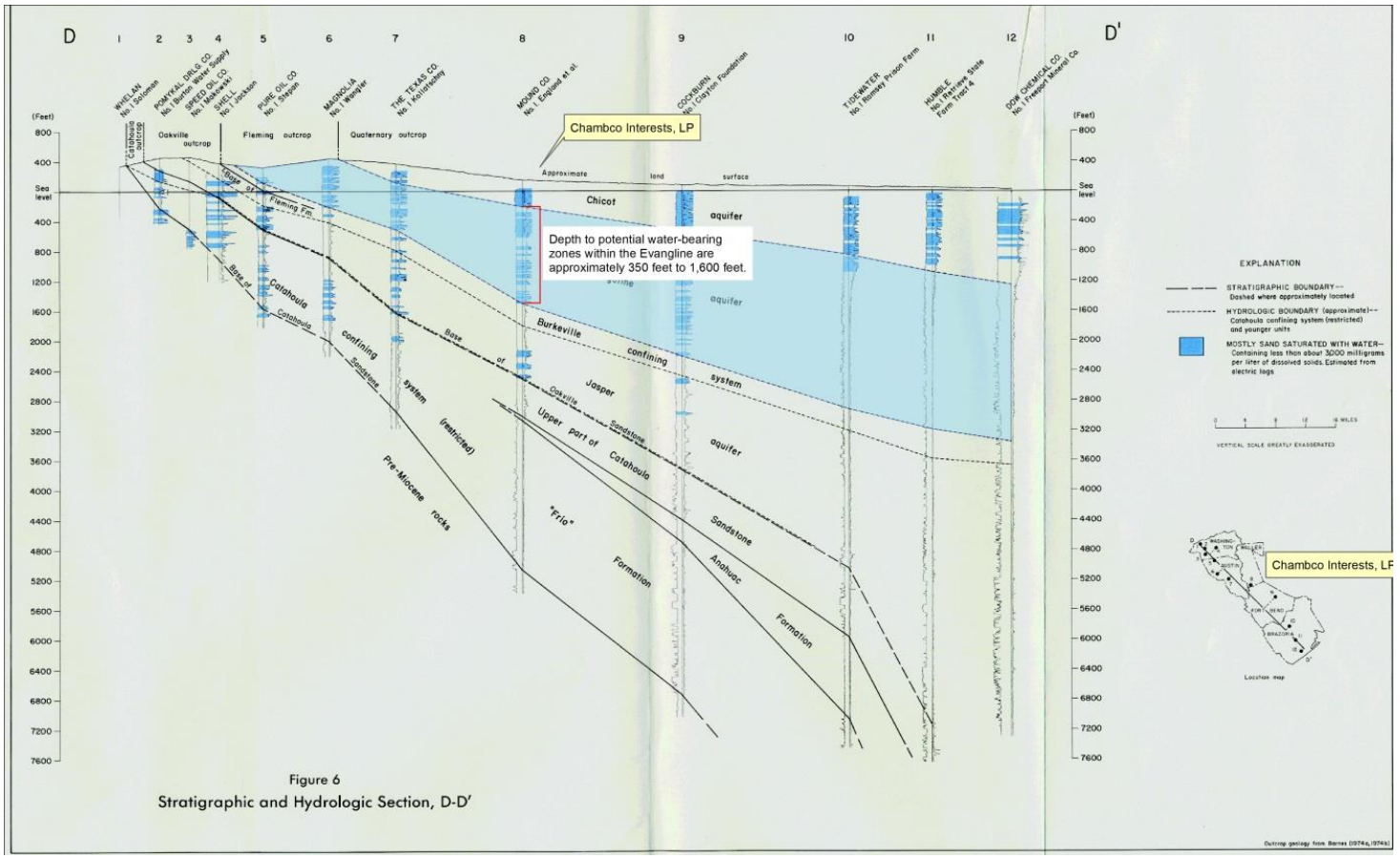
Electro Purification, LLC
Water Supply Project

- Results of Phase 1 – Aquifer, Well Owners, Land Protected
  - How artesian aquifers act
    - Water is derived from a reduction in pressure
    - The aquifer is not “mined”



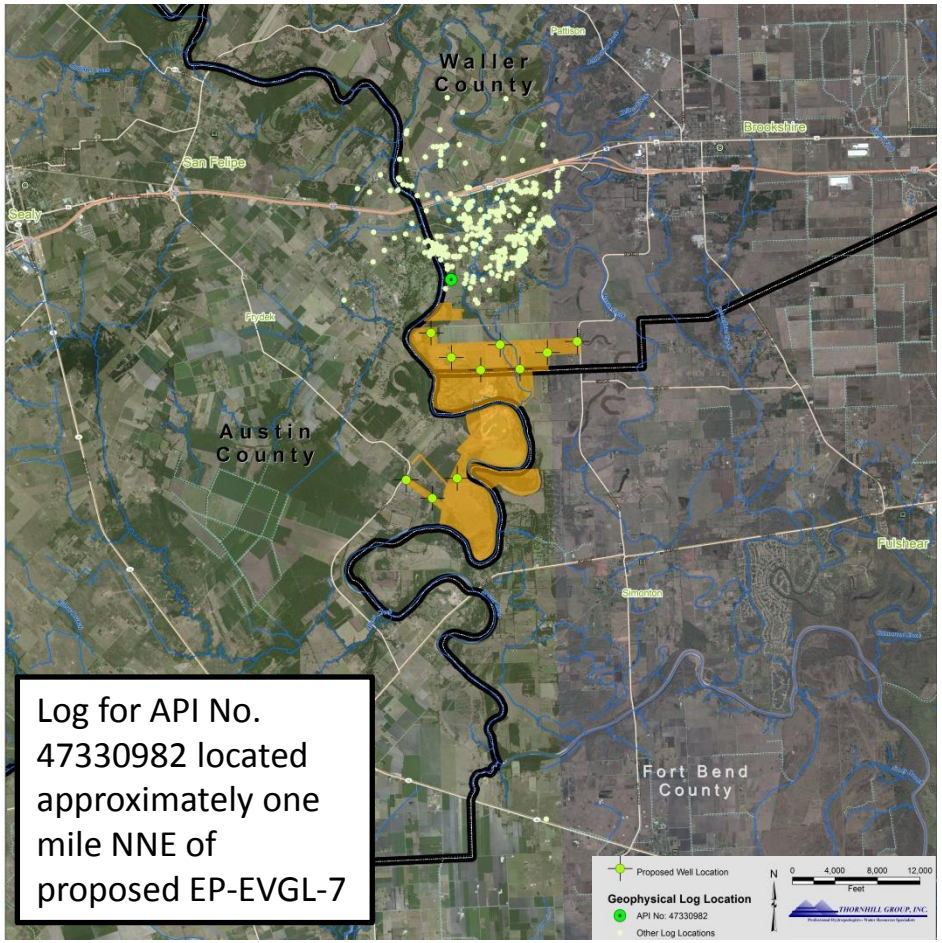
Electro Purification, LLC
Water Supply Project

- Results of Phase 1 – Aquifer, Well Owners, Land Protected
  - Good information available from previous studies
  - Previous studies are not site-specific

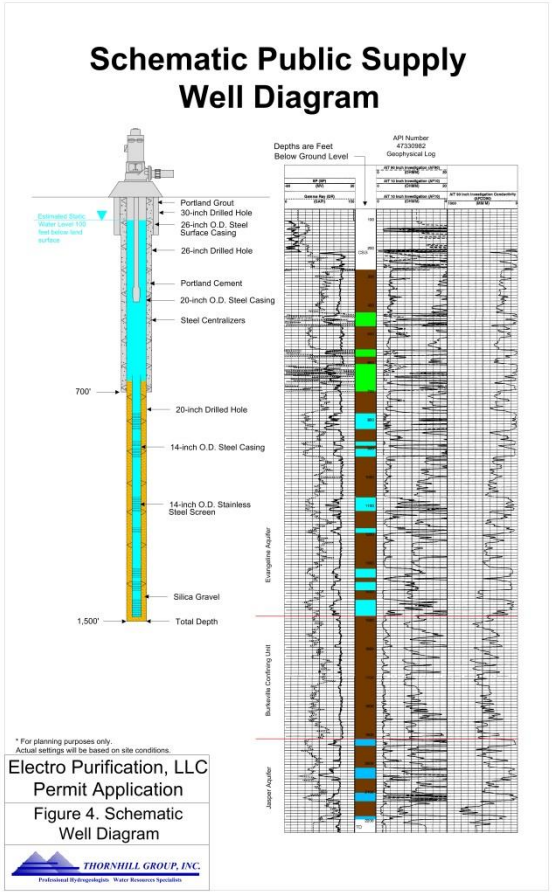


Electro Purification, LLC
Water Supply Project

- Results of Phase 1 – Aquifer, Well Owners, Land Protected
  - Preliminary well design based on available hydrogeologic data

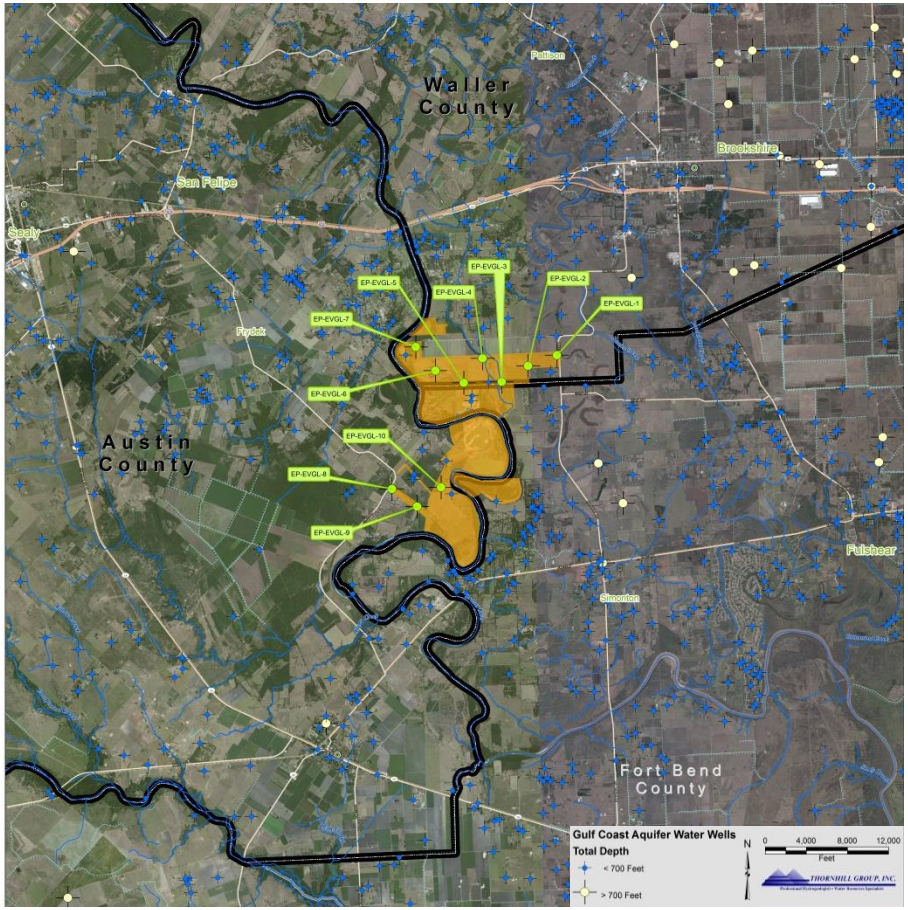


Log for API No. 47330982 located approximately one mile NNE of proposed EP-EVGL-7



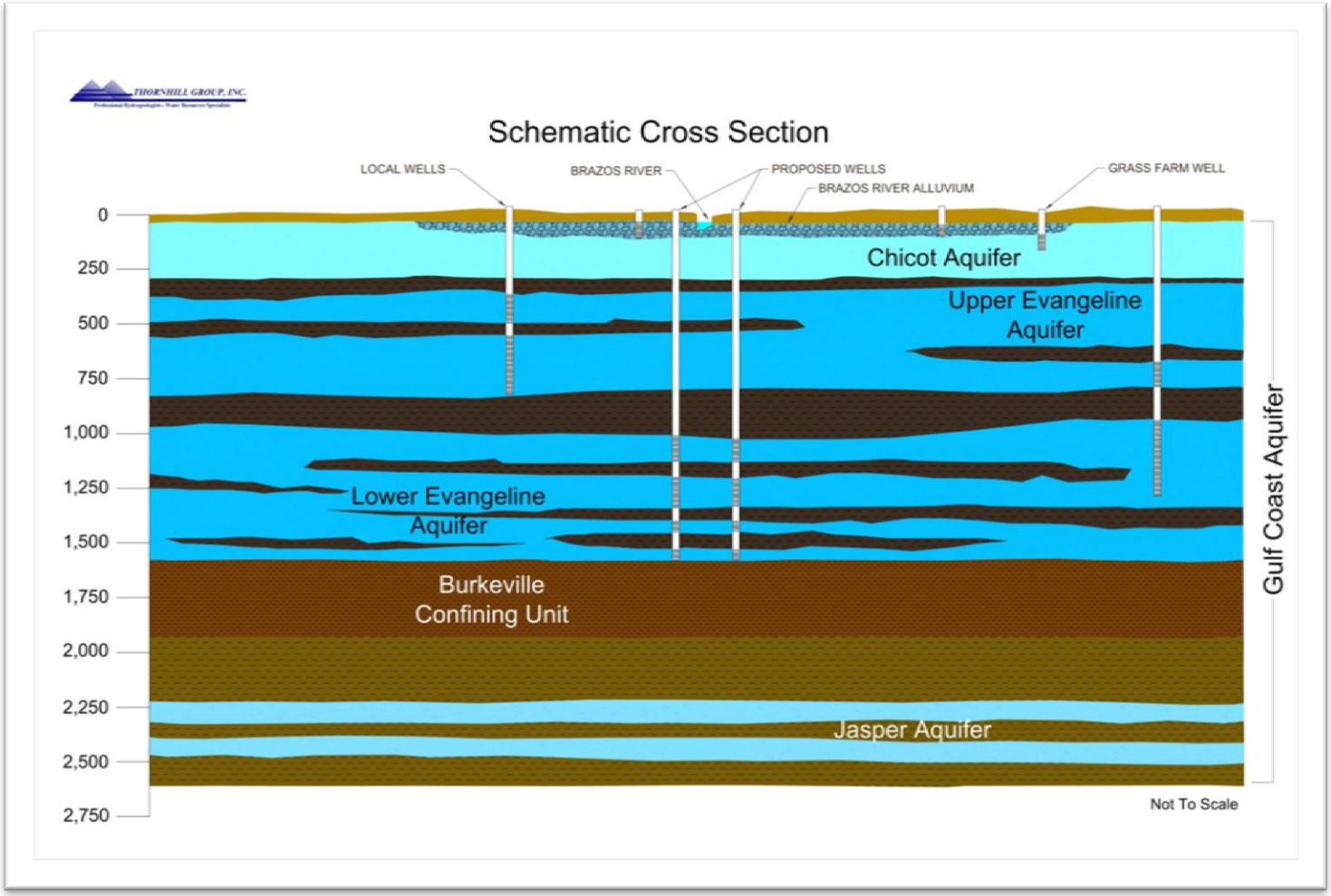
Electro Purification, LLC
Water Supply Project

- Results of Phase 1 – Aquifer, Well Owners, Land Protected
  - Locations of proposed well field and nearby existing wells
  - Target production zones separate from locally tapped zones



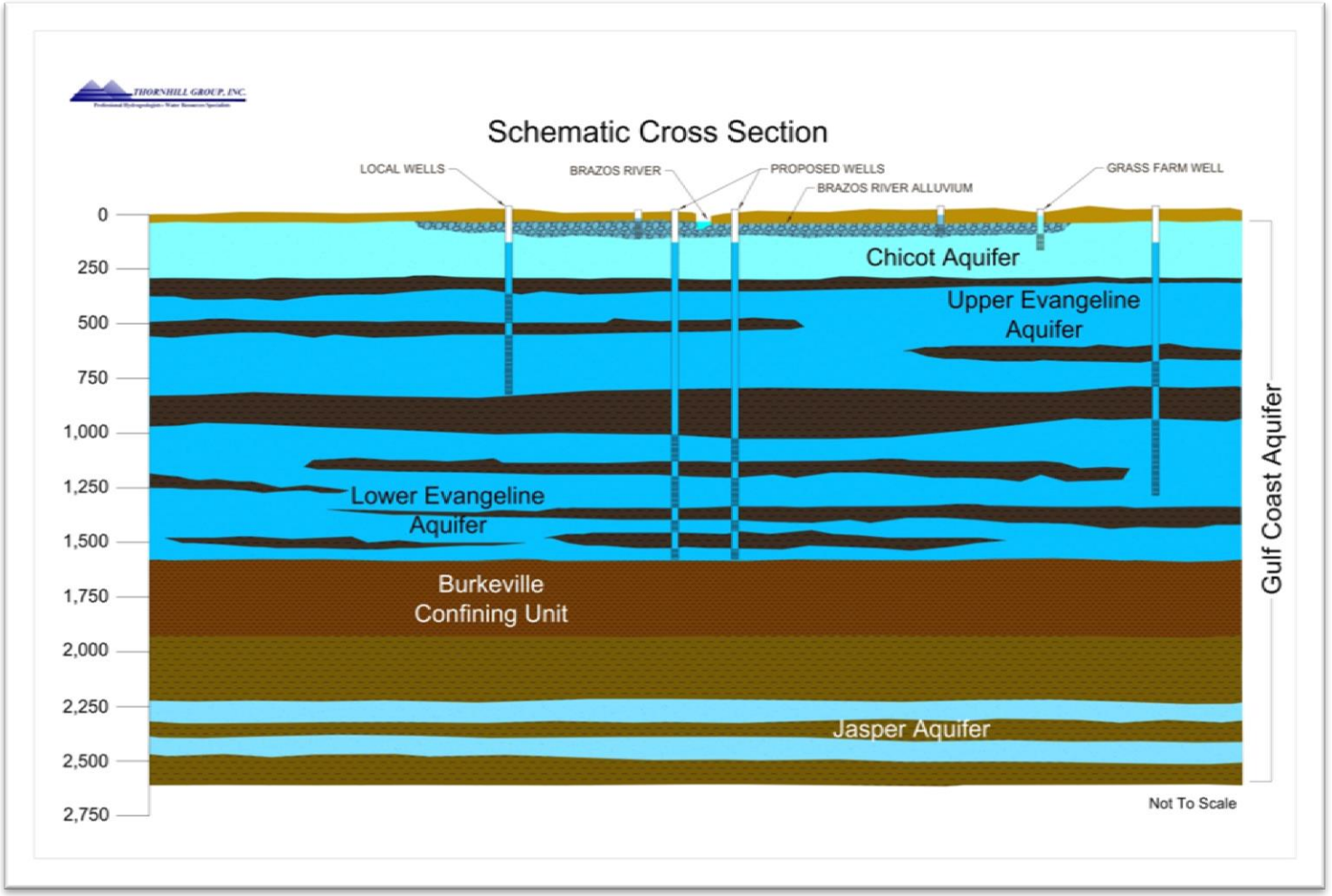
Electro Purification, LLC
Water Supply Project

- Results of Phase 1 – Aquifer, Well Owners, Land Protected
  - Schematic cross section of local Gulf Coast aquifer and wells



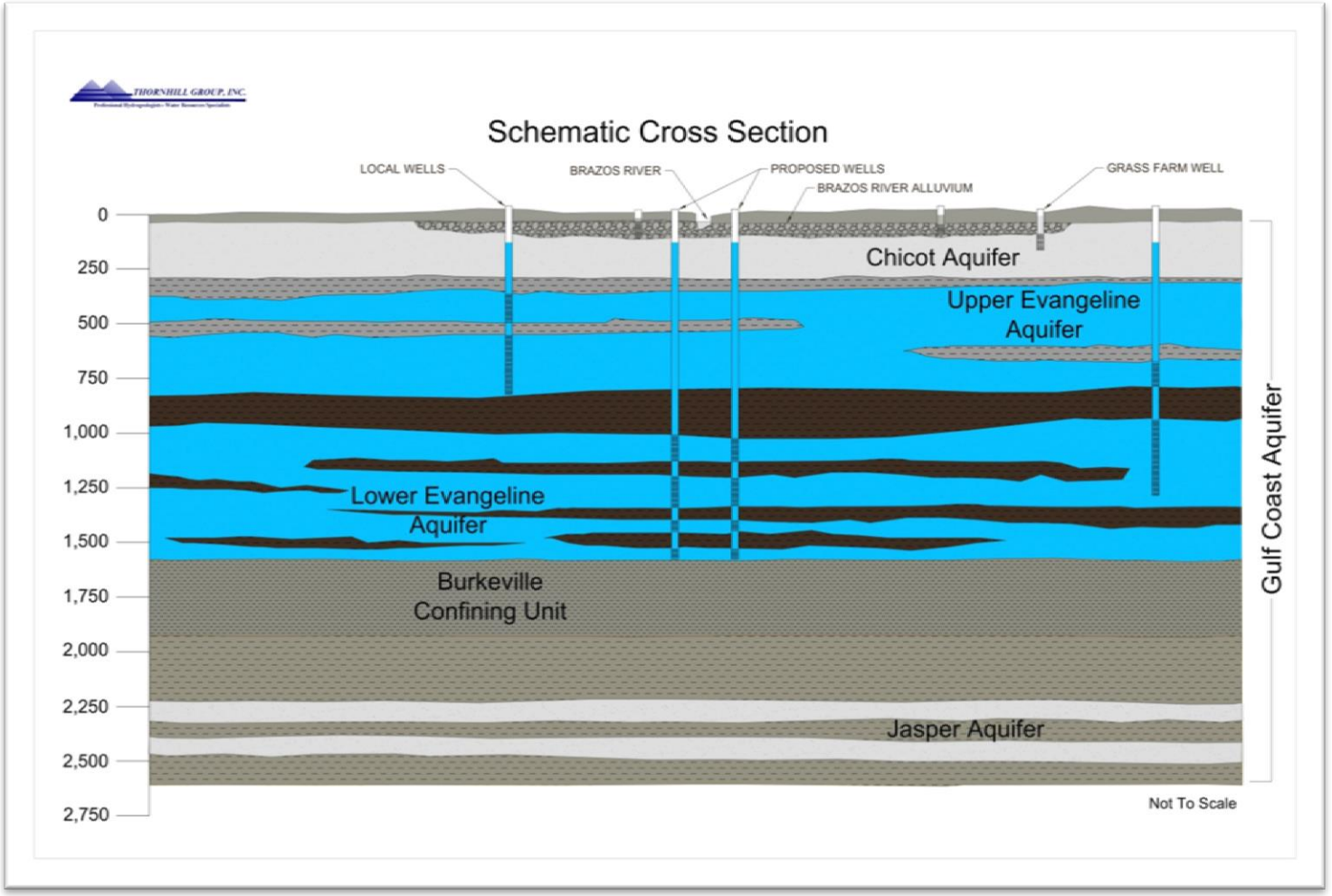
Electro Purification, LLC
Water Supply Project

- Results of Phase 1 – Aquifer, Well Owners, Land Protected
  - Schematic cross section of local Gulf Coast aquifer and wells



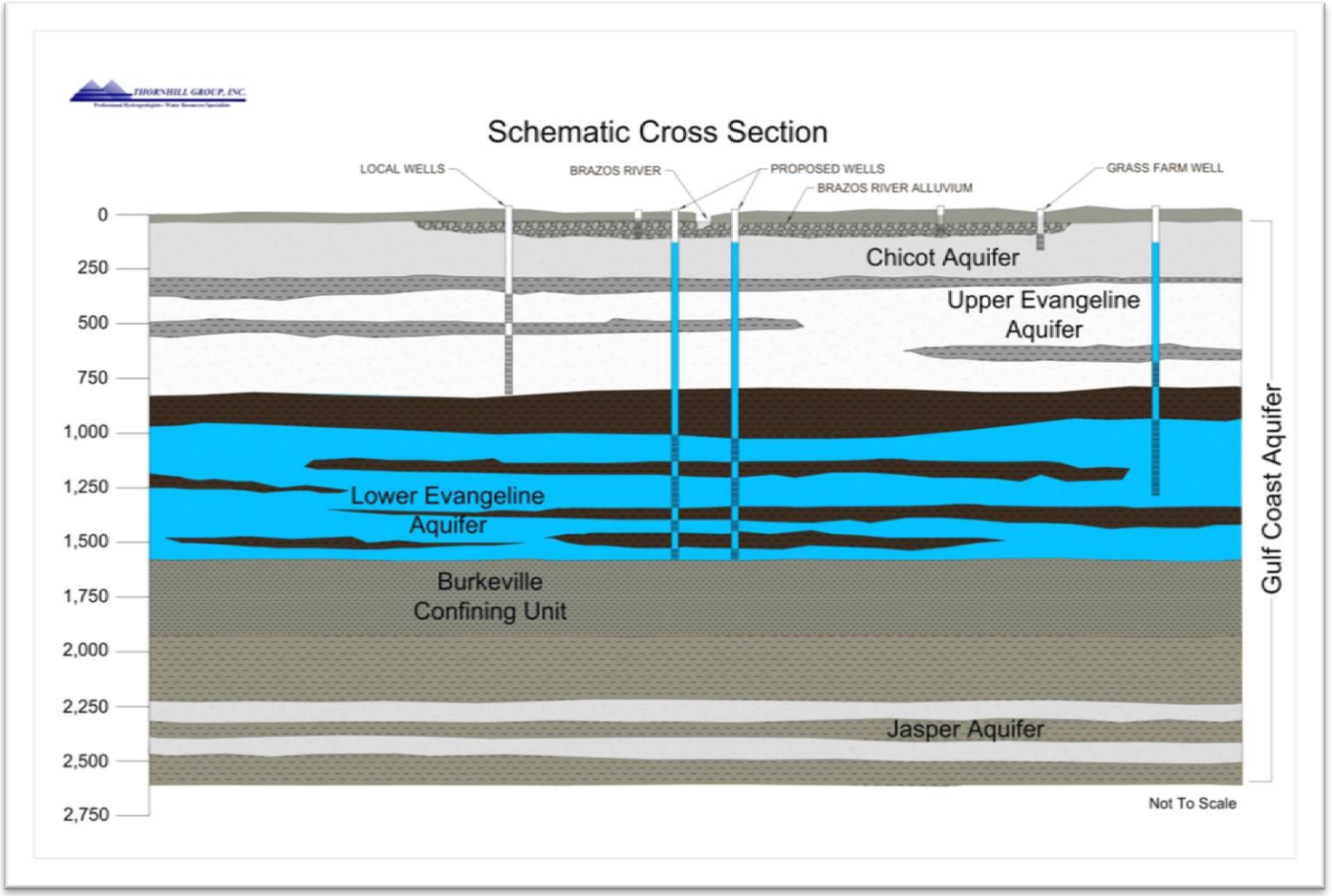
Electro Purification, LLC
Water Supply Project

- Results of Phase 1 – Aquifer, Well Owners, Land Protected
  - Schematic cross section of local Gulf Coast aquifer and wells



Electro Purification, LLC
Water Supply Project

- Results of Phase 1 – Aquifer, Well Owners, Land Protected
  - Schematic cross section of local Gulf Coast aquifer and wells



Electro Purification, LLC
Water Supply Project

- Results of Phase 1 – Aquifer, Well Owners, Land Protected
  - Aquifer will remain full and under artesian pressure
  - Storage reduction too small to detect

County	Water in Storage in Evangeline*	Reduction Due to EP Pumping 2014 – 2060
Austin	45,400,000 acre-feet	0.06 percent
Waller	49,000,000 acre-feet	0.06 percent
Fort Bend	147,130,000 acre-feet	0.001 percent
TOTAL	**241,530,000 acre-feet**	**0.023 percent**

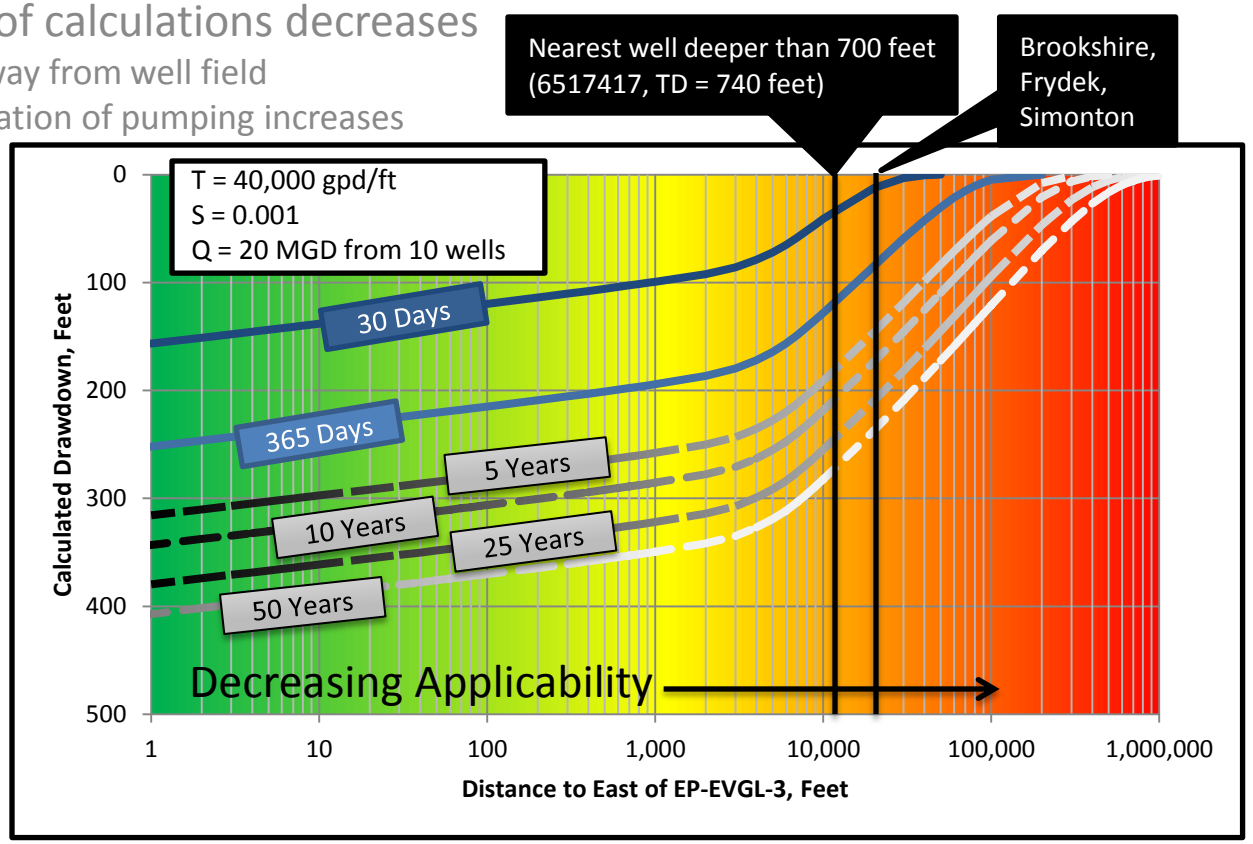
*Storage calculated based on GAM simulated water levels and an assumed specific yield of 0.15

Electro Purification, LLC
Water Supply Project

- Results of Phase 1 – Aquifer, Well Owners, Land Protected
  - Will not significantly affect water levels in local wells
    - Theis Model – Used for well spacing and short-term drawdown
    - Artesian heads (i.e., water levels) within the well field
    - Applicability of calculations decreases
      - Moving away from well field
      - As the duration of pumping increases

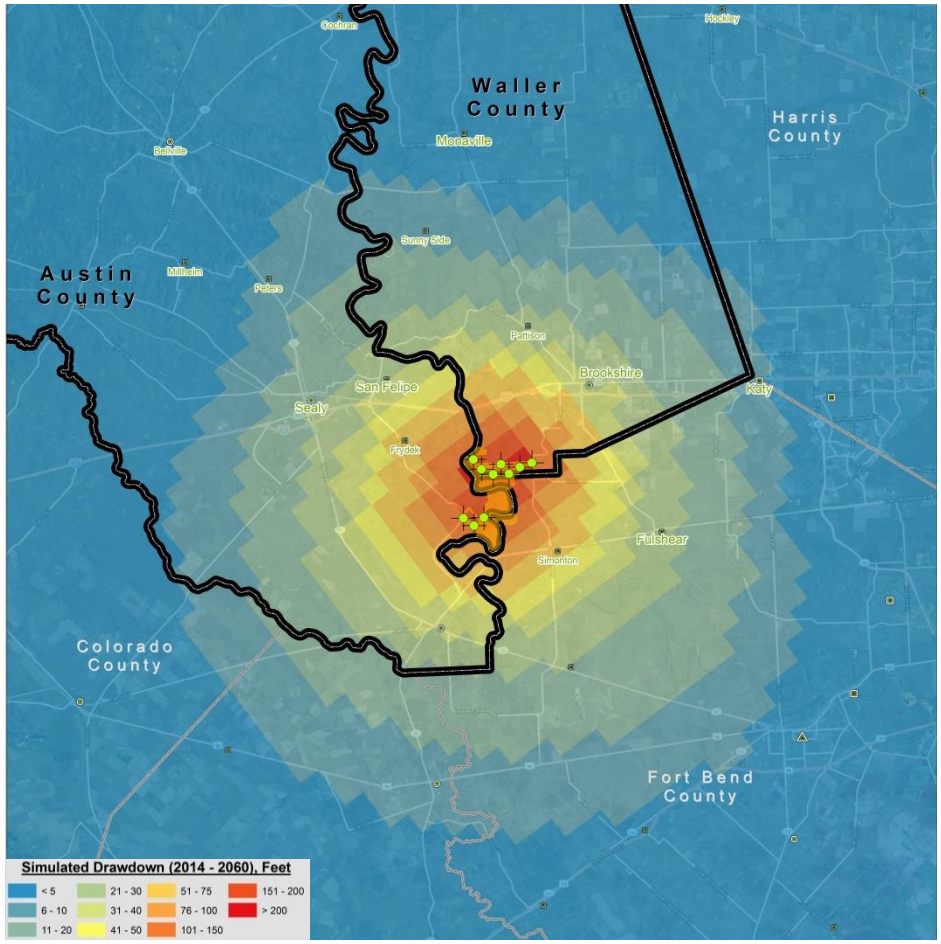
"Utilizing the Theis model provides for conservative evaluations of the potential drawdown ***near*** the proposed well field."

Phase 1 Hydrogeologic Report (emphasis added)



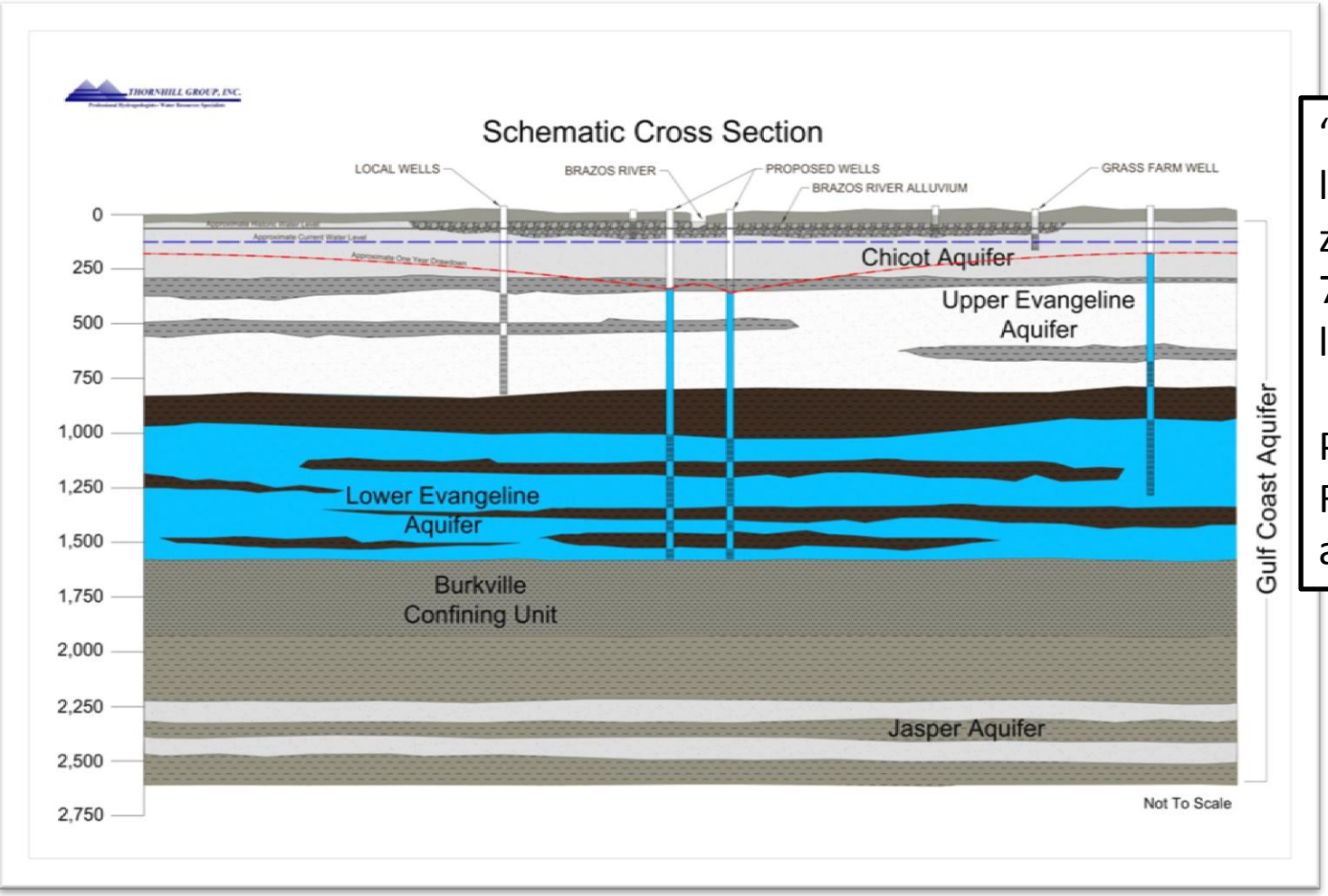
Electro Purification, LLC
Water Supply Project

- Results of Phase 1 – Aquifer, Well Owners, Land Protected
  - Will not significantly affect water levels in local wells
    - Aquifer conditions
    - Most local wells completed in shallower zones
    - Numerical Modeling – better method for outside well field – 1 to 2 miles and further
    - Selected producing zones separate from most local and area wells



Electro Purification, LLC
Water Supply Project

- Results of Phase 1 – Aquifer, Well Owners, Land Protected
  - Will not significantly affect water levels in local wells



"Drawdown will be limited to the sand zones ***deeper*** than 700 feet below ground level."

Phase 1 Hydrogeologic Report (emphasis added)

Electro Purification, LLC
Water Supply Project

- Results of Phase 1 – Aquifer, Well Owners, Land Protected
  - Minimal, if any, subsidence expected due to the EP project
    - Subsidence is a known concern in the Gulf Coast aquifer
    - Clay layers in Chicot are more susceptible to subsidence than clay layers in the Evangeline
    - Caused by compaction of clay layers as pressure is reduced
      - EP Area
        - Clay in Chicot and Evangeline is approximately 750 feet thick
        - Chicot is relatively thin
        - Simulated maximum water level decline: 260 feet in Evangeline (GAM)
      - Highest Subsidence Area
        - Clay in Chicot and Evangeline is approximately 1,500 feet thick
        - Chicot is relatively thick
        - Water level declines (TWDB Report 289)
          - Chicot: 300 feet
          - Evangeline: 400 feet
    - Thicker Chicot clays, higher historical production, and greater water level declines in areas with measured subsidence
    - EP proposed production area has less clay and smaller potential for regional water-level declines

Electro Purification, LLC
Water Supply Project

- Results of Phase 1 – Aquifer, Well Owners, Land Protected
  - Minimal, if any, subsidence expected due to the EP project
    - USGS/TWDB model overstates local compaction

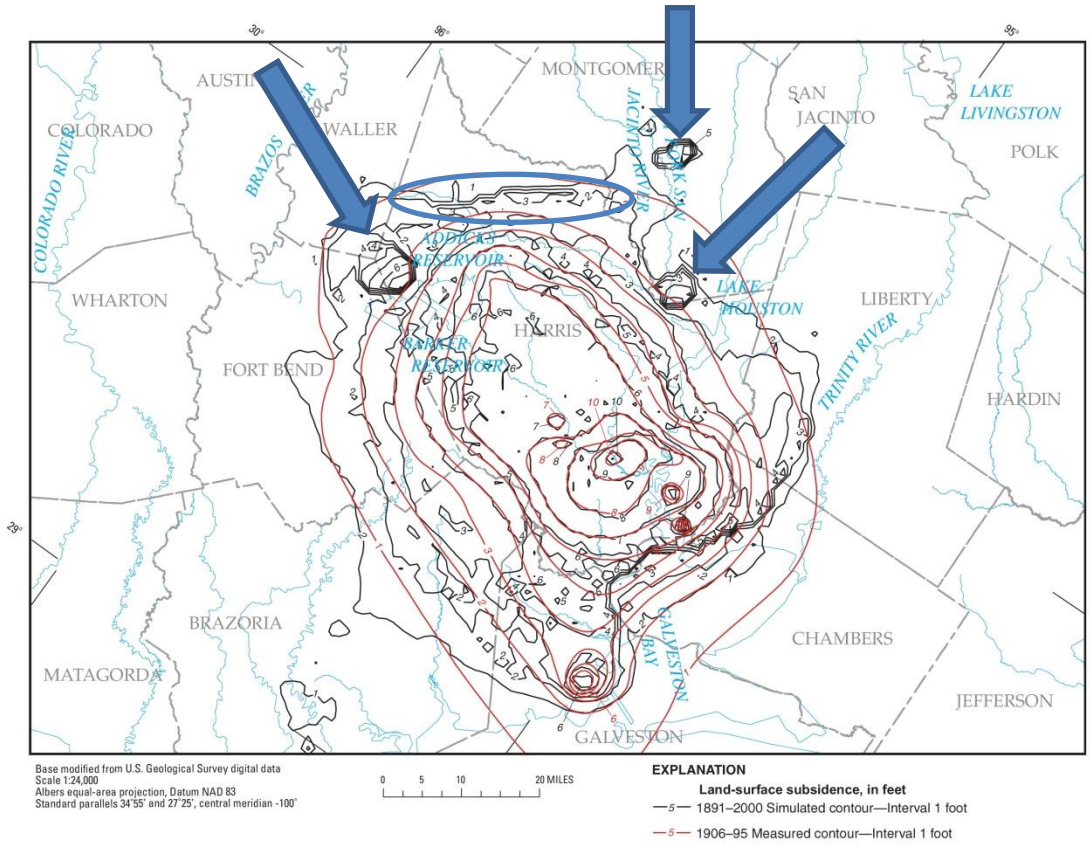
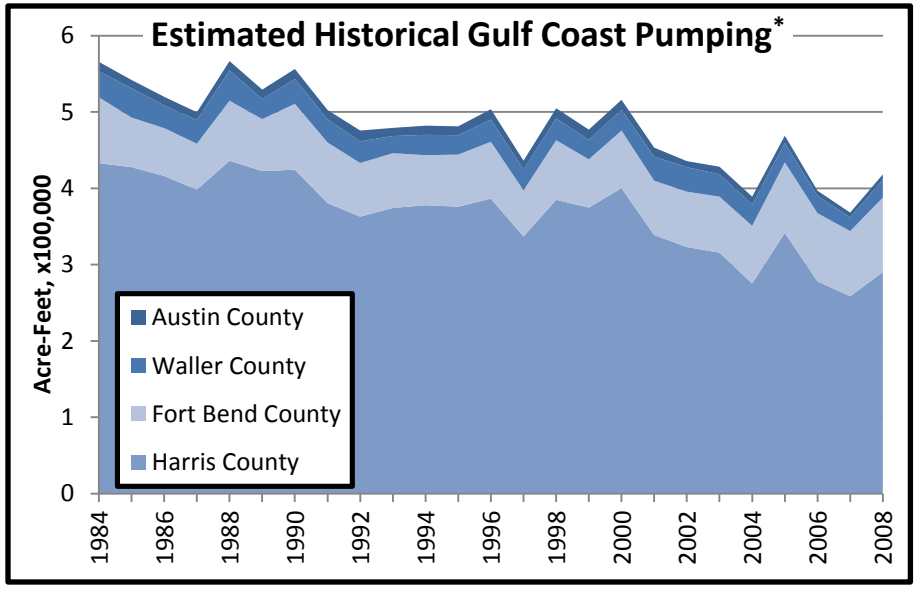
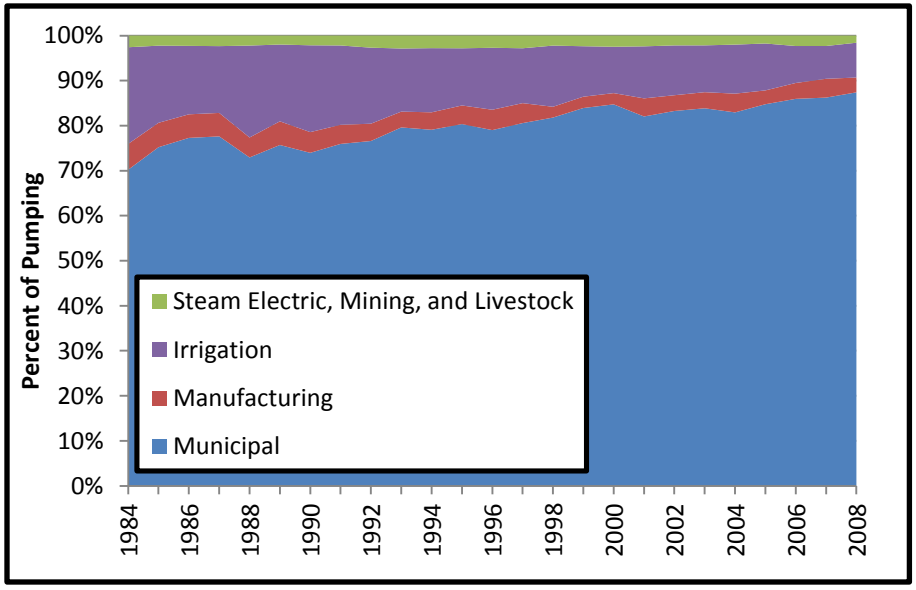


Figure 76. Simulated and measured 2000 land-surface subsidence in the Houston area of the Ground-Water Availability Model area.

Electro Purification, LLC
Water Supply Project

- Results of Phase 1 – Aquifer, Well Owners, Land Protected
  - Minimal, if any, subsidence expected due to the EP project
    - Historically, subsidence not a concern
    - Water levels have declined
    - High pumping in the past that has declined recently





*Estimated pumping from TWDB database

Electro Purification, LLC
Water Supply Project

- Conclusions
  - There are hundreds of millions of acre-feet of water stored in the Gulf Coast aquifer
  - Drawdown due to the proposed production will be limited to the zones where the wells are completed – there will be no discernible effect on shallow wells
  - The proposed pumping will not cause appreciable, if any, subsidence in the area
  - The proposed production is available under the management plan of the Bluebonnet Groundwater Conservation District

Electro Purification, LLC
Water Supply Project

- Summary
  - Will maintain current “health” of aquifer and land surface
  - Will provide resources to BGCD and implement aquifer monitoring
  - Will ALWAYS be subject to BGCD to protect aquifer, wells, water users and land
  - Will provide much needed sustainable, affordable, and high-quality water supplies to the region
  - Is a tremendous investment by and for Rosenberg and Richmond to secure their future – good for their neighbors