



Lost Pines GCD Board Meeting  
December 14<sup>th</sup>, 2022  
Giddings City Hall

# Lost Pines GCD Project Plan

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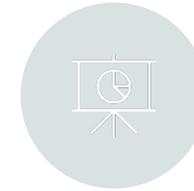
# LOST PINES PROJECT PLAN OUTLINE



Project Plan  
Timeline



Task A – General  
Consulting  
Services



Phase 1 –  
Management Plan,  
Rules and DFCs



Phase 2 –  
Aquifer Science



Phase 3 –  
Targeted Studies



Hydrogeologic  
Model

Start of Requested Client Services and Initiatives

Jan. 2<sup>nd</sup>, 2023

Management Plan and Rule Recommendations

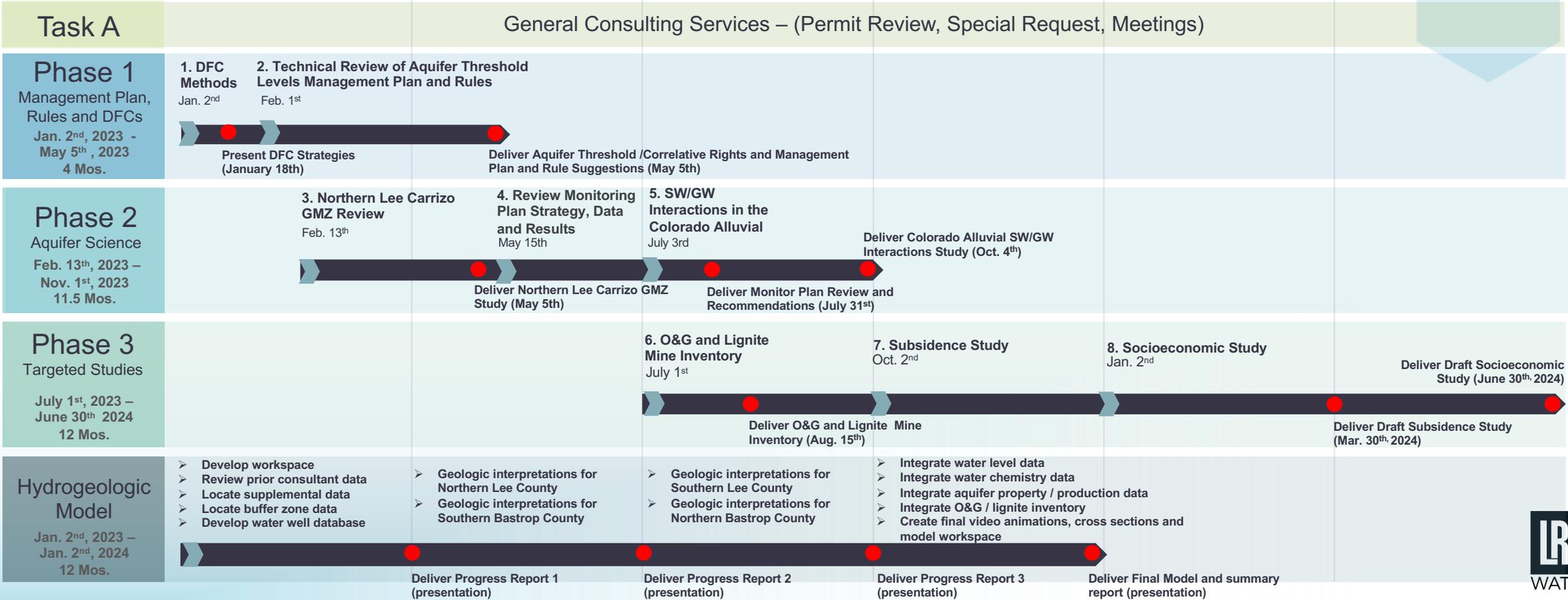
May 5<sup>th</sup>, 2023

Finalized Hydrogeologic Framework

Jan. 2<sup>nd</sup>, 2024

End of Project Plan (18 Months)

June 30<sup>th</sup>, 2024



# TASK A – GENERAL CONSULTING SERVICES

- Groundwater Permits and General Consulting Services General Task Agreement
- Flexibility between team members to ensure quick turnarounds.
- Current (4) groundwater permits will be reviewed by close of business on April 28<sup>th</sup>, 2023
  - Following Jim's direction and a defined checklist.



# PHASE 1

## *Management Plan, Rules and DFCs*

### Task 1. Determine Methodology for Calculating DFCs

- **Consultant(s):** Dr. Hutchison
- **Billing:** Fixed Cost (\$5,000)
- **Schedule:** January 2<sup>nd</sup> - 18<sup>th</sup>, 2023 (2.3 weeks)

**Task Outline and Deliverables:** Dr. Hutchison will provide the District with several methodologies to calculate average DFCs, in addition to his expert recommendation. This will be delivered as a presentation to the Management Committee and again to the Board of Directors. A technical memo that summarizes the District's preferred methodology and the benefits of this strategy will also be included in this task order.



# PHASE 1

## *Management Plan, Rules and DFCs (cont.)*

### Task 2. Technical review and studies to evaluate possible aquifer threshold levels, production caps, correlative rights, curtailment and management plan and rule recommendations

- **Consultant(s):** Dr. Hutchison (Lead) and Allan Standen
- **Billing:** Time and Materials
- **Schedule:** February 1<sup>st</sup> - May 5<sup>th</sup>, 2023 (3 months)

**Task Outline and Deliverables:** The focus of this task is to compare two basic approaches.

1. We will use historic water levels, production data and the groundwater availability models to determine if establishing threshold/trigger levels that lead to curtailment/cutbacks is an appropriate groundwater management strategy for the District.
2. Correlative right strategies can also be an effective groundwater management strategy. A review of different correlative right strategies used by GCDs across the State will be performed.

A technical memo that provides an overview and compares and contrasts these two approaches with the appropriate management plan and rule recommendations will be provided to the District. Through this process we will also provide additional management plan or rule recommendations that we believe may benefit the District's groundwater management strategies.



# PHASE 2

## *Aquifer Science*

### Task 3. Northern Lee County Carrizo GMZ

- **Consultant(s):** Allan Standen (Lead), Dr. Hutchison and Vince Clause
- **Billing:** Time and materials
- **Schedule:** February 13<sup>th</sup> - May 5<sup>th</sup>, 2023 (2.5 months)

**Task Outline and Deliverables:** We will review the current Northern Lee County Carrizo GMZ strategy based on four criteria: water levels, GAM results, pumping data and the geology. This information will ultimately lead to the creation of four maps that may provide the necessary framework for this management strategy. A technical memo will accompany this deliverable.



# PHASE 2

## *Aquifer Science (cont.)*

### Task 4. Review Monitoring Plan Strategy, Data and Results

- **Consultant(s):** Allan Standen
- **Billing:** Fixed Cost (\$15,000)
- **Schedule:** May 15<sup>th</sup> - July 31<sup>st</sup>, 2023 (3 months)

**Task Outline and Deliverables:** Review the geographic distribution and historical water level record history of the District's existing water level monitoring program and identify data gaps and aquifer geographic coverage issues. Using an updated water well database with screen intervals, identify wells for each aquifer to supplement existing monitoring well network. If there are no available existing water wells identified for the deeper aquifers, conduct a preliminary search of the Railroad Commission's database (see Task 6) to identify possible inactive oil/gas water supply wells that could possibly be used as a monitor well. This does not include field confirmation of identified oil/gas wells. A brief summary of findings and recommendations will be provided to the District.



# PHASE 2

## *Aquifer Science (cont.)*

### Task 5. Monitoring for SW/GW Interactions in the Colorado Alluvium

- **Consultant(s):** Dr. Hutchison (Lead) and Dr. Furnans
- **Billing:** Time and Materials
- **Schedule:** July 3<sup>rd</sup> – October 4<sup>th</sup>, 2023 (3 months)

**Task Outline and Deliverables:** Combine Task 4 data, GAM results, and alternative WAM results to recommend a monitoring program that focuses on the interaction between the Colorado River Alluvial groundwater elevations and stream flows in the Colorado River.

We would like to continue the discussion on this task to better understand the specific goals and possibly design a more in-depth study.



# PHASE 3

## *Targeted Studies*

### Task 6. O&G and Lignite Mine Inventory

- **Consultant(s):** Vince Clause (Lead) and Allan Standen
- **Billing:** Fixed Cost - \$15,000
- **Schedule:** July 1<sup>st</sup> - August 15<sup>th</sup>, 2023 (*1.5 months*)

**Task Outline and Deliverables:** Purchase RRC database for Lee and Bastrop Counties (~\$1,200). Open records request injection well data from the RRC. Cleanup files, organize excel tables and create GIS shapefiles. Create figures that illustrate the distribution of Oil and Gas wells with relevant (well status: plugged or active, production intervals, drill date, etc...)

Review USGS mining publications and BEG reports for lignite mining areas in Lee and Bastrop County. Create GIS shapefiles for the location and extent of each mine. Create figures that illustrate the spatial distribution of lignite mining areas.



# PHASE 3

## *Targeted Studies (cont.)*

### Task 7. Subsidence Study

- **Consultant:** Dr. Furnans and Micaela Pedrazas
- **Billing:** Fixed Cost - \$20,000
- **Schedule:** October 2<sup>nd</sup>, 2023 - March 30<sup>th</sup>, 2024 (6 months)

**Task Outline and Deliverables:** Between 2016 and 2018, LRE Water, Inc. was contracted by the TWDB to identify areas of vulnerability subsidence due to groundwater pumping. This study included Major and Minor aquifers in both Bastrop and Lee Counties. We will revisit these results and provide a detailed update specific to the LPGCD management areas. The update will incorporate data from any additional wells drilled since 2016, and we will apply our subsidence prediction tool to selected well locations to better understand subsidence risk for the LPGCD under different pumping and water level conditions. These results will be provided to the District as a summary report.



# PHASE 3

## *Targeted Studies (cont.)*

### Task 8. Socioeconomic Impact Study

- **Consultant:** Bill Hutchison (Lead) and Allan Standen
- **Billing:** Fixed Cost - ???
- **Schedule:** January 2<sup>nd</sup>, 2023 - June 30<sup>th</sup>, 2024 (6 months)

**Task Outline and Deliverables:** We would like to continue to discuss the goals of this strategy as there are several ways of looking at this type of information, both qualitative and quantitative approaches that will inform different audiences. *Economic Benefits or Ecosystem Services of Groundwater.*



# DETAILED HYDROGEOLOGIC DATA

## *Hydrogeologic Model*

- **Consultant:** Allan Standen, Vince Clause and Michelle Sutherland
- **Billing:** Fixed Cost \$150,000 billed as 12 monthly invoices of \$12,500
- **Schedule:** January 2<sup>nd</sup>, 2023 – January 2<sup>nd</sup>, 2024 (*12 months*)

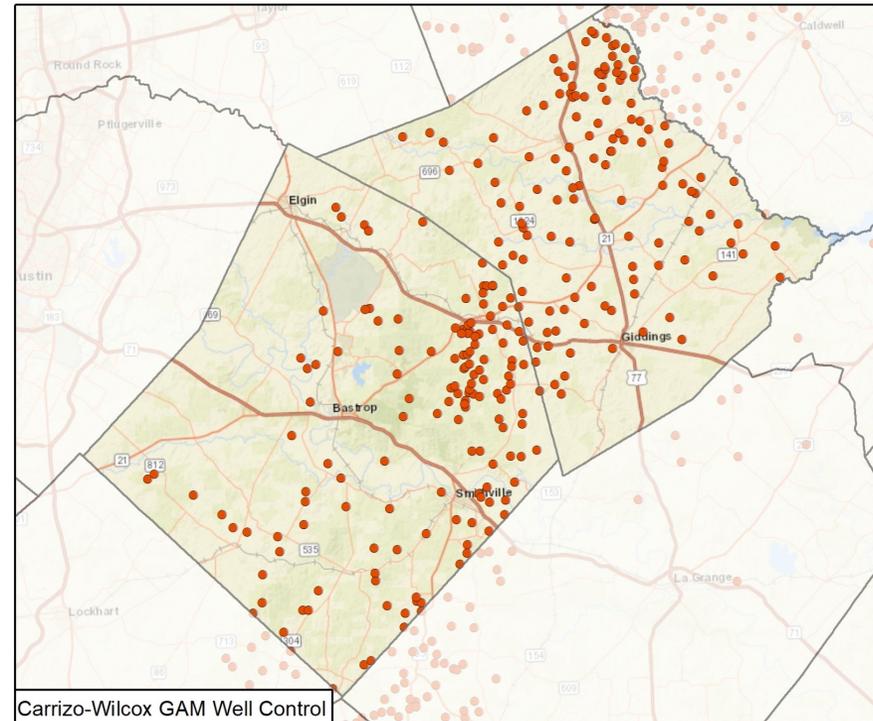
**Task Outline and Deliverables:** The model will be developed in a way that compliments other District priorities and initiatives. As a result, the time and materials used to complete other tasks will be reduced. Each quarter of 2023 will mark a project milestone. Q1 will focus on data collection and model framework development. Q2 and Q3 are focused on the development of geologic data, starting with northern Lee County. Q4 will focus on integrating aquifer property, water level and supplemental data into the model workspace and finalizing the model with an accompanying summary report.



# IMPORTANCE OF HYDROGEOLOGIC DATA

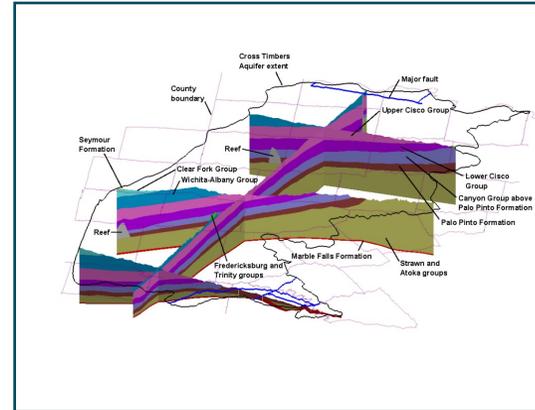
## *Common Concerns Among GCD's*

1. Declining Water Levels
2. Rapid Growth and Development
3. GMA/DFC Process
4. Groundwater Availability Models
  - Regional Analysis
    - Budget and Time Constraints
  - Carrizo-Wilcox GAM Well Control
    - Bastrop – 142 (47 Carrizo Formation Picks)
    - Lee - 129 (51 Carrizo Formation Picks)

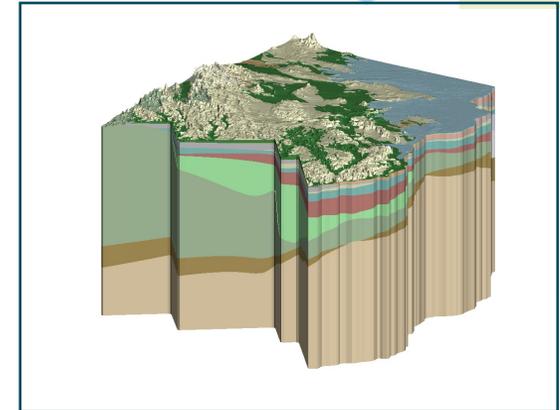


# HYDROGEOLOGIC MODELS ACROSS TEXAS

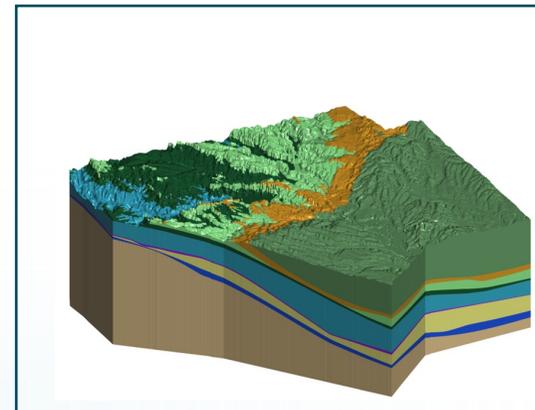
- **TWDB**
  - Cross Timbers, Blaine and Marathon Aquifer Conceptual Models
- **Middle Pecos GCD**
  - Oil and Gas Issues
  - Creating custom groundwater model
  - Litigation
- **Clearwater UWCD**
  - GAM was not reliable
  - Creating custom groundwater model
- **Hemphill UWCD**
  - Aquifer volumetrics
  - Litigation
- **Gonzales UWCD**
  - Water Level Declines associated with O&G production
- **Brazos Valley GCD**
  - Educational Outreach
- **Fayette County GCD**
  - DFCs
- **Crockett County GCD**
  - Oil and Gas Issues



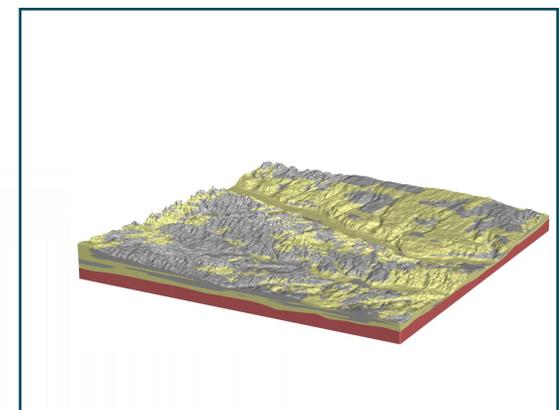
TWDB Cross Timbers Conceptual Model



Middle Pecos GCD Hydrostratigraphic Model



Clearwater UWCD Hydrostratigraphic Model



Hemphill UWCD Lithostratigraphic Model

# DETAILED HYDROGEOLOGIC DATA

## *Hydrogeologic Model (cont.)*

Q1 – January 2<sup>nd</sup> – March 31<sup>st</sup>, 2023

- **Develop model workspace** – Integrate GAM framework, develop reference layers and viewer template. This initial framework will be useful when considering threshold/trigger levels.
  - We will integrate Standen and Clause (2017) and Young and Others (2017) Colorado River Alluvium geologic well control points into the GAM framework to better understand the relationship of the Colorado River Alluvium with the underlying aquifers at this time. This data will be used to complete Task 4.
- **Review prior consultant and permit application data** – Identify any relevant and useful data available from these sources.
- **Locate geologic data** – Locate geophysical logs, cable tool driller reports, scout tickets, historic reports/bulletins, etc...
- **Locate buffer zone Data** – Request data from neighbouring GCDs, and collect supplemental geologic data where needed.
  - Buffer Zone will extend 3 miles into adjacent counties.
- **Develop water well database** – Create a well completion database with all TWDB GWDB and TDLR SDR water wells. Integrate and supplement with District's water well database.
  - This task is focused on well completion information that will be useful for identifying source aquifers.

JNO W NAYLOR		AMITY FIELD	
COMANCHE		A W SULLIVAN SURVEY, 52 ac tr,	
O T JARVIS		8 mi NE May, 175' fr WL,	
5-13-46		200' fr SL, 10 SE Rising	
6-10-46		Star, - -	
		#1	
		1748'	
		None	
CSG RECORD			
10	200		
8 5/8	670		
soil	0-18	sandy lime	789
broken sand & shale	100	shale	802
sandfresh water	122	sandy shale	870
shale	130	shale	992
sand water	145	sand	1008
yellow shale	147	shale	1213
red shale	150	sand	1218
lime	154	shale	1221
sandy shale	155	sand	1230
red shale	170	sandy shale	1275
lime	175	shale	1355
sandy lime	182	sandy shale	1375
gumbo	190	sand	1385
lime	200	sandy shale	1396
shale	205	shale	1575
sandy lime	215	sand 1 bailer water	1585
blue shale	226	shale	1623
lime	247	lime	1625
gray shale	249	sand	1630
sand	254	shale	1748
shale	275		
lime	277		
shale	290		
sand water fresh	335		
broken sand & shale	350		
shale	377		
sand	382		
sandy shale	405		
shale	435		
sandy shale	450		
shale	458		
gumbo	462		
sand	466		
shale	593		
sand Amity sand	604		
shale	674		
sale	720		
red bed	727		
shale	750		
lime and shale breaks	762		
sandy shale	779		
shale	780		
		TOTAL DEPTH	

# Hydrogeologic Model (cont.)

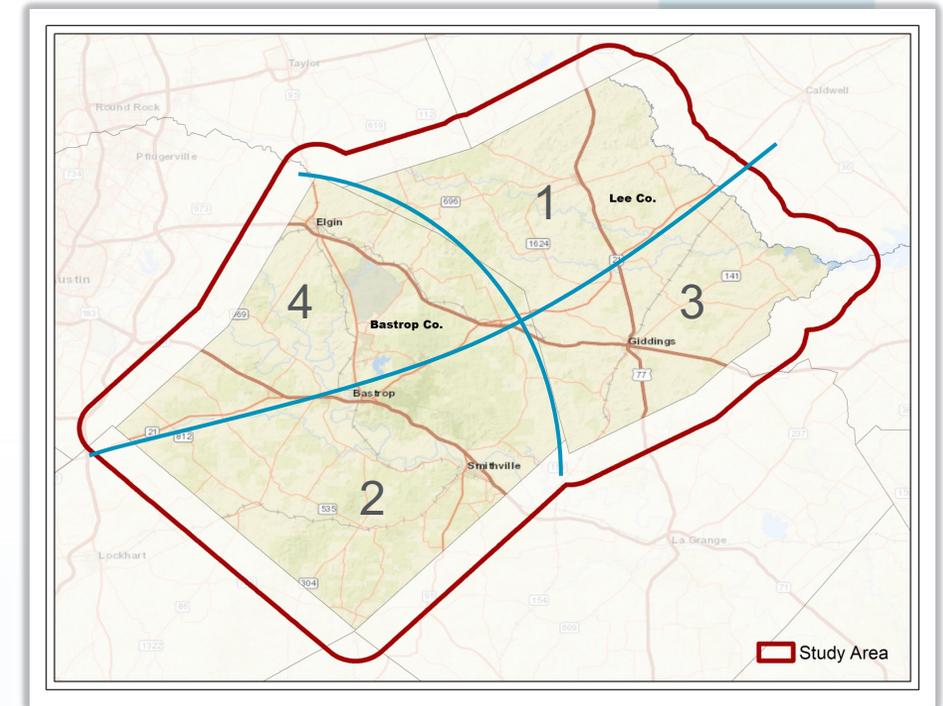
Our goal is to identify a minimum of 300 (~150 per county) new geologic well control points to supplement existing GAM, GMA and District data for Lee and Bastrop Counties using geophysical logs, O&G well reports and water well driller reports.

## Q2 – April 1<sup>st</sup> - June 30<sup>th</sup>, 2023

- **Geologic Interpretations for Northern Lee County and contiguous buffer area.**
  - Buffer Area includes areas in Milam, Williamson and Burleson Counties.
  - This is currently seen as the highest priority area and will be our focus early in the project. This data will complement our Northern Lee GMZ review and monitoring plan strategy and provide appropriate data for subsidence study.
- **Geologic Interpretations for Southern Bastrop County and contiguous buffer area.**
  - Buffer area Includes portion of Travis, Caldwell, Gonzales and Fayette Counties.
  - This data will help inform monitoring plan strategy and provide appropriate data for subsidence study.

## Q3 – July 1<sup>st</sup> – September 30<sup>th</sup>, 2023

- **Geologic Interpretations for Southern Lee County and contiguous buffer area**
  - Buffer area includes Burleson, Washington and Fayette Counties.
  - This data will help inform monitoring plan strategy and provide appropriate data for subsidence study.
- **Geologic Interpretations for Northern Bastrop County and contiguous buffer area**
  - Buffer area includes Travis and Williamson Counties.
  - This data will help inform monitoring plan strategy and provide appropriate data for subsidence study.



# Hydrogeologic Model (cont.)

Q4 – October 1<sup>st</sup> – December 31<sup>st</sup>, 2023

➤ **Integrate Water Level Data**

- Create synoptic water levels for each District Aquifer, including historic water level surfaces if sufficient data is available.

➤ **Integrate Water Chemistry Data**

- Interpolate water chemistry across each aquifer within the 3D model environment. Interpolations will be based on water wells with chemistry data and well completion data. TDS and four additional constituents selected by the District.

➤ **Integrate aquifer property and production data**

- Interpolate aquifer property and production data across each aquifer within the 3D model environment. Interpolations will be based on water wells with well completion data.

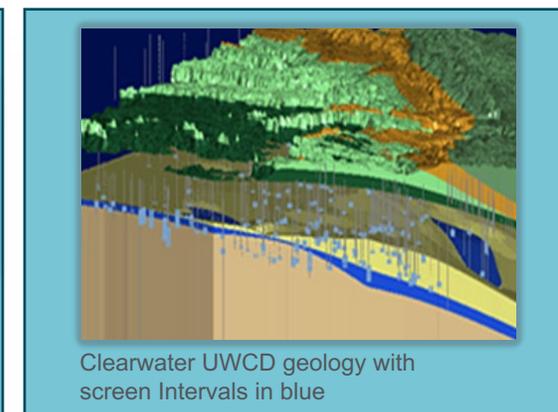
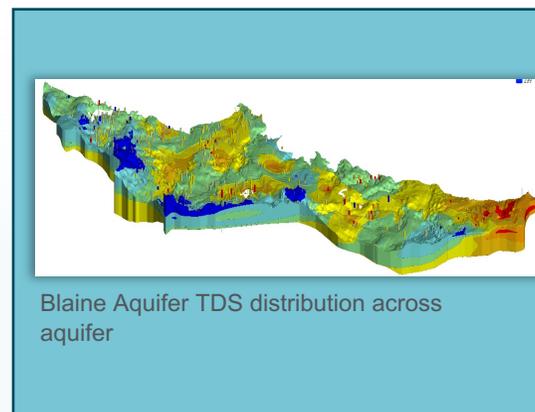
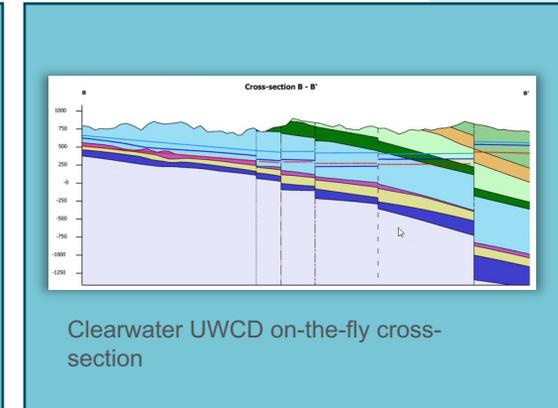
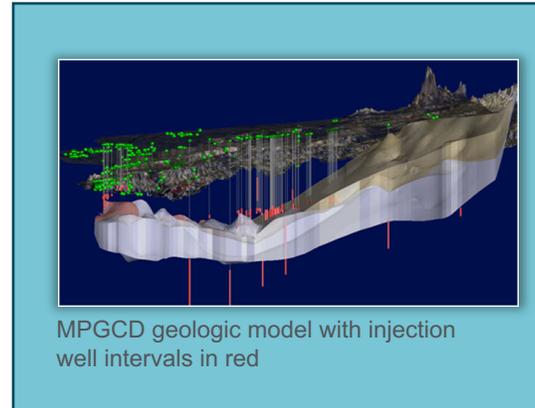
➤ **Integrate O&G / Lignite Inventory**

- Include data collected as part of the O&G well and lignite mine inventory study.

➤ **Create final video animations, cross sections and model workspace geodatabase**

➤ **Summary Report**

- Report will include methodology, discussion on geologic interpretations, geologic formation pick data, figures for each data input and formation surfaces and assumptions and limitations.



# ***Hydrogeologic Model (DEMO)***





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