in conjunction with

August 11th, 2022

Re: **Response to Brazos Valley Groundwater Conservation District Request for Qualifications No. 07-2022 for Hydrogeology Services Related to Groundwater Management**

Dear Members of the Selection Committee:

Allan R. Standen LLC is a groundwater and natural resources consulting firm that is enthusiastic about the opportunities outlined in the referenced RFQ. We understand the importance of this RFQ and have partnered with industry experts Dr. Bill Hutchison and Michelle A. Sutherland LLC (MAS LLC) to offer a robust suite of groundwater related services. Our team offers extensive experience in every aspect of the requested specialty services. The enclosed SOQ addresses the Brazos Valley Groundwater Conservation District (BVGCD) request for proposals for hydrogeology services related to groundwater management. Some of our strengths that are detailed in this SOQ are:

- Exceptional experience from industry experts in the requested specialty services.
- Demonstrated experience conducting hydrogeologic studies and investigations in the Catahoula, Yegua-Jackson, Sparta, Queen City and Carrizo-Wilcox Aquifers.
- A track record of success while working for and completing studies for groundwater conservation districts, planning groups and state agencies across Texas.
- Dedication! Our team is committed, passionate, and strives to go above and beyond the standard requirements to ensure clients receive the best available data and science.

ARS LLC, with Dr. Hutchison and MAS LLC, knows that our team has the required skills, knowledge, and capacity to complete the various technical tasks and groundwater services in support of BVGCD. Should you have any questions, please contact me at (512) 731-6242 or by email at astanden@att.net. We look forward helping the BVGCD meet the goals of this RFQ.

Sincerely,

Allan R. Standen P.G. #1227
President/Owner

Request for Qualifications (RFQ 07 - 2022)

Hydrogeology Services Related to Groundwater Management

for the

Brazos Valley Groundwater Conservation District

August 11th, 2022

Allan R. Standen LLC

in conjunction with

Dr. Bill Hutchison and Michelle A. Sutherland LLC

Table of Contents

SECTION 1 – Letter of Interest

I.A. Submitting Organization

Company Name:	Allan R. Standen LLC (ARS LLC)
Address:	12401 Painted Bunting Dr. Austin, Texas 78726
Phone Number:	(512) 731-6242
Legal Status:	LLC

I.B. Principals

Allan R. Standen

I.C. Authorized Representative

Allan R. Standen, President/Owner

I.D. Key Personnel

Allan R. Standen, PG
President/Owner
Email: astanden@att.net
Direct: 512-731-6242

Bill Hutchison, PhD, PE, PG
Independent Groundwater Consultant
Email: billhutch@texasgw.com
Direct: 512-745-0599

Michelle A. Sutherland
President/Owner
Email:msutherland@envisionwater.com
Direct: 949-702-3622

Vince Clause, GISP
Hydrogeologist
Email: vinceclause@gmail.com
Direct: 512-906-8614

I.E Proposal Contact

Allan R. Standen, 512-731-6242

I.F. Signature of Authorized Representative

Allan R. Standen, President/Owner

SECTION 2 - General Statement of Qualifications

II.A.1. Firms History

Allan R. Standen LLC (ARS LLC) is an Austin-based consulting firm that was founded in 2011 by Mr. Allan Standen. Mr. Standen has 24 years of Texas groundwater experience and 45 years of experience conducting geologic analysis, mineral exploration, and environmental site investigations. Prior to founding ARS LLC, Mr. Standen was an employee of Daniel B. Stephens & Associates (DBSA) and LBG-Guyton where he either supervised or served as technical lead on many groundwater conservation district (GCD) and Texas Water Development Board (TWDB) contracts/reports.

Since the company founding in 2011, ARS LLC has successfully completed geologic and hydrogeologic consulting services for the TWDB, University Lands, The Nature Conservancy, twelve GCDs, private companies, and large landowners. We specialize in developing detailed hydrogeologic frameworks, which is very important in areas with complex stratigraphy as found in the BVGCD: Catahoula, Yegua-Jackson, Sparta, Queen City and Carrizo-Wilcox Aquifer systems. This focus differentiates us from other consultants and leads to deliverables with more accurate geology, which ultimately reduces uncertainty when making decisions.

We fully understand the importance of this RFQ, which is why we have partnered with **Dr. Bill Hutchison**, and **Michelle A. Sutherland LLC** to offer BVGCD a full-service consulting team comprised of industry experts. Our team offers 1) specific knowledge and expertise regarding the hydrogeology of the Catahoula, Yegua-Jackson, Sparta, Queen City and Carrizo-Wilcox Aquifers, 2) extensive experience developing management plans and rules, 3) over 20 years of combined experience developing and working with Groundwater Availability Models (GAMs), 4) contested case expert witness and litigation support, and 5) joint planning support related to the Groundwater Management Area (GMA) and Desired Future Conditions (DFCs) processes. This team provides BVGCD with a robust skillset, is well suited to perform the specialty tasks outlined in this proposal, and has over 50 years of combined experience working with and helping GCDs achieve their goals.

Dr. Bill Hutchison has over 40 years of experience as a hydrogeologist/groundwater engineer. He has been an independent consultant for the last 10 years. His previous positions include Water Resources Manager for El Paso Water Utilities and Director of the Groundwater Resources Division of the Texas Water Development Board. Dr. Hutchison has extensive experience in the development and application of groundwater flow and transport models. His current and previous work has included quantifying the impacts of groundwater pumping on spring flow, induced stream flow, and captured subsurface outflow.

Michelle A. Sutherland LLC (MAS LLC) provides professional consulting services in groundwater resources. Ms. Michelle Sutherland, the firm's president, is a registered professional engineer in the state of Texas and has seventeen years of groundwater experience. Throughout her career, she has worked for fifteen GCDs in Texas. Since founding the company in 2014, MAS LLC has provided consulting services to seven GCDs, the TWDB, four groundwater consulting firms and two energy clients. Ms. Sutherland is one of the earliest (since 2007) and most prolific (35+ projects) practitioners of three-dimensional (3D) geologic modeling for groundwater resource assessment, developing the application of the technology to address a variety of groundwater issues. Michelle A. Sutherland LLC is a registered Historically Underutilized Business (HUB) in the State of Texas.

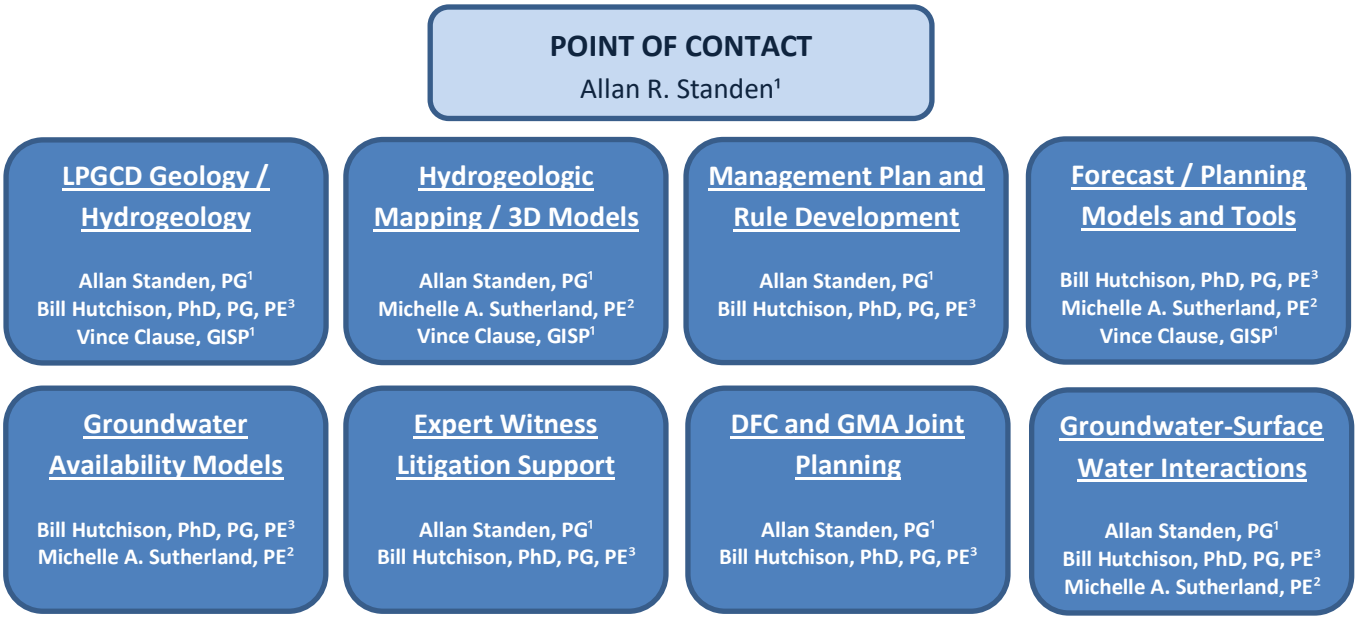
II.A.2. Staff organization and Resumes of Key Personnel

ARS LLC will serve as the primary firm. Mr. Standen will be the main point of contact with the BVGCD General Manager and Board of Directors and will ensure that projects are completed on-time, on-budget and meet or exceed the standards outlined by the District. Throughout his career he has successfully served in this capacity with over 20 GCDs. This includes establishing and maintaining active near decade-long relationships with Clearwater Underground Water Conservation District (UWCD) and Middle Pecos GCD where similar joint-consulting relationships have shown to be successful and ultimately provides clients with holistic expertise that results in defensible, scientifically rigorous analyses.

For Clearwater UWCD, ARS LLC and MAS LLC have cooperatively helped the District better understand their groundwater resources through the development of a 3D hydrostratigraphic model, groundwater monitoring tools and permit application support. We are currently assisting the District in their development of management areas with rules related to well spacing and production limits.

For Middle Pecos GCD, ARS LLC, Dr. Hutchison, and MAS LLC have worked closely together for six years. We have helped the District develop new rules, updated their management plan, developed a 3D hydrostratigraphic model, provided expert witness and litigation support, created planning and monitoring tools, and are currently developing a custom groundwater management model for the District.

Consulting services will be completed by the appropriate expert. The organizational chart below provides the team members that are responsible for each of the specialty services requested in this proposal.



[1]Allan R. Standen LLC [2]Michelle A. Sutherland LLC [3]Independent Consultant

EDUCATION

MA, Geology, University of Texas at Austin, 1986

BS, Geological Sciences Kent State University, Kent, OH 1976

EMPLOYMENT

Allan R. Standen, LLC Austin, TX 2011 – Present President & Owner

Daniel B. Stephens & Associates, Inc. Austin, TX 2003-2011 Texas Water Resources Technical Director

LBG-Guyton Associates, Austin, TX 1998-2003 Hydrogeologist

International Technology Corporation, Austin, TX 1994-1998 Hydrogeologist

Bureau of Economic Geology, Austin, TX 1979-1994 Research Assistant, Core Curator

REGISTRATION

Professional Geoscientist No. 1227, Texas

MILITARY SERVICE

Navy, 1967 – 1971 Enlisted, Diesel and Nuclear Submarines

Allan R. Standen, P.G. 1227

Specialization

Over 45 years of experience with groundwater resource evaluations, facility and field operations, database management, environmental assessments, mining and mineral exploration, and geographic information systems (GIS). He has specialized in constructing highly detailed stratigraphic and/or lithologic datasets by integrating geophysical logs and water well driller's reports into county scale, hydrostratigraphic 3D models. Mr. Standen has constructed a statewide groundwater geodatabase of over 700,000 wells to improve consulting response time and reduce costs for his clients. He presently works with multiple groundwater conservation districts assisting them in with their groundwater management and monitoring needs.

Relevant Professional Assignments

Groundwater Conservation District Studies and Experience

3-D Hydrostratigraphic Model for Fayette County GCD (FCGCD, 2010)

The study delineated the Gulf Coast, Yegua-Jackson and Sparta aquifers in addition to deep and potentially brackish aquifers, including the Queen City, Carrizo and Wilcox (Hooper, Calvert Bluff, Simsboro). A total of 413 driller's reports and geophysical logs were used to build the 3D hydrostratigraphic framework. Net saturated sands were delineated, and volumetric calculations were completed for each aquifer. These modeling efforts assisted the FCGCD in making decisions on their DFC.

Hydrostratigraphic Frameworks, Analysis and Investigations

Middle Pecos GCD (Pecos County), Clearwater UWCD (Bell County), Crockett County GCD, Hemphill County GCD, Mesa GCD (Dawson County), High Plains GCD (Parmer County), Sutton County GCD, Permian GCD (Martin and Howard Counties), Wes-Tex GCD (Nolan County), Lone Wolf GCD (Mitchell County) and Fayette County GCD:

Project manager and/or technical lead on the development of hydro-stratigraphy involving between 250 to approximately 700 driller's and cable tool reports, water well driller's reports and geophysical logs per county. These projects involved delineating stratigraphic surfaces, quantifying gross and net saturated sand sequences, and creating 3D visualizations of historical water levels.

Groundwater Monitoring Programs

Middle Pecos GCD (Pecos County), Central Texas GCD (Burnet County), Hickory GCD (areas of Lampasas, Mason, McCulloch, Concho, Kimble and Menard counties), Hemphill County GCD and Kenedy County GCD

Project manager, projects involved the selection of monitor wells based on selection criteria including historical water level availability and record extent, aquifer, aquifer condition (unconfined or confined), availability of historical water quality data, well accessibility, well status (pumping, inactive) and well type (windmill, domestic, etc.). Selected monitor wells were intended to be used for monitoring status of Desired Future Condition (DFC).

Management Plan, Rule Making and DFC Guidance

Clearwater UWCD, Hemphill County GCD, Presidio County GCD, Central Texas GCD, Hickory UWCD No. 1, Kenedy County GCD and Middle Pecos GCD

Provided guidance to GCDs by analyzing scientific data, providing expert opinion, and developing strategies to help GCDs achieve their management goals and strategies.

Relevant Professional Assignments (cont.)

Selected Client Projects and Permits

Texas Water Development Board Contracted Studies

- "Hydrostratigraphic Framework of the Marathon Aquifer Conceptual Groundwater Model" (2022) *Technical Geological Lead*
- "Core Testing for the Hill Country Trinity Aquifer" (2021) *Project Manager and Technical Lead*
- "Upper Coastal Plain East Aquifer Data Entry for the Brackish Resources Aquifer Characterization System Database" (2021) *Quality Assurance*
- "Hydrostratigraphic Framework of the Cross Timbers Aquifer Conceptual Groundwater Model and 3D Model, 31 County Area" (2021) *Technical Geological Lead*
- "Blaine Aquifer Brackish Groundwater Study" *(2016) Technical Geological Lead*
- "Capitan Reef Aquifer Conceptual Model, 6 County Area" (2009) *Technical Geological Lead*
- "Llano Uplift Aquifer Conceptual Model, 14 County Area" (2007) *Technical Geological Lead*
- *"Groundwater Availability Model for the Igneous and West Texas Bolsons" (2004) Technical Staff*
- "Lipan Aquifer Groundwater Availability Model" *(2004) Technical Geological Lead*

Groundwater Exploration, Winkler, Loving and Reeves Counties, Confidential Client:

Exploration for groundwater resources in the Pecos Valley, Rustler and Capitan Reef aquifers for local oil and gas activities. Integration of over 800 geophysical logs and driller's reports to identify most favorable areas for groundwater development.

Groundwater Availability and Sustainable Production in North-East Reeves County, Confidential Client:

Created a highly detailed stratigraphic analysis of the Rustler aquifer in North-East Reeves County that included a total of 473 oil, gas and water wells. A real-time monitoring well program established from these results, and various pumping scenarios were modeled using site-specific pump test results.

3-D Interactive Hydrostratigraphic Models for the University of Texas (University Lands) including portions of twelve West Texas counties:

Project area was approximately 1.2 million acres and involves building an interactive 3-D geological model of all aquifers and major oil and gas producing formations down to a depth of 20,000 feet within the University Lands leases in Crockett, Irion, Pecos, Reagan, Schleicher and Upton counties, West Texas (Permian Basin). Reviewed over 10,000 driller's reports and geophysical logs to select formation tops and water production zones to build surfaces and aquifer thicknesses. Through a screening process, subsurface information from over 1,100 wells was used to build the 3-D hydro-stratigraphic model.

Hydrostratigraphic Analysis of the City of Fort Stockton's water rights, City of Fort Stockton, Pecos County:

Project manager to construct 3-D hydro-stratigraphic model of southwestern Pecos County. Investigated water quality and historical water level fluctuations in the study area. Compiled over 350 geophysical logs, cable tool driller's reports and water well driller's reports to construct detailed subsurface stratigraphic model of the Edwards, Trinity, and Dockum Aquifer.

Potter County Public Water Supply Well Field, City of Amarillo, Texas

Project manager the creation of a lithologic model of the Ogallala Aquifer and assisted in a well field design of a 20 million gallon per day public water supply well field. Provided oversight for drilling and well development operations. Ward County, CRMWD well field, 20 million gpd, West Texas Water Supply.

Hydrostratigraphic Analysis of the Ward County well fields, CRMWD, Ward and Winkler County, Texas

Constructed detailed GIS hydro-stratigraphy of the Pecos Alluvium and the Dockum aquifers within the Ward and Winkler CRMWD well field. Used over 200 driller's and cable tool reports and geophysical logs to delineate stratigraphic surfaces and net sands. Information was used to construct a groundwater model to design well field.

Publications

Blandford, N.T., Clause, V.A., Donnelly, A., Standen, A.R., Umstot, T., Gallo, D., Sutherland, M.A., Calhoun, K., 2022, "Marathon Aquifer Conceptual Model Completion Report" Texas Water Development Board, Contract No. 2048302454.

Standen, A.R., Murphy, S.C., 2021, "Core Testing for Hill Country Trinity Aquifer." Texas Water Development Board, Contract No. 2000012440.

Clause, V.A., Hoadley-Leist A.D., Standen, A.R., Peacock, C.W., 2021, "Upper Coastal Plain East Aquifer Data Entry for the Brackish Resources Aquifer Characterization System Database." Texas Water Development Board, Contract No. 2000012440.

Blandford, N.T., Clause, V.A., Lewis, A., Standen, A.R., Donnelly, A., Calhoun, K., Botros, F., Umstot, T., 2021, "Conceptual Model Report for the Cross Timbers Aquifer." Texas Water Development Board Contract No. 1948312322.

Finch, S.T., Standen, A.R., Blandford, N.T., 2017, "Brackish Groundwater in the Blaine Aquifer System, North-Central Texas." Texas Water Development Board Contract Report

Standen, A. R., 2012, "Exploration of West Texas Groundwater to Supply Frac Fluids for the Bone Spring Play" Gulf Coast Association of Geological Societies and Gulf Coast Section of SEPM, 62 Annual Convention.

Standen, A. R. and Kirby, P., 2010, 3-D Model of Fayette County Hydrostratigraphy, Gulf Coast Association of Geological Societies (GCAGS), San Antonio, Texas

Standen, A. R., Finch, S., Williams, R., and Lee-Brand, B., 2009, Capitan Reef Complex Structure and Stratigraphy, Texas Water Development Board (TWDB) contracted report, 0804830794, 71 p.

Standen, A. R., Ruggiero, R., Ashworth, J., Tybor, P. and Roeling, B., 2008, Llano Uplift Structure and Stratigraphy, TWDB contracted report, 0604830614, 78 p.

Standen, A. R., and J.A. Kane, 2005, The Spatial Distribution of Radiological Contaminants in the Aquifers Overlying the Llano Uplift, Central Texas. National Groundwater Association Meeting, Arsenic and Radioactive Contamination, Charleston, South Carolina, 12 p.

Standen, A. R., and J.A. Kane, 2005, The Spatial Distribution of Radiological Contaminants in the Hickory and other aquifers overlying the Llano Uplift, Central Texas. Austin Geological Society, Volume 1, p 71-87.

Standen, A.R. and D.R. Opdyke, 2004, Contamination migration, characteristics, and responses for the Edwards-Trinity Plateau Aquifer. Aquifers of the Edwards Plateau, Texas Water Development Board, Report 360, p. 211-234.

Beach, J.A. and A. Standen. 2000. Ground-Water Availability Model of the Lipan Aquifer. Presented at the Southwest Focus Ground Water Conference sponsored by the National Ground Water Association, May 17-18, 2000, Austin Texas.

Paine, J.G., A.R. Standen, et al. 1993. Shallow Seismic Studies of a Playa Basin Near Amarillo, Texas. *In* Symposium–The Application of Geophysics to Engineering and Environmental Problems, Environmental and Engineering Geophysical Society, p. 495-500.

Price, J.A., C.D. Henry, and A.R. Standen. 1983. Annotated Bibliography of Mineral Deposits in Trans Pecos Texas, Mineral Resource Circular No. 73, Texas Bureau of Economic Geology, p.108

WILLIAM R. HUTCHISON, Ph.D., P.E., P.G.

Independent Groundwater Consultant
512-745-0599
billhutch@texasgw.com

Dr. Hutchison has over 40 years of experience as a groundwater hydrologist. He has been an independent consultant for the last 10 years. His previous positions include Water Resources Manager for El Paso Water Utilities and Director of the Groundwater Resources Division of the Texas Water Development Board.

Dr. Hutchison has extensive experience in the development and application of groundwater flow and transport models. His current and previous work has included quantifying the impacts of groundwater pumping on spring flow, induced stream flow, and captured subsurface outflow.

EDUCATION

University of Texas at El Paso:
Ph.D., Environmental Science and Engineering, 2004-2006
University of Arizona:
M.S., Hydrology, 1980-81, 1982-83
University of California, Davis: B.S., Soil and Water Sci., 1976-80

PROFESSIONAL LICENSES

Professional Engineer (Geological and Civil) No. 96287 (Texas)
Engineering Firm Registration No. 14526 (Texas)
Professional Geoscientist (Geology) No. 286 (Texas)
Registered Professional Geologist No. 0779 (Mississippi)

Representative Project Experience

Lower Colorado River Authority Groundwater Permit Contested Case Hearing

Consultant for the General Manager of the Lost Pines Groundwater Conservation District. The Lower Colorado River Authority (LCRA) submitted eight applications to the Lost Pines Groundwater Conservation District seeking authorization to withdraw 25,000 acre-feet of water per year from eight wells in Bastrop County. Dr. Hutchison was retained an expert witness for the General Manager of the Lost Pines Groundwater Conservation District for a contested case hearing before the Texas State Office of Administrative Hearings. Dr. Hutchison prepared an expert report and pre-filed written testimony regarding the use of models to evaluate potential impacts of the proposed pumping. As part of the assignment, Dr. Hutchison reviewed model runs completed by the applicant's and protesting parties' experts. Specifically, Dr. Hutchison processed model output to assess surface water-groundwater interaction impacts, provided predicted impacts to over 2,600 registered wells in the district, and processed model output to provide predicted impact to 39 monitoring wells for use in future monitoring. Dr. Hutchison was deposed on the expert report and pre-filed testimony and testified at the hearing. In a Proposal for Decision, the Administrative Law Judges recommended that the Lost Pines Groundwater Conservation District issue the Operating and Transport Permits with some recommended changes. The Lost Pines Groundwater Conservation District approved a permit for 8,000 acre-feet per year in October 2021. (2019)

Representative Project Experience (Cont.)

Texas v. New Mexico Litigation - Rincon and Mesilla Basins (New Mexico, Texas, Mexico)

Developed a groundwater model using MODFLOW-USG along with associated pre- and post-processors as an expert witness for the State of Texas for the Texas v. New Mexico litigation. The primary issue of the litigation is the impact of groundwater pumping on Rio Grande streamflow. The model uses a variable grid of Voronoi cells and incorporated data and information on historic surface water and groundwater use for irrigation. Assignments also included reviewing models and analyses of expert witnesses of New Mexico and United States. Currently, efforts are underway to settle the case through a formal mediation process. These efforts included running additional simulations with the Texas model developed as part of this litigation and reviewing New Mexico and United States simulations. (2012 to present)

Joint Planning in Groundwater Management Areas 2, 3, 4, 7, and 11 (3rd Round)

Consultant for GMAs 2, 3, 4, 7, and 11 to develop updated desired future conditions. Included in this effort are the review of aquifer conditions and uses, review of water management strategies, review of hydrologic information and data, developing future pumping estimates, running alternative simulations with the Groundwater Availability Models, and preparing explanatory reports. (2019 to present)

Joint Planning in Groundwater Management Areas 2, 3, 4, 7, 11, and 13 (2nd Round)

Consultant for GMAs 2, 3, 4, 7, 11 and 13 to develop updated desired future conditions. Included in this effort were the review of aquifer conditions and uses, review of water management strategies, review of hydrologic information and data, developing future pumping estimates, running alternative simulations with the Groundwater Availability Models, and preparing explanatory reports. (2012 to 2018)

Joint Planning Support for Bluebonnet Groundwater Conservation District and Lower Trinity Groundwater Conservation District

Dr. Hutchison has provided consulting services to the Bluebonnet Groundwater Conservation District (Austin, Grimes, Waller, and Walker counties) and the Lower Trinity Groundwater Conservation District (Polk and San Jacinto counties) to support the joint planning process in Groundwater Management Area 14. Completed analyses and simulations related to a proposal to revise the desired future conditions pursuant to a request by Lone Star Groundwater Conservation District. The request to revise the desired future conditions adopted in 2016 was part of the settlement of litigation over the reasonableness of the desired future conditions. The requested revision was reviewed, and documented, and various alternative revisions were simulated using inverse runs of the Groundwater Availability Model to provide perspective on the requested revision. Work continues in the support of these districts in the development of new desired future conditions by Groundwater Management Area 14. As part of the proposal of a GMA-wide multi metric desired future condition, work has included documenting the approach to develop district-specific desired future conditions and the link between planning, management, and regulation (2018 to present)

Representative Project Experience (Cont.)

Update to Groundwater Availability Model for the Southern Carrizo-Wilcox Aquifer

Principal Hydrogeologist for a team of consultants developing an updated flow model for the Southern Carrizo-Wilcox Aquifer (GMA 13 area of Texas) under a contract with the Texas Water Development Board. The updated model uses MODFLOW 6 and will address documented issues with the current model related to outcrop area calibration, surface water-groundwater interactions, and application to long-term predictive simulations. (2019 to present)

Update to Groundwater Availability Model for the Northern Carrizo-Wilcox Aquifer

Principal Hydrogeologist for a team of consultants developing an updated flow model for the Northern Carrizo-Wilcox Aquifer (GMA 11 area of Texas) under a contract with the Texas Water Development board. The updated model uses MODFLOW 6 and will address documented issues with the current model related to outcrop area calibration, surface water-groundwater interactions, and application to long-term predictive simulations. (2017 to 2020)

Groundwater Monitoring Thresholds in Pecos County, Texas

Reviewed historic groundwater data and model results to develop a groundwater monitoring plan, including regulatory thresholds for eleven specific monitoring wells. The regulatory thresholds were used in the settlement of several years of litigation between the Middle Pecos Groundwater Conservation District and a permit applicant. Work on implementing the settlement continues with the development of an expanded monitoring program, including expansion of establishing a baseline of groundwater quality, spring flow, and vertical gradients. (2017 to present)

Groundwater Flow and Transport Model of Lower Rio Grande Valley

Principal Hydrogeologist for a team of consultants that developed a flow and transport model for the Lower Rio Grande Valley using MODFLOW-USG under a contract for the Texas Water Development Board. The model objectives included the simulation of 23 water management strategies related to proposed fresh groundwater development and brackish groundwater desalination plants. Simulation results included quantitative estimates of groundwater elevation changes, changes in salinity, and impacts to surface water flows. (2015 to 2017).

PROFESSIONAL EXPERIENCE

Michelle A. Sutherland, LLC, Austin, Texas, 2014 to present
President and Groundwater Resource Engineer

Daniel B. Stephens & Associates, Inc., Austin, Texas, 2007-2014
Project Engineer

PROFESSIONAL REGISTRATIONS

Professional Engineer, No. 106336, State of Texas

REPRESENTATIVE PROFESSIONAL TRAINING

Leapfrog Geo Advanced – Structural Modelling Tools and Workflows, 2021
Advanced Borehole Geophysical Logging for Water Resources/Water Supply Applications, 2018
MODFLOW-USG Modeling Workshop, 2016
Applied Groundwater Flow and Contaminant Transport Modeling, 2007
M.S.E., Environmental Engineering, University of Missouri-Rolla, 2004
B.S.E., Civil and Environmental Engineering, University of Iowa, 2002

REPRESENTATIVE PROFESSIONAL ASSIGNMENTS

- **Estimation of Groundwater Pumping Volumes, Locations, and Aquifers for West Texas**, TWDB: Researched and analyzed historic estimates of groundwater pumping due to manufacturing and provided revised estimates of water use to the TWDB. Created a spatial distribution pumping dataset and confirmed aquifer designations.
- **Marathon Aquifer 3D Geologic Model**, TWDB: Created a 3D geologic model of the Marathon Aquifer System using Leapfrog Works® that included seven different categories of highly complex structural features, including faulted and folded rock formations. The structural model was converted into the framework for a MODFLOW grid.
- **TWDB Groundwater Availability Model Runs and 3D Geologic Model**, confidential energy client, Reeves County, Texas: Constructed a highly detailed 3D hydrostratigraphic model of the Rustler Aquifer for a confidential oil company client in Reeves County (300+ oil and gas geophysical logs) to refine formation surfaces and evaluate aquifer thickness. Conducted GAM model runs to predict the effects of sustained pumping of the Rustler Aquifer from a proposed well field.
- **Geologic Fault Block Model**, confidential client, Santa Barbara, CA: Created a 3-D geologic model of a complex faulted system near Santa Barbara using interpreted cross-sections and surface geology maps. The 3-D geologic model was used to create the geometries of subsequent flow (MODFLOW and PARFLOW) models.

REPRESENTATIVE PROFESSIONAL ASSIGNMENTS (cont.)

- **3D Blaine Aquifer System Geologic Model**, TWDB: Created a 3D geologic model of the Blaine Aquifer System using Leapfrog Geo that included the Clearfork, Flower Pot, Blaine and Whitehorse formations, Seymour Aquifer System, surface topography, water levels, drainages, screen intervals, completion data, depths and thicknesses of cavities, deeper injection intervals and water quality data. The model was used to calculate brackish aquifer volumes by designated ranges of total dissolved solids.
- **3D Hydrostratigraphic Model, Crockett County GCD**, Crockett County, Texas: Created a county-wide 3D hydrostratigraphic model of Crockett County, Texas using Leapfrog Geo software and data from driller's reports and geophysical logs. The project included interpretation of 14 geologic formations, 4 aquifer systems, and recent water level data.
- **3D Hydrostratigraphic Model, Hemphill County UWCD**, Hemphill County, Texas: Created a county-wide 3D hydrostratigraphic model of Hemphill County, Texas using Leapfrog Geo software. Over 800 driller's reports were used to model the distribution of sand and clay intervals within the Ogallala Aquifer. Water level data was used to show groundwater and surface water interactions with gaining streams in the county. The project also included developing an interactive ESRI ArcGIS online geodatabase to share data used in the 3D model.
- **3D Hydrostratigraphic Model, Middle Pecos GCD**, Pecos County, Texas: Created a county-wide 3D hydrostratigraphic model of Pecos County, Texas using Leapfrog Hydro software and data from driller's reports and geophysical logs. Created a MODFLOW-USG grid from interpretations of 18 geologic formations and 5 aquifer systems.
- **3D Hydrostratigraphic Model**, Clearwater UWCD, Central Texas: Created a county-wide 3D hydrostratigraphic model of Bell County, Texas using Leapfrog Hydro software and data from multiple sources. The project included interpretation of four aquifer units, water levels within those aquifers and nine geologic formations. The model was used to update the regional GAM.
- **Geologic Analysis of the Ogallala Aquifer and Well Field Design, Potter County Well Field**, City of Amarillo, Texas: Constructed a hydrostratigraphic 3D model (coarse, medium and fine sands, clay) of the proposed well field by using more than 200 driller's reports and geophysical logs. Proposed well locations were based on virtual cores within the 3D hydrostratigraphic model. Project won the 2011 NGWA Groundwater Supply Award.

RELEVANT PUBLICATIONS AND PRESENTATIONS

- Sutherland, M.A. 2022. Influence of fault structures in the Balcones Fault Zone on groundwater flow and DFC compliance. Texas Alliance of Groundwater Conservation Districts Texas Groundwater Summit. San Antonio, Texas. Platform Presentation.
- Sutherland, M.A. 3-D Modeling, Visualization, and Management. 2017. Texas Alliance of Groundwater Conservation Districts Texas Groundwater Summit. San Marcos, Texas. Panel Discussion.
- Standen, A. R., M.A. Sutherland and V. Clause, 2017. Interactive 3-D Geologic Models for Daily Operations, Permitting and Stakeholder Communications, Texas Alliance of Groundwater Districts. Platform Presentation

EDUCATION

MA, Geography and the Environment, University of Texas at Austin, 2014

BA, Geography and the Environment, University of Texas at Austin, 2021

BA, Government, University of Texas at Austin, 2012

EMPLOYMENT

Allan R. Standen, LLC
Austin, TX 2014 – Present
Hydrogeologist

Apple Inc.
Austin, TX 2016-2018
GIS Team Lead

The University of Texas at Austin, Austin, TX 2012-2014 Teaching Assistant – GIS and Physical Geography

REGISTRATION

Geographic Information Systems Professional, GIS Certification Institute, No. 160533

NOTABLE CLIENTS

TWDB
The Nature Conservancy
Clearwater UWCD
Middle Pecos GCD
University Lands

Vincent A. Clause, GISP

Allan R. Standen - Hydrogeologist

Vince Clause is a Hydrogeologist with Allan R. Standen LLC, a Texas based natural resource and groundwater consulting firm. He is a certified Geographic Information Science Professional and holds a Bachelor's and Master's degree in Process Geomorphology from The University of Texas at Austin Department of Geography and the Environment. Over the last 10 years, Vince has focused on mapping and evaluating groundwater resources across the State of Texas and has specialized in developing detailed hydrostratigraphic groundwater models. Using these models, he has helped GCDs, state agencies, private landowners and the oil and gas industry solve complex technical, regulatory, and legal issues. Most recently, he has used this experience to help Clearwater UWCD, better understand how complex fault systems impact groundwater flow through the Edwards-Trinity aquifer in Bell County, TX.

Relevant Project Experience

"Hydrostratigraphic framework of the Marathon aquifer conceptual model" ***Technical Staff*** **(TWDB, 2022)** Identified the producing formation for all TDLR and TWDB GWDB water wells within the Marathon Aquifer. Developed an aquifer-wide dataset for historic aquifer pump test, water level measurements, and driller estimated production data. Led a remote sensing based geologic lineament and fracture analysis to identify more favorable areas for groundwater production and recharge. Provided oversight on 3D geologic model development. Georeferenced and digitized historic geologic data.

"Middle and Lower Trinity Hydrogeologic Investigation of Southwest Bell and Northwest Williamson County" ***Project Lead*** **(Clearwater UWCD, 2021)** Completed a detailed hydrostratigraphic investigation of the Trinity Aquifer using driller report lithology descriptions and geophysical logs for a 491 square mile area of southwest Bell and northwest Williamson County. Over 1,400 well records were reviewed and used to identify faults, facies changes and structural controls. These results were integrated into the Clearwater UWCD 3D Hydrostratigraphic workspace and evaluated with respect to GAM aquifer properties and estimated production rates.

"Upper Coastal Plain East Aquifer Data Entry for the Brackish Resources Aquifer Characterization System Database" ***Project Manager*** **(TWDB, 2021)**
Managed a team that processed 19,163 well files from the TWDB unprocessed log collection for the Upper Coastal Plain East (UCPE) Aquifer System. The project began in late 2020 and resulted in 11,102 new well records while also improving 1,655 existing well records. This new data accounted for a 148% increase from the prior 7,498 well records in BRACS database well coverage for the UCPE Aquifer System and will be used in future studies to map aquifers and help characterize brackish resources.

"Hydrostratigraphic framework of the Cross Timbers aquifer conceptual model" ***Technical Staff*** **(TWDB, 2021)** Responsible for screening over 2,400 geophysical logs for relevant aquifer data. Completed stratigraphic interpretations on approximately 1,000 of these logs, which included the identification of up to seven stratigraphic units and saturated sand intervals. Additionally, georeferenced and digitized eighteen net sands isopach large-format maps that cover an 18-county area.

Relevant Project Experience (cont.)

"3D Interactive Stratigraphic Model for Pecos County, TX" *Technical Staff* (MPGCD, 2015 - Present)
Developed a database of 1,100 oil, gas and water well driller's reports and geophysical logs for stratigraphic, water well and aquifer data analysis. Used interpolation methodology to develop 3D model surfaces from stratigraphic well data. Completed three model updates since initial development with newly acquired water well and aquifer pump test and chemistry data.

"3D Interactive Stratigraphic Model for Bell County, TX" *Technical Staff* (Clearwater UWCD, 2014 - Present)
Developed a county-wide database with all available water well and aquifer data pertinent to the study of the Edwards and Trinity Aquifers. Identified stratigraphic formation picks for 900 water wells using driller lithology descriptions and geophysical log data. Perform an annual model update to include new stratigraphic data.

"Identification of Brackish Groundwater Production Areas - Blaine Aquifer" *Technical Staff* (TWDB, 2016)
Assisted in the development of the hydrostratigraphic framework of the Permian Whitehorse Group and Blaine Aquifer for a fifteen-county area in North-Central Texas. Analyzed oil and gas well records and driller's reports, geophysical logs, and water well datasets for stratigraphic data. Assisted with the interpretation of this subsurface data to define the top and base of the Blaine confined zone, evaluate subsurface karst intervals within the Blaine and create stratigraphic surfaces.

"Groundwater Exploration in Winkler, Loving and Reeves Counties, TX" Technical Staff (Confidential, 2019)
Exploration for groundwater resources in the Pecos Valley, Rustler and Capitan Reef aquifers for local fracking activities. Integrated of over 800 geophysical logs and water well driller's reports to identify the most favorable area for groundwater development. Water well type and completion data were evaluated to better understand current demands on groundwater in the region.

"3D Interactive Hydro-stratigraphic Models for the University of Texas (University Lands) including portions of twelve West Texas counties" *Technical Staff* (University Lands, 2016)
Screened over 10,000 driller's reports and geophysical logs to identify formation tops and water production zones to a depth of 20,000 feet within the University Lands leases in Crockett, Irion, Pecos, Reagan, Schleicher, and Upton Counties. Developed a GIS dataset from the wells with formation picks from the Edwards, Trinity, Dockum, Rustler, Yates, San Andres, Grayburg, Fusselman and Ellenburger.

Relevant Publications and Presentations

- Blandford, N.T., Clause, V.A., Donnelly, A., Standen, A.R., Umstot, T. Gallo, D., Sutherland, M.A., Calhoun, K. "Marathon Aquifer conceptual Model Completion Report." Texas Water Development Board Contract No. 2048302454, (2022).
- "Oil and Gas Well Problems for the Middle Pecos Groundwater Conservation District." Presentation. American Groundwater Trust, Texas Conference, (2022).
- Blandford, N.T., Clause, V.A., Lewis, A., Standen, A.R., Donnelly, A., Calhoun, K., Botros, F., Umstot, T. "Conceptual Model Report for the Cross Timbers Aquifer." Texas Water Development Board Contract No. 1948312322, (2021).
- "New Understanding of the Trinity Aquifer System." Panelist. Bell County Water Symposium, Nov. 10th, 2021.
- Clause, V.A., Hoadley-Leist A.D., Standen, A.R., Peacock, C.W. "Upper Coastal Plain East Aquifer Data Entry for the Brackish Resources Aquifer Characterization System Database." Texas Water Development Board, Contract No. 2000012440, (2021).
- James A. Neely, Michael J. Aiuvalasit, and Vincent A. Clause. "New Light on the Prehistoric Purron Dam Complex: Small corporate group collaboration in the Tehuacan Valley, Puebla, Mexico." *Journal of Field Archaeology* (2015)

II.B. Evidence of financial capability and financial stability to correctly, timely, and reliably perform the requested services for the District

References will confirm ARS LLC, Dr. Hutchison, and MAS LLCs ability to correctly, timely and reliably perform requested services.

Financial evidence disclosures are available upon request.

II.C. Professional memberships, certifications, licenses, and other qualifications for key individuals assigned to the District

Mr. Allan R. Standen has a Texas professional geoscientist (#1227) license issued on August 31, 2003. No complaints have ever been filed against Mr. Standen. He is a long-time member of the National Groundwater Association and Austin Geological Society.

Dr. Bill Hutchison is a Texas professional engineer (civil and geological #96287) and a Texas professional geoscientist (#286). Dr. Hutchison is an associate member of the Texas Alliance of Groundwater Districts (TAGD) the National Groundwater Association and International Association of Hydrogeologists. No complaints have ever been filed against Dr. Hutchison.

Ms. Michelle A. Sutherland is a Texas professional engineer (#106336 issued in 2010). No complaints have ever been filed against Ms. Sutherland.

Mr. Vince Clause is a certified Geographic Information Systems Professional (GISP). (#160533 issued in 2018). Mr. Clause will become a geologist in training (GIT) in late 2022. No complaints have ever been filed against Vince Clause.

ARS LLC, Dr. Hutchison, LRE and MAS LLC regularly attend TAGD business meetings and the Texas Groundwater Summit.

II.D. Company's experience and qualifications for similar types of engagements

II.D.i Relevant experience, expertise, and qualifications as it relates to the aquifers of the District; hydrogeologic mapping, hydrogeologic modeling, hydrogeologic investigations, research, and general knowledge of the aquifers in the District

In 2010, Mr. Standen while with DBSA, managed the construction of a 3D hydrostratigraphic model for the Fayette County GCD (Figure 1). This study focused on delineating deeper sandy aquifer production zones to help evaluate potential future brackish aquifers, including the Catahoula, Jackson, Yegua, Sparta, Queen City, Carrizo, and Wilcox (Simsboro). Subsurface well data was compiled from the District geophysical logs, TWDB and Texas Commission on Environmental Quality (TCEQ) water well databases.

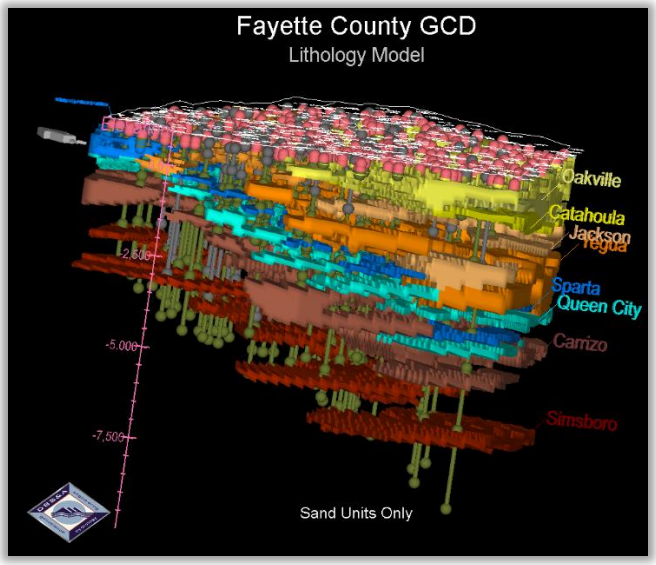


Figure 1 – Fayette County GCD 3D Hydrostratigraphic Model. Mapped sand intervals for the Oakville, Catahoula, Jackson, Yegua, Sparta, Queen City, Carrizo, and Wilcox (Simsboro) Aquifers.

A total of 413 carefully selected driller's reports and geophysical logs were used to build the 3D hydrostratigraphic framework using ArcGIS and Mining Visualization Software (MVS). A probability analyses was conducted to identify sand lenses within each formation (Catahoula, Jackson, Yegua, Sparta, Queen City, and Carrizo, Wilcox) to better understand the spatial distribution of groundwater availability. Recent water levels were used to create a piezometric surface in the 3D hydrostratigraphic model. Net saturated sands were delineated, and volumetric calculations (acre-feet in storage) were completed for each formation. This modeling effort assisted the District while setting their DFCs.

In 2017, ARS LLC completed a detailed Colorado River Alluvium mapping study for Fayette County GCD. This study collected data from over 300 water wells to map the river alluvium thickness and correlated these results with changes in the river morphology to provide the District with a foundation for future volumetric and hydraulic flow studies. Although this aquifer system is outside the District, this methodology and our knowledge of large river alluvial systems can be applied to the Brazos Valley River Alluvium within BVGCD.

In 2019, ARS LLC and MAS LLC jointly completed an update to the Brazos Valley GCD 3D Hydrogeologic Model. We built upon previously completed work by integrating Texas Department of Licensing and Regulation and Texas Water Development Board water wells into the model workspace and provided the District with pertinent geophysical logs for the study of the shallow aquifer systems. With this model framework in-hand we can easily update and build upon these early efforts.

In 2020, MAS LLC created an interactive 3D hydrostratigraphic model for Gonzales County UWCD. This model included portions of the Sparta, Queen City, Carrizo, and Wilcox Aquifers and was used to visualize their DFCs within the 3D model workspace and across several cross sections. Time series water level figures were generated from this data.

II.D.ii Experience developing GCD management plans and rules

Management plan strategies and/or rules will need to be updated or revised as the District continues to mature. ARS LLC has assisted several GCDs (Hemphill, Clearwater, Middle Pecos, Presidio County, Crockett County) improve their management plans and rules in response to updated insights as new scientific and/or management strategies become available. We are currently assisting Clearwater UWCD establish groundwater management zones and develop rules on well construction and spacing requirements.

As Director of Groundwater Resources Division at TWDB, Dr. Hutchison led and managed an effort to update and streamline management plan checklist that is still used today in the administrative review of District Management Plans. As a consultant, developed and prepared management plans for Bluebonnet Groundwater Conservation District (12/2/2013 and 10/31/2018), Kinney County Groundwater Conservation District (7/2/2013 and 4/11/2018), Middle Pecos Groundwater Conservation District (8/19/2020) and Red River Groundwater Conservation District (7/3/2012). Consulting assignments have included support for updates to GCD Rules for Bluebonnet GCD, Kinney County GCD, and Middle Pecos GCD.

II.D.iii Experience reviewing water well permit applications, assessing impacts of proposed or existing water wells and providing professional opinions regarding activities that may impact the groundwater resources in the District

Our team has experience as both an applicant and reviewer of water well permit applications and hydrogeologic reports. As a consultant for Clearwater UWCD, we are responsible for evaluating stratigraphic interpretations and geologic assumptions associated with these reports. For Middle Pecos GCD, ARS LLC reviews drilling and production permits while Dr. Hutchison models potential impacts and provides a summary opinion on hydrogeologic reports.

As a district consultant, Dr. Hutchison has reviewed permit applications for the following GCDs: Bluebonnet GCD, Hickory UWCD No. 1, Lost Pines GCD and Middle Pecos GCD.

Potential *regional impacts* will be modeled using the TWDB's Carrizo-Wilcox, Queen City and Sparta GAM models. ARS LLC, Dr. Hutchison, and MAS LLC are currently collaborating on a custom model for Middle Pecos GCD and could provide a similar service to Brazos Valley GCD if deemed necessary. Dr. Hutchison also has extensive experience evaluating the regional impacts of pumping via his work with various GAMs in six GMAs across Texas, including GMAs 11, 13, and 14, and evaluating permit applications for the Bluebonnet GCD.

An aquifer pump test software package such as Aqtesolv would be used to review submitted pumping tests and assess localized aquifer properties, to model potential drawdown, and *local impacts* of proposed groundwater production.

Collectively, we have provided guidance to GCDs on pumping impacts on water levels, recommended monitor well locations, designed monitoring programs, provided stakeholder feedback, evaluated oil and gas injection wells, studied impacts of surface contamination to groundwater, and have offered recommendations for alternative water supplies.

II.D.iv Experience relevant to technical aspects of GCD rules relating to well spacing and production limits

We are currently providing technical assistance to Clearwater UWCD while they update their rules to reflect well spacing and production limits. Dr. Hutchison has also completed analyses in support of well spacing and production limits for Bluebonnet GCD, Lone Wolf GCD, Lost Pines GCD and Middle Pecos GCD.

II.D.v Experience creating forecast, planning models and tools

As Director of the Groundwater Resources Division at TWDB, Dr. Hutchison led the effort to update six Groundwater Availability Models as part of the first round of Joint Planning in 2009 and 2010. Existing models were not suitable for the evaluation and development of desired future conditions, and the updated models were modifications of existing models that were suitable to the objectives of the groundwater conservation districts.

ARS LLC and MAS LLC have jointly specialized in developing interactive 3D Leapfrog models for their clients. These models are effective tools for communicating subsurface geology with constituents and provide the district with a platform that allows for groundwater analysis within a 3D workspace. They are also frequently integrated into educational outreach programs and have been used to provide litigation support. We have developed an interactive 3D leapfrog model for the following GCDs, Middle Pecos GCD, Crockett County GCD, Clearwater UWCD, Gonzales UWCD in addition to three aquifer wide models developed for the TWDB for the Blaine, Cross-Timbers, and Marathon Aquifer systems.

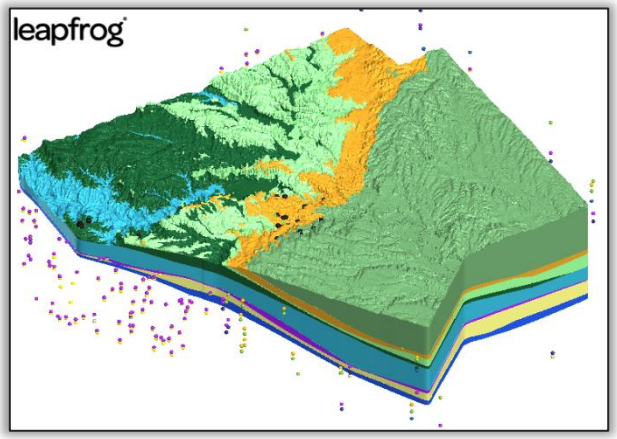


Figure 3 – Clearwater UWCD Hydrostratigraphic Model, Bell County Model Area. Color beds correspond to stratigraphic units from land surface to base of the Trinity aquifer system.

II.D.vi Experience delivering presentations to the District, planning groups and the public

Our team has collectively delivered hundreds of technical presentations to GCDs, groundwater management areas, regional planning groups, conferences, and the public. We recognize the need to convey scientific and engineering information in a way that is easily digestible to decision-makers and their constituents. We routinely present our work to stakeholders during our numerous projects with the TWDB and provide regular project updates to the many GCDs we represent at their monthly meetings.

II.D.vii Experience working with Groundwater Availability Models for the aquifers in the District

Dr. Hutchison has extensive experience using the Carrizo-Wilcox GAMs, which also includes the Sparta and Queen City aquifers. He was the Principal Hydrogeologist on the team that successfully updated the Northern and Southern Carrizo-Wilcox GAMs under contract to the TWDB. This research addresses documented issues with the previous models related to outcrop area calibration, surface water-groundwater interactions, and application to long-term predictive simulations. He also completed simulations and analyses of the Central Carrizo-Wilcox GAM on behalf of the LPGCD as part of the LCRA contest case hearings.

Dr. Hutchison also has experience using the Yegua-Jackson GAM through his work in GMA 13, and experience with the Northern Gulf Coast GAM, which includes the Catahoula Aquifer, through his work for Bluebonnet GCD and GMA 14.

II.D.viii Experience as an expert witness in contested cases, writing and analyzing testimony, working with legal counsel

Dr. Hutchison is an expert witness in Texas v. New Mexico (US Supreme Court Original No. 141) and provided contested case hearing support to Bluebonnet GCD (Electropurification permit), and Lost Pines GCD (LCRA permit).

Mr. Standen has provided legal testimony for contested permit applications for Hemphill County GCD (Hemphill County GCD v. Boone Pickens, 2010) and for MPGCD (MPGCD v. Clayton Williams, Fort Stockton Holdings 2012-2016), in addition to numerous contested permit hearings in both CUWCD and MPGCD. He also served as a professional witness in a large oil and gas lawsuit in Palo Pinto County (2018).

II.D.ix Experience working on the joint planning process within Groundwater Management Areas (GMAs) and developing Desired Future Conditions (DFCs)

During the first round of joint planning, Dr. Hutchison was the Director of the Groundwater Resources Division at TWDB, which provided technical support to 14 of the 15 groundwater management areas with groundwater conservation districts. All groundwater management areas met the September 1st, 2010 statutory deadline for adopting the first set of desired future conditions.

During the second round of joint planning (2012 to 2018), he was the lead consultant for six groundwater management areas (GMAs 2, 3, 4, 7, 11 and 13), and led the effort to develop updated desired future conditions. Included in this effort were the review of aquifer conditions and uses, review of water management strategies, review of hydrologic information and data, developing future pumping estimates, running alternative simulations with the Groundwater Availability Models, and preparing explanatory reports.

During the third round of joint planning (2019 to present) he was the lead consultant for five groundwater management areas (GMAs 2, 3, 4, 7, and 11), and led the effort to develop updated desired future conditions. Included in this effort are the review of aquifer conditions and uses, review of water management strategies, review of hydrologic information and data, developing future pumping estimates, running alternative simulations with the Groundwater Availability Models, and preparing explanatory reports.

During the second and third rounds of joint planning, Dr. Hutchison also participated in the joint planning process for Groundwater Management Area 14 as a consultant to the Bluebonnet Groundwater Conservation District and Lower Trinity Groundwater Conservation District. He completed analyses and simulations related to a proposal to revise the desired future conditions pursuant to a request by Lone Star Groundwater Conservation District. The request to revise the desired future conditions adopted in 2016 was part of the settlement of litigation over the reasonableness of the desired future conditions. The requested revision was reviewed, and documented, and various alternative revisions were simulated using inverse runs of the Groundwater Availability Model to provide perspective on the requested revision. Work continues in the support of these districts in the development of new desired future conditions by Groundwater Management Area 14. As part of the proposal of a GMA-wide multi metric desired future condition, work has included documenting the approach to develop district-specific desired future conditions and the link between planning, management, and regulation.

Ms. Sutherland has worked with a variety of GCDs to visualize proposed DFCs in the context of current water levels and aquifer thicknesses by either creating cross-sections, geospatially referenced 3D animations, or a combination of the two. These illustrations have been used by GCDs to clearly communicate goals to stakeholders in preparation for the joint planning process.

II.D.x Experience collecting and analyzing scientific data regarding groundwater resources

Collection and the evaluation of scientific data are key to the evolution of the District. We will provide guidance to the General Manager and Board of Directors on the integration of different data sources and will help develop or expand the existing data collection programs.

We have helped numerous GCDs acquire both historical and recent water well and aquifer data through data mining efforts (Figure 4) that include reviewing data found within the Texas Department of Licensing and Regulation, Texas Water Development Board (TWDB) and TCEQ water well driller report databases, TWDB GAM and Brackish Resources Aquifer Characterization System (BRACS) well log databases. Many unregistered water wells have been identified and inventoried for GCDs using these data mining efforts (e.g., for the Middle Pecos GCD, ARS LLC identified over 500 unregistered wells).

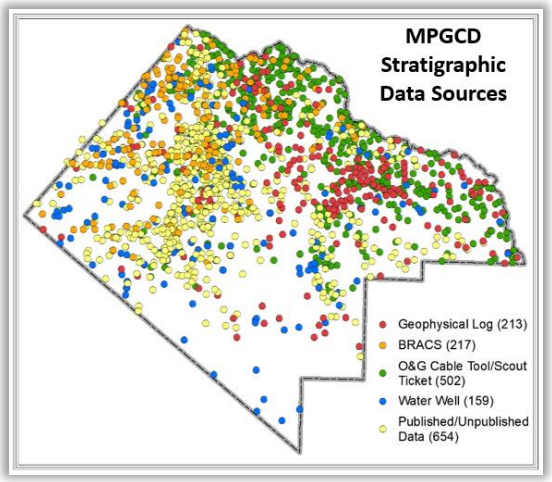


Figure 4 - MPGCD Stratigraphic Model Data Sources, organized by color and collected by ARS, LLC. Sources of data include water wells, oil and gas geophysical logs and GAM reports and models.

We also have the required skills to search oil and gas databases for subsurface hydrostratigraphy data. The Bureau of Economic Geology curates a Brazos and Robertson County collection of historic oil and gas cable tool driller reports, mud and geophysical logs that can be reviewed for additional subsurface data in any area of concern.

Our team members also have experience doing field work and would welcome the opportunity to assist the District in any field related data collection efforts, this includes but is not limited to collecting groundwater samples and water level measurements, drilling and pump test oversight, and field mapping.

We have written numerous scientific and/or technical memos and reports for GCDs and the TWDB. These reports provided documentation of our reviews of scientific assessments provided by other consultants and political entities within Texas and detailed our assessment of the validity of the work presented and the impact of the studies on our client's interests and operations. We have collectively reported on subsidence impacts, Aquifer Storage and Recovery feasibility, general groundwater availability with respect to MAGs and DFCs, groundwater management strategies, groundwater permitting impacts, contamination issues, geology and structural impacts, surface-groundwater interactions, recharge and storage estimates and other hydrogeological topics. Our assessments often included reviews of published GAMs and how the GAMs accurately or improperly represented observed conditions.

II.D.xi Accessibility, responsiveness, and access to client

ARS LLC will return calls and/or emails same day, or next business day when after hours. If for any reason ARS LLC will be unavailable for an extended period, a notice will be provided to the District with the appropriate point of contact for consulting services.

It is important for GCDs to actively monitor and participate in external discussions that may impact groundwater resources within their jurisdiction. We will assist the District in these efforts by monitoring state legislation, following relevant TWDB studies and crafting stakeholder feedback.

Our team regularly attends GCD District meetings upon request. A representative from the consulting team will always be available for District meetings. We currently do not have any reoccurring schedule conflicts in the evening on the third Wednesday of the month.

Referrals will confirm accessibility and responsiveness to client needs.

II.E. A listing of projects, for groundwater conservation district(s) that have been handled by the respondent and/or its firms through consultation, negotiation, settlement, mediation, or litigation

ARS LLC, Dr. Hutchison, LRE and MAS LLC Staff GCD Project Experience	
District Management Plan and Rule Writing	**ARS LLC** – Clearwater UWCD, Hemphill Co. UWCD, Middle Pecos GCD, Presidio Co. UWCD **Dr. Hutchison** – Bluebonnet GCD, Kinney County GCD, Middle Pecos GCD, Red River GCD
Groundwater Availability Modeling	**ARS LLC –** Middle Pecos GCD **Dr. Hutchison** – GMA 2, GMA 3, GMA 4, GMA 7, GMA 11, GMA 13, Bluebonnet GCD, Kinney County GCD, Middle Pecos GCD, Hickory UWCD No. 1
DFC Guidance	**ARS LLC** – Clearwater UWCD, Hemphill Co. UWCD, Middle Pecos GCD, Presidio Co. UWCD **Dr. Hutchison** – GMA 2, GMA 3, GMA 4, GMA 7, GMA 11, GMA 13, Bluebonnet GCD, Kinney County GCD, Middle Pecos GCD, Hickory UWCD No. 1 **MAS LLC** – Hemphill County UWCD, Clearwater UWCD
Designed Groundwater Monitoring Systems	**ARS LLC** – Central Texas GCD, Hickory UWCD No. 1, Kenedy Co. GCD, Presidio Co. UWCD, Kimble Co. GCD, Middle Pecos GCD, Sutton Co. UWCD **Dr. Hutchison** – Bluebonnet GCD, Middle Pecos GCD, Rusk County GCD
Supervised Water Well Drilling/Activities	**ARS LLC** – Clearwater UWCD, Middle Pecos GCD
Evaluated Groundwater Pump Tests	**ARS LLC** – Clearwater UWCD, Hemphill Co. GCD, Middle Pecos GCD **Dr. Hutchison** – Bluebonnet GCD, Hickory UWCD No. 1, Middle Pecos GCD
Litigation and Contested Case Hearing Support	**ARS LLC** – Clearwater UWCD, Hemphill Co. GCD, Middle Pecos GCD **Dr. Hutchison** – Lost Pines GCD, Middle Pecos GCD
3D Interactive Stratigraphic Models	**ARS LLC & MAS LLC** – Brazos Valley GCD, Clearwater UWCD, Crockett Co. GCD, Gonzales Co. UWCD, Middle Pecos GCD
Developed water well and stratigraphic pick datasets	**ARS LLC** – Central Texas GCD, Clearwater UWCD, Crockett Co. GCD, Hemphill Co. UWCD, Hickory UWCD No. 1, High Plains UWCD No. 1, Kenedy Co. GCD, Kimble Co. GCD Lone Wolf GCD, Middle Pecos GCD, Santa Rita UWCD, Menard Co. UWCD, Presidio Co. UWCD
Permit Application Guidance	**ARS LLC** - Clearwater UWCD, Hickory UWCD No. 1, Presidio Co. UWCD, Middle Pecos GCD **Dr. Hutchison** – Bluebonnet GCD, Middle Pecos GCD, Kinney County GCD
Contamination Issues	**ARS LLC** – Middle Pecos GCD, Presidio Co. UWCD.
Geologic Mapping	**ARS LLC** – Clearwater UWCD and Middle Pecos GCD

II.F. Listing of clients with water wells producing groundwater in the District

Our team has not worked for any clients producing groundwater from wells under the District/s jurisdiction.

II.G. Description of experience involving the major and minor aquifers in the District

Our team experiences involving the major and minor aquifers of the District have been described in sections II.D.i - II.D.vii of this proposal. To not be repetitive, we have provided the main experiences highlighted from these sections below.

ARS LLC

- Developed the hydrostratigraphy for the Fayette County GCD stratigraphic model. This included the Catahoula, Jackson, Yegua, Sparta, Queen City, Carrizo, and Wilcox (Simsboro).

Dr. Hutchison

- Principal Hydrogeologist on the team that successfully updated the Northern and Southern Carrizo-Wilcox GAMs under contract to the TWDB.
- As an expert witness for Lost Pines GCD, evaluated Carrizo-Wilcox GAM model simulations using the "old GAM" and the "new GAM.

MAS LLC

- Updated the Brazos Valley GCD 3D Hydrostratigraphic model.
- Created a 3D hydrostratigraphic model for the Gonzales UWCD. This included the Sparta, Queen City, Carrizo, and Wilcox and their associated DFCs.

II.H. Description of your professional liability insurance

Allan R Standen LLC has active professional liability insurance policy with biBerk Business Insurance. The coverage is for $1,000,000. Other team members carry professional liability insurance. This information is available upon request.

II.I. Statement certifying that the Respondent and/or his/her firm is not aware of any existing conflicts of interest with the Brazos Valley Groundwater Conservation District or its Board of Directors, including the filing of any statements required under Chapter 176, Local Government Code

ARS LLC has none and does not anticipate any potential conflicts if consulting for BVGCD.

Dr. Hutchison has none and does not anticipate any potential conflicts if consulting for the BVGCD.

MAS LLC has none and does not anticipate any potential conflicts if consulting for the BVGCD.

ARS LLC, Dr. Hutchison, and MAS LLC have teamed with one other firm and responded to an RFQ from Lost Pines GCD. Lost Pines is currently reviewing the SOQs, and we intend to immediately disclose any potential conflicts that the Lost Pines GCD SOQ process may create.

III. Certificate of Non-Discrimination

EXHIBIT B

CERTIFICATION OF NON-DISCRIMINATION

TO BE EXECUTED BY RESPONDENT AND SUBMITTED WITH STATEMENT OF QUALIFICATIONS

Respondent hereby certifies in performing work or providing services for the District, there shall be no unlawful discrimination in its hiring or employment practices, and Respondent shall comply with applicable federal and Texas anti-discrimination laws.

IN WITNESS WHEREOF, the undersigned has executed this Certificate of Non-Discrimination this 9th day of August, 2022.

RESPONDENT:

Type or print complete legal name of firm)

BY: Allan R Standen
(Signature)

NAME: Allan R Standen
(Type or Print)

TITLE: President
Type or Print)

ADDRESS: 12401 Painted Bunting Dr.

CITY Austin STATE TX

ZIP 78726

IV. References

Reference #1 (ARS LLC & MAS LLC)	
Name	Clearwater UWCD
Address	700 Kennedy Court
City, State Zip Code	Belton, TX 76513
Telephone #	325-776-2730
Contact	Dirk Aaron, General Manager
Dates of Service	2012 – Present (ARS LLC & MAS LLC)
Description of Services	ARS LLC – hydrogeological assistance, 3D hydrogeologic model development, management plan and rule writing assistance, DFC guidance, permitting guidance, developed water well and stratigraphic well datasets, expert testimony support

Reference #2 (ARS LLC, MAS LLC & Dr. Hutchison)	
Name	Middle Pecos GCD
Address	405 North Spring Drive
City, State Zip Code	Fort Stockton, TX 79735
Telephone #	254-965-6705
Contact	Ty Edwards, General Manager
Dates of Service	2012 – Present (ARS LLC & MAS LLC), 2016-Present (Dr. Hutchison)
Description of Services	Hydrogeological assistance, 3D hydrogeologic model development, management plan and rule writing assistance, DFC guidance, permitting guidance, developed water well and stratigraphic well datasets, expert testimony support, evaluated contamination, developed technical reports.

Reference #4 (Dr. Bill Hutchison)	
Name	Bluebonnet GCD
Address	303 E Washington Ave.
City, State Zip Code	Navasota, TX 77868
Telephone #	936-825-7303
Contact	Zach Holland, General Manager
Dates of Service	2011-Present
Description of Services	Groundwater model application, groundwater model development, rules and management plan updates, joint planning support, permit review.

Reference #5 (Michelle A. Sutherland LLC)	
Name	Hemphill GCD
Address	908 S 2nd Street
City, State Zip Code	Canadian, Texas 79014
Telephone #	806-323-8350
Contact	Janet Guthrie, General Manager
Dates of Service	2007 - Present
Description of Services	3D geologic model with periodic update, cross-sections, general hydrologic consulting, database updates and mapping services.