STATEMENT OF QUALIFICATIONS

Hydrogeology Services Related to Groundwater Management

Request for Qualifications #07-2022

Prepared For:

BRAZOS VALLEY GROUNDWATER CONSERVATION DISTRICT

Prepared By:

INTERA

AUGUST 12, 2022

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I. Letter of Interest

Alan M. Day
General Manager
Brazos Valley Groundwater Conservation District
112 W. 3rd Street
Hearne, Texas 77859

RE: Statement of Qualifications to Provide Hydrogeology Services Related to Groundwater Management (Response to RFQ #07-2022)

Dear Mr. Day:

INTERA Incorporated (INTERA) is pleased to submit this Statement of Qualifications (SOQ) in response to the above-referenced solicitation from the Brazos Valley Groundwater Conservation District (Brazos Valley GCD or District). We understand that the District is seeking a highly qualified consultant to provide professional services related to groundwater management and hydrogeology. As a leader in the characterization, evaluation, and modeling of groundwater resources in Texas with experience supporting more than 25 groundwater conservation districts (GCDs), INTERA is well qualified to support the District with this important work. Highlights of our offering include:

- **Expertise and Experience with Aquifers within the District.** We bring experience with all the major and minor aquifers of interest within the District, including the Carrizo, Wilcox (Simsboro, Calvert Bluff, and Hooper formations), Sparta, Queen City, Yegua-Jackson, and Brazos River Alluvium aquifers. As evidence of this experience, INTERA developed the original groundwater availability models (GAMs) for all these aquifers under the Texas Water Development Board's Groundwater Availability Modeling Program. We also developed the updated TWDB GAM for the central portion of the Carrizo-Wilcox Aquifer that is now being used for the joint planning process in GMA 12.
- **Over 15 Years of Experience Supporting GCDs in Texas.** INTERA staff have worked with GCDs in Texas for over 15 years, providing sound science and guidance to support water resource decision-making for multiple purposes, from developing rules and management plans, to evaluating permits, to supporting the joint-planning process. This experience, combined with our ability to communicate in plain language with stakeholders, as well as provide expert testimony when it is required, makes INTERA a "turnkey" solution for providing groundwater management and hydrogeology services for the Brazos Valley GCD.

The remainder of this letter provides the information specified in the District's Request for Qualifications (RFQ).

Principals of the Firm. As an employee-owned firm, INTERA's ownership is distributed among nearly 100 employees. The company is led by a Board of Directors and the team of Executives and Officers (Principals) listed below.

- Marsh Lavenue, Chief Executive Officer, Board Chair
- Abhishek Singh, PE, President – Water Resources Services, Board Director
- Peter Castiglia, PG, President – Mining and Environmental Services
- Kelly Hunter, PE, President – Federal, Coastal, and International Services
- Eric Markland, CPA, Chief Financial & Administrative Officer
- Van Kelley, PG, Senior Vice President, Board Secretary
- Alaa Aly, PhD, PE, CGWP, Senior Vice President, Board Director
- Cynthia Ardito, PH, CGWP, Senior Vice President, Board Director
- William Nichols, Senior Vice President – Hanford Operations
- Neil Deeds, PhD, PE, Vice President, Board Director
- Noreen Baker, PG, Vice President, Corporate Health and Safety Officer
- Mark Gosselin, PhD, PE, Vice President - Coastal Engineering
- Gregory Ruskauff, PHG, Vice President – Northwestern Region

Authorized Person. As our proposed Project Manager, I am authorized to contractually negotiate and obligate our firm. My contact information is provided below.

Wade Oliver, PG
Senior Geoscientist & Manager, Houston Operations
832.535.5763 (mobile)
woliver@intera.com

Key Personnel. In addition to me, INTERA is proposing four other key personnel that were selected based on their firsthand knowledge of the aquifers within the District and their technical expertise, which includes all facets of water resources engineering, planning, modeling, stakeholder engagement, facilitation, and project management. Our proposed key personnel are:

- Van Kelley, PG, Principal Geoscientist, 512.569.0689 (mobile)
- Steve Young, PhD, PE, PG, Principal Engineer & Geoscientist, 512.635.0059 (mobile)
- Neil Deeds, PhD, PE, Vice President and Principal Water Resources Engineer, 512.506.1230 (mobile)
- Daniel Lupton, PG, Senior Geoscientist, 512.644-1661 (mobile)

These key personnel have been working together on various projects for GCDs and other clients for over 10 years, they understand how to communicate effectively with clients and stakeholders, and they achieve results quickly and efficiently. The skills, expertise, and direct experience that each team member offers are detailed in Section II.A of this SOQ.

Contact for Clarification. Should you have any questions or require any clarifications regarding our SOQ, please do not hesitate to contact me by phone or email (contact information provided above). As a Texas-registered PG, Senior Geoscientist, and Manager of INTERA's Houston Operations, I have over 14 years of experience focused on water resources and management, and bring the experience needed to provide the District with the highest quality services and work products. My experience includes helping update aquifer management plans and rules for GCDs in Texas, developing and applying GAMs to support water planning and management strategies for both public and private entities, and providing expert testimony on behalf of GCDs.

Signature of Authorized Person. As our SOQ will demonstrate, INTERA offers several assets that we believe make us the best selection for this work—assets that will result in tangible benefits to the District. These benefits include ensuring that every dollar we spend supporting the District is focused on the ultimate goal of providing the science and information needed to make sound decisions regarding the management, use, and protection of groundwater resources. We appreciate the opportunity to support the Brazos Valley GCD with this important work.

Sincerely,

INTERA Incorporated

Wade Oliver, PG
Senior Geoscientist & Manager, Houston Operations

II. Statement of Qualifications

INTERA

II. Statement of Qualifications

The Brazos Valley GCD is a not-for-profit local government that is required, by law, to protect and conserve the groundwater resources of Robertson and Brazos counties through local management. The District's primary goal, and legally required mandate, is to ensure that enough good quality groundwater remains in the area for future generations. The District strives to maintain a balance between protecting the rights of private landowners and its responsibility to protect the area's groundwater resources. The District has the statutory authority to adopt a management plan, undertake various studies, determine and characterize aquifer conditions, issue permits for nonexempt wells, regulate production and well spacing, and adopt rules. To help meet the Brazos Valley GCD's statutory authority, the District is seeking a highly qualified professional to provide services that include:

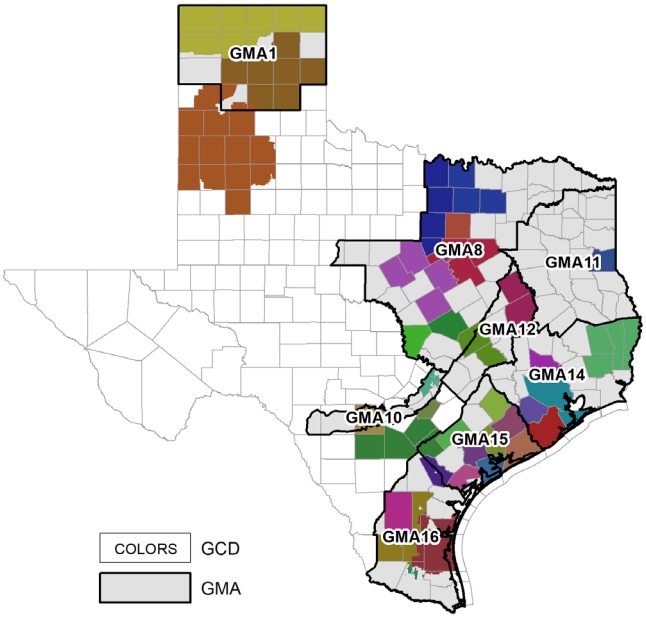
The Brazos Valley GCD brings together representatives of groundwater interests in both Robertson and Brazos counties to work together for the benefit of the area as a whole.

- Serving as a technical consultant and assisting the General Manager and Board of Directors (Board) with ongoing and potential studies and programs focused on the collection and analysis of scientific data regarding groundwater resources in the District and the region.
- Assisting in executing day-to-day tasks, such as reviewing water well permit applications, assessing impacts of proposed or existing wells, and providing professional opinions regarding activities that may impact the groundwater resources within the District.
- Providing scientific and technical reports and advice as requested by the General Manager and/or the Board.
- Attending meetings with the General Manager and permittees, with the District's legal counsel; attending regular and special meetings of the Board, when requested; and being available for consultation as needed.

As this SOQ will demonstrate, INTERA provides the expertise and experience needed to excel in providing the District with these services.

II.A History of Firm and Resumes of Proposed Personnel

Established in 1974 as a technology-based consulting firm specializing in hydrogeologic modeling, INTERA is a Texas corporation headquartered in Austin. Our staff consists of 225 personnel (50 in Texas) specializing in hydrogeology, hydrology, water resources engineering, geosystems engineering, environmental science and engineering, and remote sensing and geographic information systems (GIS) technology. Our staff includes 32 registered Professional Engineers and 29 Registered Professional Geoscientists. In addition, many of our geoscientists are nationally licensed as Certified Ground Water Professionals (CGWP) by the National Ground Water Association. We are registered with the Texas Board of Professional Geoscientists (#50189) and the Texas Board of Professional Engineers (#4722) to offer and perform geoscience and engineering services in the State of Texas. Our Water Resources Group has played an integral role in developing GAMs for the TWDB and in performing hydrogeologic studies and analyses to assist the planning efforts of Texas GCDs and groundwater management areas (GMAs).

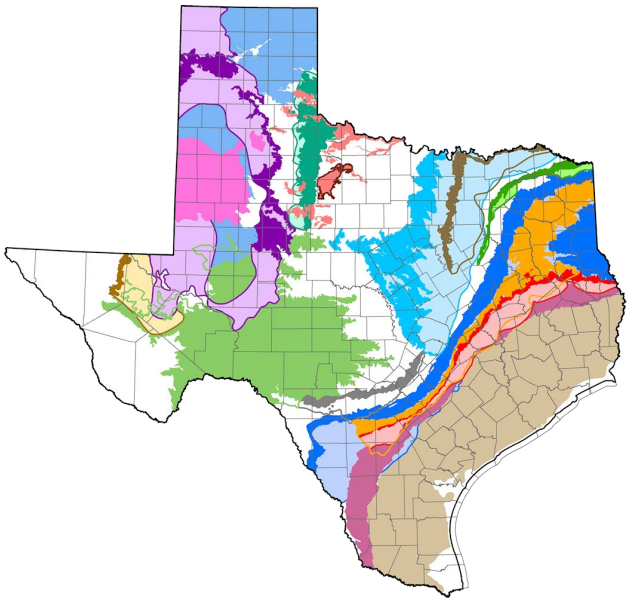


INTERA staff have provided hydrogeological and other technical services for over two dozen GCDs and eight GMAs across Texas.

INTERA offers the District several key assets that will enable us to not only provide the highest-quality technical services and products, but do so in a cost-effective manner in accordance with any and all schedule requirements. These assets are summarized below and described in more detail throughout our SOQ.

- **Proven Expertise and Experience in all Support Areas Required by the District.** Over the last 15 years, INTERA has provided technical services to GCDs and similar organizations across Texas, including those that manage the Carrizo-Wilcox, Sparta, Queen City, Yegua-Jackson, and Brazos River Alluvium aquifers. For these districts, our services have included: preparing management plans, groundwater rules, and guidance documents; designing monitoring well networks; providing GCD representation during GMA meetings; reviewing application permits; developing groundwater databases; organizing and conducting public meetings; directing and implementing field studies/well construction; evaluating alternative desired future conditions (DFCs); responding to DFC petitions; and conducting technical and public workshops. INTERA's experience includes providing technical and joint planning support for over two dozen GCDs and eight GMAs in Texas.

- **Cost Efficiency Through Effective Resource Utilization.** Technical support under this contract with the District will be provided on a task-by-task basis. INTERA has been working under similar task-order based contracts for over 40 years. To deliver services under these contracts, we have developed effective project control systems and processes that ensure work is performed on schedule and at, or below, the agreed-upon budget. We understand that every dollar spent must provide value in meeting the District's duties and overall mission of effectively managing and protecting groundwater resources. Our in-depth experience and expertise in supporting GCDs will help us to work cost efficiently to support the District.



Over the past 18 years, INTERA's has provided expertise to support the development, revision, and application of numerous GAMs under the TWDB's Groundwater Availability Modeling Program and for numerous other water resource projects. This includes developing the original GAMs for nearly all of the aquifers of interest within the Brazos Valley GCD.

- **An Outstanding Team of Management and Technical Personnel.** INTERA offers the proven expertise and experience of five key personnel to provide and manage the services required by the District. INTERA's efforts will be led by Wade Oliver, PG, and supported by Neil Deeds, PhD, PE, Van Kelley, PG, Daniel Lupton, PG, and Steve Young, PhD, PE, PG. Wade brings over 10 years of experience in helping manage Texas groundwater resources. He has led a wide range of groundwater resources projects and has performed dozens of hydrogeologic studies for GCDs and the TWDB, and has acted as an expert witness for permit hearings, contested cases, and lawsuits. His focus will be to bring high-quality and cost-effective services to the District. For the last 25 years, Van Kelley has led several large modeling projects including the development of seven GAMs under the TWDB's Groundwater Availability Modeling Program, all of which are being used in the joint planning process. Neil Deeds has over 20 years of experience managing projects that focus on hydrogeology, from design and installation of water wells to development of regional GAMs. Daniel Lupton leads INTERA's hydrogeologic characterization group and has over a decade of experience in project management, water well siting, drilling and testing; water supply wellfield design; water resources modeling; evaluation of geophysical logs; and hydrogeologic conceptualization. Steve Young has worked with more than 20 GCDs in Texas to help develop management plans, groundwater rules, groundwater databases, and to gain a better understanding of groundwater resources. Collectively, our six key personnel bring over 140 years of experience in conducting water resource and hydrogeologic studies and modeling analyses to support groundwater resource development, management, and protection.

Resumes of our proposed key personnel, and several additional technical support personnel that we anticipate will contribute to our work with Brazos Valley GCD, are provided on the following pages.

Wade Oliver, PG
Project Manager & Senior Hydrogeologist

Years of Experience: 15

Education:
- MS, 2008, Geology, University of Utah
- BS, 2006, Environmental Geoscience, Texas A&M University

Professional Registrations/Affiliations:
- Professional Geoscientist, TX, 2011, No. 11112

Professional History:

2014 – Present	Senior Hydrogeologist and Manager of Houston Operations – INTERA Incorporated, Houston, TX
2012 – 2014	Hydrogeologist – INTERA Incorporated, Austin, TX
2008 – 2012	Geoscientist IV/Groundwater Modeler – Texas Water Development Board, Austin, TX
2007 – 2008	Research Assistant – University of Utah, Salt Lake City, UT
2006 – 2007	Environmental Technician – AQUI-VER, Inc., Park City, UT
2005	Geographic Information System Intern – Lower Colorado River Authority, Austin, TX

Specialized Training:
- OSHA Project Management, University of Texas at Austin, 2009
- MODFLOW, PEST, TTim, Groundwater Vistas, GMS
- ArcGIS, Perl, Python, STELLA, Surfer, PHREEQC

Wade Oliver has 15 years of research and applied experience focusing on the characterization of groundwater systems and the development and application of numerical flow models to analyze these systems. His experience includes characterizing the structure, water quality, and water levels of aquifers, updating aquifer management plans for GCDs in Texas, and developing GAMs to support water planning strategies for both public and private entities. To help energy companies secure reliable water for operations while protecting local fresh water supplies, Wade also has experience in characterizing brackish aquifer resources in water-scarce areas of Texas, New Mexico, and Oklahoma. He has managed over 100 projects involving evaluations of aquifer recharge, groundwater-surface water interaction, inter-aquifer flow, and future groundwater conditions and availability for local and regional groundwater management organizations in Texas. T he information developed for these projects has been used to evaluate various water management strategies by GCDs and GMAs. Through this experience, Wade brings in-depth knowledge of groundwater planning, development, management, and regulation in Texas, especially the DFC process. In modeling and data analysis studies, he has experience with groundwater codes, including MODFLOW and TTim, as well as the application of PEST for calibrating and optimizing numerical models. He has many years of experience working with the GIS software ArcGIS and is a skilled Perl and Python programmer.

Representative Project Experience

Expert Witness for Challenge to Production Permit, Barton Springs-Edwards Aquifer Conservation District, Austin, TX. 2020 - Present. *Technical Expert.* Serving as an expert witness for Barton Springs-Edwards Aquifer Conservation District (BSEACD) during a challenge to the production permit granted to Electro Purification (EP). The permit was challenged by a local environmental group concerned about impacts to the Trinity and Edwards aquifers. Tasks include review of technical reports and analyses prepared by both the permit applicant and environmental group, development of written testimony, deposition, and testifying at the State Office of Administrative (SOAH) Hearings.

Evaluation of Water Well Spacing Relationships, Northern Trinity Groundwater Conservation District, Tarrant County, TX. 2016 – 2017. *Lead Hydrogeologist.* Evaluated the interrelationships among pumping rate, drawdown and spacing distance for the Trinity and Woodbine Aquifers in Tarrant County, Texas to assist the district in development of updated well spacing rules. Well spacing rules are a key function of groundwater conservation districts as defined in Chapter 36 of the Texas Water Code. The analytic element modeling code TTim was used to evaluate the relationships for both the outcrop and subcrop portions of each aquifer. The analysis enables the District to develop defensible well spacing rules that are customized to local aquifer conditions.

Alternative Groundwater Availability Model for the Carrizo-Wilcox Aquifer in Panola County, Panola County Groundwater Conservation District, TX. 2015 – 2016. *Project Manager and Lead Hydrogeologist*. Developed a GAM to assist with establishing DFCs. After evaluating the results of aquifer tests, water level trends, and the distribution of sands and clays in the Wilcox formation, it was determined that an alternative tool beyond the existing state-approved GAM was needed to adequately represent the unique hydrogeologic conditions in the district. The alternative GAM allows the district to reliably evaluate the relationship between pumping and impacts to the aquifer necessary for developing groundwater management goals.

Expert Witness for Petition of Desired Future Conditions, Lone Star Groundwater Conservation District, Conroe, TX. 2017. *Technical Expert.* Served as an expert witness for Lone Star Groundwater Conservation District (LSGCD) during a petition against the district's long-term aquifer management goals known as desired future conditions. Evaluated the technical merits of claims by the petitioners and provided direct written testimony and rebuttal testimony related to the hydrogeology of the northern portion of the Gulf Coast Aquifer in Texas and the scientific basis for the district's management approach. Also testified during a day-long deposition as part of the proceeding. The testimony was used by the district as it successfully settled the matter before going to trial before the State Office of Administrative Hearings.

Groundwater Model for the Paleozoic Aquifers, Upper Trinity Groundwater Conservation District, North TX and Southern OK. 2013 – 2014. *Project Manager and Lead Hydrogeologist.* Developed an updated groundwater model for the Paleozoic Aquifers in north-central Texas and southern Oklahoma including the Wichita, Bowie, Cisco, Canyon and Strawn groups. These are now known collectively referred to as the Cross Timbers Aquifer by the TWDB. These often-brackish aquifers are a significant resource where the Trinity and Seymour Aquifers are not present. Updates included refinement of the model grid, development of a connection to the newly developed groundwater availability model for the Trinity Aquifer, and improved representation of the aquifer structure, groundwater-surface water interaction, recharge from precipitation, hydraulic properties, and pumping. The model was calibrated to measured water levels and baseflows and is being used by the Upper Trinity Groundwater Conservation District to better understand and manage the aquifers.

Updating and Recalibrating an Analytic Element Groundwater Model for the Trinity Aquifer, Barton Springs Edwards Aquifer Conservation District, Austin, TX. 2017 – 2018. *Lead Hydrogeologist.* The model is an extension to a previously model we developed and incorporates the results of several new multi-day aquifer tests. Following the recalibration of the model, we will use it to evaluate the expected impacts of pumping at a planned wellfield on nearby wells in the Trinity Aquifer and the overlying Edwards Aquifer.

Groundwater Joint Planning Technical Assistance, Groundwater Management Area 1, Amarillo, TX. 2019 – Present. *Project Manager and Lead Hydrogeologist.* Serving as a technical expert and facilitator for the development of long-term groundwater management goals for the northern portion of the Ogallala Aquifer and Dockum Aquifer in Texas. The area includes Amarillo and 18 surrounding counties that are dominated by irrigated agriculture. Over 30 percent of the groundwater used in Texas is produced in GMA 1. Activities include assessing aquifer uses and conditions, water supply needs and management strategies, and environmental impacts and modeling potential future water use and management scenarios. The results of this work will guide aquifer management over a 50+ year time horizon.

Technical Assistance and Groundwater Modeling to Support the Regulatory Plan Review, Harris-Galveston and Fort Bend Subsidence Districts, Houston, TX. 2020 – Present. *Project Manager and Lead Hydrogeologist.* Multi-year project with the subsidence districts and local stakeholders to review the district's regulatory plan to stop land surface subsidence caused by groundwater extraction while ensuring adequate water is available for the over 5 million residents in the districts. Tasks include evaluating the viability of aquifer storage and recovery (ASR) and brackish groundwater development as alternative water supply strategies, reviewing the updated groundwater availability model being developed by the U.S. Geological Survey and modeling any proposed changes to the regulatory plan.

Groundwater Joint Planning Technical Assistance, Groundwater Management Area 14, Jasper, TX. 2019 – Present. *Project Manager and Lead Hydrogeologist.* Serving as a technical expert and facilitator for the development of long-term groundwater management goals for the northern portion of the Gulf Coast Aquifer in Texas. The area includes Greater Houston and surrounding counties which has experienced significant land surface subsidence historically due to groundwater extraction. Activities include assessing aquifer uses and conditions, water supply needs and management strategies, subsidence, and environmental impacts and modeling potential future water use and management scenarios. The results of this work will guide aquifer management over a 50+ year time horizon.

Groundwater Joint Planning Technical Assistance, Groundwater Management Area 15, TX. 2014 – 2016. *Hydrogeologist.* Provided technical support and policy guidance to the groundwater conservation districts (GCD) in GMA 15 for establishing long-term management goals for the Gulf Coast Aquifer in Texas. Activities included modeling various aquifer management strategies being considered by each of the 13 GCDs to evaluate hydrological conditions, environmental impacts, subsidence, feasibility of implementation, water supply needs, aquifer uses and conditions, alternative management strategies, and private property rights. The results of the analyses were documented in the legislatively required explanatory report.

Van Kelley, PG
Principal Geoscientist

Years of Experience: 37

Education:
- MS, 1985, Hydrogeology, Texas A&M University
- BS, 1982, Petroleum Geology, Mississippi State University

Professional Registrations/Affiliations:
- Professional Geoscientist, TX, 2003, No. 4923
- Member, Association of Ground Water Scientists and Engineers
- Member of the American Geophysical Union, Water Resources Division
- Member, Texas Water Conservation Association

Professional History:

2014 – Present	Executive Vice President, Principal Hydrogeologist – INTERA Incorporated, Austin, TX
2005 – 2014	Senior Vice President, Water Resources Lead, Senior Hydrogeologist – INTERA Incorporated, Austin, TX
2002 – 2005	Division Manager, Senior Hydrogeologist – INTERA Incorporated, Austin, TX
1995 – 2002	Group Manager, Project Manager, Senior Hydrogeologist – Duke Engineering & Services, Austin, TX
1992 – 1995	Project Manager, Senior Hydrogeologist – INTERA Incorporated, Austin, TX
1990 – 1992	Project Manager, Staff Hydrogeologist – INTERA Incorporated, Austin, TX
1989 – 1990	Staff Hydrogeologist – INTERA Incorporated, Baden, Switzerland
1985 – 1989	Staff Hydrogeologist – INTERA Technologies, Austin, TX
1984 – 1985	Research Hydrogeologist – Texas A&M University, College Station, TX
1983 – 1984	Consulting Geologist – Holditch & Associates, College Station, TX

Specialized Training & Software:
- Analytic Element Modeling using Python Notebooks, 2015
- Aquifer Recharge, AGWT, 2012
- Evidence Support Logic Methodology, 2008

Van Kelley has over three decades of experience in developing and applying groundwater flow and transport models to evaluate water resource management strategies and waste-management issues. He has performed studies to determine groundwater availability over long-term planning periods, review DFCs, evaluate and predict future groundwater quality, and assess the impacts of various management strategies on local and regional surface water and groundwater resources. Van has also managed projects to assess brackish water resources and the relative risk of developing those resources with regards to subsidence. Over the last 25 years, he has led several large modeling projects including the development of seven GAMs under the TWDB's Groundwater Availability Modeling Program, all of which are being used in the joint planning process. He also managed development of an updated GAM for the northern portion of the Trinity and Woodbine aquifers for four GCDs in GMA 8. Van has served as the hydrogeologic consultant for multiple GCDs where his efforts have included evaluating the applicability of aquifer GAMs, reviewing the GMA DFCs, participating in joint planning, supporting the establishment of interim rules on well spacing, developing management plans, providing estimates of current groundwater use, leading efforts to gain approval by TWDB of Groundwater Management Plans, and establishing monitoring well strategies. His technical support to GCDs also includes applying GAMs, characterizing brackish aquifers, evaluating subsidence from groundwater withdrawal, and examining the feasibility of ASR operations.

Representative Project Experience

Technical Support for Water Planning, Post Oak Savannah Groundwater Conservation District (POSCD), Milano, TX. 20018 – Present. *Consulting Hydrogeologist*. INTERA has served as the District hydrogeology firm for over a decade. Efforts have included supporting various management reports developed by the District including monitoring and DFC compliance plans as well as the District's Groundwater Management Plan.

Technical Support for Water Planning, Upper Trinity Groundwater Conservation District, Springtown, TX. 2008 – 2019. *Consulting Hydrogeologist.* Providing technical support to the Upper Trinity Groundwater Conservation District (UTGCD) as hydrogeologist. The UTGCD is a new district aimed at conserving groundwater within a four-county region just west of the Dallas-Fort Worth Metroplex. Historically, the Northern Trinity Aquifer has experienced significant drawdown, and the region has most recently been designated as a Priority Management Groundwater Area by the Texas Commission on Environmental Quality. The counties within the district are experiencing urbanization as well as groundwater production associated with the Barnet Shale gas play. Tasks have included supporting UTGCD in gaining an understanding of the current Northern Trinity Aquifer GAM, the significance of the GMA 8 Northern Trinity DFCs, interim rules on well spacing, estimates of current groundwater use, and developing a GIS-based database system. Also led the effort to get the Groundwater Management Plan approved

by the TWDB within the regulatory deadline. In addition to regular review of variance requests and other technical matters that come before the Board, leading a study to expand the UTGCD's monitoring program. This work included the development of a detailed hydrogeologic framework and documented strategy for monitoring network expansion.

Technical Support for Water Planning, Northern Trinity Groundwater Conservation District (NTGCD), Tarrant County, TX. 2014 – 2020. *Consulting Hydrogeologist*. Supported the NTGCD as their district hydrogeologist. The NTGCD is in Tarrant County and has seen significant historical water level declines. Tarrant County and the NTGCD are within a Priority Management Groundwater Area designated by the Texas Commission on Environmental Quality (TCEQ). INTERA supported the district in development of their annual reports, rules, groundwater management plan, database work and support in joint planning.

Expert Witness for Groundwater Production and Export Permits, Carrizo-Wilcox Aquifer, Lower Colorado River Authority, Bastrop County, TX. 2018 – 2019. *Testifying Expert Hydrogeologist*. Served as an expert in hydrogeology to support the Lower Colorado River Authority (LCRA) in their pursuit of a groundwater production and transport permit for eight production wells and a total of 25,000 acre-feet per year (AFY) production from the Simsboro Formation of the Wilcox Aquifer. Provided expert testimony with regards to site and regional hydrogeology, potential impacts and compliance with District Rules and Management Plan. Provided input to the client on revisions to the draft permits to improve the predictability of the regulation of the permits. The case was heard by the SOHA.

Technical Support for Water Planning, Northern Trinity Groundwater Conservation District, Tarrant County, TX. 2014 – Present. *Consulting Hydrogeologist.* Supporting the Northern Trinity Groundwater Conservation District (NTGCD) as their district hydrogeologist since 2014. The NTGCD is in Tarrant County and has seen significant historical water level declines. Tarrant County and the NTGCD are within a Priority Management Groundwater Area designated by the TCEQ.

Development of an Updated Groundwater Availability Model for the Northern Trinity and Woodbine Aquifers, North Texas /Upper Trinity Groundwater Conservation District /Prairielands Groundwater Conservation District, TX. 2012 – 2014. *Project Manager.* Managed a team responsible for completing a major revision to the Northern Trinity and Woodbine Aquifers Groundwater Availability Model (GAM). This GAM was unique in Texas in that it was entirely funded by four GCDs through an Inter-local Agreement. The model was developed to bridge the gap between regional Groundwater Management Area (GMA) models and those that have significance on a water planning perspective at a GCD scale. A significant accomplishment of the work was the development of a consistent hydrogeologic framework for the entire Northern Trinity and Woodbine Aquifers from the Colorado River to the south through South Oklahoma and into Southwest Arkansas.

Technical Evaluation of a Proposed Groundwater Management Area 14 Desired Future Condition and Development of a Detailed Hydrostratigraphic Cross-Section in the Gulf Coast Aquifer, Harris-Galveston Subsidence District, TX. 2015. *Project Manager and Technical Lead.* Commented on proposed DFCs and the relevance of Total Estimated Storage (TERS) in a public hearing held at the Lone Star Groundwater Conservation District (LSGCD) for GMA 14. Additionally, this project required the development of a hydrostratigraphic cross-section from the City of Conroe in Montgomery County to the southwest to Katy and the Brazos River.

Development of Groundwater Availability Models for the Queen City and Sparta Aquifers - Incorporating the Carrizo-Wilcox GAMs, Texas Water Development Board, TX. 2002 – 2004. *Project Manager*. Led development of three regional MODFLOW models for the southern, central, and northern portions of the Queen City and Sparta aquifers. Each model consisted of eight layers representing the Sparta, Queen City, and Carrizo-Wilcox aquifers, as well as the intervening aquitards. Key technical issues included hydraulic properties, recharge, and aquifer-stream interaction. In addition to the standard GAM calibration requirements, developed a set of models that reproduced water balances consistent with the accepted conceptualization of groundwater flow in the aquifer. The Queen City and Sparta GAMs intersect 10 of the 16 RWPGs in Texas, and consistent with state water planning policy, the models were developed with the support of numerous stakeholders. In addition to leading the modeling efforts, organized and conducted quarterly stakeholder forums involving the TWDB, RWPGs, groundwater conservation districts, river authorities, and the public to present modeling results and solicit input.

Development of a Groundwater Availability Model for the Yegua-Jackson Aquifer, Texas Water Development Board, TX. 2008 – 2010. *Project Manager*. Led development of the Yegua-Jackson Aquifer GAM. The model is comprised of five layers and extends from the Rio Grande to the Red River. Since the Yegua-Jackson Aquifer is a minor aquifer with little supporting data, the modeling efforts relied heavily on the depositional environment study that was part of an earlier study completed to develop the structure for this aquifer system.

Steve Young, PhD, PE, PG
Principal Geoscientist/Engineer

Years of Experience: 38

Education:
- PhD, 1996, Earth Sciences, University of Waterloo
- MS, 1982, Environmental Engineering, Stanford University
- BS, 1981, Environmental Science, University of Virginia

Professional Registrations/Affiliations:
- Professional Engineer, TX, 2001, No. 88049;
- Professional Geoscientist, TX, 2003, No. 231;
- Certified Ground Water Professional, 2001, No. 3027410, National Ground Water Association
- LPST Corrective Action Manager, TX, 2001, No. CAPM01543

Professional History:

2010 – Present	Principal Geoscientist/Engineer – INTERA Incorporated, Austin, TX
2003 – 2010	Regional Manager – URS, Inc., Austin, TX
1997 – 2003	Regional Manager – HydroGeoLogic, Austin, TX
1994 – 1997	Senior Hydrogeologic Consultant – P Squared Technologies, Knoxville, TN
1982 – 1994	Project Engineer – TVA Laboratory, Norris, TN

Advisory Boards:
- Advisory Board, Texas Department of Licensing and Regulations, Water Well Drillers and Pump Installers
- Board of Directors, Texas Desalination Association

Specialized Training & Software:
- PEST++ , ArcGIS,
- MODFLOW, MT3DMS, SEAWAT, UTCHEM

Steve Young brings over three decades of experience in characterizing and solving water supply and groundwater remediation problems. He has worked on a wide range of water development issues, including characterizing groundwater resources, developing and applying groundwater models, and designing water supply wellfields. Steve's experience includes working with GCDs, GMAs, and the TWDB to perform numerous hydrogeological studies. In the area of joint planning, he has worked with GMAs 7, 8, 12, 15, and 16. His GAM experience includes co-developing the updated GAM for the central portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers; the Yegua-Jackson GAM, the Northern Trinity GAM. He managed twelve projects for the TWDB that focus on characterizing and modeling aquifer systems, and characterizing surface water-groundwater interactions. He has worked with several GCDs to create groundwater models to support their management goals and permit evaluations. Steve has published the results of his work in over 100 journal and conference articles and numerous reports, and over the last 15 years has frequently made public presentations regarding water resources through his work with the TWDB, GCDs, River Authorities, EPA, and the Department of Defense.

Representative Project Experience

Technical Support, Post Oak Savannah Groundwater Conservation District, Milano, TX. 2004 – Present. *Project Manager*. Assisting the District with characterizing and managing its groundwater resources by performing a wide range of groundwater simulations to evaluate groundwater availability of District aquifers. Wrote major sections of groundwater management plan and was responsible obtaining the approval of plan from the Texas Water Development Board. Provides technical review of major permits, including two for over 20,000 acre-feet of water per year, and assisted with developing groundwater rules for the District, including well spacing. Responsible for evaluating DFC compliance.

Update of the Carrizo-Wilcox, Queen City, and Sparta Groundwater Availability Model for Groundwater Management Area 12, Texas Water Development Board, TX. 2016 – 2018. *Project Manager*. Led update of the conceptual groundwater flow model for GAM with regard to the regional fault zones, and hydraulic properties for the Carrizo-Wilcox, Queen City, and Sparta Aquifers. Analyzed 1,200 geophysical logs to map the Mexia-Talco fault zone and the offsets in the Simsboro formation. Used water levels and pumping rates from large scale aquifer tests to estimate aquifer hydraulic properties and to help recalibrate the GAM. Refined the numerical grid around rivers to improve the GAM's capability to simulate groundwater-surface water interaction. Conducted a literature review to characterize the physical and hydraulic properties of the Colorado Alluvium in the GMA 12 area. Developed a geohydrostratigraphic model to provide relationships and constraints for assigning hydraulic properties to aquifers during model calibration. Conducted workshops with stakeholders to request information and to discuss approaches to modeling.

Hydrogeologic Consultant for 2022 Joint Planning Cycle, GMA 16,. 2018-2022. *Project Manager.* INTERA guided GMA 16 through the GMA 16 joint planning process, which culminated with the writing and TWDB's acceptance of the Explanatory Report. INTERA provided presentation of the nine factors that require condition for development of desired future conditions. INTERA performed all GAM simulations and provide technical support for all Districts on an as needed basis.

Hydrogeological Characterization of the Carrizo-Wilcox Aquifer, Evergreen UCWD, 2017-2019. *Project Manager.* INTERA analyzed approximately 300 geophysical logs to map the stratigraphic boundaries for the Carrizo-Wilcox Aquifer based on a chronostratigraphic framework. This framework was used to map ten major transgressive shales that are key markers and boundaries for delineating the Carrizo-Wilcox Aquifer. Approximately 12,000 sand intervals were identified. For each of the sand interval, the total dissolved solids (TDS) concentration of the groundwater in the sand was estimated based on the resistivity value of the sand interval. The TDS concentrations calculated from the resistivity values were used to group the water quality of the groundwater into the following classifications: fresh water , slightly saline, moderately saline, and very saline.

Hydrogeologic Consultant for 2016 Planning Cycle, GMA 15, 2012-2016. *Project Manager.* INTERA guided GMA 15 through the GMA 16 joint planning process, which culminated with the writing and TWDB's acceptance of the Explanatory Report. INTERA provided presentation of the nine factors that require condition for development of desired future conditions. INTERA performed all GAM simulations and provide technical support for all Districts on an as needed basis.

Evaluation of DFC Compliance, Multiple GCDs in GMA 15, 2019-2022. *Project Manager.* INTERA assembled and performed quality check water level data for GMA 15 from 2000 through 2022 from GCDs and from the TWDB. Using several advanced geostatistical techniques, the water level was interpolated to generate continuous surfaces for the water levels across the Chicot and Evangeline aquifers. The interpolated water levels were used to determine the average water levels for the and check compliance with DFCs for the following four GCDs: Victoria County, Refugio, Texana, and Calhoun County. Results for each GCD were presented to each of the GCD boards and the complete data set and analysis were document in a report.

Monitoring of Surface Water-Groundwater Interaction, Lower Colorado River Authority, 2021-Present. *Project Manager.* INTERA is currently monitoring groundwater levels and river water levels at LCRA test site at Pope Bend Vista Ramp Facility. The equipment is measuring temperature, TDS concentrations, and water levels at 15 minute intervals and INTERA is uploading the data automatically to a web site where INTERA and LCRA can monitor the data in real time. The project is a continuous of INTERA report documenting and modeling groundwater -surface water interaction along the Colorado River.

Hydrogeological Characterization of the Yegua-Jackson Aquifer, Evergreen UCWD, 2019-2020. *Project Manager* INTERA analyzed approximately 550 geophysical logs to map the stratigraphic boundaries for the Yegua-Jackson Aquifer are based on a chronostratigraphic framework. The logs were used to map sand units and estimated porosities that combined with results from aquifer pumping tests and water quality sampling to develop a comprehensive hydrogeogeolgical model to support rule making. The hydrogeological model was used in collaboration with the GAM to validate and to modify rules related to well spacing and production.

Technical Support for Second Round of Joint Planning in Groundwater Management Area 12, Post Oak Savannah Groundwater Conservation District, Milano, TX. 2012 – 2017. *Senior Hydrogeologist*. Participated in approximately 20 public meetings conducted by GMA 12 to establish DFCs for the Yegua-Jackson, Brazos River Alluvium, Sparta, Queen City, and Carrizo-Wilcox Aquifers. Presented information on the geohydrology, water resource strategies, water demands, and groundwater pumping for the GMA in support of establish appropriate DFCs that balance production and conservation. Worked with five GCDs and other consultants to construct alternative future pumping scenarios and applied groundwater models to evaluate the impacts on groundwater resources from the alternative pumping scenarios. Contributed to the writing of an Explanatory Report and response to public comments on DFCs considered by the GMA.

Red Sands Groundwater Conservation District Management Plan, Red Sands Groundwater Conservation District, Hidalgo County, TX. 2017. *Project Manager*. Updated Red Sands GCD Groundwater Management Plan. Assembled historical pumping, characterized hydraulic properties of Gulf Coast Aquifer System, summarized groundwater needs and supplies from the state water plan for Hidalgo County. Served as the primary point of contact for TWDB. Submitted draft and final management plan to the TWDB.

Neil Deeds, PhD, PE, PG
Principal Water Resources Engineer

Years of Experience: 26

Education:
- PhD, 1999, Civil Engineering, University of Texas
- MS, 1997, Civil Engineering, University of Texas
- BS, 1994, Environmental Engineering, University of Oklahoma

Professional Registrations/Affiliations:
- Professional Engineer, TX, 2003, No. 92741
- Professional Geoscientist, TX, 2021, No. 15238

Professional History:

2014 – Present	Vice President, Principal Water Resources Engineer – INTERA Incorporated, Austin, TX
2009 – 2014	Group Lead, Senior Water Resources Engineer – INTERA Incorporated, Austin, TX
2006 – 2014	Adjunct Professor – Department of Petroleum and Geosystems Engineering, University of Texas, Austin, TX
1999 – 2009	Water Resources Engineer – INTERA Incorporated, Austin, TX

Specialized Training & Software:
- PEST++ and PyEMU, 2021
- MikeSHE Training, Danish Hydrology Institute, 2009
- MODFLOW, MT3DMS, SEAWAT, SWIFT II, SWAT, NUFT, UTCHEM, and UTSTREAM for fluid-flow modeling and GTFM/nSIGHTS

Neil Deeds has over two decades of research and applied experience in modeling and analysis of hydrologic systems, including water availability, flow, and transport. He has managed dozens of projects that focus on hydrogeology, ranging from design and installation of water wells to development of regional GAMs. Neil has served as a technical manager or technical lead in quantifying processes such as recharge, hydraulic conductivity, and surface water/groundwater interaction in support of regional and sub-regional groundwater modeling projects. Examples of his relevant experience include performing modeled available groundwater (MAG) simulations to support development of DFCs in GMA 1; providing joint planning assistance, focused on evaluating the nine factors considered in the explanatory report for the Trinity and brackish portion of the Edwards aquifers, to the GCDs in GMA 10; evaluating and implementing a multi-phase groundwater monitoring network for the Upper Trinity GCD; and providing groundwater modeling support for developing DFCs in GMA 8. Neil is also currently serving as the technical lead for providing hydrogeological services to the newly established Central Texas GCD.

Representative Project Experience

Hydrogeologic Consultant, Central Texas Groundwater Conservation District, Burnet County, TX. 2020 – Present. *Project Manager and Lead Hydrogeologist*. Acting as consulting hydrogeologist for Central Texas Groundwater Conservation District (CTGCD). Activities to date have included providing reviews of water availability studies associated with subdivision plats (with proposed private wells on every lot). This included writing a memo suggesting best practices for performing the impact modeling in these studies. Also developed and performed a new MAG simulation for the Llano-Uplift Aquifer System, in response to a request by CTGCD regarding several stakeholder comments. Provided a review and analysis of a water balance from an aggregate mine to help assess whether the mine is using more groundwater than their permit allows.

Wellfield Interference Modeling in the Simsboro Aquifer, City of Bryan, TX. 2020 – Present. *Project Manager and Lead Groundwater Modeler*. Wellfield scale groundwater modeling is ongoing for the City of Bryan. Simulation of the City's current wellfield consisted of constructing a wellfield-scale groundwater model using MODFLOW. The model was based on the central Carrizo-Wilcox groundwater availability model, but was refined horizontally to approximate 500-foot gridblocks, centered on the City wellfield. General head "distance boundaries" were used along the perimeter, with heads interpolated from the simulated values in the regional model. Simulated pumping from the regional model was removed in the area of the City wellfield, and the last 10 years of pumping records were used to create a well file reflecting actual wellfield pumping. The simulated response at monitoring wells in and around the wellfield was compared favorably to measured values, indicating that the local model was well-calibrated for predicting water-level response to wellfield pumping. Ongoing activities include simulation of new wells and future pumping in the wellfield and determining where and the magnitude of interference at existing wells.

Groundwater Modeling Support, Groundwater Management Area 8, Gainesville, TX. 2015 – 2016. *Modeler and Analyst.* Supported the simulation and post-processing of several MAG simulations to support the development of desired future conditions (DFCs) by the members of Groundwater Management Area 8 in North Texas. The simulations were performed with the updated Northern Trinity and Woodbine Aquifer Groundwater Availability model. Simulations included future pumping

based on simple multiples of existing pumping, as well as matching particular future conditions with respect to available drawdown in the aquifer.

Aquifer Storage and Recoverability Modeling in the Simsboro Aquifer, City of Bryan, TX. 2019 – Present. *Project Manager and Lead Groundwater Modeler*. Led construction of a model of the Simsboro Aquifer to simulate ASR for a production well that was being repurposed for recharge by the City of Bryan. The recoverability modeling was performed to support application for a permit from the TCEQ. Used well logs to characterize the stratigraphy of the Simsboro Aquifer at the well location. Evaluated pump test data to estimate hydraulic conductivity and storativity and constructed a groundwater model that reflected these hydraulic properties and the structure of the Simsboro. Simulated the proposed cycle testing using transport modeling and estimated the recoverability of the recharge water. Recently performed new simulations to support permitting of two to three additional ASR wells for the City. These simulations include assessing how the existing wellfield drawdown cone affects the movement of the storage "bubbles" for any proposed ASR wells, how the hydraulics of the ASR wells might affect existing wells in terms of creating artesian conditions, and how operational strategies may affect the recoverability of the recharge water.

Groundwater Joint Planning Technical Assistance, Groundwater Management Area 1, Amarillo, TX. 2014 – 2015. *Project Manager and Lead Hydrogeologist.* Serving as a technical expert and facilitator for the development of long-term groundwater management goals for the northern portion of the Ogallala Aquifer and Dockum Aquifer in Texas. The area includes Amarillo and 18 surrounding counties that are dominated by irrigated agriculture. Over 30 percent of the groundwater used in Texas is produced in GMA 1. Activities included assessing aquifer uses and conditions, water supply needs and management strategies, and environmental impacts and modeling potential future water use and management scenarios. Note that Wade Oliver has taken over this work for the current planning cycle.

Groundwater Joint Planning Technical Assistance, Groundwater Management Area 10, TX. 2014 – 2016. *Hydrogeologist.* Teamed with another contractor to provide technical support and policy guidance to the groundwater conservation districts in GMA 10. Includes development of the GMA explanatory report required as part of the planning process. Specifically tasked with the brackish Edwards Aquifer and the Trinity Aquifer, evaluating the nine factors that are considered in the explanatory report, including hydrogeologic conditions, environmental impacts, etc.

Evaluation and Implementation of a Multi-Phase Monitoring Network, Upper Trinity Groundwater Conservation District, Springtown, TX. 2012 – 2016. *Analyst.* The Upper Trinity Groundwater Conservation District (UTGCD) hired INTERA to create a 3D geological model of the Cretaceous and Paleozoic Aquifer systems underlying the district. At the time the project began, the district was monitoring a network of approximately 100 wells. Performed an in-depth analysis of the wells, revealing that there was some redundancy in the wells that were being monitored. To improve the quality of the monitoring network, evaluated all the possible monitor wells in the district (>4,000) and identified 120 ideally placed wells. Provided district with priority list of target wells. The district is in the ongoing process of contacting the well owners to seek access to the wells with agreeable owners' wells being integrated into the water level measurement program.

Groundwater Availability Model for the Queen City and Sparta Aquifers, Texas Water Development Board, TX. 2002 – 2004. *Lead Modeler and Various Technical Lead Positions*. Lead modeler in the development of a regional-scale groundwater model for the southern portion of the Queen City and Sparta Aquifers. Developed region-wide recharge and ET distributions, and hydraulic conductivity fields. The calibrated models are used to make water availability predictions to the year 2050 using estimates of future water use. The predictive runs include evaluating the sensitivity to climatic conditions such as drought. These models were developed by adding the Queen City and Sparta Aquifers as young sediments overlying the Carrizo-Wilcox Aquifer models.

Development of the Yegua-Jackson Aquifer Groundwater Availability Model, Texas Water Development Board, TX. 2008 – 2010. *Lead Modeler*. Lead modeler on the development of the Yegua-Jackson Aquifer GAM. For the initial conceptual model work, focused on characterization of recharge and discharge mechanisms, including baseflow estimation and conceptualization of groundwater evapotranspiration. Based on the conceptual model, constructed a numerical model in MODFLOW. The model started with a steady-state predevelopment period (representing the natural state of the aquifer before 1900) and then ran for 97 years to 1997. The focus of the transient calibration was on the years from 1980 to 1997. The model included a shallow surficial layer that allowed more realistic modeling of surface water/groundwater interaction, while preserving the confined hydraulic aspects of the deeper sediments. The model was calibrated within industry standard specifications and produced a reasonable water budget for the 97-year transient period.

Daniel Lupton, PG
Senior Geoscientist

Years of Experience: 14

Education:
- MS, 2009, Hydrogeology, University of Texas at San Antonio
- BS, 2006, Resource and Environmental Studies (Geology emphasis), Texas State University

Professional Registrations/Affiliations:
- Professional Geoscientist, TX, 2012, No. 11354, IN, 2014, No. 2512, LA, 2015, No. 901
- Chief Science Advisor: C. L. Browning Ranch
- Member, Geological Society of America, Hydrogeology Division
- Member, Austin Geological Society

Professional History:

2019 – Present	Senior Hydrogeologist, Texas Water Supply Lead and Manager of Aquifer Characterization Group – INTERA Incorporated, Austin, TX
2018 – Present	Senior Hydrogeologist and Manager of Aquifer Characterization Group – INTERA Incorporated, Austin, TX
2015 – 2018	Hydrogeologist and Manager of Aquifer Characterization Group – INTERA Incorporated, Austin, TX
2010 – 2015	Hydrogeologist and Manager of Aquifer Characterization Group – INTERA Incorporated, Austin, TX
2010	Independent Contractor – Lupton Hydrologic, Austin, TX
2009	Intern – Bee Cave Water Well Drilling Services, Austin, TX
2007 – 2009	Research Assistant / Teaching Assistant – University of Texas at San Antonio, San Antonio, TX
2006 – 2007	Technician – Selby Geologic, Austin, TX

Specialized Training & Software:
- ARANZ GEO Advanced Leapfrog Geo Training, 2015
- PetroSkills 40-Hour Sequence Stratigraphy Course (Instructor: Dr. Clyde H. Moore), 2014 and Well Log Interpretation Course (Instructor: Dr. E.C. Thomas), 2013
- 40-Hour General Site Workers Training, OSHA 29 CFR 1910.120(e)(3), 2011 & 8-hr Refresher, 2018

Daniel Lupton is a hydrogeologist and has over a decade of professional experience in project management, water well siting, drilling and testing; water supply wellfield design; water resources modeling; evaluation of geophysical logs; and, hydrogeologic conceptualization. In his current capacity as a Senior Hydrogeologist, Texas Water Development Lead and Manager of the Aquifer Characterization Group, He oversees a group of geologists and engineers that work on a variety of groundwater projects ranging from single well aquifer tests to the design and installation of a 40-well wellfield. As Manager for each of his projects, Daniel oversees costing, field crew scheduling and progress, budgeting, subcontractor management, and stakeholder communications. He has managed budgets up to $6 million and has installed wells up to 4,500 feet deep. In addition, he has participated in the development and application of several regional-scale GAMs and brackish groundwater assessments used for long-term planning and management of water resources in Texas. Daniel has specific expertise in aquifer characterization and interpretation of geophysical logs to define stratigraphy, lithology, structure, and water quality. This expertise has been applied in a variety of settings including groundwater quality characterizations, well and wellfield design, groundwater model parameterization, etc. He has worked for clients that include the state of Texas, multiple groundwater conservation districts, municipalities, proppant mines, oil and gas companies and water prospectors.

Representative Project Experience

Effects of Faulting in the Carrizo-Wilcox Aquifer in Groundwater Management Area 12, Texas Water Development Board, TX. 2015 – 2017. *Geologist*. Evaluated and correlated over 500 geophysical logs, primarily spontaneous potential and resistivity/induction, in support of a regional evaluation of the effects of faulting within the Simsboro and Carrizo intervals of the Carrizo-Wilcox Aquifer system on the regional groundwater flow trends. Evaluated pumping tests to determine if fault boundaries could be recognized in the drawdown data. Where possible, distance drawdown algorithms were used to determine approximate locations of the faults. Results were incorporated into a report summarizing the fault geometry and possible sensitivities of the groundwater flow system to the newly proposed fault geometries. Results were incorporated into a revised GAM for the Carrizo-Wilcox Aquifer.

Evaluation of Hydrogeologic Trends within the Evergreen Underground Water Conservation District, South Texas Energy and Economic Roundtable, San Antonio, TX. 2015 – 2016. *Geologist*. Evaluated the occurrence and distribution of water quality within the Carrizo-Wilcox, Queen City-Sparta, Yegua-Jackson, and Gulf Coast Aquifer systems that underlie the Evergreen Underground Water Conservation District (EUWCD). Initial phases of the project involved assembling relevant water well data and GAM data from the TWDB. South Texas Energy and Economic

Roundtable (STEER) member companies provided their geophysical, well construction and water chemistry data in support of an analysis of the distribution of water quality using existing geophysical logs/water chemistry samples and newly acquired logs run in oil and gas wells. Initial phases of this involved organizing the massive amounts of data into a consistent format and then evaluating the wells on an aquifer-by-aquifer basis. Undeniable trends in water quality by aquifer and water quality relative to distance down dip were determined. The results of this analysis along with other educational material were presented to the EUWCD Board at a 4-hour educational course emphasizing the advantages of using groundwater management zones to regulate the groundwater.

Characterization and Assessment of Production of Fresh, Brackish, and Saline Groundwater in the Carrizo Wilcox Aquifer in Groundwater Management Area 13, Texas Water Development Board, Various Locations, TX. 2016. *Hydrogeologist*. Supported a TWDB-funded study, conducted under an expedited schedule to meet the requirements of a legislative mandate, aimed at identifying and evaluating the availability of brackish groundwater in Texas. Responsibilities on the project included review of geophysical logs and log derived data, mainly lithology and water quality. Water quality estimations were derived from relationships between resistivity signatures and sampled water quality from nearby water wells. This data was incorporated into regional volumetric calculations of fresh, brackish, and saline groundwater. Subsequently, potential groundwater production areas were identified, and 3D groundwater models were developed to simulate impacts to fresh groundwater resources from a series of hypothetical wellfields pumping brackish groundwater.

Construction of Geologic Model, Panola Groundwater Conservation District, Carthage, TX. 2014 – 2015. *Geologist*. The Panola Groundwater Conservation District (PCGCD) was interested in mapping the subsurface geologic units within their district, mainly the lower units within the Wilcox Aquifer. Used previously published information and geophysical well logs to supplement areas with low data density. The analysis required the construction of a geologic model, along with the analysis of hundreds of geophysical logs for structural contacts and lithologic properties. In addition, all groundwater wells within the study area that had digitized driller's logs were incorporated into the geologic model. Study results were used to better understand the hydraulics of the groundwater units within the PCGCD.

Evaluation of Water Quality and Stratigraphy, Panola County Groundwater Conservation District, Panola County, TX. 2013. *Lead Geologist*. PCGCD is responsible for the protection, conservation, and enhancement of groundwater resources in Panola County. This project entailed the evaluation of the stratigraphy and groundwater quality distribution throughout the county. Responsibilities included the creation of structural surfaces for the base of the Wilcox Aquifer and the base of useable-quality water, which were visually depicted in a series of eight (four along dip and four along strike) cross sections and a composite fence diagram. In addition, picks from the RRC) were evaluated to check agreement and consistency with documented sources for the base of the Wilcox Aquifer. Upon receiving a detailed report and presentation, the client immediately began to appropriate funds for a second, more detailed analysis of the aquifer stratigraphy and water quality distribution.

Evaluation and Implementation of a Multi-Phase Monitoring Network, Upper Trinity Groundwater Conservation District, North-Central TX. 2012 – Present. *Hydrogeologist.* Supported the development of a 3D geological model of the Cretaceous and Paleozoic Aquifer systems underlying the district. At the time the project began, the district was monitoring a network of approximately 100 wells. An in-depth analysis of the wells revealed that there was some redundancy in the wells that were being monitored. To improve the quality of the monitoring network, evaluated all the possible monitor wells in the district (>4,000) and identified 120 ideally placed wells. The district is currently contacting the well owners to seek access to the wells, and the next phase will be to go to each well with the district staff to measure the water level.

Structural and Water Quality Cross Sections, Evergreen Underground Water Conservation District, Various Locations, TX. 2016. *Lead Geologist*. EUWCD requested the integration of existing geologic data on the various aquifer systems underlying the district into a set of 5 cross sections that could be used for research purposes. The EUWCD had previously worked with a local expert to define the sequence stratigraphic boundaries in the area for the Carrizo and Wilcox systems. This data, in combination with sand/clay picks, structural picks for the Queen City-Sparta, Yegua, Jackson, and Gulf Coast units were all combined and plotted on a series of five large scale horizontally and vertically accurate cross sections. Additionally, water quality for each of the sands was calculated using a series of documented resistivity cutoffs for the various water bearing units from the ground surface to 8,000 feet below ground surface. The resulting cross sections and accompanying location maps were presented to the district and resulted in the acquisition of additional cross sections for the remaining two counties in the EUWCD. Oversaw the data collection, analysis, and cross section construction.

Tingting Yan
Senior Geoscientist

Years of Experience: 20

Education:
- MS, 2007, Hydrogeosciences, Virginia Polytechnic Institute and State University
- MS, 2004, Hydrogeology and Water Resources, Nanjing University
- BS, 2001, Hydrogeology and Engineering Geology, Nanjing University

Professional Registrations/Affiliations:
- Engineer in Training (EIT), TX, 2010, No. 44547
- Member, National Ground Water Association

Professional History:

2007 – Present	Hydrogeologist – INTERA Incorporated, Austin, TX
2005 – 2007	Teaching Assistant - Virginia Polytechnic Institute and State University, Department of Geosciences, Blacksburg, VA
2006	Walter Spofford Intern – Resources for the Future, Washington, DC
2004 – 2005	Research Assistant – Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ
2002 – 2004	Research Assistant – Nanjing University, Department of Earth Sciences, Nanjing, China

Specialized Training & Software:
- MODFLOW, MT3D, MODPATH, UCODE, PEST, GMS, Groundwater Vistas, Argus One
- ArcGIS, Surfer
- FORTRAN, Matlab

Tingting Yan brings research and applied experience in developing and applying groundwater models, and conducting hydrogeological studies and analyses to support water resources development and management. Her modeling experience includes using codes including various MODFLOW and MT3D, and parameter estimation with model optimization codes such as PEST and UCODE. She is also a skilled programmer, using languages and codes that include FORTRAN, Matlab, Python, and R. She has experience with GIS software such as ArcGIS and IDRISI, and develops hydrogeologic databases and geodatabases using Access and GIS. Tingting applies her modeling and other technical experience to support a wide range of projects focused on water resources studies, including GAMs of aquifers in Texas, and the development and application of models and other quantitative decision support tools to evaluate water management strategies for regional and local GCDs, groundwater sustainability districts, and other water authorities.

Representative Project Experience

Technical Support on Groundwater Management Area 12 Joint Planning, Post Oak Savannah Groundwater Conservation District/Groundwater Management Area 12, Milano, TX. 2017 – 2018. *Hydrogeologist*. Calculated and analyzed DFCs around Post Oak area based on the most recent GAM. Developed scripts to calculate average drawdown for each county with options on various weighting methods. Supported studies on surface water and groundwater integration in the area of interest. The modeling and analysis results are being used to benefit GMA 12 regional planning and policy making.

Identification of Potential Brackish Groundwater Production Area for Gulf Coast Aquifer System, Texas Water Development Board, Gulf Coast, TX. 2016. *Technical Support/ GIS Analyst*. This study was performed for and funded by Texas Water Development Board (TWDB) to support the understanding and delineation of brackish groundwater resources for the Gulf Coast Aquifer System, a major aquifer that underlies all or parts of 56 counties along the Texas Gulf Coast. INTERA collected and analyzed data to define geologic structure, sand intervals, salinity zones and potential brackish production areas. Activities includes supporting visualization of the salinity zones, developing figures for reports and assembling geodatabase. The results of this project support TWDB to meet legislation goals.

Technical Support and Monitoring, Post Oak Savannah Groundwater Conservation District/ Groundwater Management Area 12, Milano, TX. 2015. *Hydrogeologist*. Provided technical support that included evaluating the impact of the Little River Reservoir on GMA 12 modeling results. Analyzed pumping tests to obtain aquifer permeability. Mapped water quality data and assisted with well permit evaluations. Evaluated impact of faults on modeling results. Evaluated different methods of aquifer assignment at wells; compared aquifer assignment from TWDB and POSGCD in support of a testimony for a TCEQ hearing. Prepared maps of measured water level drawdown and assisted with presentations.

Update of the Central Groundwater Availability Model for the Queen City/Sparta Aquifer, Post Oak Savannah Groundwater Conservation District, Milano, TX. 2014. *Modeler*. Updated the GAM with more accurate pumping data associated with operating the Sandow Mine from 1988 to 1999. Incorporated new pumping data, analyzed the results, evaluated the differences in simulated water levels between the updated and original models, and documented the results. The results showed that

changes made to the pumping rates associated with the Sandow Mine from 1988 to 2000 primarily impact the Simsboro Formation and have a negligible effect on the ability of the GAM to reproduce measured water levels at the regional scale.

Evaluation of Effectiveness and Reliability of Alternate Methods for Measuring Water Production, High Plains Water District, Lubbock, TX. 2012. *Hydrogeologist/GIS Analyst*. This study evaluated the uncertainty and reliability of various "alternate" water-measuring methods for the High Plains Water District. Conducted uncertainty analysis on the current groundwater monitoring network based on the GAM for the Edwards-Trinity (High Plains) Aquifer in West Texas and eastern New Mexico. The uncertainty of the monitoring network was evaluated in three ways: (1) head comparison between interpolated surface from GAM measurements at monitoring locations; (2) geostatistical approach, and (3) cross-validation approach. The results indicated the current monitoring network was adequate to yield a water level surface with a satisfactory approximation to reality.

Development of a Monitoring Strategy, Upper Trinity Groundwater Conservation District, Springtown, TX. 2012. *Hydrogeologist/ GIS Analyst*. A greatest distance approach was developed to design groundwater monitoring networks. The approach was applied to the Upper Trinity Groundwater Conservation District to estimate the required or optimal number of monitoring wells based on an existing monitoring network and to recommend new monitoring well locations. The influence of pumping on developing a better monitoring network was also investigated. Work included a proposal of the greatest distance approach, code development and application, an initial recommendation of Phase II wells, analysis of multiple scenarios, and documentation. The recommended new monitoring network significantly improved performance with a minimum number of additional monitoring wells.

Technical Support on Groundwater Management and Monitoring Plans, Post Oak Savannah Groundwater Conservation District, Milano, TX. 2010 – 2012. *Hydrogeologist/GIS Analyst*. Provided support on the joint planning process, changes to district rules and management plans, and studies to improve the characterization of aquifer properties and processes. Work included evaluating and updating the current database according to management plans, hydrograph plotting, GIS mapping, and water level and well information analysis to help develop desired future conditions scenarios. Also conducted model runs to understand the impact of groundwater pumping associated with the Alcoa Permit.

Evaluation of Desired Future Conditions, Pecan Valley Groundwater Conservation District, Cuero, TX. 2010 – 2012. *Hydrogeologist/GIS Analyst*. Provided support on the evaluation of DFCs and managed available groundwater according to the district rules, model runs to understand the impact of pumping scenarios on average drawdown, and assessment of the impacts of pumping water supply wells for hydraulic fracturing on nearby water wells and the DFCs.

Technical Assistance for Developing Groundwater Management Plans and Groundwater Resource Assessment, Brush Country Groundwater Conservation District, Falfurrias, TX. 2010 – 2012. *Hydrogeologist/Modeler*. Work included analysis of existing wells in the Brush Country Groundwater Conservation District to develop DFCs, model runs with multiple pumping scenarios to understand the impact of pumping on average drawdown, DFC model runs, assessment of groundwater quality and groundwater availability, and hydrograph plotting.

Brackish Groundwater Assessment, Coastal Plains Groundwater Conservation District, Bay City, TX. 2009 – 2012. *Hydrogeologist/GIS Analyst*. Responsible for creating interfaces of freshwater, slightly saline water, and moderately brackish groundwater to define the volumes of the three types of water in Matagorda County and for delineating transmissivity of the Chicot, Evangeline, and Jasper aquifers to help assess the feasibility and economics of producing brackish groundwater.

Groundwater Availability Model of the Yegua-Jackson Aquifer, Texas Water Development Board, TX. 2009 – 2010. *Modeler*. Developed the conceptual and numerical model of a GAM for the Yegua-Jackson Aquifer for the TWDB. Responsibilities included collecting/analyzing data for the Yegua-Jackson Aquifer on climate, water levels, hydraulic properties, streams, springs, and water quality; running pumpamatic tools and quality analyses for the client; developing a data model; making input packages for the MODFLOW model; and report writing.

Revised Groundwater Availability Model of the Northern Trinity and Woodbine Aquifers, North Texas, Northern Trinity, Prairielands, and Upper Trinity Groundwater Conservation Districts, TX. 2013 – 2014. *Hydrogeologist*. Part of a team responsible for revising and updating this GAM to provide the GCDs with a more accurate modeling tool for assessing groundwater conditions and availability over a 50-year planning period. Specific responsibilities included evaluation and incorporation of water-level data; collection, analysis, and implementation of pumping data; and model documentation.

Ryan Harmon, PhD
Hydrogeologist

Years of Experience: 7

Education:
- PhD, 2022, Hydrogeology, Colorado School of Mines
- BS, 2014, Earth Science, University of California
- BA, 2014, Environmental Studies, University of California

Professional History:

2020 – Present	Hydrogeologist – INTERA Incorporated, Houston, TX
2014 – 2019	Teaching Assistant – Colorado School of Mines, UC Santa Cruz, and National Outdoor Leadership School, Lander, WY
2015 – 2022	PhD Candidate – Colorado School of Mines, Golden, CO
2014 – 2016	Staff Researcher – Hydrogeology Group, UC Santa Cruz, Santa Cruz, CA
2012 – 2014	Research Assistant, Hydrogeology and Biochemistry Groups, UC Santa Cruz, Monterey Bay, CA

Specialized Training:
- Python, MATLAB, R
- PEST++ and PyEMU
- MODFLOW , ArcGIS, Illustrator, MS Office, LaTex, geophysical inversion, COMSOL MultiPhysics, ParFlow

Ryan Harmon is a hydrogeologist with academic and research experience that includes hydrogeophysics and groundwater and surface water modeling. He brings experience working with local agencies, municipalities, and citizen stakeholder groups. His work has contributed to the first net-metering groundwater recharge program in California and new technologies to promote denitrification in recharged groundwater. Ryan communicates the results of his work through presentations given to diverse groups of stakeholders and through scientific publications in journals such as Water Resources Research. He is currently working on a number of different groundwater related projects, but is focused on investigating connections between groundwater withdrawals and subsidence in the Gulf Coast region of Texas.

Representative Project Experience

Development of Historical Pumping Estimates for the Northern Gulf Coast Region, Harris-Galveston Subsidence District, TX. 2021. *Hydrogeologist*. Developed estimates of historical pumping from the northern Gulf Coast aquifer for the period between 1900 and 2018 to be used in the next-generation Houston-area groundwater flow and land subsidence model using MODFLOW-6 and the CSUB process. The model will be used to guide future regulatory actions related to subsidence and groundwater use.

Development of Monitoring Well Network and Program, Prairielands Groundwater Conservation District (PGCD), Cleburne, TX. 2021 – 2022. *Hydrogeologist*. Developed monitoring program that includes potential well locations, recommended sampling protocols, and a strategic monitoring plan. Assembled groundwater well and hydrogeological data from state agencies and consulting reports, and identified preferred monitoring locations to demonstrate compliance to drawdown limits associated with DFCs adopted by GMA 8. Compiled and analyzed water levels, water quality data, and regional groundwater model results, and created GIS datasets and maps.

Regional Aquifer Storage and Recovery and Aquifer Recharge Study Prairielands Groundwater Conservation District, Cleburne, TX. 2021. *Project Manager*. Led regional assessment of the suitability of each of the aquifer units within PGCD for ASR and aquifer recharge. Used ranking matrix strategy to assess how parameters such as depth, hydraulic conductivity, storativity, porosity, and other factors could affect hydrogeologic suitability. Raw hydrogeologic parameters were extracted from the Northern Trinity GAM, and a weighting and scoring scheme was applied to create scores for the recharge, storability, and recoverability categories. These scores were then combined to form a final hydrogeologic suitability score.

Hydrogeologic Assistance for Groundwater Management, Mid-East Texas Groundwater Conservation District, TX. 2022 – Present. *Project Manager and Lead Hydrogeologist*. Providing consultation on the impacts of proposed pumping under permit applications, assistance with developing hydrogeologically appropriate well spacing rules, and evaluating long-term groundwater availability to guide development of long-term groundwater management goals (DFCs).

Subsidence Impacts on the Spring Creek Watershed, Harris-Galveston and Fort Bend Subsidence Districts, Houston, TX. 2021 – Present. *Hydrogeologist*. Developing future subsidence grids that will be used to evaluate subsidence impacts on flood risk along Spring Creek. Future subsidence grids were constructed using a novel approach, which utilized both measured (via GPS and satellite) and modelled data. The results of this work will provide insight into the potential hazard and economic costs of continued subsidence resulting from groundwater use.

Technical Support for Desired Future Conditions Plan Update, Groundwater Management Area 14, Houston, TX. 2020. *Hydrogeologist*. Provided technical assistance during regional planning process for GMA 14. Focused on evaluating how planned groundwater management strategies impact surface-groundwater interactions.

Ross Kushnereit
Hydrogeologist

Years of Experience: 8

Education:
- MS, 2017, Geology, University of Texas at San Antonio
- BS, 2015, Geological Sciences, Angelo State University

Professional Registrations/Affiliations:
- Geoscientist in Training (GIT)

Professional History:

2017 – Present	Hydrogeologist – INTERA Incorporated, Austin, TX
2015 – 2017	Hydrologist – U.S. Geological Survey, San Antonio, TX
2014 – 2015	Student Hydrologist – U.S. Geological Survey, San Angelo, TX
2013 – 2015	Student Research Assistant – Angelo State University, San Angelo, TX

Specialized Training & Software:
- Python, GIT, LATEX
- PEST++, MODFLOW6, MODFLOW & MODFLOW-USG, MODPATH, MODPATH3DU, TTim, PEST, HEC-RAS
- FloPy, pyEMU, scikit-learn, GDAL, Geopandas, rasterio, Flask
- QGIS, Texmaker
- Windows, OSX, Linux

Ross Kushnereit is experienced in numerical flow and transport modeling for water resources applications for both surface and groundwater as well as model calibration and uncertainty. He has developed skills in model planning through utilizing geographical information systems, remote sensing, map analysis and composition. He has applied modeling codes such as MODFLOW, HEC-RAS and HEC-HMS. His software experience also includes GIS through software such as QGIS and ESRI products. His programming languages include Python and GIT, which he applies to a variety of hydrogeologic data used for model development. More recently, Ross has performed model calibration and uncertainty analysis using the popular inversion software PEST++. He has worked independently and with teams, on a wide range of diverse and unique projects for state and local governments as well as federal clients.

Representative Project Experience

Evaluation of Uncertainty in the Groundwater Availability Model Used for Groundwater Management Area 12, Post Oak Savannah Groundwater Conservation District, Milam and Burleson Counties, TX. 2021 – 2022. *Lead Modeler*. Estimated model uncertainty in the Queen City-Sparta and Carrizo-Wilcox GAM used in GMA 12 based on new information on aquifer properties from well tests and monitoring data that were not available during development of the original model. This also helped to show uncertainty in the DFCs for the GMA 12 region.

Evaluation of Aquifer Storage and Recovery, Post Oak Savannah Groundwater Conservation District, Milano, TX. 2018 – 2019. *Modeler*. Used the particle tracking program; mod-PATH3DU to estimate recoverability of artificial recharge in an unstructured multilayered model representing a portion of the GMA 12 groundwater availability model. Simulations were conducted using Python with MODFLOW-USG and mod-PATH3DU.

Brackish Groundwater Identification and Development of a Flow and Transport Model, Victoria County Groundwater Conservation District, Victoria County, TX. 2018 – 2019. *Lead Modeler*. Designed a flow and transport model of the Gulf Coast Aquifer. Tasks included estimating the salinity at different depths using geophysical well logs, estimating the percentage of sand and clay in each formation, and modeling drawdown of fresh water from predictive pumping in brackish water. Simulations were conducted using FloPy with MODFLOW-NWT.

Updated Representation of the Simsboro Formation in the Groundwater Management Area 12 Groundwater Availability Model, Milam and Burleson Counties, TX. 2020. *Lead Modeler*. Evaluated a new transmissivity field in the Simsboro Formation using well test that were not available during development of the original GMA 12 model.

Geostatistical Analysis, Victoria County Groundwater Conservation District, Victoria County, TX. 2020 – 2021. *Lead Modeler*. Designed a geostatistical package, using Python, for interpolating water levels in the in the Gulf Coastal Aquifer System using a combination of MODFLOW head results and measured water level data.

Evaluation of Potential Subsidence from Brackish Groundwater Production, Harris-Galveston Subsidence District, Harris, Fort Bend, and Galveston Counties, TX. 2017. *Modeler*. Supported the generation of a 40-year, regional depiction of groundwater levels and subsidence of the Gulf Coast Aquifer System in Harris, Fort-Bend, and Galveston counties. Project activities included the automation of water level data processing, mapping contours of water levels in coastal aquifer system, time-series analysis and quantification, geostatistical and geospatial analysis, and ASCII table data processing. Also developed a risk model of subsidence related to pumping in these counties. Used MODFLOW-NWT and the subsidence package to evaluate the impacts of development on land subsidence.

II.B Financial Capability and Stability

As a contractor to the District, INTERA will be financially responsible for performance of professional services related to hydrogeology and groundwater management. INTERA has been operating profitably as an employee-owned company for 48 years and is among the financially strongest businesses of our size operating in the water resources and environmental consulting business today. To ensure we have the financial resources needed to successfully execute projects of all sizes, our banking partner, JPMorgan Chase, has committed an aggregate of $6 million in line of credit and term loans, although we have not requested or used any advances on these commitments. Additionally, as of the date of this proposal, INTERA has approximately $4 million in cash and cash equivalents. The resources described herein provide financial strength capable of responsibly handling any capital and administrative requirements of this contract with Brazos Valley GCD. As further evidence of our financial capability and stability, our most recent audited financial statement can be provided to the District upon request.

II.C Professional Memberships

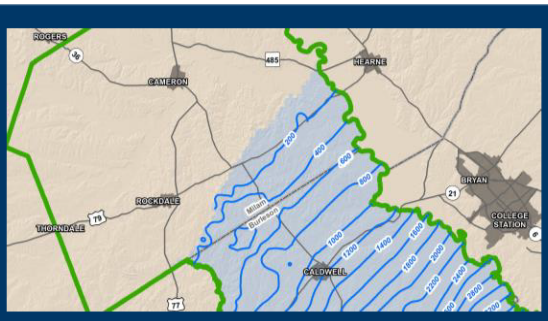
The registrations, certifications, and other professional memberships for the five key personnel being proposed to support the Brazos Valley GCD are summarized in **Table 1**. All our proposed key personnel are either registered professional engineers or professional geoscientists, or both, and are in good standing with the State of Texas.

Table 1. Registrations and Professional Memberships for Proposed Key Personnel

Name	Registration/ Certification	Professional Memberships
Wade Oliver	▪ Professional Geoscientist, TX, No. 11112	▪ Texas Water Conservation Association ▪ Texas Aquifer Storage and Recovery Association ▪ Texas Alliance of Groundwater Districts ▪ Houston Advanced Research Center Groundwater Science Advisory Committee
Van Kelley	▪ Professional Geoscientist, TX, No. 4923	▪ Association of Ground Water Scientists and Engineers ▪ American Geophysical Union, Water Resources Division ▪ Texas Water Conservation Association
Neil Deeds	▪ Professional Engineer, TX, No. 92741 ▪ Professional Geoscientist, TX, No. 15238	▪ Texas Water Conservation Association ▪ Texas Alliance of Groundwater Districts
Daniel Lupton	▪ Professional Geologist, TX, No. 11354; IN, No. 2512; LA, No. 901	▪ Chief Science Advisor: C. L. Browning Ranch ▪ Geological Society of America, Hydrogeology Division ▪ Austin Geological Society
Steve Young	▪ Professional Engineer, TX, No. 88049; TN, No. 19644; MA, No. 43235 ▪ Professional Geoscientist, TX, No. 231; TN, No. TN3727 ▪ Certified Ground Water Professional, No. 3027410, NGWA	▪ Texas Water Conservation Association ▪ Texas Alliance of Groundwater Districts

II.D Experience and Qualifications

INTERA has completed dozens of projects for GCDs and the TWDB in support of groundwater planning, development, management, and protection in Texas. These projects cover the complete spectrum of services anticipated under this contract with the Brazos Valley GCD. Several representative examples of our experience on similar engagements are summarized in **Figure 1** on the next page. Additional details on several of the projects presented in Figure 1 are provided



Project Name and Location	Relevant Experience												
	Major and Minor Aquifers						Scope of Work Areas						
	Carrizo	Wilcox (Simsboro, Calvert Bluff, Hooper)	Sparta	Queen City	Yegua-Jackson	Brazos River Alluvium	Hydrogeologic mapping, modeling, and investigations	Groundwater management plans	Rules on well spacing and production limits	Presentations to GCDs, planning groups, and general public	Groundwater availability modeling	Expert testimony; working with legal counsel	Joint planning with GMAs; developing DFCs
Hydrogeology Services to Support Groundwater Planning and Management for Post Oak Savannah GCD and GMA 12, Central Coastal Plain, TX	■	■	■	■	■	■	■	■	■	■	■		■
Hydrogeology Services to Support Groundwater Planning and Management for Lone Star GCD and GMA 14, Southeast TX							■	■	■	■	■	■	■
Update to the Groundwater Availability Model of the Carrizo-Wilcox, Queen City, and Sparta Aquifers for GMA 12, Central Coastal Plain, TX	■	■	■	■		■	■			■	■		
Hydrogeology Services and Modeling to Support Groundwater Planning and Management for Panola County GCD, Northeast TX	■	■					■	■	■	■	■		■
Hydrogeology Services to Support Groundwater Planning and Management for Evergreen Underground Water Conservation District, South TX	■	■	■	■	■		■	■	■	■	■		■
Development of a Groundwater Availability Model of the Brazos River Alluvium Aquifer for Texas Water Development Board, TX	■	■	■	■	■	■	■			■	■		
Identification and Characterization of Brackish Groundwater Resources in GMA 13 for the Texas Water Development Board, TX	■	■	■	■			■			■			
Hydrogeology Services to Support Groundwater Planning and Management for Red Sands GCD, South TX							■	■	■	■			
Development of a Groundwater Availability Model of the Yegua-Jackson Aquifer for Texas Water Development Board, TX					■		■			■	■		
Hydrogeology Services to Support Groundwater Planning and Management for Brush County GCD, Falfurrias, TX							■	■	■	■	■		■
Development of Groundwater Availability Models of the Queen City-Sparta Aquifers for Texas Water Development Board, TX	■	■	■	■			■			■	■		
Hydrogeology Services to Support Groundwater Planning and Management for Lone Star GCD, Coastal Plains, TX					■		■	■	■	■		■	■
Hydrogeology Services to Support Groundwater Planning and Management for Barton Springs-Edwards Aquifer Conservation District, Central TX							■					■	
Hydrogeologic Consultant for the Mid-East Texas Groundwater Conservation District, TX	■	■	■	■	■	■	■	■	■	■	■		■
Hydrogeology Services for Groundwater Production and Export Permits for Lower Colorado River Authority, Bastrop County, TX	■	■					■					■	
Hydrogeology Services to Support Groundwater Planning and Management for Coastal Bend GCD, Wharton and Matagorda Counties, TX							■	■	■	■			
Development of Groundwater Availability Models for the Northern and Southern Portions of Carrizo-Wilcox Aquifer for TWDB, TX	■	■					■			■	■		
Hydrogeology Services to Support Groundwater Planning and Management for Pecan Valley GCD, Cuero, TX							■	■	■	■			
Use of Geochemical Data to Improve Groundwater Models in GMAs 14, 15, and 16, Coastal Plains, TX						■	■			■	■		
Hydrogeology Services to Support Groundwater Planning and Management for Northern Trinity GCD, Tarrant County, TX							■	■	■	■			■
Evaluation of Fresh and Brackish Groundwater Availability for Campbell Group, Anderson, Cherokee, and Houston Counties, TX	■	■					■						

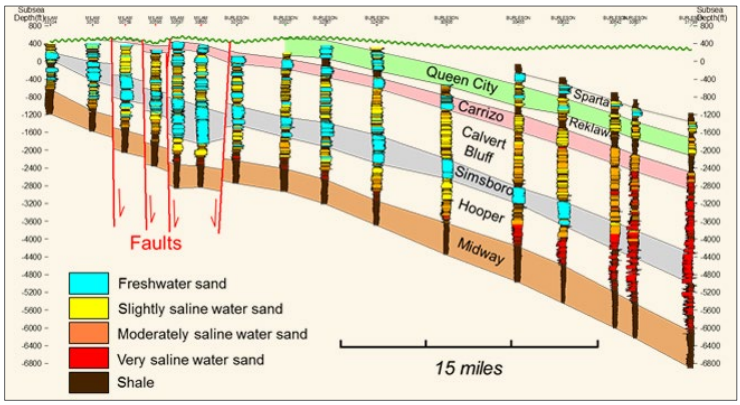
Figure 1. Examples of INTERA's relevant project experience

below. Because Section II.G includes additional projects specifically demonstrating our experience involving major and minor aquifers in the Brazos Valley GCD, the project descriptions below emphasize our experience supporting GCDs and GMAs, irrespective of the aquifers being managed. A more comprehensive listing of projects completed for GCDs is provided in the next section (II.E).

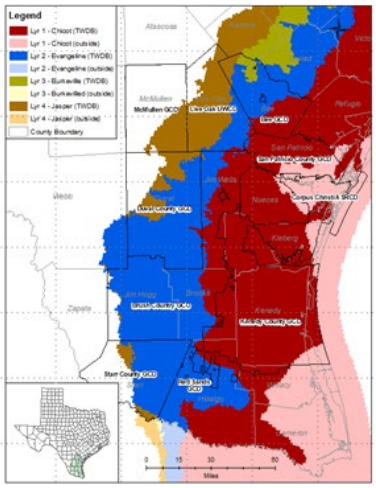
Hydrogeological Services to Support Groundwater Planning and Management, Central TX

Client: Post Oak Savannah Groundwater Conservation District

Period of Performance: 2010 to 2022 (ongoing)



INTERA has performed a wide range of technical services for Post Oak Savannah GCD to support the joint planning process, changes to District rules and management plans, and studies to improve the characterization of aquifer properties and processes. We have performed numerous groundwater availability simulations that have been used to evaluate DFCs and the validity of the conceptual groundwater flow models. We have prepared documents and presentations to explain the rationale for the selected DFCs and performed model simulations to demonstrate that the DFCs are physically possible. INTERA's Steve Young has been a lead presenter in public meetings for GMA 12 and the Post Oak Savannah GCD and has helped prepare the GMA 12 DFC submittal to the TWDB since the first planning cycle. In the 2016 and 2022 planning cycle, INTERA has been involved with all of the GAM simulations in GAM 12 to evaluate and establish DFCs. INTERA has led the updated in several Management Plan updates including an update in 2022. INTERA has also provide technical support with the development of the District rules and policies associated with evaluating compliance with DFCs. As part of the compliance evaluation, INTERA led an effort to convert oil and gas wells into monitoring wells for the Simsboro Aquifer. We also assisted in expanding the POSGCD monitoring network to approximately 350 wells.



Hydrogeologic Services for Joint Regional Planning and Preparation of the Explanatory Report for GMA 16

Client: Groundwater Management Area 16

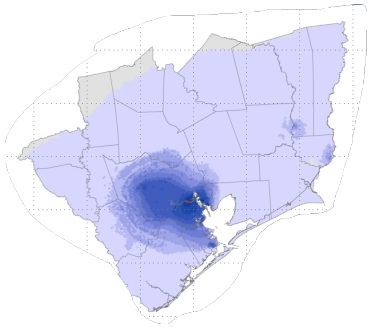
Period of Performance: 2018 to 2022

INTERA provided technical support to GMA 16 with the evaluation and adoption of DFCs. GMA 16 consists of all or portions of 10 GCDs in south Gulf Coast Aquifer System. INTERA assisted the GMA 16GCDs in identifying the type and number of GAM simulations for investigating alternative DFCs. Modeling input files were prepared for the DFCs GAM simulations and performed the numerical simulations of groundwater flow. Major modeling tasks included constructing the pumping input files based on information submitted by the GCDs and calculating DFCs based on average drawdown values across each county for the different aquifers in the Texas Gulf Coast. INTERA presented on the nine factors at GMA 16 meeting and prepared an explanatory report to address the nine factors listed in Texas Water Code Section 36.108(d)(1).

Hydrogeologic Services for Joint Regional Planning and Preparation of the Explanatory Report for GMA 14

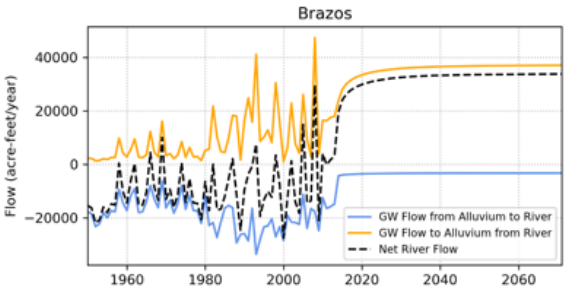
Client: Groundwater Management Area 14

Period of Performance: 2017 to 2022



INTERA provided technical support to GMA 15 with the evaluation and adoption of DFCs and developing of the explanatory report. INTERA assisted GMA 14 with addressing the nine factors listed in Texas Water Code (TWC) Section 36.108(d) for developing DFCs. Our work included reviewing the GAM run selected by GMA 14 to

assess DFCs and using the Gulf Coast Aquifer GAM to perform additional simulations. INTERA also quantified – to the extent possible – each end of the balancing test, which is defined in TWC Section 36.108 (d-2) as balancing the proposed DFC between the highest practicable level of groundwater production and the conservation, preservation, protection, recharging, and prevention of waste of groundwater and control of subsidence in the management area. This will involve a series of model simulations using the Houston Area Groundwater Model to define a low pumping scenario to represent conservation and preservation and a high pumping scenario that represents the upper limits of practicability of production. INTERA identified any characteristics of the model for GMA 14 that may have skewed skew the results for either side of that balance. Each of the factors, the balancing test, and any modeling results will be presented at GMA 14 meetings and documented in an explanatory report, which will also include the policy and technical justification for the DFCs



Hydrogeologic Services for Joint Regional Planning and Preparation of the Explanatory Report for GMA 12

Client: Groundwater Management Area 12

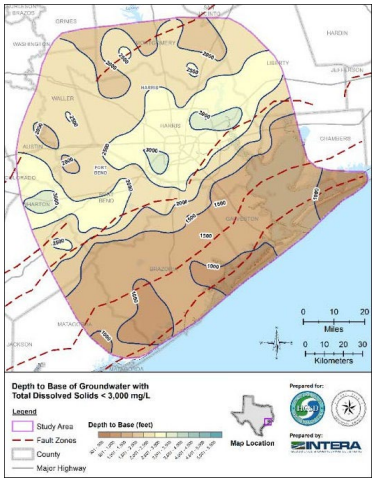
Period of Performance: 2015 to 2022

INTERA was a part of a consulting team that provided technical support to GMA 12. In the last two planning cycles, INTERA has provided presentations on environmental impacts, subsidence, social economic impacts, and the feasibility of addressing DFCs. INTERA was the lead consultant for modeling the DFCs for the Yegua-Jackson Aquifer and the Brazos River Alluvium Aquifer. INTERA contributed heavily with the modeling using the GAM for the Central Portion of the Sparta, Queen City, and Carrizo-Wilcox GAM. INTERA provided response comments to stakeholders and specifically with address considers regulated to over pumping the Simsboro aquifer and impacting surface water -groundwater interactions. INTERA participated in preparing the Explanatory Report and address TWDB question regarding their review.

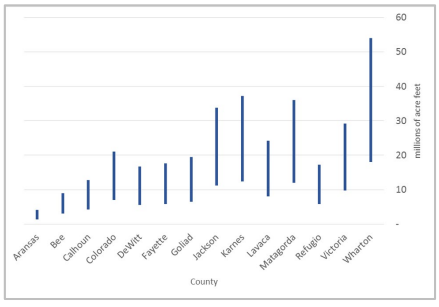
Evaluation of Brackish Groundwater Production, Harris, Galveston, and Fort Bend Counties, TX

Clients: Harris-Galveston Subsidence District; Fort Bend Subsidence District

Period of Performance: 2015 to 2018



In support of updating the District's groundwater management plans and to support the regulation of groundwater use in the region, INTERA performed a hydrogeological study covering some 8,300 square miles that included all of Brazoria, Fort Bend, Galveston and Harris counties and portions of Austin, Chambers, Liberty, Matagorda, Montgomery, Waller and Wharton counties. Three hundred geophysical logs were interpreted to identify sand units and to estimate the TDS concentration of the groundwater. Maps of volumes and surfaces for various TDS concentrations were created for the different aquifers and formations that comprise the Gulf Coast deposits. In addition, the analysis provides an improved vertical and horizontal depiction of the hydrostratigraphy that can be used in groundwater models in the region including the ongoing update to the Houston Area Groundwater Model being revised by the USGS (INTERA is providing review support). We used new characterization data for the deeper and more saline Jasper Aquifer to perform a risk assessment of subsidence from pumping



Hydrogeologic Services for Joint Regional Planning and Preparation for GMA 15, TX

Client: Groundwater Management Area 15

Period of Performance: 2013 to 2016

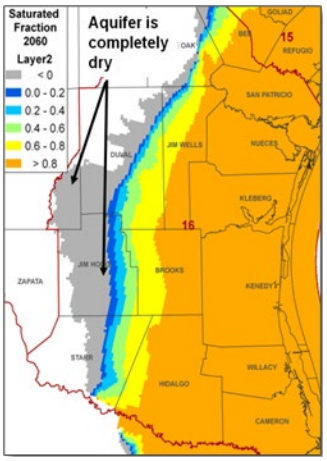
INTERA provided technical support to GMA 15 with the evaluation and adoption of DFCs. GMA 15 consists of all or portions of 12 GCDs in the coastal plains and along the central coast of Texas. We assisted the GMA 15 GCDs in identifying the type and number of GAM simulations for investigating alternative DFCs. Modeling input files

were prepared for the DFCs GAM simulations and performed the numerical simulations of groundwater flow. Major modeling tasks included constructing the pumping input files based on information submitted by the GCDs and calculating DFCs based on average drawdown values across each county for the different aquifers in the Texas Gulf Coast. INTERA prepared an explanatory report to address the nine factors listed in Texas Water Code Section 36.108(d)(1): aquifer uses and conditions, water supply needs and water management strategies, hydrological conditions, environmental factors, land subsidence, socioeconomics, private property rights, and the feasibility of achieving the proposed DFCs.

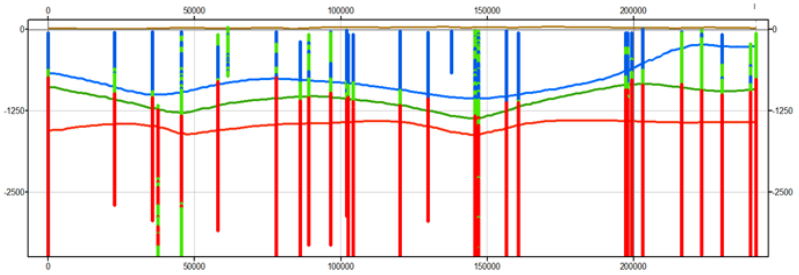
Hydrogeologic Services to Support Groundwater Planning and Management, South TX

Client: Brush Country Groundwater Conservation District

Period of Performance: 2013 to 2018



.INTERA provided technical support to the District in establishing DFCs and evaluating modeling results produced by GMA 16. We estimated current and future pumping for the Brush Country GCD and applied the GMA 16 GAM to estimate drawdown impacts over a 60-year period. The potential for water quality change and subsidence was evaluated based on estimated drawdowns. Our results were presented to GMA 16, and we helped develop modeling scenarios for use by the GMA for constructing DFCs. INTERA has also assisted the Brush Country GCD in developing management plans. INTERA also provided technical support for characterizing the groundwater resources, delineating regional aquifer stratigraphy and lithology, and evaluating water quality. We constructed a 6,000-well database that included water level measurements and well screen information, and interpreted over 200 geophysical logs to develop vertical profiles of TDS concentrations, clay beds, and sand beds. A conceptual model was developed for Brush Country GCD's groundwater system that includes recharge estimates, aquifer hydraulic properties, and the location of fresh and brackish groundwater



Hydrogeologic Services to Support Groundwater Planning and Management, Matagorda County, TX

Client: Coastal Plains Groundwater Conservation District

Period of Performance: 2013 to 2016

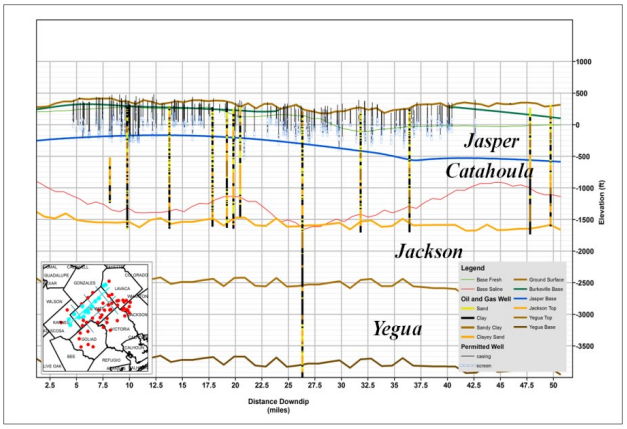
INTERA estimated the availability of fresh and brackish groundwater in Matagorda County by integrating the results from water quality sampling at approximately 200 water wells and calculating TDS concentrations from 100 geophysical logs. The total volume of freshwater and brackish water resources was estimated to be 136 million acre-feet and 129 million acre-feet, respectively. Based on transmissivity values generated for aquifer regions containing slightly saline (1,000 to 3,000 ppm TDS) waters, we estimated that 41 million AFY of the brackish water can be economically developed. INTERA subsequently developed several approaches for predicting the impacts that pumping brackish water would have on the freshwater resources in the county, and made recommendations for developing the brackish resource. In addition, INTERA mapped the locations and placements of approximately 200 waste injection wells that could impact groundwater quality. These wells are located near the boundary of the moderately saline waters, which have a TDS concentration of less than 10,000 ppm. We also mapped the salt domes in the area and demonstrated how their formation affects both the salinity and the stratigraphy of the Gulf Coast Aquifer. INTERA performed a series of regional model runs, using the TWDB's Central Gulf Coast GAM, to evaluate the reasonableness of the current DFCs and recommendations for alternative DFCs for the next round of regional planning.

Evaluation of Large-Scale Pumping and Hydraulic Fracturing on Groundwater Resources, DeWitt County, TX

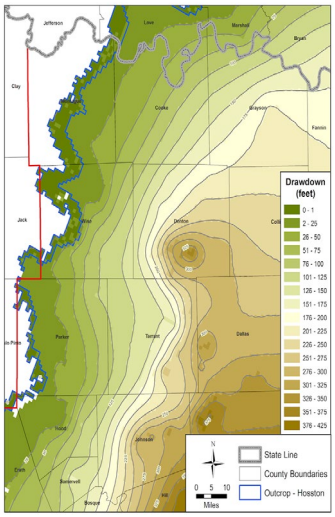
Client: Pecan Valley Groundwater Conservation District

Period of Performance: 2013 to 2016

INTERA developed a conceptual model for the groundwater flow system in the Pecan Valley GCD and performed a series of groundwater simulations to evaluate the impacts of hydraulic fracturing on groundwater availability from the Gulf Coast Aquifer. The evaluation considered both local and regional impacts to groundwater availability. The local impacts focused



on estimating drawdown that occurs at existing wells within two miles of the pumping wells. As part of the project, INTERA developed a methodology for estimating local drawdown impacts using an analytical code and the aquifer hydraulic properties from TWDB's Central Gulf Coast GAM. The Pecan Valley GCD was trained on applying the analytical model and on performing aquifer tests to improve the estimates of the aquifer properties. The application of the analytical model demonstrated that local pumping impacts could be significant in the Jasper Aquifer.. To help evaluate the depth to which water supply wells can be drilled and still obtain fresh water, INTERA analyzed geophysical logs and developed maps of TDS concentration contours, sand and clay thicknesses, and aquifer boundaries. An evaluation of regional impacts primarily focused on estimating the impacts of hydraulic fracturing on Pecan Valley GCD's DFC. Based on estimates of water use by individual fracturing operations and the number of anticipated operations over the next 50 years, we adjusted the pumping estimates for the county and then re-ran the GAM simulations used to generate the DFCs.



Hydrogeologic Services to Support Groundwater Planning and Management, North Central TX

Client: Upper Trinity Groundwater Conservation District

Period of Performance: 2008 – present

INTERA has provided technical support to the Upper Trinity GCD since its formation in 2008. The Upper Trinity GCD comprises the counties of Hood, Parker, Wise and Montague and is in an area experiencing the double pressures of urbanization from the Dallas-Fort Worth Metroplex and the high demand for water in the Barnett Shale gas play. Historically, the Northern Trinity Aquifer has experienced significant drawdown and the region has most recently been designated as a Priority Management Groundwater Area by the Texas Commission on Environmental Quality (TCEQ). INTERA has performed a variety of support work for the Upper Trinity GCD including reviewing the original Northern Trinity-Woodbine GAM; performing simulations using the GAM to support the District's input in the joint planning process; supporting the establishment of interim rules on well spacing; providing estimates of current groundwater use; assisting in variance request hearings; and developing a GIS-based database well registration, metering and fee calculation system. In support of establishing DFCs, the Upper Trinity GCD has developed a district-wide groundwater monitoring program consisting of two parts: one for the Trinity Aquifer system and one for the Paleozoic units. As part of creating/augmenting the monitoring well system, activities included: establishing a full set of potential monitor wells, developing DFC zones, investigating monitor well locations based on DFC methods, accounting for water level trends, determining initial monitor well locations based on previous analyses, and screening monitor well locations based on updated hydrogeology and the depth of zones to be monitored. One of the key components to the proper design of the groundwater monitoring network was developing a detailed understanding of the hydrostratigraphic units that comprise the resource.

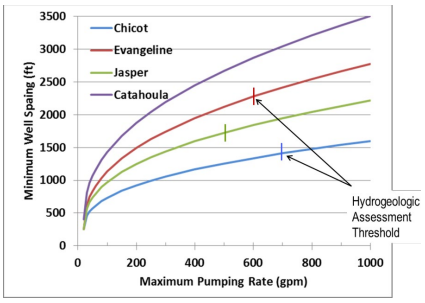
Hydrogeologic Services to Support Groundwater Planning and Management, Gulf Coast Aquifer, TX

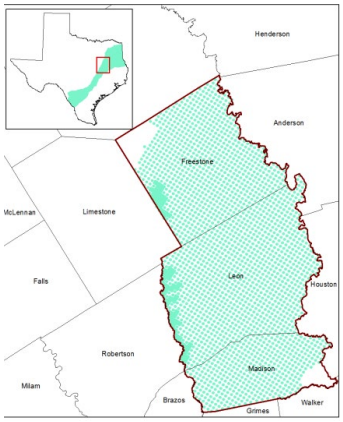
Client: Lone Star Groundwater Conservation District

Period of Performance: 2009 – 2019

INTERA has provided a variety of hydrogeologic services including working with the Yegua–Jackson Aquifer and the Northern Gulf Coast Aquifer GAMs, to support the Lone Star GCD's groundwater planning and management efforts. The primary focus of our work has been to assess how pumping in the Catahoula Aquifer impacts the water levels in the overlying Jasper Aquifer. Our efforts have included applying analytical models based on aquifer properties extracted from the GAM models to predict the impacts of pumping in the Catahoula Aquifer. In collaboration with two other firms, we

developed a regional model for groundwater flow in the Jackson, Catahoula, and Jasper aquifers across a 6-county area. The modeling work consisted of several phases. Phase 1 involved developing a hydrogeologic conceptual model of the study area based on the analysis of over 300 geophysical logs. The conceptual model incorporates detailed maps of sands and clays and water quality zones based on concentrations of TDS as well as estimates of aquifer hydraulic properties. Phase 2 involved developing and calibrating a numerical groundwater model that provides better representation of local groundwater flow conditions in Montgomery County than do the TWDB GAMs for the region.





Hydrogeologic Services to Support Groundwater Planning and Management, Madisonville, TX

Client: Mid-East Texas Groundwater Conservation District

Period of Performance: 2008 – 2022

INTERA's Dr. Matt Uliana has served as the consulting hydrogeologist for the Mid-East Texas GCD (METGCD) for 14 years. Services have included reviewing the technical aspects of permit applications, evaluating groundwater resources, developing and maintaining the water level monitoring plan, advising the METGCD board on aquifer management issues, and providing representation in the GMA 12 DFCs joint planning process. We have also performed MODFLOW model runs using the Central Queen City-Sparta GAM to calculate future impacts from groundwater development in the METGCD, and provided several public presentations in open meetings.

II.E Projects for GCDs

INTERA has completed projects for over two dozen GCDs covering the complete spectrum of hydrogeologic services anticipated under this contract with the Brazos Valley GCD. A listing of many of the GCDs, and projects we have completed for each, is provided in **Table 2**.

Table 2. Representative Examples of Projects Completed for GCDs

GCD Name	Project(s)
Barton Springs Edwards Aquifer	▪ Update of analytic element groundwater model of Trinity Aquifer ▪ Expert witness for challenge to production permit
Bee County	▪ Presentation on Gulf Coast Aquifer System ▪ Assessment and Development of DFCs
Brush Country	▪ Development of a groundwater monitoring program ▪ Evaluation of potential for land subsidence in southern Texas Gulf Coast ▪ Development of groundwater management plan and groundwater resource assessment ▪ Hydrogeologic services for joint planning in GMA 16
Calhoun County, Refugio County, and Texana County GCD	▪ Analysis of water levels to evaluate compliance with DFCs and to support monitoring objectives ▪ Estimation and evaluation historical land subsidence and water level declines
Central Texas GCD	▪ Review of water availability studies for new developments using private wells ▪ Managed available groundwater simulations using Llano Uplift Aquifer System model ▪ Analysis of aggregate mine water level data, development of a hydrologic water balance
Clearwater Underground Conservation District	▪ Assessment of the feasibility and impacts to groundwater resources of aquifer storage and recovery projects ▪ Development of a refined groundwater model for Bell County
Coastal Bend	▪ Preparation of Management Plan and support development of rules ▪ Evaluation of Operation Well permits ▪ Development of a well database to support groundwater management ▪ Development and evaluation of DFCs
Coastal Plains	▪ Development of groundwater management plan and support development of rules ▪ Evaluation of Operation well permit ▪ Development of a well database to support groundwater management ▪ Assessment of brackish groundwater resources and development of rules for brackish groundwater production

Table 2. Representative Examples of Projects Completed for GCDs (cont.)

GCD Name	Project(s)
Colorado County	▪ Hydrogeologic assessment of Operational Well Permits ▪ Evaluation of monitoring data to assess impacts of rice farming
Duval County	▪ Groundwater management workshop ▪ Evaluated land subsidence and water quality
Evergreen	▪ Evaluation of groundwater rules for well spacing and groundwater production ▪ Development of brackish groundwater rules ▪ Development of hydrogeological framework for Carrizo Wilcox, Gulf Coast, and Yegua-Jackson aquifers ▪ Development of GIS files to support groundwater management
Fort Bend Subsidence District	▪ Characterization of brackish groundwater resources ▪ Mapping of the Jasper, Burkeville, Chicot, and Evangeline aquifer boundaries ▪ Assessment of risks from developing brackish groundwater in the Jasper Aquifer
Harris-Galveston Subsidence District and Fort Bend Subsidence District	▪ Technical assistance and groundwater modeling to support regulatory plan review ▪ Technical oversight for the development of the Gulf 2023 GAM for GMA 16 ▪ Investigation of brackish resources and potential development impact on land subsidence ▪ Assessment of risks from developing brackish groundwater in the Jasper Aquifer ▪ Mapping of the Jasper, Burkeville, Chicot, and Evangeline aquifer boundaries
Kenedy County GCD	▪ Evaluation of groundwater resources ▪ Evaluation of historical land subsidence and methodologies for predicting land subsidence
Lone Star	▪ Expert witness for petition of DFCs ▪ Development of recommendations for well spacing rules ▪ Characterization and assessment of productivity of Catahoula and Jasper formations ▪ Technical expert on groundwater panel
Northern Trinity	▪ Assistance with preparing the Management Plan ▪ Evaluation of water well spacing relationships
Mid-East Texas GCD	▪ Hydrogeologic services for joint planning in GMA 12 ▪ Development and implementation of groundwater monitoring plan ▪ Review of well permit applications ▪ Technical support for implementing groundwater rules
Panhandle	▪ Web application for water well meter readings and water level measurements
Panola	▪ Characterization of Carrizo-Wilcox Aquifer system ▪ Alternative groundwater availability model of Carrizo-Wilcox Aquifer in Panola County ▪ Evaluation of Wilcox Aquifer and management plan assistance ▪ Evaluation of permit application
Pecan Valley	▪ Evaluation of impacts of large-scale pumping on groundwater resources ▪ Develop rules for brackish groundwater production
Post Oak Savannah	▪ Preparation of Groundwater Management Plan and support for development of rules ▪ Evaluation of well operational permits ▪ Support for developing well monitoring program, development of methods for demonstrating well compliance ▪ Hydrogeologic support for second round of joint planning in GMA 12 ▪ Expert witness to support DFCs in petition of GMA 12 DFCs during first round of joint planning ▪ Assessment of hypothetical aquifer storage and recovery project
Prairielands GCD	▪ Evaluation of pumping allocation consistent with DFC updates ▪ Evaluation of potential for aquifer storage and recovery and managed aquifer recharge ▪ Evaluation of drought impacts and assistance with drought rule updates
Red Sands	▪ Preparation of Management Plan ▪ Development of monitoring well network and program
Upper Trinity	▪ Assistance with preparing the Management Plan and interim groundwater rules ▪ Evaluation of GMA 8 DFCs ▪ Development of GIS-based database system ▪ Evaluation of monitoring program expansion ▪ Groundwater model of the Paleozoic aquifers ▪ Hydrogeological assessment of pumping permits
Victoria County	▪ Development of a science program ▪ Development of brackish groundwater rules ▪ Analysis of water levels to check DFC compliance ▪ Evaluation of options for measuring land subsidence and determination of historical water levels ▪ Assessment of hypothetical aquifer storage and recovery project

II.F Clients with Producing Water Wells in the District

INTERA does not have any clients with water wells that are producing groundwater in the Brazos Valley GCD. INTERA has provided modeling support to CDM Smith to support their TCEQ application to operate an ASR facility within the District.

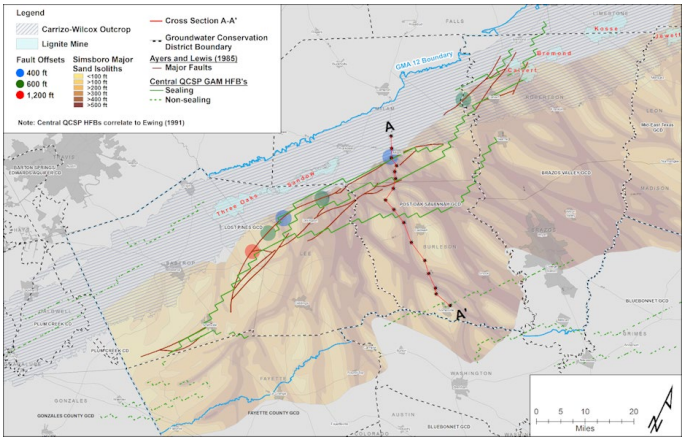
II.G Experience Involving Major and Minor Aquifers in the District

INTERA specializes in understanding, characterizing, and simulating the hydrogeology of Texas and we have relevant experience with all the major and nearly all the minor aquifers in Texas. This includes all the major and minor aquifers in the Brazos Valley GCD. Our expertise ranges from local activities (e.g., designing and fielding aquifer tests, designing and providing observation services for well drilling) to regional activities (e.g., performing county or multi-county hydrogeologic studies, developing regional groundwater GAMs). Examples of our experience involving the major and minor aquifers that occur in the District are provided below.

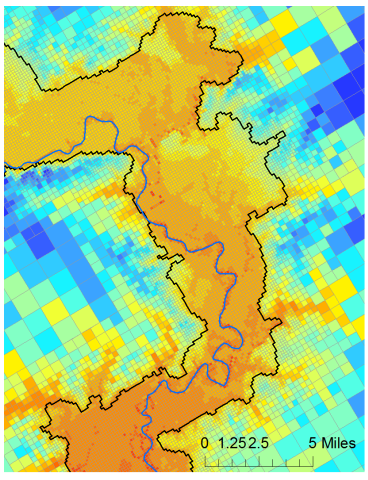
Update of the Groundwater Availability Model of the Central Carrizo-Wilcox Aquifer, TX

Client: Texas Water Development Board

Period of Performance: 2015 to 2018



Since the existing GAM provided an unsatisfactory match to measured water levels in the area of faults, INTERA updated the model to improve the numerical representation of major fault zones. With additional funding provided by the Brazos River Authority and Lower Colorado River Authority, we also updated the model to enhance its ability to simulate surface water-groundwater interaction. The updated model includes several improvements to the conceptual model for defining and modeling the Milano Fault Zone, aquifer recharge, and surface water-groundwater interaction. The updated GAM provides significantly better matches to measured water levels in the fault zones near large-pumping areas such as Bryan/College Station. To develop the new conceptual model, we analyzed over 700 geophysical logs to map the Mexia-Talco Fault Zone, evaluated the results of more than 200 aquifer pumping tests, conducted hydrograph separation at more than 55 river gages, and developed historical pumping rates in some 50 counties. Physical representation of surface-groundwater interactions was improved by a reconceptualization of the shallow groundwater flow system and the use of a locally refined grid developed using the MODFLOW USG. The updated GAM provides a more realistic and credible simulation of surface water-groundwater interaction.



Groundwater Availability Model of the Brazos River Alluvium Aquifer, TX

Client: Texas Water Development Board

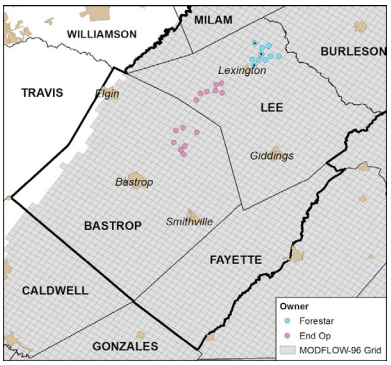
Period of Performance: 2014 to 2016

Developed under TWDB's Groundwater Availability Modeling Program, this model simulates the water balance for the Brazos River Alluvium Aquifer from Bosque and Hill counties to Fort Bend County. The GAM consists of three layers, the upper two of which represent the Brazos Alluvium and the bottom layer which represents the shallow portion of the underlying formations. The underlying formations include the Gulf Coast, Yegua-Jackson, Sparta, Queen City, Carrizo-Wilcox, and Trinity aquifers. The Streamflow-Routing package was used to represent perennial streams, while the River package was used to represent ephemeral streams defined as those with a Strahler Order less than four. Streamflow was routed by the model in between stream gages. The streamflow was input based on a combination of stream gage data and output from the United States Army Corps of Engineers RiverWare model of the Brazos River Basin. To support regional water resource planning efforts, the GAM has been used by TWDB to develop Modeled Available Groundwater (MAG) values and simulate surface water-groundwater interaction.

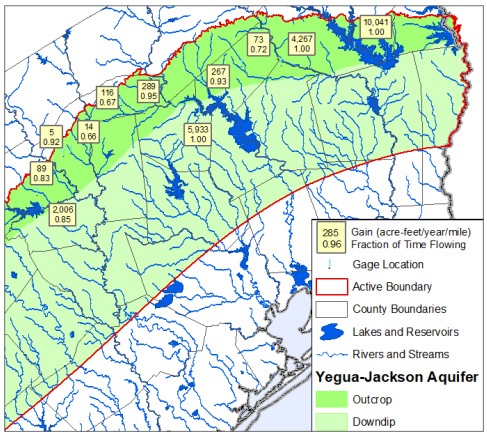
Evaluation of Forestar Well Permits to Extract Groundwater, Bastrop County, TX

Client: SledgeLaw Group, PLLC

Period of Performance: 2018 to 2019



INTERA performed a due diligence of the financial assets associated with the well permits owned by Forestar in Bastrop County. We determined the viability of producing 28,000 AFY from the Forestar permits in Lee County, based on information regarding existing production, and the special conditions placed on the aggregate permits. Our analysis included examining a special permit condition that constrained the operating permit by projected overall compliance to DFCs in the District, and the potential impact of the permitted production on that compliance. INTERA's analysis also incorporated an assessment of the hydrogeology of the Simsboro formation based on field data, an evaluation of the sources of errors and uncertainty in the GAMs used by the District to predict DFC compliance, and the potential issues associated with the District's existing monitoring program.



Development of the Hydrostratigraphy and Groundwater Availability Model for the Yegua-Jackson Aquifer, TX

Client: Texas Water Development Board

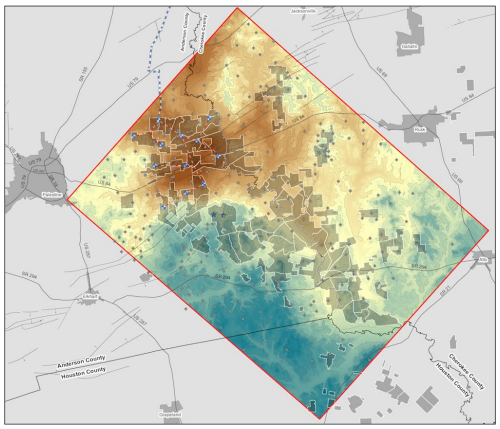
Period of Performance: 2008 to 2010

INTERA developed a three-dimensional model of the Yegua-Jackson Aquifer as part of the TWDB's Groundwater Availability Modeling Program. The Yegua Formation and Jackson Group, following typical Texas Gulf Coast geology, dip deep beneath land surface all the way to the coast and beyond. However, water quality degrades quickly moving into the confined portion, rendering it unsuitable for use without further treatment. Even in the outcrop, both the yield and water quality can vary significantly over small differences in location and depth. INTERA developed the structure for the Yegua-Jackson Aquifer, including estimates of lithology using geophysical logs. The Yegua Formation and Jackson Group were each divided into upper and lower units. We used these structural surfaces to locate wells from the TWDB groundwater database in the four units. Head measurements for the located wells were used to analyze water levels and conceptualize regional groundwater flow. Recharge to the Yegua-Jackson Aquifer was estimated based on analysis of discharge to streams, using hydrograph separation (to determine shallow recharge/discharge), and basic application of Darcy's law at the point where the aquifer enters the subcrop (to determine deeper recharge). In addition, topography, surficial soil conductivity, and irrigation return flow were analyzed for their impact on recharge. Little evidence was found that surficial soil conductivity and irrigation return flow have a significant impact on recharge. Based on lithology, formation, and depth of burial, a relationship was developed to estimate aquifer properties of storage and hydraulic conductivity across the aquifer. This relationship was very useful for developing the model because of the lack of measured hydraulic properties for the aquifer.

Assessment and Appraisal Support for Evaluating Groundwater Resources for a Large Land Holding, East TX

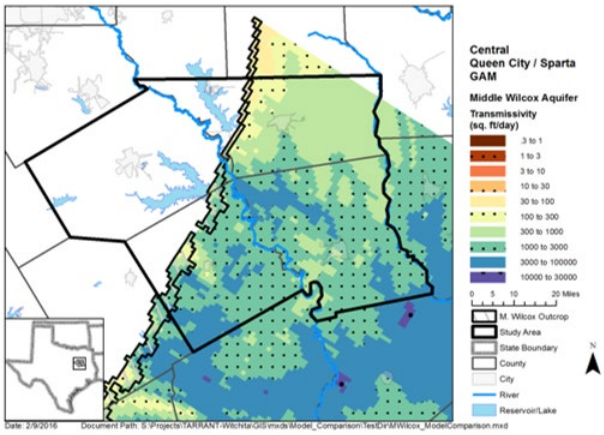
Client: Crown Pine Timber

Period of Performance: 2013 to 2015



Crown Pine Timber owns significant tracts of land in east and southeast Texas that are used to sustainably grow pine timber. As part of managing their land portfolio, INTERA supported an evaluation of the economic feasibility of developing groundwater resources from one large tract of these properties. Our work included assessing the groundwater availability and water quality in the Carrizo-Wilcox Aquifer over a 485 square mile area near the Trinity River. To accomplish this, we analyzed 287 geophysical logs to successfully delineate aquifer contacts, aquifer lithology (e.g., sand

thicknesses), and water quality. In a second project, we supported the appraisal of water rights for 1.1 million acres of forest land in east and southeast Texas. This assessment investigated the availability of groundwater from the Carrizo-Wilcox, Queen City and Sparta, and the Gulf Coast aquifers under these properties. As part of the assessment, INTERA examined potentially plausible water project configurations and modeled the impacts of these projects both with, and without, the current regulatory constraints.



Evaluation of the Availability Impaired Groundwater in the Carrizo-Wilcox Aquifer

Client: Tarrant Regional Water District

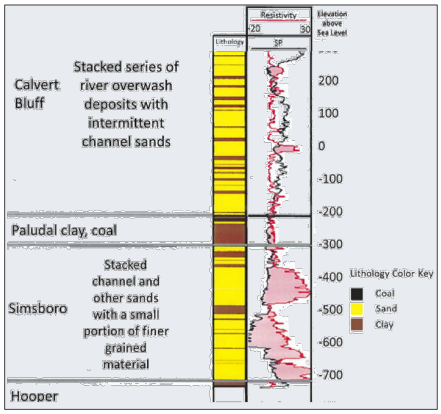
Period of Performance: 2014 to 2016

As part of expanding Tarrant Regional Water Authority's (TRWD) water supply portfolio, INTERA assessed impaired (brackish) groundwater resources with respect to availability and quality for nine aquifers in two study areas. The Eastern Study Area included Anderson, Freestone, Henderson, and Navarro counties and the Richland-Chambers and Cedar Creek reservoirs, collectively referred to as the East Texas Reservoirs. The primary aquifers of interest in the Eastern Study Area included the Carrizo-Wilcox, Nacatoch, Queen City, Sparta, and Woodbine aquifers. INTERA's assessment of groundwater sources included impaired groundwater, defined as waters with measured concentrations in water wells that exceed a primary or a secondary drinking water standard for the EPA or the TCEQ. This assessment led to the selection of seven candidate well field sites in the Eastern Study Area. Results of our assessment showed that while groundwater development near the TRWD's East Texas Reservoirs is technically feasible at a unit cost comparable to other new sources, such development would only provide about 5% of the TRWD's projected water needs in 2020.

Expert Witness Services for a Contested Groundwater Permit for Griffith League Ranch, Bastrop County, TX

Client: Lower Colorado River Authority
(through Bickerstaff Heath Delgado Acosta LLP)

Period of Performance: 2018 to 2020



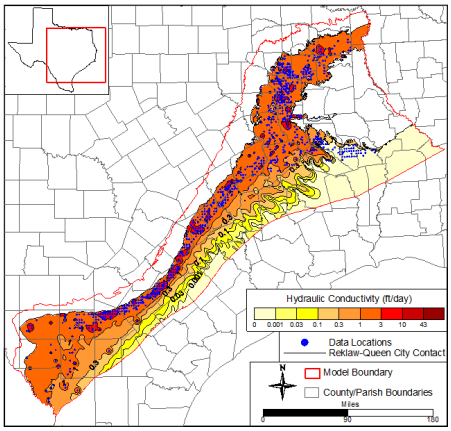
To address future drought conditions, one of LCRA's goals is to diversify its water supply portfolio. As part of this initiative, LCRA filed operating and transport permit applications for eight new water supply wells within the Lost Pines Groundwater Conservation District in Bastrop County for an annual aggregated production of up to 25,000 acre-feet from the Simsboro Formation of the Carrizo-Wilcox Aquifer. The permits were contested by several parties and the permit hearing was referred to the State Office of Administrative Hearings (SOAH). INTERA staff (Van Kelley and Steve Young) provided oral and written testimony for (SOAH) Docket Number 952-2900705. This included expert testimony on well field design, groundwater-surface interaction, groundwater modeling, simulated drawdowns at existing wells, and the hydrogeology of the Carrizo-Wilcox Aquifer. INTERA presented criteria for defining unreasonable impact caused by pumping. We also provided expert testimony regarding the special conditions in the permit and their consistency with the science, the District rules and policies and state statutes. Inconsistencies in the special permit conditions proposed by Lost Pines GCD were identified and changes to the draft permits (production and transport) were developed and suggested. SOAH's Proposal for Decisions recommends that LCRA receive their full permit.

Development of Groundwater Availability Models for the Southern, Central, and Northern Portions of the Queen City and Sparta Aquifers, TX

Client: Texas Water Development Board

Period of Performance: 2003 to 2005

In support of the TWDB's Groundwater Availability Modeling Program, INTERA developed three-dimensional groundwater flow models for the southern, central, and northern portions of the Queen City and Sparta Aquifers. These aquifers are

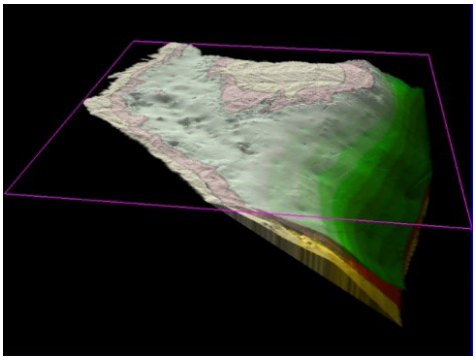


classified as minor aquifers and overlie the Carrizo-Wilcox Aquifer, a major Texas aquifer. We developed the three Queen City and Sparta GAMs using MODFLOW. The models were developed using a modeling protocol that is standard to the groundwater modeling industry and to the GAM program. Important technical issues that we addressed included hydraulic properties, recharge, and aquifer stream interaction. To develop hydraulic properties, we reviewed and summarized all available reported properties and also performed a review of the TCEQ Well Casing Log Records for pumping tests and specific capacity tests. This resulted in the development of 444 additional hydraulic conductivity estimates for the Queen City Aquifer and an additional 33 for the Sparta Aquifer. To augment these values and to scale them to an aquifer scale, net sand maps and a depth trend was used to integrate the hydraulic conductivity data to the regional model scale. The resulting hydraulic conductivity field accurately represented the data while maintaining the depositional fabric. For the steady-state model calibrations, INTERA used predevelopment conditions (prior to significant groundwater withdrawal). The GAMs were also calibrated to transient aquifer conditions from January 1980 through December 1989, incorporating yearly variations in recharge, ET, streamflow, and pumping. We performed checks to ensure that transient responses in model overlap regions are consistent. In addition to the standard calibration GAM requirements, INTERA focused on developing a set of models that reproduced water balances consistent with conceptual understanding. INTERA met with stakeholders on three occasions to discuss the revised scope of the model, to discuss concerns, and to present the approach that was ultimately applied.

Development of Groundwater Availability Models for the Southern and Northern Portions of the Carrizo-Wilcox Aquifer, TX

Client: Texas Water Development Board

Period of Performance: 2000 to 2003



In support of the TWDB's Groundwater Availability Modeling Program, INTERA developed GAMs for the northern Carrizo-Wilcox Aquifer and the southern Carrizo-Wilcox Aquifer. The objective of the Groundwater Availability Modeling Program is to provide reliable information on groundwater availability in Texas over a 50-year planning period. The models are being used to evaluate water management strategies and to assess the potential impacts of regional water plans. For both portions of the Carrizo-Wilcox Aquifer, INTERA developed steady-state, pre-development models and transient models that were calibrated from 1980 through 1990. The time period from 1991 through 2000 was used as a validation phase. MODFLOW was used to develop the GAMs, and the stream-routing package was used to model aquifer-stream interaction. Project tasks included database development, GIS data development and presentation, model conceptualization/ design, model calibration/prediction, reporting and web publishing, and stakeholder meetings. Conceptual model development included the review and assessment of aquifer/aquitard system geometry (geology, hydrostratigraphy, outcrops, river basins, and model boundaries), water levels and regional groundwater flow, aquifer hydraulic properties, recharge, discharge (groundwater/surface water interaction and pumping), and water quality. All data and their sources were documented in a GIS-based geodatabase that includes metadata and was provided to the TWDB as a deliverable. Recharge was estimated using the Soil Water Assessment Tool (SWAT) with MODFLOW in an uncoupled method. Because recharge had to be estimated for over 20 years of historical record and for average and drought of record conditions, SWAT provided a sound basis for developing the transient recharge estimates over hundreds of square miles.

II.H Professional Liability Insurance

INTERA maintains professional liability insurance in an amount commensurate with the consulting services industry. Our professional liability policy currently has limits of $2,000,000 aggregate and $1,000,000 per claim. We also maintain an excess liability policy that sits over our other policy limits (including professional liability policy) with limits of $6,000,000 each occurrence and $6,000,000 aggregate. A sample Certificate of Liability Insurance (ACORD form), showing all INTERA's insurance coverage, is provided on the next page.

Client#: 914933 INTERINC22

ACORD™ CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 6/03/2022

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer any rights to the certificate holder in lieu of such endorsement(s).

PRODUCER USI Insurance Services LLC -CL 4630 North Loop 1604 West Suite 410 San Antonio, TX 78249	CONTACT NAME: Danelle Touchstone PHONE (A/C, No, Ext): 210 524-2094 FAX (A/C, No): 610 537-1904 E-MAIL ADDRESS: danelle.touchstone@usi.com
INSURED INTERA Inc. 9600 Great Hills Trl Suite 300W Austin, TX 78759	INSURER(S) AFFORDING COVERAGE — NAIC # INSURER A : Lloyd's of London — SURPLU INSURER B : Hartford - WC Multiple Issuing Cos — 00914 INSURER C : Sentinel Insurance Company Ltd. — 11000 INSURER D : INSURER E : INSURER F :

COVERAGES CERTIFICATE NUMBER: REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY			ENVP000025422	06/01/2022	06/01/2023	EACH OCCURRENCE	$1,000,000
	CLAIMS-MADE X OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$300,000
	X Pollution Liability						MED EXP (Any one person)	$25,000
	X BI/PD DED $10,000						PERSONAL & ADV INJURY	$1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$2,000,000
	POLICY X PRO-JECT X LOC						PRODUCTS - COMP/OP AGG	$2,000,000
	OTHER:							$
C	AUTOMOBILE LIABILITY			65UECZR3402	06/01/2022	06/01/2023	COMBINED SINGLE LIMIT (Ea accident)	$1,000,000
	X ANY AUTO						BODILY INJURY (Per person)	$
	OWNED AUTOS ONLY / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	X HIRED AUTOS ONLY / X NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
								$
A	UMBRELLA LIAB X OCCUR			ENVX000020622	06/01/2022	06/01/2023	EACH OCCURRENCE	$6,000,000
	X EXCESS LIAB CLAIMS-MADE						AGGREGATE	$6,000,000
	DED RETENTION $							$
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N	N / A		65WBOL6H7Y	06/01/2022	06/01/2023	X PER STATUTE OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? N (Mandatory in NH)						E.L. EACH ACCIDENT	$1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$1,000,000
							E.L. DISEASE - POLICY LIMIT	$1,000,000
A	Professional Liab Each Wrongful Act			ENVP000025422 Retroactive Date	06/01/2022 01/10/2002	06/01/2023	$2,000,000 Aggregate $1,000,000 Per claim $100,000 deductible	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

The Excess Policy sits over the General Liability, Pollution Liability, Automobile Liability and Professional Liability limits. Professional Liability is on a claims made basis.

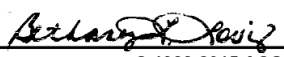
CERTIFICATE HOLDER

SAMPLE CERTIFICATE

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE



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#S36198739/M36169972 DYGZP

II.I Conflict of Interest with the District

INTERA is currently the hydrogeological consultant for both the METGCD and the POSGCD. Prior to preparing our response to this solicitation from the Brazos Valley GCD, we contacted the general managers of both the METGCD and POSGCD. Both general managers support INTERA's desire to serve in a similar hydrogeologic consulting capacity with Brazos Valley GCD. To maintain independence, we are proposing to provide a different project manager for each of the three districts (Brazos Valley GCD, POSGCD, and METGCD). INTERA is proposing Wade Oliver as the project manager for Brazos Valley GCD. Wade brings experience with providing expert testimony for GCDs, preparing groundwater management plans, developing and applying GAMs, and providing hydrological expertise to support a GMA's joint planning process. Steve Young and Ryan Harmon will continue to serve as the project managers for POSGCD and METGCD, respectively. INTERA has several groundwater modelers with experience in running the GAMs used to evaluate permits and DFCs in GMA 12. All three INTERA project managers will have access to our technical support staff. To date, INTERA has not supported any project in Brazos Valley GCD that as applied for a groundwater operation permit. Within the last five years, we have provided technical assistance to CDM Smith for preparing an application for an authorization letter for the City of Bryan to operate an ASR facility. This work has been completed and neither INTERA or CDM Smith foresees any conflict should INTERA become a consultant for Brazos Valley GCD.

III. Certificate of Non-Discrimination

III. Certificate of Non-Discrimination

INTERA's executed certification (Exhibit B from the RFQ) is provided below.

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 28th day of July, 2022.

RESPONDENT:

Type or print complete legal name of firm)

BY:_____
(Signature)

NAME: Eric Markland
(Type or Print)

TITLE: Chief Financial & Administrative Officer
Type or Print)

ADDRESS: 9600 Great Hills Trail, Suite 300W

CITY Austin STATE Texas

ZIP 78759

IV. References Form

INTERA

IV. References Form

To confirm our experience and success in providing professional services related to hydrogeology and groundwater management to GCDs and similar water planning and management organizations, five client references are provided below. The reference information includes the name, address, telephone number, contact, dates of service, and description of services as defined in Exhibit B of the RFQ. We welcome members of the evaluation team to contact any, or all, of these references to confirm our track record of proven performance.

Reference 1	
Name:	Post Oak Savannah Groundwater Conservation District
Address:	310 E Avenue C, Milano, TX 76556
Telephone #:	512.455.9900
Contact:	Gary Westbrook, General Manager, gwestbrook@posgcd.org
Dates of Service:	2004 – Present
Description of Services:	Review of GAMs, support development of DFCs; update management plans and groundwater rules; development of well database; design of monitoring network; GMA 12 presentations; draft GMA 12 DFC submissions and resolutions; preparation of documents for GMA 12 petitions

Reference 2	
Name:	Upper Trinity Groundwater Conservation District
Address:	1859 W Highway 199, Springtown, TX 76082
Telephone #:	817.523.5200
Contact:	Doug Shaw, General Manager; doug@uppertrinitygcd.com
Dates of Service:	2008 – Present
Description of Services:	Review of GAM; updates to management plans and groundwater rules; development of web-based aquifer assessment tools; development of groundwater monitoring program

Reference 3	
Name:	Harris-Galveston Subsidence District
Address:	1660 Bay Area Blvd, Houston, TX 77058
Telephone #:	832.463.7170
Contact:	Michael Turco, General Manager, mturco@subsidence.org
Dates of Service:	2011 – Present
Description of Services:	Characterization of brackish water resources and potential subsidence risk resulting from development; investigation of potential for subsidence from ASR projects; hydrogeologic services and modeling for regulatory plan review

Reference 4	
Name:	Coastal Bend and Coastal Plains Groundwater Conservation Districts
Address:	2200 7th St, Bay City, TX 77414
Telephone #:	979.533.0804
Contact:	Neil Hudgins, General Manager, nhudgins@cbgcd.com
Dates of Service:	2008 – Present
Description of Services:	Evaluation of DFC runs using GMA 15 GAM and LCRB regional groundwater model; collection and assessment of aquifer information; assessment of brackish resources; guidance for hydrogeologic assessments

Reference 5	
Name:	Evergreen Underground Water Conservation District
Address:	110 Wyoming Boulevard, Pleasanton, TX 78064
Telephone #:	830.569.4186
Contact:	Russell Labus, General Manager, Russell.labus@evergreenuwcd.org
Dates of Service:	2014 – Present
Description of Services:	Evaluation of groundwater rules; development of hydrogeological framework of Gulf Coast Aquifer; hydrogeologic characterization for developing groundwater rules and permitting requirements; support for well spacing criteria and other management rules

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