



JOINT FUNDING AGREEMENT No. 24-013-AMS  
BETWEEN THE  
EDWARDS AQUIFER AUTHORITY  
AND  
UNITED STATES DEPARTMENT OF THE INTERIOR  
UNITED STATES GEOLOGICAL SURVEY  
FOR A VULNERABILITY ANALYSIS OF THE EDWARDS AND TRINITY AQUIFERS IN  
PARTS OF BEXAR AND COMAL COUNTIES, TEXAS

Agreement: \_\_\_\_\_  
Customer No: 6000000612  
Project No: \_\_\_\_\_  
Tax ID No.: 74-6026194

This Joint Funding Agreement (Agreement) for a Vulnerability Analysis of the Edwards and Trinity Aquifers Outcrop in Parts of Bexar and Comal Counties, Texas is made and entered into effective as of October 1, 2024, by and between the EDWARDS AQUIFER AUTHORITY (EAA), a political subdivision of the State of Texas, with its principal place of business located at 900 E. Quincy Street, San Antonio, Texas 78215, and the UNITED STATES GEOLOGICAL SURVEY (Survey or USGS), a bureau of the Department of Interior, and part of the United States Government, with an office located at 1505 Ferguson Lane, Austin, Texas 78754 (collectively, the Parties, or individually, Party). The Survey's legal authority to enter this Agreement is 43 USC 36C; 43 USC 50, and 43 USC 50b.

For and in consideration of the mutual promises and benefits contained herein, the sufficiency of which is hereby acknowledged, the EAA and the Survey agree as follows:

ARTICLE I  
DESCRIPTION OF WORK

Subject to the terms and conditions of this Agreement, the Survey hereby agrees to perform the work set forth in the Scope of Work, a copy of which is attached hereto as Exhibit A, and incorporated herein for all purposes, and is a part of this Agreement. The Survey hereby accepts such engagement and agrees to devote its best talents, efforts, and abilities and furnish all labor, machinery, equipment, tools and transportation necessary in the furtherance of its engagement hereby. The Scope of Work specifically identifies the work to be performed by the Survey over the term of this agreement and contains a schedule for performance of the work and a budget broken down by the three (3) specific tasks that make up the Scope of Work (Tasks). In exchange, the EAA agrees to fund a portion of the costs incurred by the Survey, as set forth in more detail in Article II below. The EAA may request changes or additions to the Scope of Work during the

progress of the study, and upon mutual agreement, the EAA and the Survey will make the necessary written revisions to the Statement of Work and project schedule to reflect such requested changes as set forth in Articles III and VI below.

ARTICLE II  
JOINT FUNDING

A. The EAA agrees to reimburse the Survey for a portion of the costs the Survey incurs in performing the yearly tasks enumerated in Exhibit A. For the term of this Agreement, the total costs for each of the Calendar Years as enumerated in Exhibit A are estimated to be as follows:

	<u>EAA Contribution</u>	<u>Survey Contribution</u>	<u>Total Contribution</u>
CY 2024	\$70,000.	\$60,000.	\$130,000.
CY 2025	\$60,000.	\$55,000.	\$115,000.
CY 2026	\$60,000.	\$55,000.	\$115,000.
CY 2027	\$60,000.	\$55,000.	\$115,000.
TOTAL	\$250,000.	\$225,000.	\$475,000.

The Survey agrees to be directly responsible for the payment of any invoices, costs or expenses incurred by it or any of its contractors or subcontractors in the performance of this Agreement.

B. As a prerequisite to receiving such reimbursement from the EAA, the Survey shall deliver to the EAA separate, quarterly invoices at the end of each December, March, June, and September, which demonstrate successful completion of the Tasks outlined in this Scope of Work and the costs and expenses incurred by the Survey in the previous quarter for each Task identified in Exhibit A. Payments of invoices are due within sixty (60) days after the receipt of and approval by the EAA of each such invoice. Alternate payment arrangements may be established upon mutual agreement of the Parties if set forth in writing. If not paid by the due date, interest on unpaid amounts will be charged at the current Treasury rate for each thirty (30) day period, or portion thereof, that the payment is delayed beyond the due date (31 USC 3717; Comptroller General File B-212222, August 23, 1983). The EAA’s contribution for this Agreement will be \$250,000. The Survey’s contribution for this Agreement will be \$225,000.

ARTICLE III  
ALTERATIONS TO AGREEMENT AND STATEMENT OF WORK

Either Party may request, in writing, changes or additions to the Scope of Work during the term of this Agreement. Upon such request, the Survey will propose the necessary revisions to the specific Tasks, associated schedule and costs. These revisions must be accepted by both Parties in writing. No amendments to this Agreement shall be considered valid unless the amendments have been approved by both Parties in writing.

ARTICLE IV  
COMPLETION OF WORK

The Survey shall have until December 31, 2027, to complete all work identified in the Scope of Work. All work shall be completed in compliance with the schedule of Tasks and budget as set forth in the Scope of Work.

ARTICLE V  
TERM OF JOINT FUNDING AGREEMENT

This Agreement shall be effective on the date indicated in the first paragraph above and shall continue in effect through December 31, 2027. This Agreement is subject to annual appropriations by the Survey and the EAA, but the Survey and the EAA represent that they will use their reasonable best efforts to obtain the proper appropriations to fund this Agreement as necessary for any future year or portion thereof during which this Agreement will be in effect. The Parties acknowledge that subsequent phases of the Scope of Work beyond the term of this Agreement, upon terms and for such consideration as may be mutually agreed upon by the Parties at such time, may be desirable.

ARTICLE VI  
INSPECTION AND TERMINATION

During the term of this Agreement, all operations of the Survey pertaining to the Scope of Work shall be open to the inspection of the EAA, and if the work is not being carried out in a mutually satisfactory manner, the EAA may terminate this Agreement upon the failure of the Survey to cure the unsatisfactory condition within sixty (60) days after receipt of written notice to the Survey. Either Party may, with or without cause, terminate this Agreement by giving thirty (30) days' written notice to the other. In the case of any termination of this Agreement, the Survey will be reimbursed by the EAA for the EAA's pro rata share of costs incurred up to the time of termination in accordance with Article II above. In the event of early termination, insofar as possible, all work in progress will be brought to a logical termination point and a final settlement of payments shall be made. Copies of all finished and unfinished documents, data, studies, surveys, drawings, maps, reports, photographs, and other materials prepared by the Survey will be delivered to the EAA and will become the property of the EAA. If applicable, the Survey shall be entitled to receive from the EAA, the EAA's pro rata share of reasonable compensation for any additional costs associated with terminating Tasks prior to completion.

ARTICLE VII  
DATA SHARING

A. The Parties agree to freely share with each other all data generated from the performance of the Scope of Work. The Survey shall furnish to the EAA copies of reports of the results of investigations performed by the Survey under the Scope of Work for internal use and review upon completion of necessary review. Review of report manuscripts by the EAA and the Survey shall be completed expeditiously. Both Parties shall have the privilege of publishing the maps, reports, and report manuscripts provided that all publications by either Party shall contain a statement of

the cooperative relations between the Parties. Original tracings of all drawings and illustrations, which are a part of these reports, shall be furnished to the EAA to permit their reproduction for publications and reports by the EAA.

The original data and maps generated by each individual Task conducted under the terms of this Agreement shall be retained by the Survey. Copies of all such data shall be furnished to the EAA.

When requested by the EAA, the Survey shall make reasonable efforts to allow and accommodate EAA staff or representatives to accompany or observe Survey personnel in carrying out the Scope of Work.

#### ARTICLE VIII SURVEY PERSONNEL AND CONTRACTORS

A. The Survey will provide any personnel necessary for its performance of the Scope of Work. The Survey will be responsible for its employees in all respects, including, without limitation, its compliance with applicable laws and their safety, including without limitation, all Occupational Safety and Health Administration (OSHA) standards, requirements and regulations.

B. The Survey will be responsible for its contractors and subcontractors in all respects, including without limitation, their compliance with applicable law and their safety, including without limitation, OSHA standards, requirements, and regulations.

#### ARTICLE IX EQUAL EMPLOYMENT OPPORTUNITY

In the performance of this Agreement, the Survey will comply with the provisions of Title VI of the Civil Rights Act of 1964 (42 U.S.C. 200d), and Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. 794). The Survey shall not discriminate on the grounds of race, color, national origin, sex, religion, marital status, age, creed, Vietnam-Era or Disabled Veterans status or the presence of any sensory, mental or physical handicap.

#### ARTICLE X NOTICES

All notices and communications under this Agreement to be mailed or delivered to the EAA shall be sent to the EAA's principal place of business as follows, unless and until the Survey is otherwise notified:

EDWARDS AQUIFER AUTHORITY  
Attention: Shelly Hendrix, Controller/Sr. Director of Finance  
900 E. Quincy Street  
San Antonio, TX 78215

All notices and communications under this Agreement to be mailed or delivered to the Survey shall be sent to the address as follows, unless and until the EAA is otherwise notified:

UNITED STATES GEOLOGICAL SURVEY  
TEXAS WATER SCIENCE CENTER  
Attention: Timothy Raines, Director  
1505 Ferguson Lane  
Austin, TX 78754-4733

Any notices and communications required to be given in writing by one Party to the other shall be considered as having been given to the addressee on the date the communication is posted by the sending Party.

#### ARTICLE XI RECORDS AND RIGHTS TO MATERIALS

A. The Survey and the EAA will collaborate as provided herein and as may be otherwise required for proper performance. The Survey will, upon request by the EAA, at any time, provide the EAA with all financial information necessary to enable the EAA to determine the financial condition of work efforts covered by this Agreement.

B. The Survey shall retain a record or copies of all data developed in the course of performing the Scope of Work and said materials will be supplied to the EAA upon request after expiration or termination of this Agreement.

#### ARTICLE XII GENERAL

A. Entire Agreement. This Agreement constitutes the entire agreement between the Parties regarding the Scope of Work, and there are no representations, warranties, agreements or commitments between the Parties hereto except as set forth herein. No amendments to this Agreement shall be binding on the Parties unless in writing and signed by both Parties.

B. Non-Waiver. The waiver by either Party of a breach of any term or provision of this Agreement shall not be construed as a waiver of any subsequent breach.

C. Governing Law. This Agreement is deemed to have been made and to be performable in the State of Texas, and all questions relating to the Agreement shall be governed by the applicable laws of the United States (i.e., federal law) and the State of Texas (i.e., state and local law).

D. Counterparts. This Agreement may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

E. Binding Effect. The provisions of this Agreement shall be binding upon and inure to the benefit of the Parties and their respective successors and assigns; provided, however, that the

Survey may not assign any of its rights nor delegate any of its duties hereunder without prior written EAA consent.

F. Validity. The invalidity of any provision or provisions of this Agreement shall not affect any other provision of this Agreement, which shall remain in full force and effect, nor shall the invalidity of a portion of any provision of this Agreement affect the balance of such provision.

G. Captions. The captions of the various sections of this Agreement are for descriptive purposes only and shall not alter or affect the terms and conditions of this Agreement.

H. Independent Party. Nothing in this Agreement will be construed to constitute either Party as a partner, employee or agent of the other Party, nor will either Party have the authority to bind the other in any respect. Each Party will remain an independent Party responsible for its own actions except as otherwise specifically provided herein.

IN WITNESS WHEREOF, the Parties have executed this Agreement in duplicate counterparts, both having equal force and effect, on the date first above written.

EDWARDS AQUIFER AUTHORITY

UNITED STATES  
GEOLOGICAL SURVEY  
TEXAS WATER SCIENCE CENTER

By: \_\_\_\_\_  
Roland Ruiz  
General Manager

By: \_\_\_\_\_  
Timothy Raines  
Director

ATTEST:

By: \_\_\_\_\_  
Jennifer Wong-Esparza  
Assistant to the Board Secretary

APPROVED AS TO FORM:

\_\_\_\_\_  
Darcy Alan Frownfelter  
General Counsel  
Edwards Aquifer Authority

## EXHIBIT A SCOPE OF WORK

This Scope of Work is to create a vulnerability map for the outcrops of the Edwards and Trinity Aquifers in parts of Bexar and Comal Counties, Texas. The vulnerability map is needed to enhance protection of the groundwater entering both aquifers, which supplies water to the citizens of south-central Texas. The vulnerability map will highlight the hydrostratigraphic units' areas that are susceptible to contamination based on their unique hydrostratigraphic characteristics. The scope of the project will encompass the outcrops of the Edwards and Trinity Aquifers in parts of Bexar and Comal Counties, Texas coinciding with the map limits of previous mapping reports (Clark and others, 2023). The duration of the project will be 4 years.

The Survey will be responsible for conducting and completing the following tasks:

### ***Task 1 – Review of Previously Published Methods for Determining Outcrop Vulnerability and Field Trip***

Previously published reports, maps and digital data related to vulnerability analyses approaches will be reviewed. Reviewing previous studies will allow for determining which methods proved more useful and understanding the types of data that may be useful to incorporate into the current study. In addition, a review will be done to identify studies that may have provided the best type of data to aid in developing a vulnerability map. Sources of potential data include the USGS, Texas Water Development Board (TWDB), Texas Commission of Environmental Quality (TCEQ), EAA, San Antonio Water Systems (SAWS), Natural Resources Conservation Service (NRCS), and local groundwater districts (GCDs).

As part of Task 1, a field trip will be developed for the staff of the EAA. The field trip will show EAA staff the various hydrostratigraphic units of the Edwards aquifer and the upper Trinity aquifer identified by previous studies (Maclay and Small, 1976; Clark, 2003; Clark 2004; Clark and others, 2009; Clark and others, 2023) as well units forming the upper confining unit to the Edwards aquifer.

### ***Task 2 – Collection and Review of Available Hydrologic Data***

Historical data to be collected and reviewed may include hydrostratigraphy, fault, cave, and geologic assessment data. In addition, borehole (geophysical and physical) porosity, permeability, transmissivity, surface porosity, and infiltration data will be compiled from available sources. This data will be reviewed to determine which available data is most complete and usable to build the vulnerability map of the outcrops of the geologic units that contain the Edwards and Trinity Aquifers within the study area. Sources of data might include the USGS (reports, data in local file room, and log archiver data), TWDB (BRACS database), TCEQ (geologic assessments), EAA (geologic assessments and geophysical data), SAWS (geophysical and pump test data), NRCS (infiltration data), local groundwater districts (geophysical data), and consultants (miscellaneous data types).

Historical infiltration data may include surface water gain/loss studies, infiltration analyses, and sediment-crack infiltration data. Cave and sinkhole data is limited and held by a combination of public agencies and private organizations. Cave and sinkhole data will be collected by reviewing geologic assessments filed with the TCEQ and those performed by EAA. This data will be combined with any data that can be obtained from the Texas Speleological Survey (TSS) to produce a cave and sinkhole probability or hydrostratigraphic unit map.

One part of this model may use a fracture factor method to assign the vulnerability rankings. Using the fracture factor method, faults, and fractures will be ranked on a scale that will be based on an estimate of their fault displacement in feet. This value system agrees with other studies that show a direct correlation between fault displacement and the width of the fault's shatter zone (Faulkner and others, 2011). Faults with the highest values can represent segments of major faults with fault displacement being more than fifty (50) percent of the aquifers thickness.

Cave and sinkhole data from geologic assessments will be closely scrutinized to account for personal biases by the assessors with respect to the amounts of caves and sinkholes. Specific cave and sinkhole location data will not be retained because of sensitivity issues related to knowing the precise location of caves. The cave and sinkhole data will be used to produce a probability coverage. The cave and sinkhole probability coverage will be created using a statistical probability of significant karst features per hydrostratigraphic unit.

### **Task 3 – GIS based Map of Vulnerability**

Development of the cumulative rated vulnerability map will rely on the same process described in Clark (2000) and Clark (2003), however the ratings for the categories (soils, porosity, and permeability) will have ratings assigned based existing data and from information collected during this study. In addition, the fracture ratings will be derived from a calculated rating based on faults displacement. Cave and sinkholes ratings will be based on a probability rating developed for each hydrostratigraphic unit. Once the hydrologic data is analyzed, evaluated, and ranked for each of the categories identified in the study for creating a vulnerability map (i.e., porosity, permeability, infiltration, etc.), the cumulative rated vulnerability map will be created by applying a function that incorporates the maps that depict relative ranking distributions of porosity, permeability, infiltration rates, etc.

The Survey will employ quality assurance and quality control (QA/QC) measures to ensure the quality, precision, accuracy, and completeness of the data generated during the project. The quality-assurance objectives are to provide data that: (1) withstand scientific scrutiny, (2) are obtained by methods appropriate for their intended use, and (3) are representative and of known precision, accuracy, and comparability. The USGS Oklahoma-Texas Water Science Center's Quality Assurance and Data Management Plan (QAP) will be followed to ensure the quality, precision, accuracy, and completeness of the data generated during the study. The QAP describes the USGS-approved methods and procedures used to collect hydrologic data, although other hydrologic data collection methods outlined in Cunningham and Schalk (2011) will also be followed. All data will be reviewed and archived by the USGS Oklahoma-Texas Water Science Center. The project and project budget will be reviewed by USGS management and cooperators on a quarterly basis to ensure project timelines are met.

The Scope of Work and project progress will be reviewed by Survey management on a quarterly basis to ensure timelines and objectives are met. All data will be reviewed by the Survey's Texas Water Science Center personnel to ensure proper documentation and will be subject to the review, approval, and release requirements of the Survey's Fundamental Science Practices.

**Performance of Work Schedule and Budget**  
(USGS Fiscal Year)

<b>Tasks</b>	<b>FY25</b>				<b>FY26</b>				<b>FY27</b>				<b>FY28</b>				
<b>Task 1:</b> Review of Previously Published Methods for Determining Outcrop Sensitivity and Field Trip																	
<b>Task 2:</b> Collection and Review of Available Hydrologic Data																	
<b>Task 3:</b> GIS based Map of Vulnerability																	
<b>Deliverables</b>																	
<b>Budget Summary</b>																	
USGS	\$60,000				\$55,000				\$55,000				\$55,000				
EAA	\$70,000				\$60,000				\$60,000				\$60,000				
<b>TOTAL</b>	<b>\$130,000</b>				<b>\$115,000</b>				<b>\$115,000</b>				<b>\$115,000</b>				

## References

- Clark, A.K. 2000, Vulnerability of ground water to contamination, Edwards Aquifer recharge zone, Bexar County, Texas, 1998: U.S. Geological Survey Water-Resources Investigations Report 4149, 9 p. pamphlet, 1 pl., accessed on April 11, at <https://doi.org/10.3133/wri004149>.
- Clark, A.K., 2004, Geologic framework and hydrogeologic characteristics of the Glen Rose Limestone, Camp Stanley Storage Activity, Bexar County, Texas: U.S. Geological Survey Scientific Investigations Map 2831, 1 sheet, scale 1:24,000, accessed August 22, 2023, at <https://doi.org/10.3133/sim2831>.
- Clark, A.K., Golab, J.A., and Morris, R.R., 2023, Geologic framework and hydrostratigraphy of the Edwards and Trinity aquifers within northern Bexar and Comal Counties, Texas: U.S. Geological Survey Scientific Investigations Map 3510, 1 sheet, scale 1:24,000, pamphlet, accessed on March 5, , 2024, at <https://pubs.usgs.gov/publication/sim3510> <https://doi.org/10.3133/sim3366>.
- Clark, A.R., 2003, Vulnerability of ground water to contamination, northern Bexar County, Texas; U.S. Geological Survey Water-Resources Investigations Report 4072, 17 p. pamphlet, accessed on April 11, at <https://doi.org/10.3133/wri034072>.
- Clark, A.R., Blome, C.D., and Faith, J.R., 2009, Map showing the geology and hydrostratigraphy of the Edwards aquifer catchment area, northern Bexar County, south-central Texas: U.S. Geological Survey Open-File Report 2009–1008, 24 p., 1 pl., scale 1:50,000, accessed July 20, 2018, at <https://doi.org/10.3133/ofr20091008>.
- Cunningham, W.L., and Schalk, C.W., comps., 2011, Groundwater technical procedures of the U.S. Geological Survey: U.S. Geological Survey Techniques and Methods 1–A1, 151 p. accessed on June 7, 2023, at <https://pubs.usgs.gov/tm/1a1/pdf/tm1-a1.pdf>.

Faulkner, D.R., Mitchell, T.M., Jensen, E., Cembrano, E., 2011, Scaling of fault damage zones with displacement and the implications for fault growth processes; American Geophysical Union, Journal of Geophysical Research, 11 p., accessed on April 17, 2024, at <https://agupubs.onlinelibrary.wiley.com/doi/epdf/10.1029/2010JB007788>.

Maclay, R.W., and Small, T.A., 1976, Progress report on geology of the Edwards aquifer, San Antonio area, Texas, and preliminary interpretation of borehole geophysical and laboratory data on carbonate rocks: U.S. Geological Survey Open-File Report 76-627, 65 p., accessed August 22, 2023, at <https://doi.org/10.3133/ofr76627>.