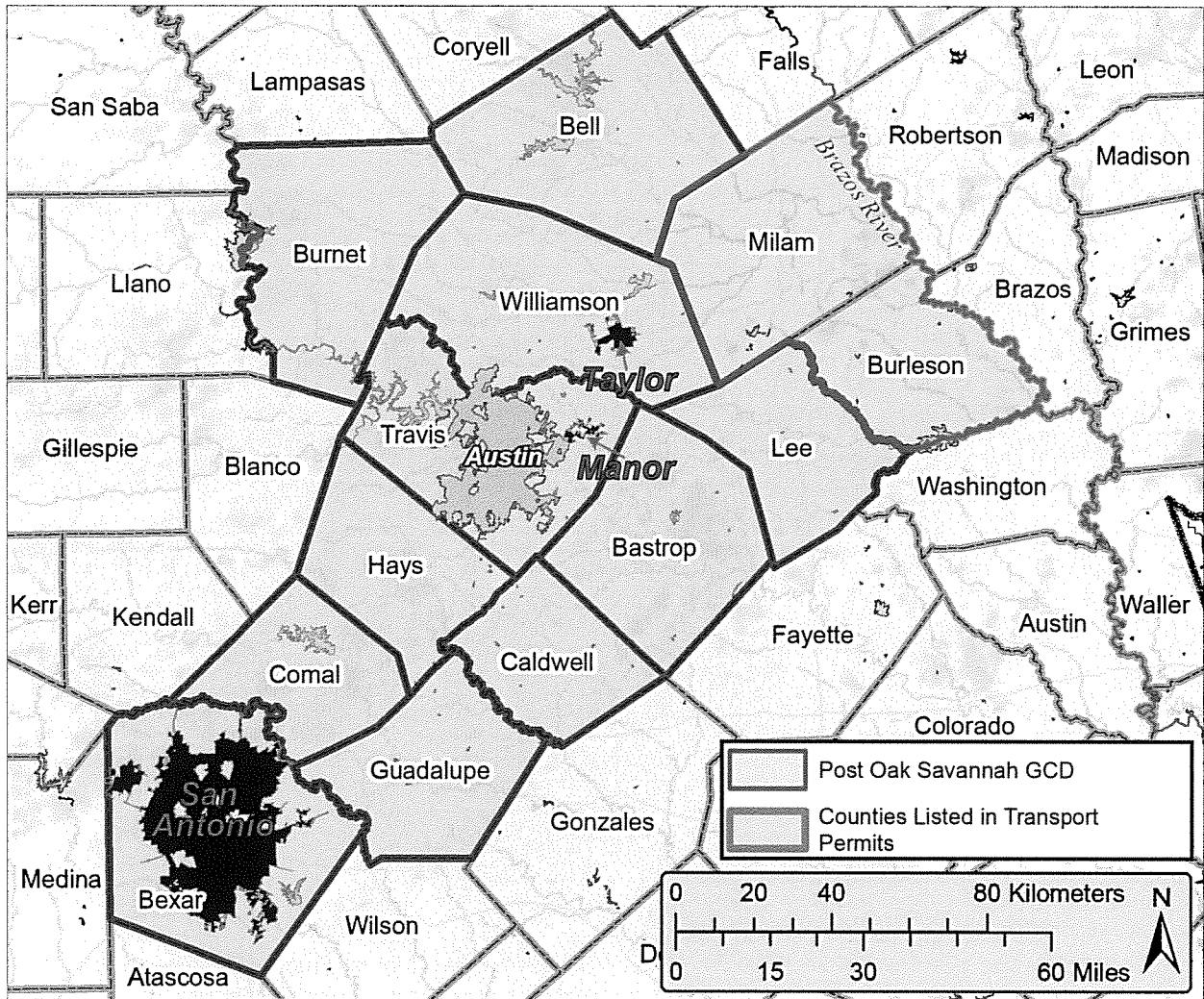




2 – TITLE PAGE

An Operations and Management Model to Enhance Water Resource Sustainability and Climate Resiliency in Central Texas



Applicant:



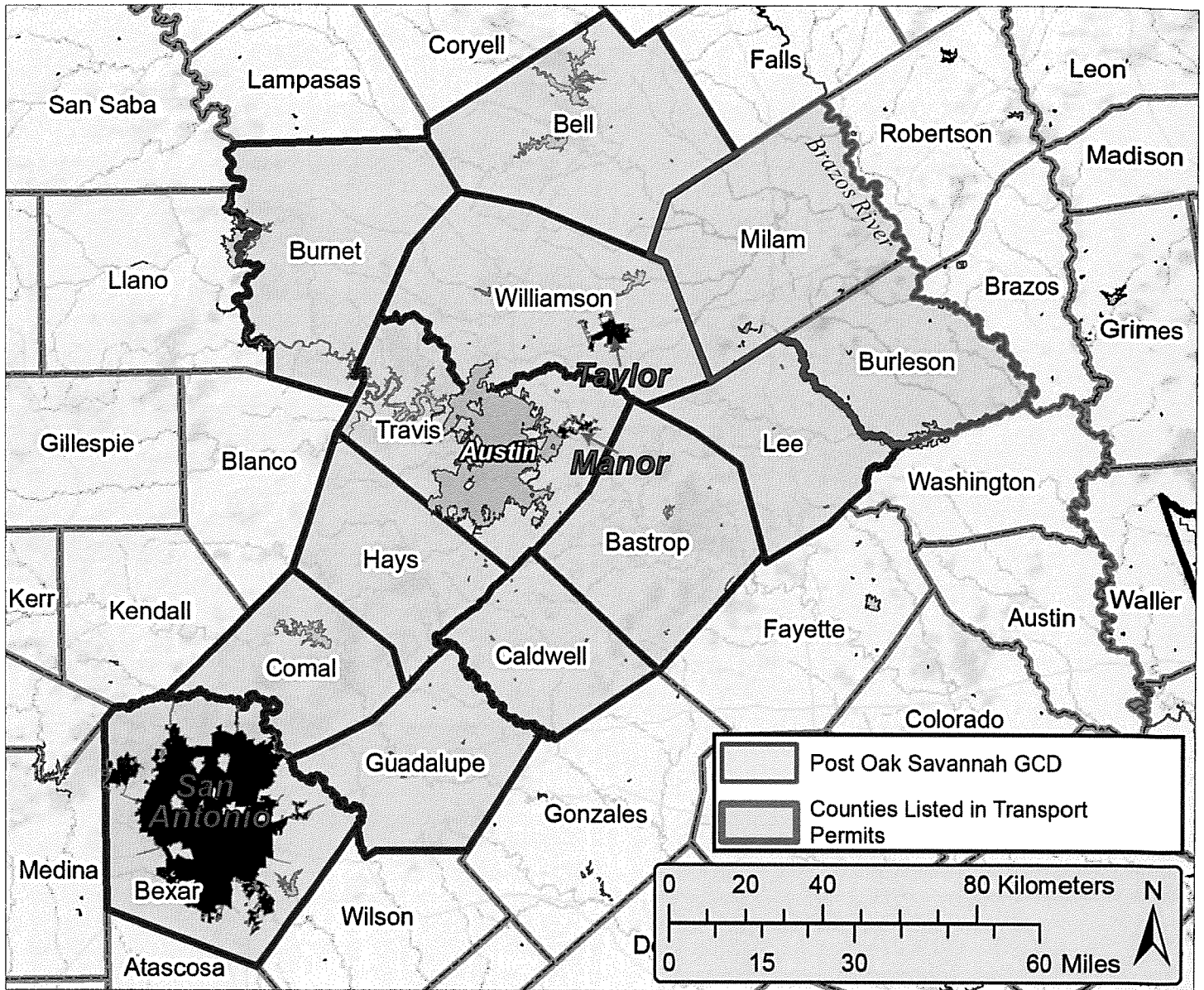
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An Operations and Management Model to Enhance Water Resource Sustainability and Climate Resiliency in Central Texas



Prepared for



BUREAU OF RECLAMATION

Prepared by



APR 14 '22 PM 2:02

APRIL 14, 2022



1 – MANDATORY FEDERAL FORMS

Post Oak Savannah Groundwater Conservation District's completed federal forms (SF-424, SF-424A, SF-424B, and Project Abstract Summary) are provided on the following pages. SF-LLL, Disclosure of Lobbying Activities is not applicable to the Post Oak Savannah Groundwater Conservation District.





3 – TABLE OF CONTENTS

- 1 – Mandatory Federal Forms i
- 2 – Title Page..... xi
- 3 – Table of Contents..... xii
- 4 – Technical Proposal and Evaluation Criteria 1
 - 4.1 Executive Summary..... 1
 - 4.2 Technical Project Description 1
 - 4.3 Project Location.....6
 - 4.4 Evaluation Criteria7
 - 4.4.A Evaluation Criterion A – Benefits to Water Supply Reliability7
 - 4.4.B Evaluation Criterion B – Need for Project and Applicability of Project Results 11
 - 4.4.C Evaluation Criterion C – Project Implementation 12
 - 4.4.D Evaluation Criterion D – Dissemination of Results 16
 - 4.4.E Evaluation Criterion E – Presidential and Department of the Interior Priorities..... 18
 - Cited References:20
- 5 – Project Budget21
 - 5.1 Funding Plan and Letters of Funding Commitment21
 - 5.2 Budget Proposal.....21
 - 5.3 Budget Narrative21
- 6 – Environmental and Cultural Resource Considerations.....23
- 7 – Required Permits or Approvals24
- 8 – Overlap or Duplication of Effort Statement.....25
- 9 – Letters of Support and Letters of Recommendation.....26
- 10 – Official Resolution27
- 11 – Unique Entity Identifier and System for Award Management29
- 12 – Conflict of Interest Disclosure30
- 13 – Uniform Audit Reporting Statement.....31

Appendix – Letters of Support





FIGURES

Figure 4-1. Location of the District, Groundwater Management Area 12, the SLR well field, and the Vista Ridge well field and areas covered by the existing groundwater availability model and the proposed Operations and Management Model.....2

Figure 4-2. Drawdown in the Carrizo Aquifer that has occurred since the Vista Ridge project began production.....31

Figure 4-3. Schematic showing the integration of the Operations and Management Model into the District’s framework for developing its management strategies and management documents...6

Figure 4-4. Counties listed in Post Oak Savannah GCD transport permits and cities (dark blue; San Antonio, Taylor, and Manor) either currently receiving exported water or expected to receive exported water in the near future.7

Figure 4-5. Counties Schedule and cost of proposed project tasks31

TABLES

Table 4-1. Project Deliverables..... 14

Table 4-2. Comparison of Demographic Data for the District and Bexar County..... 19

Table 5-1. Summary of Non-Federal and Federal Funding Sources.21

Table 5-2. Total Project Cost.....21

Table 5-3. Budget Proposal.....22





4 – TECHNICAL PROPOSAL AND EVALUATION CRITERIA

This section of Post Oak Savannah Groundwater Conservation District's (Post Oak Savannah GCD's or District's) application, which has been limited to 20 pages, includes an executive summary, a technical description of the project, details on the project location, and our responses to the five evaluation criteria defined in the Notice of Funding Opportunity (NOFO).

4.1 Executive Summary

Date: April 14, 2022
Applicant Name: Post Oak Savannah Groundwater Conservation District
City, County, and State: Milano, Milam County, Texas

The Post Oak Savannah GCD, in collaboration with The Meadows Center for Water and the Environment at Texas State University (Meadows Center), will develop an **OPerations and MANagement Model (OPMAN)** to be used by the District to help establish a comprehensive and consistent set of rules, policies, and strategies to address water resource management challenges in central Texas. OPMAN will provide the capabilities to facilitate the District's rule- and decision-making processes associated with balancing responsibilities that include conservation of groundwater resources, development of these resources to meet growing needs and demands of the State, and protection of private property water rights. Unlike the State-developed super-regional groundwater availability models (GAMs) currently in use, OPMAN will be developed at a scale that can accurately inform local management decisions. Once developed, the District will use OPMAN to generate model simulations to help inform management decisions related to issues including evaluation of permit renewals, long-term aquifer sustainability, improved climate resiliency, development of desired future conditions (DFCs), curtailment of permits and/or production, and drought management. OPMAN will be developed and embedded into a modified GAM. In addition to providing more accurate predictions of impacts from pumping than a GAM, OPMAN will provide estimates of predictive uncertainty and be readily updateable when new information becomes available. As the State's need for groundwater resources increases due to growth and more uncertainty in surface water resources, improved tools like OPMAN will prove invaluable in informing policy and management decisions. This project will serve as an example, and provide a replicable process, that other groundwater managers in Texas and across the western United States can use to help meet the challenges of achieving water resource sustainability and climate resiliency.

Length of Time and Estimated Completion Date for Project: 18 months from award date, 08/14/2024
Is Project Located on a Federal Facility? No

4.2 Technical Project Description

Applicant Category: The Post Oak Savannah GCD is a Category A applicant.

Detailed Project Description: In Texas, groundwater conservation districts (GCDs) are the local units of government authorized by the State to manage and protect groundwater. The responsibilities and regulatory authority of GCDs are codified in the Texas Water Code (TWC § 36.0015) and include the following:

- Protect property rights
- Balance the conservation and development of groundwater to meet the needs of the State





- Use the best available science in the conservation and development of groundwater through rules developed, adopted, and promulgated in accordance with the provisions of this chapter

Many parts of Texas are experiencing rapid rates of industrial and population growth. This includes the Post Oak Savannah GCD, shown in Figure 4-1, which is located in Milam and Burleson counties in central Texas. Recent and projected growth within the Post Oak Savannah GCD and surrounding area has resulted in substantial increases in groundwater pumping:

- 2015 to 2019: 12,000 AFY – long term annual average groundwater pumping (0 AFY exported)
- 2020 to 2021: 60,000 AFY – current groundwater pumping (50,000 AFY exported)
- Future: 123,000 AFY – total production permits from Carrizo Wilcox (100,000 AFY exported)

Groundwater extraction in the Post Oak Savannah GCD is affected by multiple factors including local population growth and groundwater use, local industrial growth (such as the Sandow Lakes Ranch [SLR] permit application to export water for use in semiconductor manufacturing in the City of Taylor), and regional growth and groundwater use outside the District (the Vista Ridge pipeline transports water extracted from the District to the City of San Antonio).

In 2020, the Vista Ridge project (well field location shown in blue on Figure 4-1), began pumping 50,000 acre-feet per year (AFY) of groundwater from 18 wells in the Carrizo-Wilcox Aquifer in Burleson County. At present, the District has issued production permits for 123,000 AFY from the Carrizo-Wilcox Aquifer. In a

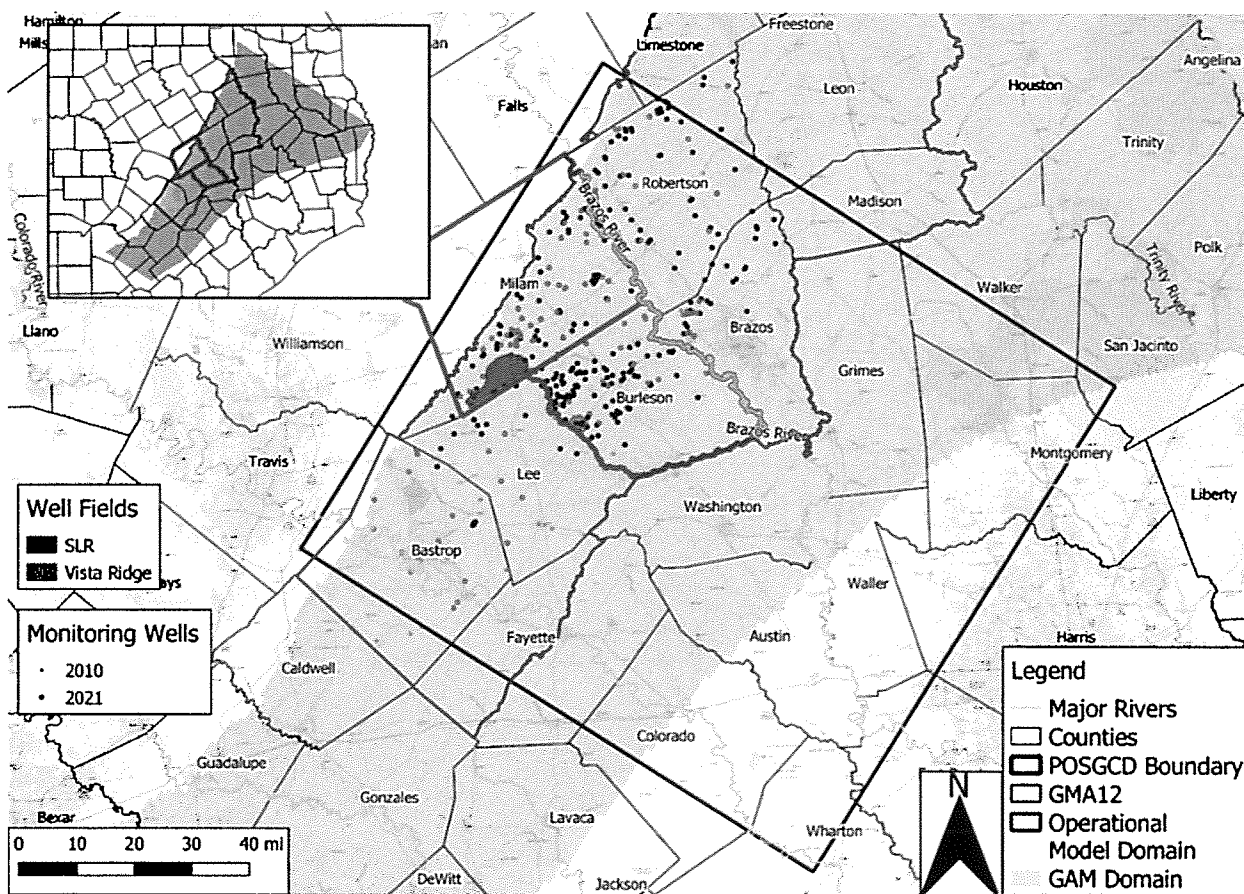


Figure 4-1. Location of the District, Groundwater Management Area 12, the SLR well field, and the Vista Ridge well field and areas covered by the existing groundwater availability model and the proposed Operations and Management Model.





few years, the SLR permit is anticipated to start pumping an additional 25,000 AFY from the Carrizo-Wilcox Aquifer. Since the Vista Ridge project began production, water level declines of up to several hundred feet, shown in **Figure 4-2**, have been observed in wells near the production wells. Figure 4-2 shows contours of drawdown that occurred in the Carrizo Aquifer since the Vista Ridge project started production. Water level declines are expected to increase in the Carrizo-Wilcox Aquifer over the next few decades as pumping continues from current and new permits.

The challenge faced by the Post Oak Savannah GCD—and all GCDs in the State—is to balance the conflicting responsibilities to conserve and protect groundwater, develop groundwater to meet needs of the State, and to protect private water property rights. The District has adopted rules to limit drawdowns by curtailing production and permits after drawdown thresholds have been exceeded in the aquifer. Although there is much that can be debated about groundwater management rules, and specifically about rules regarding curtailments, one issue that is not debatable is that these rules need to be based on best available science.

To improve the best available science and help guide the making of policies, rules, and decisions, the Post Oak Savannah GCD has advocated and provided funding to enhance existing groundwater availability models (GAMs). These GAMs were developed by the Texas Water Development Board (TWDB) to support regional water planning over a 50-year period. For planning within the Post Oak Savannah GCD, the TWDB-approved model is the central portion of the Queen City/Sparta/Carrizo-Wilcox Aquifer GAM, which includes all or part of 46 counties (Figure 4-1). Currently, there are known deficiencies in using the existing

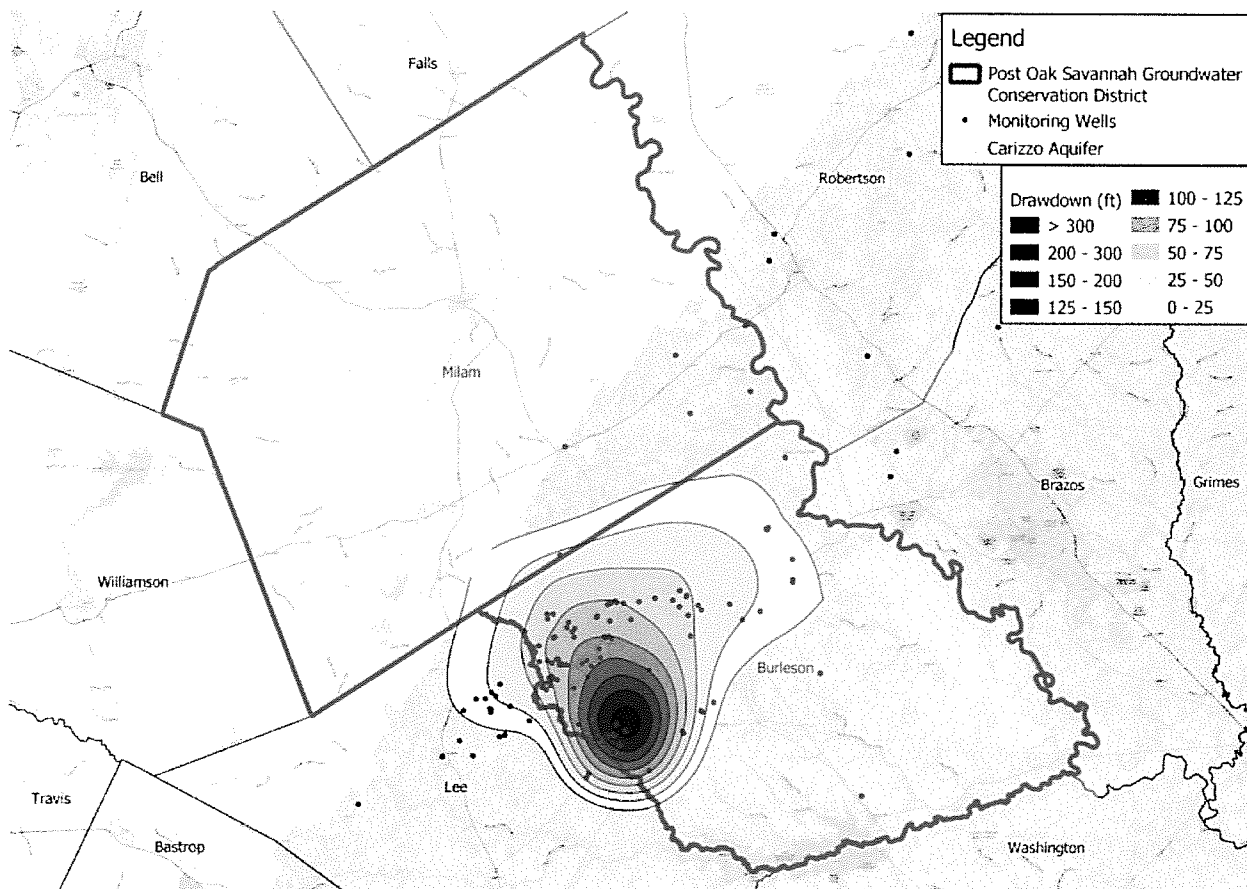


Figure 4-2. Drawdown in the Carrizo Aquifer that has occurred since the Vista Ridge project began production.





GAM to simulate groundwater flow in Milam and Burleson counties. During recent permit hearings, the District and the applicant (SLR) discovered that the existing GAM stratigraphy had several areas where the permitted wells would be assigned to the wrong formation based on the location of the model layers. The root cause of the problem was that the GAM layers, which were developed approximately 20 years ago, were not sufficiently ground-truthed using stratigraphic picks from drillers and geophysical logs in the areas where the aquifer outcrops. In 2021, the District also discovered that the GAM could not satisfactorily reproduce the drawdowns caused by production from the Vista Ridge project. The root causes of this problem were that a very sparse set of hydraulic data was used to calibrate the GAM in Burleson and Lee counties, and there was minimal historical production from the Carrizo-Wilcox Aquifer in Burleson County so there was essentially no data to estimate aquifer properties.

The lack of a credible and defensible model is a significant obstacle for a GCD striving to use best science in guiding groundwater management. Addressing these deficiencies through the development and application of OPMAN will allow for improved groundwater management in the Post Oak Savannah GCD and across the rapidly growing central Texas region. OPMAN will improve regional sustainability and resilience through better groundwater management of the Carrizo-Wilcox Aquifer. Leveraging previous and on-going efforts in the region, the central portion of the existing State-developed Queen City/Sparta/Carrizo Wilcox GAM will be used as the foundation of OPMAN. The approach to developing and applying this valuable tool is described in the following six tasks.

Task 1 – Extend the GAM Simulation of Historical Water Levels from 2010 to 2022. The existing GAM was calibrated using historical pumping and estimated hydraulic boundary conditions from 1930 to 2010. Pumping rates, recharge rates, and related hydraulic boundary conditions will be updated from 2010 to 2021. The pumping information will be assembled from historical pumping databases maintained by the TWDB and GCDs in the area. The recharge estimates will be generated using spatial maps of annual precipitation amounts and equations provided in the GAM documentation (Young and others, 2018).

Task 2 – Build and Calibrate OPMAN. OPMAN will be calibrated using the advanced calibration software PEST++ (White and others, 2020) to adjust aquifer parameters in the GAM to better represent aquifer conditions in the District. In 2021, the District successfully demonstrated that the application of PEST++ can produce a model that provides significantly better predictions than the current GAM, which was calibrated based on a single simulation of changing water levels from 1930 to 2010. OPMAN will be calibrated using the following multiple modeling simulations that reflect both regional and local scales.

- The historical period from 1930 to 2010
- The historical period from 2010 to 2021
- Aquifer pumping tests from 18 Vista Ridge production wells (period of 36 hours to 23 days)
- Aquifer pumping tests conducted other wells (period of 12 hours to 30 days)

The historical period 1930 to 2010 will include the same data sets and calibration targets used to calibrate the GAM to help facilitate the comparison between OPMAN and the current GAM. The historical period from 2010 will include data across the entire GAM where the majority of the data will be focused within the cone of depression caused by pumping from the Vista Ridge project. The aquifer pumping tests will be located within OPMAN's domain. Calibration to the time-drawdown data from pumping tests will improve the capability of OPMAN to represent aquifer properties at the local scale.

An important part of the model calibration is the number and distribution of the measured water levels. The District's monitoring network has expanded from 106 wells with five transducers in 2010 to 397 wells with 75 transducers in 2021. Another important component of model calibration is the ability to simulate the





effect of pumping on drawdown and, more specifically, the ability to match the observed water levels in areas that are most impacted by pumping. Recent water level and pumping data collected by the District and their stakeholders provide excellent scenarios for calibration, as demonstrated by the large drawdowns observed in response to pumping at the Vista Ridge wellfield from January 2020 to January 2022. This type of high-quality and detailed data was not previously available and provides an excellent opportunity to improve model calibration for the proposed study area and surrounding regions.

The model surfaces of OPMAN in the study area (Figure 4-1) will be updated to reflect the formation surfaces generated from an on-going analysis of over 800 geophysical logs currently being performed by the District. The revised surfaces will be completed by December 2022.

Task 3 – Determine Predictive Uncertainty for OPMAN Simulations: Permit Renewals , Curtailment Schemes, and Desired Future Conditions. For most model calibrations, including that of the existing GAM, only one calibrated model is produced. Typical groundwater model calibration demonstrates non-uniqueness; that is, there are multiple combinations of model parameters that can produce nearly identical matches to the measured data. Unlike the classical calibration process, applying the IES module of PEST++ will generate numerous models (typically more than 100 models) with similar calibration statistics that can be run in the forward mode to generate a range of possible predictions with varying probabilities of occurrence. This will produce a series of predictions that can be used to quantify the uncertainty associated with the prediction.

Using the IES module, the uncertainty associated with predicted drawdowns will be quantified for model simulations of the predicted impact from: production from the Vista Ridge and SLR well fields over the course of their 40-year permit lives. The simulations will show the sensitivity of aquifer conditions to different curtailment schemes and climate scenarios. The results of the simulations will be used to develop a methodology for evaluating existing permits every five years and for evaluating DFCs.

Task 4 – Develop Management Strategies for Sustainability and Climate Resilience. A series of OPMAN simulations will be run to investigate the effect of different groundwater management policies, rules, and strategies on achieving Post Oak Savannah GCD’s multiple management objectives, including long-term sustainability of the groundwater resource. Policies may include incentives for joining an aquifer conservancy program, operating aquifer storage and recovery (ASR) facilities, and executing conjunctive surface water and groundwater permits. The type of rules that may impact long-term sustainability are those related to landowners’ entitlement to fair share of the groundwater resource, correlative rights, the curtailment of production, and drawdown thresholds requiring District actions. Climate resiliency will be investigated by considering rules and permit variances that allow for over drafting of the aquifer during times of low surface-water availability contingent on a commitment to either recharge the aquifer or produce less during times of adequate surface water ability to restore the conditions that the aquifer would have experienced if no overdraft had occurred.

Task 5 – Reporting and Webinars. All project work will be documented in a technical report, with a draft final report submitted to Reclamation for review and the final product available to the public on the District webpage. The project team will provide a template to tailor regional models to address groundwater issues that are sensitive to local-scale hydrology. The Project Team will conduct a series of webinars to share results with Reclamation, the District, the regional GMA, the TWDB, and the Texas Alliance of Groundwater Districts.

Task 6 – Project Management. Project management will include administrative, technical, and public outreach tasks. The administrative tasks will include coordinating the timely submittal of reports and forms with Reclamation personnel, tracking progress with budget and schedule, and processing payments





through the Department of Treasury Automated Standard Application for Payments (ASAP). The technical tasks include ensuring that tasks goals and deliverables are being met and identifying any technical issues that may require Reclamation involvement. Public outreach tasks include interacting with stakeholders, Post Oak Savannah GCD Board members, and interested GCDs to translate the modeling results into rules, policies, and strategies.

Goals: The primary goal of the proposed project is to enhance regional sustainability and climate resiliency through improved local groundwater management, which will be realized by the development of a credible and defensible OPMAN. **Figure 4-3** shows how OPMAN will be integrated into the Post Oak Savannah GCD’s management framework once completed. The District’s management strategies, rules, and polices rely on best available science. Once generated, OPMAN will represent best available science. It will be developed by reconstructing and recalibrating the portion of a regional state planning model that covers the District and will more accurately simulate hydrogeologic conditions when compared to the unmodified regional model. In addition, to help the District evaluate risk, OPMAN will be developed to provide estimates of predictive uncertainty. The predictive uncertainty will be expressed as a histogram of the range of predictions generated by a hundred or more models that have provided acceptable matches to the calibration data.

Figure 4-3 shows how OPMAN will be integrated into the District’s management framework. A critical feature of OPMAN is that it provides the overarching set of hydrogeological relationships that promotes consistency among numerous rules and policies such that aquifer sustainability and resiliency can be achieved. Since the understanding of hydrogeologic conditions is always being improved, OPMAN will be designed and built so that it can be updated quickly, and seamlessly as new information becomes available. For instance, OPMAN can be easily recalibrated after the collection of annual monitoring data or the completion of significant aquifer pumping tests.

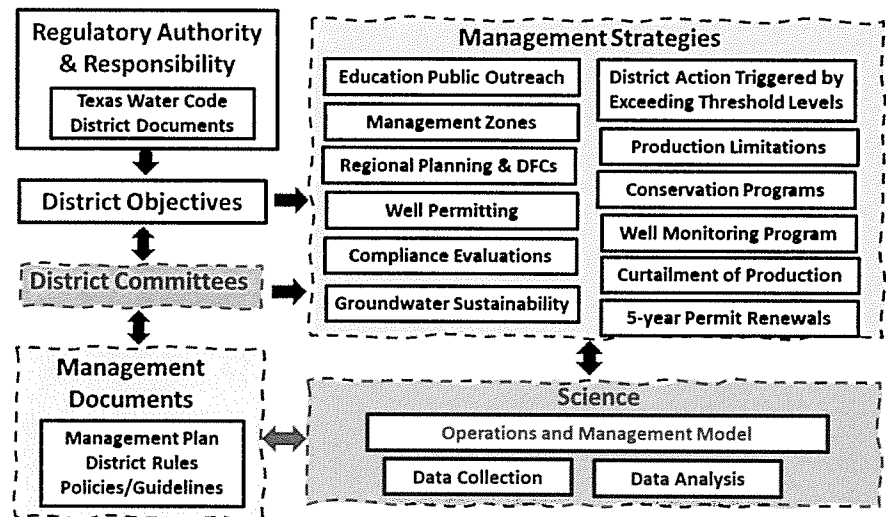


Figure 4-3. Schematic showing the integration of the Operations and Management Model into the District’s framework for developing its management strategies and management documents.

4.3 Project Location

While the proposed project will primarily benefit the Post Oak Savannah GCD, which includes Milam and Burleson counties, it will also impact the counties and cities where groundwater is exported. The District has transport permits of 100,000 AFY that list the 11-county area shown in **Figure 4-4** as potential recipients of groundwater. Currently, groundwater is being transported to the cities of San Antonio and Manor. Among the planned recipients of water from the SLR permit is a semiconductor plant located in the City of Taylor.





4.4 Evaluation Criteria

The District’s responses to each of the application evaluation criterion and sub-criterion, presented in the order the evaluation criteria appear in Section E of the NOFO, are provided below.

4.4.A Evaluation Criterion A – Benefits to Water Supply Reliability

Groundwater is managed in Texas by GCDs whose management decisions are integrated into state water planning through the regional planning efforts of GMAs (consisting of multiple GCDs).

By the year 2070, Texas’ population is expected to grow by 73% with a 9% increase in water demand. This equates to an additional 7.7 million AFY of supply, 12% of which is comprised of new groundwater. For the State to grow, the management of groundwater must become more reliable for the users. The following describes how the proposed project will benefit water reliability for users within the Post Oak Savannah GCD, while also providing a framework for many other GCDs within Texas to better manage groundwater resources. This project will provide a workflow that will be applicable to other GCDs and groundwater managers across Texas and the western United States.

4.4.A.1 Water Management Issues Occurring within Project Area that Will Be Addressed

The Post Oak Savannah GCD is located less than 110 miles from four of the top eight metropolitan areas in the United States as ranked by population growth from 2020 to 2021 (Axios, 2022). The District is also located just east of a large growth corridor in central Texas that currently includes five million people and is expected to grow to 9.5 million people by 2070. Surface water reservoirs have been built in the vicinity of the growth corridor to serve as water supply sources, but no new reservoirs are planned, and none have been built for at least half a century. Aquifers underlying this growth area have either been completely permitted, do not produce enough water for major municipal purposes, or are not drought resilient. The most promising source of water to address the demands caused by tremendous growth in central Texas is production from the Carrizo-Wilcox Aquifer, which is not only recognized as a highly productive aquifer in Texas but is also climate resilient. As a result of these conditions, the Post Oak Savannah GCD currently has three large Carrizo-Wilcox Aquifer development projects that are permitted to export 100,000 AFY to 11 counties in central Texas. More of these projects are expected.

In 2019, groundwater production from the Carrizo-Wilcox Aquifer in the District was 13,000 AFY. In 2020, the Vista Ridge project began exporting 50,000 AFY to the City of San Antonio. Within the next 10 years,

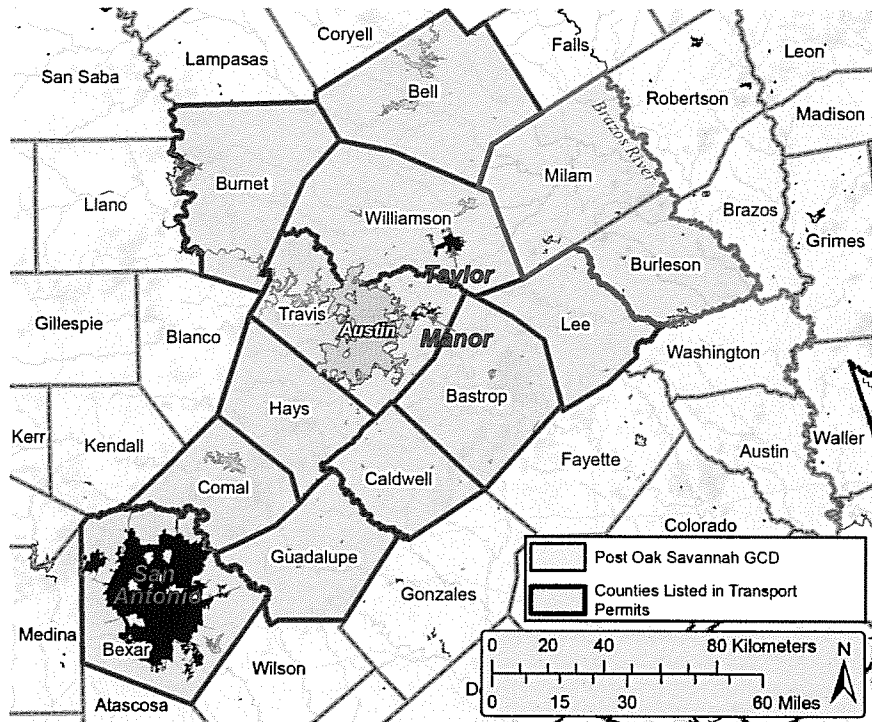


Figure 4-4. Counties listed in Post Oak Savannah GCD transport permits and cities (dark blue; San Antonio, Taylor, and Manor) either currently receiving exported water or expected to receive exported water in the near future.





an additional 25,000 AFY is anticipated to be transported to the Austin metropolitan area and to the City of Taylor. The significant increase in production has caused, and will continue to cause, substantial water level declines that are of concern to the rural communities. Since the Vista Ridge project began production, water level declines of several hundred feet have been observed in the production wells and declines of greater than 100 feet have occurred in several existing wells in the Carrizo Aquifer (see Figure 4-2). Similar declines have occurred in the Wilcox Aquifer.

Post Oak Savannah GCD is currently at the forefront of several significant water issues facing Texas. One of the issues is balancing the responsibilities to conserve and protect groundwater, including the protection of private property water rights, while allowing development of groundwater to meet needs of the State. The current Texas statutes codified in Texas Water Code; Chapter 36 provide the general framework for management of groundwater. However, much of the statute is open to interpretation which results in uncertainty in groundwater availability for users both within and outside of a GCD. This results in significant water supply uncertainty that undermines water supply planning.

The uncertainty with water supply planning is also aggravated by the fact that GCDs do not have adequate models to accurately forecast the impacts of future pumping on groundwater. Most GCDs, if not all, rely on a GAM that was developed by the State (Texas Water Development Board) to support regional water planning and management. As a result of recent work with simulating the impacts of pumping from the Vista Ridge project and permitting additional production using the existing GAM for the Carrizo-Wilcox Aquifer, the Post Oak Savannah GCD discovered that the regional scale of the GAM cannot provide accurate information at the resolution needed to support local management decisions without significant modification.

To achieve groundwater sustainability while ensuring a reliable groundwater resource for landowners and for large water-supply projects, Post Oak Savannah GCD is developing a consensus-based management program that applies the best available science. An integral component of this program is OPMAN, which will serve as a credible and defensible tool for making decisions regarding management and the development of a comprehensive and consistent set of rules, policies, and strategies to accomplish the District's mission.

The development and application of OPMAN will help address Post Oak Savannah GCD's water management issues by providing the capability to:

- accurately forecast the impact of future pumping on water users and groundwater availability
- investigate sources of, and quantify uncertainty associated with model forecasts that provide both the District and well owners with a better assessment of risks associated with impacts from future production
- generate improved estimates of the number of well owners that will be eligible for financial assistance from the District for the costs associated with lowering pumps or replacing wells because of declines in groundwater levels
- investigate the potential benefits of using adaptive management to achieve greater sustainability and improved climate-resiliency by increasing the flexibility for pumping, especially during times of drought
- investigate the potential benefits for incentivizing or requiring conjunctive management of water projects after drawdown or production thresholds are reached
- clearly articulate the conditions under which curtailment of production of permits could occur, thereby reducing some of the uncertainty associated with the permitting process.





4.4.A.2 How Project will Address Water Management Issues

The development and application of OPMAN will address the identified water management issues by supporting water supply reliability, water marketing and drought management activities, conjunctive use of ground and surface water, watershed health and water rights administration, and conservation and efficiency. Additional details on each of these areas are provided below.

Water supply reliability. Water supply reliability is the central tenet of this project. It will develop a reliable operations model that can serve as the basis for reliable permitting and management of groundwater resources within the Post Oak Savannah GCD. Texas Water Code, Chapter 36 requires that GCDs manage groundwater resources to achieve the long-term DFC. While this does not explicitly set a pumping cap, it does in practice allow curtailment of existing and future permits. And while this is a reasonable adaptive management approach, it should be based on reliable science. Providing reliable permits, and by extension, supplies, requires reliable estimates of sustainable production and the impacts of that production. Because the impacts from large-scale production only evolve after pumping begins, the reliability of a production volume is only as good as the reliability of the science used to predict it. If the science is reliable, the permits underlying the pumping are also reliable.

Water marketing activities. Currently, the largest impediment to water marketing activities is the lack of transparency and reliability in permitting. One of the reasons for uncertainty with permitted production is that Chapter 36 of the Texas Water Code allows GCDs to curtail permitted production, but does provide any guidance of when it is justified and how it should be performed. Unanswered questions regarding the curtailment lessens the reliability of the water supply. Regulatory certainty for both water marketers trying to supply state water needs and for current landowners. As stated above, this project seeks to improve the science to inform a development framework that provides regulatory certainty for water marketing supply projects that comply with the management plan, regulations, and permit conditions. This does not imply that water projects are guaranteed to always get all the water they want. Rather, it means that they understand the scientific basis for the water permitted, and the conditions under which that water is secure.

Drought management activities. Most of the urban areas within 100 miles of Post Oak Savannah GCD rely on surface water supplies that are largely adjudicated and are drought prone. Many municipalities are looking for groundwater to firm up supplies during drought or to generally increase supply. During drought, most water users produce more groundwater. OPMAN will be well suited to investigate the regulatory use of pumping cycles to meet increased short-term demands caused by drought without causing unacceptable short-term and long-term impacts. The proposed project will investigate the potential benefits and feasibility of allowing permits to apply for increased pumping during drought contingent on commitments to lessen production or provide for aquifer recharge shortly after the drought to allow for the aquifer to recover. This type of allowance significantly alleviates the problems associated with water supply during drought. In addition, the capability of OPMAN to accurately forecast water levels and to provide an estimate of predictive uncertainty will allow well owners to better prepare for drought.

Conjunctive use of ground and surface water. As part of the proposed project, Post Oak Savannah GCD will intensify efforts to promote and incentivize conjunctive ground and surface water permits. The coexistence of the Brazos River and the Carrizo-Wilcox Aquifer represents an opportune place to use conjunctive management to increase supplies. OPMAN will be well suited to assess conjunctive strategies. The key to making conjunctive use projects work will be the ability to structure groundwater permits in such a way that permitted production is based on an average amount over an extended time period rather than traditional maximum production concepts. This could allow conjunctive groundwater-surface water users





the ability to increase the firm yield of a surface water supply while also meeting long-term aquifer condition objectives prescribed by the Post Oak Savannah GCD.

Watershed health and water rights administration. The physical sustainable development of groundwater resources depends on the capture of aquifer discharge. The dominant aquifer discharge mechanisms are focused on the aquifer outcrop and are dominated by evapotranspiration and stream/river discharge. The current GAM (the state's model) for the central portion of the Carrizo-Wilcox Aquifer does a good job of simulating these capture mechanisms on an average long-term basis. However, OPMAN will provide considerably more information regarding the uncertainty in streamflow depletion that will occur from pumping. The Lower Brazos Basin is managed by a Texas Commission on Environmental Quality (TCEQ) Watermaster because the basin is prone to insufficient water availability in droughts. While the improved predictive ability of OPMAN may be of interest to the Watermaster, there is no legal regulatory framework for integrating pumping capture into surface water rights unless the pumping of groundwater under the influence can be demonstrated.

Conservation and efficiency. The Post Oak Savannah GCD currently administers an Aquifer Conservancy Program that pays landowners to not develop their water rights over a fixed time horizon. Through implementation of this project, it is reasonable to expect that landowners will be more willing to join the Aquifer Conservancy Program as they increase their trust in the long-term sustainable management of the Carrizo-Wilcox Aquifer. In addition, predictive simulations of the spatially varied response of the Carrizo-Wilcox Aquifer to pumping will help the District determine what areas should be a priority for the Aquifer Conservancy Program.

4.4.A.3 Extent to Which Project Will Improve Water Management

The District is at the nexus of rural and urban water needs with 100,000 AFY of water currently permitted for export from the Carrizo-Wilcox Aquifer. This project will develop and apply a management model to investigate adaptive strategies aimed at increasing groundwater reliability and sustainability using a management approach driven by policy and informed by science. The financial impact of this project is potentially significant to entities that are relying on the groundwater as a primary water supply with limited options during times of drought. For example, the Vista Ridge project is a multi-billion-dollar investment that serves metropolitan areas with more than two million people and whose primary water supplies are not climate resilient. In addition, the groundwater being used by several industries represents their primary source of water supply. The curtailment or reduction of the groundwater production would adversely affect socioeconomic conditions of people and the industry that rely on groundwater from the District. Improper management of the groundwater that leads to water shortage will affect the economic growth of not only the District, but central Texas as well.

4.4.A.4 How Project Complements Other Similar Efforts in the Area

Most GCDs in Texas have the need for an operations and management model that not only works well in conjunction with the State GAMs, but that can provide local-scale predictions with quantification of the uncertainty in the predictions. This type of a management tool offers groundwater managers and users a degree of reliability in the management goals of the Post Oak Savannah GCD as well as the quantity of groundwater that can be developed. This tool also provides valuable information on the data that can be collected to improve model reliability moving forward. The Clearwater Groundwater Conservancy District in Bell County is developing a deterministic local-scale model. There are several GCDs within the State that have yet to develop clear policy on how management is tied to aquifer conditions. These GCDs will find the OPMAN project beneficial to the further development of their adaptive management strategies.





This project is directly applicable to, and can inform, legislative activities at the State level. A House Interim Charge for the 87th Legislature speaks to several of the water management issues being addressed in the proposed project. Specifically, the House Committee on Natural Resources will examine the state's groundwater management policy and regulatory framework, including a review of large-scale water transfers and their impact on groundwater resources. The committee will make appropriate recommendations for legislation or state agency action to (1) promote the achievement of planning goals under Texas Water Code, Chapter 36, including those involving DFCs and (2) provide adequate transparency to the permit application process (Phelan, 2022).

4.4.B Evaluation Criterion B – Need for Project and Applicability of Project Results

Central Texas is ground zero for many of the water supply problems facing the State and those who manage groundwater resources (i.e., GCDs). To meet growing water demands, both municipalities and industry are targeting the export of groundwater from the productive and climate-resilient Carrizo-Wilcox Aquifer in the Post Oak Savannah GCD. The large exports of groundwater pits rural interests against urban interests and potentially threatens the economies, property rights, and ecology of rural areas. The District needs science-based tools to support an adaptive management approach for developing rules, policies, and management strategies that will achieve a balance between conservation and production to meet the needs of the State, long-term groundwater sustainability, and the protection of private property water rights.

4.4.B.1 How Project Will Result in Readily Useful Applied Science Tool that Meets an Existing Need

Since its inception, the Post Oak Savannah GCD has stressed the need for improved modeling tools to support science-based decisions for groundwater management. The District routinely integrates groundwater modeling results into the management framework using a workflow similar to that shown in Figure 4-3. The incorporation of OPMAN into the workflow will be immediate and seamless.

4.4.B.2 Who Has Expressed Need and How/Where Was Need Identified

The need for a credible groundwater model has been expressed by Post Oak Savannah GCD staff, District board members, stakeholders, well owners, and landowners since the first application for a production permit to transport water outside of the District in 2004. Public hearings regarding large export permits have been characterized by crowded rooms of landowners expressing concerns about the reliability and sustainability of groundwater supplies. The need for improved science and modeling capabilities at an appropriate scale to quantify groundwater availability and evaluate the impacts of future pumping is a recurring theme at the Post Oak Savannah GCD's annual groundwater summit held in Burleson County. In late 2020 and early 2021, three District reports (Kushnereit and others, 2021; Young and Kelley, 2021; Young and others, 2021) identified improved groundwater modeling as a key component to implementing the District's groundwaters rules, management strategies, Groundwater Well Assistance Program for providing financial assistance to impacted wells, and evaluation of compliance with its DFCs.

In 2021, the District identified the need for an operations and management model after discovering that the State's GAM would not provide accurate and defensible predictions of drawdown created by the two largest production permits in the Carrizo-Wilcox Aquifer. The need for OPMAN was presented to the public during the District's 2021 Groundwater Summit. During the presentation, three key points were emphasized: (1) the District has an extensive well monitoring network (see Figure 4-1) that provides the necessary data to improve the predictive accuracy of the GAM; (2) the uncertainty associated with model predictions needs to be quantified and explained so the District's Board of Directors can make informed decisions; and (3) recent developments in model calibration (IES module in PEST++) provide a state-of-the art approach for





estimating uncertainty. The response from attendees to developing a tool like OPMAN was very favorable and viewed as a key to gaining the public's trust in the regulatory decisions being made by the District.

4.4.B.3 Who Will be Involved as Project Partners

The District will be supported in developing and applying OPMAN by the Meadows Center, who will be engaged throughout the entire project duration. The Meadow Center will identify approaches for (1) defining and quantifying sustainable pumping, (2) using model results to demonstrate that a desired future condition achieves a balance between production and conservation of groundwater, and (3) incorporating the effects that climate variability and change could have on management strategies.

4.4.B.4 Will Results Inform Water Resource Management Actions/Decisions Immediately Upon Completion

The results of the project will inform water resource management actions and decisions immediately upon completion of the project. The project work will include specific analyses that will immediately inform decisions associated with the selection and evaluation process for DFCs, the evaluation of DFC compliance, the identification of wells vulnerable to significant water level declines, and policies related to climate change and drought conditions. Moreover, OPMAN will become a tool central to incorporating best available science into the development and implementation of the Post Oak Savannah GCD's groundwater management strategies, rules, evaluation of permit applications, and permit renewal process. Because the project is committed to enforcing consistency with the more regional-scale GAMs, the methods employed in this project will be directly applicable to many other GCDs in Texas.

4.4.B.5 Will Results be Transferrable to Other Users and Locations

The workflow and techniques associated with developing and applying OPMAN are applicable to creating similar models to support groundwater management and decision making across Texas and other western states. The project results in quantifying predictive uncertainty and the sensitivity of groundwater conditions to climate variability will be available for other water resource managers and organizations.

4.4.C Evaluation Criterion C – Project Implementation

Immediately upon entering a financial assistance agreement with the Bureau of Reclamation (Reclamation), Post Oak Savannah GCD is fully prepared to proceed with the development and application of OPMAN. The District will contract INTERA Incorporated (INTERA) to perform the technical work. As the District's hydrogeological consultant since 2010, INTERA is intimately familiar with the groundwater issues facing the District as well as the adaptive management framework being used. INTERA is also a leader in Texas groundwater modeling. The company developed all four of the GAMs that the Post Oak Savannah GCD uses to simulate future impacts of pumping on groundwater. These GAM include the Brazos River Alluvium (Ewing and Jigmond, 2016), the Northern Trinity GAM (Kelley and others, 2014), the Yegua-Jackson GAM (Deeds and others, 2010), and the GAM for the central portion of the Queen City/Sparta/Carrizo-Wilcox Aquifer (Young and others, 2020). To augment the technical capability of INTERA, the District will contract with Dr. Robert Mace of the Meadows Center, who is recognized as one of the foremost experts in Texas regarding groundwater planning and sustainability.

4.4.C.1 Approach and Methodology to Meet Project Objectives

The project approach consists of two primary components—development of the OPMAN model and its subsequent integration into a programmatic framework for groundwater management. The approach for developing OPMAN incorporates the modeling techniques and software that have been thoroughly vetted by the Post Oak Savannah GCD's hydrogeologic consultant, INTERA. The groundwater modeling code,





MODFLOW-USG (Panday, 2015), which is available through the U.S. Geological Survey (USGS), will be used to develop OPMAN. The model will be constructed by modifying the GAM for the central portion of the Queen City/Sparta/Carrizo-Wilcox aquifers (Young and others, 2020). The GAM has undergone a thorough review and is publicly available from the TWDB. We will use the PEST++ software (White and others, 2020) to recalibrate the GAM and to determine predicted uncertainty. The hydrogeologic data will be obtained from federal agencies, including the USGS and the National Oceanic and Atmospheric Administration, state agencies, including the TWDB, the TCEQ, and GCDs, as well as other publicly available reports.

The blueprint for the approach to integrating OPMAN already exists within the Post Oak Savannah GCD's programmatic framework for groundwater management. The blueprint, explained in a Management Strategies Report (Young and Kelly, 2021), follows the workflow shown in Figure 4-3. In the absence of a credible and defensible operations and management model, the District is currently using the GAM and several other groundwater models tailored to the District's hydrogeology as the science to help establish rule and policies. This project will deliver a much-needed tool to inform the development of rules and policies that provide for a sustainable long-term groundwater supply and for climate resiliency.

4.4.C.2 Work Plan for Implementing Proposed Scope of Work

The District's proposed Project Manager, Mr. Gary Westbrook, will oversee the efforts of several Technical Leads that include staff from INTERA and the Meadows Center. In their role as the District's hydrogeologic consultant, Mr. Westbrook has managed INTERA personnel for more than 10 years, and he has developed effective communication channels with the company's upper management and technical staff. Mr. Westbrook has led several modeling projects, including a recent effort with other GCDs to update the central portion of the Queen City/Sparta/Carrizo-Wilcox GAM (Young and others, 2020).

The total project budget is \$550,080, and the project duration is 18 months. **Figure 4-5** provides a budget and schedule for each project task. These tasks are described under Section 4.2, Technical Project Description. There are three key milestones for the project. The first milestone is extending the groundwater availability model simulation from January 2010 to January 2022 (end of Task 1). The second milestone is completing the development of OPMAN at the end of Task 2. The third key milestone is completing the draft technical reports toward the end of Task 5.

4.4.C.3 Products Anticipated to Result from Project

The products anticipated to result from the OPMAN project are shown in **Table 4-1**.

4.4.C.4 Project Staff

The Post Oak Savannah GCD has assembled an outstanding team to complete the development and application of OPMAN. Summaries of the credentials, qualifications, and experience of key staff members are provided below.



Gary Westbrook – Project Manager. Gary Westbrook is the General Manager of the Post Oak Savannah GCD and has a BS in agriculture education. He has served as the District's General Manager for nearly 19 years. Gary served as the president of the Texas Alliance of Groundwater Districts from 2005 to 2007, and serves as the District's voting representative to GMA 8, as well as the voting representative for GMA 12 on the Brazos G Regional Water Planning Group. Gary was the Project Manager for a GMA 12 led effort to revise TWDB's GAM for the central portion of the Queen City/Sparta/Carrizo-Wilcox in 2020 (Young and others, 2020).





Task	Start Date	End Date	Cost (\$)	2023												2024											
				F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A					
Task 1: Extend GAM Simulation from 2010 to 2022	02/15/23	04/14/23	55,600	█																							
Task 2: Construct and Calibrate OPMAN	04/17/23	12/15/23	227,580			█																					
Task 3: Quantify Predictive Uncertainty for OPMAN Simulations	09/15/23	02/15/24	77,200									█															
Task 4: Management Strategies for Sustainability and Climate Resilience	01/15/24	06/14/24	88,300													█											
Task 5: Reporting and Webinars	05/15/24	08/15/24	71,400																		█						
Task 6: Project Management	02/15/23	08/15/24	30,000	█																							

Figure 4-5. Schedule and cost of proposed project tasks.

Table 4-1. Project Deliverables

Deliverable		Description
Software	Operations and Management Model (OPMAN)	MODFLOW-USG packages and MODFLOW-USG executable for the groundwater model that achieves the best model calibration
	GitHub Repository for one example application of OPMAN to quantify predictive uncertainty	Repository containing MODFLOW files, python scripts for generating input and output files for PEST++-ies, scripts for post processing *.ies output and an anaconda *.yml file containing the python environment used to run PEST++-ies
Reports	Technical Model Report	Report will document the construction and calibration of MOM. Report will be submitted to POSGCD for review.
	Management Strategy Report	Report will document the model results and potential implications from the application of MOMs to existing permits and curtailment rules.
Webinars	Project Overview of Technical Work and Findings	Post Oak Savannah GCD will conduct webinars coordinated with Reclamation and other appropriate organizations in Texas and the western United States

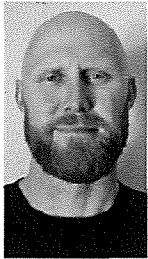


Steven Young, PhD, PG, PE – Tasks 1 and 2 Lead. Steve Young is a Principal Geoscientist/Engineer at INTERA with a PhD in earth sciences, a MS in environmental engineering, a BS in environmental science, and over 35 years of experience in characterizing and solving water supply and groundwater remediation 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. His expertise includes assessing fresh and brackish groundwater resources through the analysis of geophysical logs, aquifer test data, and geochemical data. Working with water management agencies and commercial industry, Steve has evaluated groundwater resources in Texas that include the Carrizo-Wilcox Aquifer, Gulf Coast Aquifer System, and the Northern Trinity Aquifer. He has managed a wide range of water projects across Texas, working with more than 15 GCDs to help develop management plans, groundwater rules, groundwater databases, and gain a better understanding





of groundwater resources. He has participated in joint planning activities with several GMAs and helped with the development and modification of GAMs. Steve has managed projects that use PEST or PEST++ to calibrate groundwater models for more than 15 years and is the lead author on several TWDB modeling reports that demonstrate the application of PEST in groundwater modeling. He has served as the Post Oak Savannah GCD's hydrogeologic consultant since 2004 (prior to 2010 with a previous employer). Steve is a Principal Geoscientist at INTERA and is both a Professional Engineer and Professional Geologists. He is an expert on the modeling and characterization of the Carrizo-Wilcox Aquifer.



Jeremy White, PhD – Task 3 Lead. Jeremy White is a Principal Hydrogeologist at INTERA with a PhD and MS degrees in hydrogeology, a BS in computer science, and 18 years of experience focused on development and construction of environmental models for decision support. He is lead developer of several internationally recognized software platforms including PEST++ (White and others, 2020) for uncertainty, data assimilation, and optimization under uncertainty, as well as modeling workflow automation. He has used PEST and PEST++ to calibrate and evaluate uncertainty of over 50 groundwater models. Jeremy has pioneered new approaches and workflows for environmental simulation that focus on

rapid and reproducible modeling analyses. He has worked on modeling projects around the world and in numerous environmental settings to support both water resources management and environmental remediation activities. Jeremy also collaborated on the development of several advanced new capabilities for the MODFLOW family of codes including a solution techniques for MODFLOW-5 using general-purpose graphical processing units, the development and implementation of a diffusive-wave MODFLOW-5-coupled surface-water model, as well as the new subsidence process for MODFLOW-6.



Robert Mace, PhD, PG – Task 4 Lead. Robert Mace is the Executive Director and Chief Water Policy Officer at The Meadows Center for Water and the Environment and a Professor of Practice in the Department of Geography at Texas State University. He has PhD and MS degrees in hydrology, a BS in geophysics, and over 30 years of experience in hydrology, hydrogeology, stakeholder processes, and water policy, mostly in Texas. From 2000 to 2017, Robert served at the TWDB as the Deputy Executive Administrator for the Water Science & Conservation Office. In this role, he was responsible for the development of nearly every GAM in the state and played a key role in advising legislators regarding water policy. He has

recently completed several reports related to groundwater sustainability in Texas and has authored a book on groundwater sustainability that is currently in press. He has published on climate change and groundwater in Texas and currently leads a project to evaluate the impacts of climate change on water resources in Texas.



Van Kelley, PG – Task 5 Lead. Van Kelley is a Principal Geoscientist at INTERA and previously served as Director of Water Resources for over 25 years. He has a MS in hydrogeology, a BS in petroleum geology, and over 35 years of experience in developing and applying groundwater flow and transport models to evaluate water resource management strategies and waste-management issues. In the area of water resources management, he has integrated field data with groundwater models to determine regional and local groundwater availability over long-term planning periods, evaluate and predict future groundwater quality, and assess the impacts of various management strategies on local and

regional surface water and groundwater resources. He has managed and performed work in virtually every major and minor aquifer in Texas. Over the last eight years, Van has managed several alternative water supply strategy projects focused on ASR and brackish groundwater resources. He is experienced in communicating with the public and with his peers, and regularly presents the results of his work at





conferences. Van has authored or co-authored 15 GAM reports and more than 200 technical reports. He has also served as the project manager for the development of 12 GAMs for aquifers throughout Texas.

There are no plans to request additional technical assistance from Reclamation or outside of the organizations that comprise the Post Oak Savannah GCD team (the District, Meadows Center, and INTERA). The District team has completed more than 70 other modeling projects that are similar in scope, budget, and schedule to the proposed OPMAN project. INTERA is a proven leader in Texas hydrogeology and groundwater modeling. As evidence of this, no other company has delivered more groundwater models to the TWDB than INTERA. In addition, INTERA brings experience in applying the best available science to support GCDs in developing groundwater management strategies and rules.

The Post Oak Savannah GCD's project team stands ready to proceed with the tasks immediately upon receiving a notice to proceed from Reclamation.

4.4.D Evaluation Criterion D – Dissemination of Results

Results of this project will be actively disseminated, transferred, and communicated directly with partners and resource managers in the region and throughout the western United States as described in the following subsections. The final report, documenting the results of the development and application of OPMAN, will be publicly available on the Post Oak Savannah GCD website.

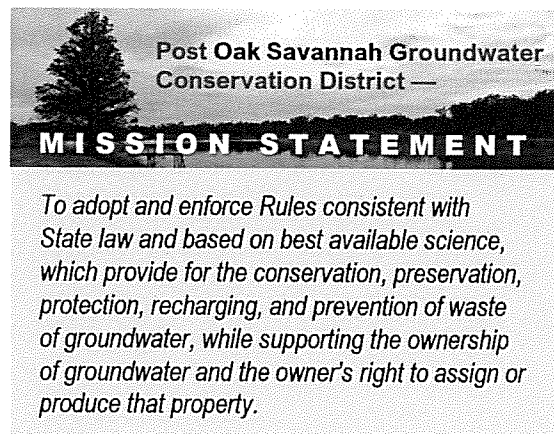
4.4.D.1 POSGCD as Primary Beneficiary – Communication of Project Results Internally and to Interested Stakeholders and Water Resources Managers in the Area

The primary beneficiaries of this project are well owners and landowners of the Post Oak Savannah GCD. An improved model means the District can better meet their conservation goals, more easily enforce regulations, and withstand legal and technical challenges, which is how they protect well owners and landowners. This project is an intrinsic and crucial component of the Post Oak Savannah GCD's long-term Management Plan, which has been evolving over the years as the need for more sophisticated planning tools has become more apparent and, as more data are available to conduct the necessary analyses. As such, District staff and Board members are actively aware of and understand the importance of the project. Post Oak Savannah GCD staff will be closely monitoring project progress and results.

The Post Oak Savannah GCD has an ongoing and active stakeholder outreach program in Milam and Burleson Counties; they have been holding annual educational events for over five years which includes their Groundwater Summit. The Groundwater Summit includes speakers from the GCD and from other groundwater management entities across the state speaking on issues related to groundwater science, planning and policy. These events are a perfect forum to share results from this project.

4.4.D.2 Other Primary Beneficiary

While the Post Oak Savannah GCD is the primary beneficiary of the proposed project, the potential beneficiaries extend far beyond the boundaries of the District to the communities receiving groundwater through export. The largest current beneficiary external to the District geography are the stakeholders of





the San Antonio Water System (SAWS). SAWS uses water from the District to augment supplies from the Edwards Aquifer. The SAWS ASR Project provides a climate resilient source. Similarly, the groundwater being exported from the Post Oak Savannah GCD represents another water supply that provides climate resiliency in the face of a changing climatic conditions. Other GCDs within Texas also stand to benefit from this project and the structured use of a model similar to OPMAN to inform policy that allows a quantifiable balance between development and conservation.

4.4.D.3 Sharing Project Results with Other Water Managers in the West

The project team has a long history of active participation with the stakeholders and interested water resource managers in the area as well as water managers across the West. Project team members frequently present at regional and national events, serve as officers of water resources organizations, convene conferences dedicated to water resources management, provide invited testimony to legislative oversight committees, and routinely submit technical papers to trade journals. This includes active roles in the organizations and events that include:

- Western States Water Council (WSWC)
- Colorado River Water Users Association (CRWUA)
- Association of Western State Engineers (AWSE)
- Groundwater Resources Association of California (GRAC) hosts a Western Water Council
- Groundwater Management Districts Association (GMDA)
- American Water Works Association/Water Environment Association (AWWA/WEAT)
- American Society of Civil Engineers (ASCE)
- International Boundary and Water Commission

The project team will explore opportunities to disseminate project results with the above organizations, by submitting proposals for speaking engagements. Legislative interest of the team's efforts in Texas is anticipated to result in a request to provide invited testimony to legislative oversight committees. Additionally, project team members regularly publish technical and policy papers in trade journals and will submit at least one article to a relevant trade journal.

Post Oak Savannah GCD staff are active participants in the State groundwater and water resources community. Gary Westbrook, General Manager of the District, is ex-president of Texas Alliance of Groundwater Districts (TAGD) and Bobby Bazan, Water Resources Management Specialist at the District, currently serves on the TAGD Executive Committee. Mr. Westbrook is active in the state's regional water planning process, where he represents GMA 12 on Region G, the Brazos Water Planning Group, and also serves on the Groundwater Subcommittee of TWCA, which develops white papers on groundwater-related legislation.

District staff routinely attend TAGD events, including the TAGD Texas Groundwater Summit, which brings together a diverse group of groundwater professionals over three days to discuss emerging trends and new research. The event provides a mix of expert presentations on all areas of groundwater management, as well as networking opportunities for the groundwater community. This event is attended by 350 groundwater industry leaders, community stakeholders, agency representatives, and elected officials.

Post Oak Savannah GCD staff attend Texas Water Conservation Association (TWCA) meetings held throughout the year. The TWCA brings together a diverse community of professionals from across the State who support water resources legislation. The TWCA is an excellent platform to share results of this project to a diverse set of stakeholders in Texas and beyond. In addition, as discussed above, the District





holds several educational events a year in addition to their Annual Groundwater Summit. These events are well attended and offer an excellent venue to communicate the results of the OPMAN project.

4.4.E Evaluation Criterion E – Presidential and Department of the Interior Priorities

This project directly supports the Biden-Harris Administration's priorities, including E.O. 14008 Tackling the Climate Crisis at Home and Abroad", E.O. 13985 "Advancing Racial Equity and Support for Underserved Communities Through the Federal Government". Details on how the project supports each of these priorities are provided below.

4.4.E.1 Sub-criterion No. E1 – Climate Change

This project addresses impacts of climate change and combats the climate crisis by providing an alternate source of water to a major water provider. Additionally, this project strengthens sustainability and increases resilience to climate change because the model simulations provide better understand of aquifer behavior – especially during climatic conditions worse than the drought of record – which, in turn, allows managers to provide flexibility through permit allowances and incentivizing conjunctive use. Each of these concepts is discussed further below.

Central to this project is an operational model (OPMAN) that will provide the Post Oak Savannah GCD with improved understanding of the aquifer, better ability to predict future aquifer conditions, and better data to adaptively manage groundwater use, particularly during times of drought. This model will allow for the quantification of uncertainty that is inherent in model predictions. As a result, the District will gain more confidence in acceptable pumping levels providing for greater flexibility (more pumping) without fear of negative consequences. Climate change is expected to result in conditions more severe than the drought of record (e.g., the "2011" drought in the Central Texas study area). During these conditions, better knowledge of the effects of pumping allows groundwater managers greater flexibility to withdraw more water from the confined Carrizo-Wilcox aquifer (which is inherently insensitive to climate change) with confidence in the rate of recovery.

Currently, POSGCD does not have any conjunctive use permits although the exported groundwater is a conjunctive source to the City of San Antonio. The results of this project will quantify the impacts of conjunctive management on aquifer conditions (such as water levels and rate of recovery following), and contribute to an informed framework within which managers can design an appropriate incentive program for conjunctive use permits. The District will evaluate permit strategies which will allow non-exempt users the flexibility to use confined groundwater at temporary increased amounts during drought which will be offset by decreased production in wetter times or by aquifer recharge (ASR). These conjunctive management strategies will be investigated for their ability to enhance the yield of the aquifer while meeting the management goals of the District.

In addition to providing a better framework for permitting decisions, the improved data and modeling abilities resulting from this project also informs State water planning. Texas' regional water planning process requires each Planning Group to develop water plans every five years for the following 50-year horizon. Therefore, this project will inform future plans to strengthen water supply sustainability and increase resilience for both the local rural community and the nearby urban center of San Antonio.

SAWS uses water from the District to augment supplies from the Edwards Aquifer. This groundwater component of their portfolio is meant to provide a climate resilient source to augment the demand on the Edwards Aquifer which is highly impacted by drought and a changing climate. Through the advancement of the District's ability to predict future aquifer conditions, the management of the aquifer can be optimized to





support both in-District and out-of-District groundwater users to be more climate resilient while increasing confidence in the aquifer yields under future climate and demand scenarios.

4.4.E.2 Sub-criterion No. E2 – Disadvantaged or Underserved Communities

Communities benefitting from this project include the local Post Oak Savannah GCD counties of Milam and Burleson as well as the receiving counties of exported water that include Bastrop, Bell, Bexar, Burnet, Caldwell, Comal, Guadalupe, Hays, Lee, Travis, and Williamson. These counties represent a mix of rural, low populated areas and large urban centers, including San Antonio and Austin.

Demographic data for District and Bexar County were compiled from the EPA Environmental Justice Screening Tool. **Table 4-2** compares these data to National and State values. The population in these counties is highly diverse and includes areas with low income, high underemployment, and a high percentage of residents with less than high school education when compared to State and National averages. The Demographic Index in Table 4-2 is determined by averaging the indices for People of Color and for Low Income. For example, 36% of the population in the Post Oak Savannah GCD (Milam and Burleson Counties) is considered low income, compared with 31% at the National level and 34% at the State level. Eighteen percent of residents in the District have less than high school education compared with only 12% nationally and 16% state-wide. Bexar County receives approximately 50,000 AFY water supplied by the Vista Ridge Project from Post Oak Savannah GDC, and has higher socioeconomic indicator values than the National averages for all six of the Environmental Justice Screening Tool’s demographic indicators (demographic index, people of color, low income, unemployment rate, linguistically isolated, and high school education). Five of the six indicators are equal to or greater than the State averages.

Table 4-2. Comparison of Demographic Data for the District and Bexar County

Socioeconomic Indicator	State	National	Post Oak Savannah GCD	Bexar County
Demographic Index	46%	36%	36%	54%
People of Color	58%	40%	37%	72%
Low Income	34%	31%	36%	36%
Unemployment Rate	5%	5%	5%	5%
Linguistically Isolated	8%	5%	2%	7%
Less Than High School Education	16%	12%	18%	16%

Of the 11 counties that are likely at some time to receive exported water from the Post Oak Savannah GCD, seven counties have greater index values than the national average for Demographic Index; eight counties have greater index values than the national average for People of Color; four counties have greater index values than the national average for Lower Income; and five counties have greater index values than the national average Less than High School Education.

Because of this project, these populations will benefit from increased water security and climate resiliency. Another benefit of this project is new job opportunities that are created by industries requiring water to operate. With a secure water supply, new industries bring jobs, decreasing the unemployment rate and the percentage of population that falls into the low-income category. For instance, the SLR transport permit for 25,000 AFY that was granted in 2021 is principally targeted for a \$17 billion semiconductor plant located in the City of Taylor in Williamson County. This construction of this plant will employ some 6,000 to 10,000 workers and will eventually be staffed by a full-time workforce of nearly 2,000 employees.

Another benefit of this project is new job opportunities that are created by industries requiring water to operate. With a secure water supply, new industries bring jobs, decreasing the unemployment rate and the percentage of population that falls into the low-income category. For instance, the SLR transport permit for 25,000 AFY that was granted in 2021 is principally targeted for a \$17 billion semiconductor plant located in the City of Taylor in Williamson County. This construction of this plant will employ some 6,000 to 10,000 workers and will eventually be staffed by a full-time workforce of nearly 2,000 employees.

4.4.E.3 Sub-criterion No. E3 – Tribal Benefits

Not applicable. There are no Tribes in the project area.





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5 – PROJECT BUDGET

The Post Oak Savannah GCD’s project budget includes three components—a funding plan, budget proposal, and associated budget narrative. These components are described in detail below.

5.1 Funding Plan and Letters of Funding Commitment

The non-Federal share of project costs will be provided by Post Oak Savannah GCD. These project costs include both monetary contributions towards the cost-share requirement and costs associated with the time expended for overall management and administration of the project by the District’s General Manager (Gary Westbrook), Water Resources Management Specialist (Bobby Bazan, Jr.), and Project Coordinator (Courtney Gentry). The source of the monetary contributions towards the cost-share requirement will come from the District’s funds generated from program fees, transport permit fees, drilling and operational permit fees, and other permit fees and miscellaneous income.

5.2 Budget Proposal

The total project cost for developing and applying the OPMAN model to enhance water resource sustainability and climate resiliency in central Texas is \$550,080. As shown in **Table 5-1**, there are two sources of funding for the project: the Post Oak Savannah GCD and Reclamation. **Table 5-2** provides the total project cost, including information on the costs to be reimbursed with the requested Federal funding (from Reclamation) and the costs to be paid by the applicant (the District). **Table 5-3** provides a more detailed budget for the OPMAN project in a format consistent with the “sample” provided in the NOFO.

Table 5-1. Summary of Non-Federal and Federal Funding Sources

Funding Sources	Amount
Non-Federal Entities	
1. Post Oak Savannah Groundwater Conservation District	\$350,080
Non-Federal Subtotal	\$350,080
Requested Reclamation Funding	\$200,000

Table 5-2. Total Project Cost

Source	Amount
Costs to be reimbursed with the requested Federal funding	\$200,000
Costs to be paid by the applicant	\$350,080
Value of third-party contributions	—
Total Project Cost	\$550,080

5.3 Budget Narrative

The following budget narrative provides a discussion of, or explanation for, items included in the budget proposal (Table 5-3).

Salaries and Wages. Post Oak Savannah GCD costs will accrue only from staff salaries. No travel costs or indirect costs will be incurred. Salaries are for Gary Westbrook, the Project Manager, Bobby Bazan, Jr., a Water Resources Management Specialist, and Courtney Gentry, an Administrative Assistant at the District who will serve as Project Coordinator. Costs by project task and unit rates (provided in parentheses to the right of each labor category) are shown in Table 5-3.

Fringe Benefits. No separate fringe benefits are included.

Travel. There are no travel requirements for the project.





Table 5-3. Budget Proposal

Budget Item Description	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Total
Salaries and Wages							
Project Manager (Gary Westbrook) (\$90/hour)	--	--	\$5,000	\$6,000	\$2,000	\$22,000	\$35,000
Water Resources Specialist (\$60/hour)	\$2,100	\$3,500	\$4,200	\$4,200	\$700	--	\$14,700
Project Coordinator (\$40/hour)	--	--	--	--	--	\$8,000	\$8,000
Subtotal Salaries and Wages	\$2,100	\$3,500	\$9,200	\$10,200	\$2,700	\$30,000	\$57,700
Fringe Benefits							
Equipment							
Supplies and Materials							
Contractors							
Meadows Center							
Executive Director (\$150/hour)	--	\$3,000	\$3,000	\$15,000	\$11,000	--	\$32,000
Graduate Student (\$50/hour)	--	--	--	\$20,000	--	--	\$20,000
Subtotal Meadows Center	--	\$3,000	\$3,000	\$35,000	\$9,000	--	\$52,000
INTERA Incorporated							
Principal Geoscientist/Engineer (\$250/hour)	\$17,500	\$62,500	\$20,000	\$12,500	\$38,700	--	\$151,200
Senior Scientist/Engineer (\$180/hour)	\$14,400	\$58,500	\$28,800	\$11,700	--	--	\$113,400
Scientist/Engineer (\$120/hour)	\$21,600	\$94,680	\$14,400	\$17,100	\$10,000	--	\$157,780
Project Associate (\$90/hour)	--	\$5,400	\$1,800	\$1,800	\$9,000	--	\$18,000
Subtotal INTERA	\$53,500	\$221,080	\$65,000	\$43,100	\$57,700	--	\$440,380
Indirect Costs							
Total Estimated Project Costs	\$55,600	\$227,580	\$77,200	\$88,300	\$71,400	\$30,000	\$550,080

Equipment. There are no separate equipment costs. All required equipment is included under the "Contractors" line items in Table 5-3.

Materials and Supplies. There are no separate costs for materials and supplies. All required materials and supplies are included under the "Contractors" line items in Table 5-3.

Contractual. As mentioned in Section 4, Technical Proposal and Evaluation Criteria of this application, the Post Oak Savannah GCD is partnering with the Meadows Center to execute the OPMAN project. In addition, the District's hydrogeologic consulting firm, INTERA, will perform the largest portion of the project. Costs by project task and unit rates (provided in parentheses to the right of each contractor's labor categories) are shown in Table 5-3.

Third-Party In-Kind Contributions. There are no third-party in-kind contributions.

Environmental and Regulatory Compliance Costs. There are no costs associated with environmental or regulatory compliance.

Other Expenses. There are no other expenses anticipated for the execution of this project.

Indirect Costs. There are no indirect costs that will be incurred on the project.

Total Costs. As shown in Tables 5-2 and 5-3, the total project cost is \$550,080. The Federal portion being requested is \$200,000, with the Post Oak Savannah GCD contributing the remaining \$350,080.





6 – ENVIRONMENTAL AND CULTURAL RESOURCE CONSIDERATIONS

Given the nature of this project—the development and application of a numerical model—the Post Oak Savannah GCD does not anticipate that it will have any environmental and cultural resources impacts. The District's responses to the questions included in Section H.1 of the NOFO are provided below.

Will the proposed project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? No, the proposed project does not include any earth-disturbing work or work that will affect the air, water, or animal habitat in the project area.

Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? While there are species listed or proposed to be listed as a Federal threatened or endangered species, and designated critical habitat in the project area, they will not be affected by any project activities.

Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as “Waters of the United States?” While there are wetlands and surface waters inside the project boundaries that potentially fall under CWA jurisdiction, the proposed project will have no impact on them.

When was the water delivery system constructed? Not applicable.

Will the proposed project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? No, the proposed project will not result in any modification of or effects to, an irrigation system.

Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? While there are buildings and structures within the boundaries of the Post Oak Savannah GCD (Milam and Burleson Counties, Texas), the proposed project will have no impact on them.

Are there any known archeological sites in the proposed project area? While there are archeological sites in the proposed project area, this project will have no impact on them.

Will the proposed project have a disproportionately high and adverse effect on low income or minority populations? No, the proposed project will not have a disproportionately high and adverse effect on low income or minority populations.

Will the proposed project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands? No, the proposed project will not limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands.

Will the proposed project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area? No, the proposed project will not contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area.





7 – REQUIRED PERMITS OR APPROVALS

Again, given that this project involves the development and application of a numerical model, no permits or approvals will be required to comply with National Environmental Policy Act, the National Historic Preservation Act, or the Endangered Species Act.





8 – OVERLAP OR DUPLICATION OF EFFORT STATEMENT

There is not any overlap between the proposed project and any other active or anticipated proposals or projects in terms of activities, costs, or commitments of key personnel. Furthermore, the proposed project submitted for consideration under the WaterSMART Program is in no way duplicative of any proposal or project that has been or will be submitted for funding consideration to any other potential Federal or non-Federal funding source. If at any time the Post Oak Savannah GCD becomes aware of a proposal being awarded funds that would be duplicative of the funding requested from Reclamation, the District will immediately notify the Program Coordinator.





9 – LETTERS OF SUPPORT AND LETTERS OF RECOMMENDATION

Several letters from interested stakeholders in support of the development and application of OPMAN are provided in the **Appendix** to this application.





10 – OFFICIAL RESOLUTION

An official resolution, adopted by the Post Oak Savannah GCD's board of directors is provided on the following page. The resolution verifies the identity of the official with legal authority to enter into an agreement (Gary Westbrook), the capability of the District to provide the amount of funding specified in the funding plan (\$350,080), and that the District will work with Reclamation to meet established deadlines for entering into a grant or cooperative agreement.





A RESOLUTION OF THE BOARD OF DIRECTORS OF THE POST OAK SAVANNAH GROUNDWATER CONSERVATION DISTRICT AUTHORIZING FUNDS TO SUPPORT RECLAMATION NOTICE OF FUNDING OPPORTUNITY No. R22AS00165

Whereas, the Post Oak Savannah Groundwater Conservation District (“District”) is committed to using best available science in the conservation and development through the rules developed, adopted, and promulgated by the District;

Whereas, the District recognizes the importance of accurate forecasts of the impact of pumping on the water levels in existing water wells and aquifer conditions;

Whereas, the District recognizes the benefits of quantifying uncertainty associated with model predictions to better assess risks with future pumping;

Whereas, the District recognizes the importance of a credible and defensible groundwater model for evaluating desired future conditions, aquifer sustainability, operational permits, and impacts of pumping on groundwater resources;

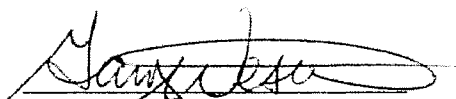
NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE POST OAK SAVANNAH GROUNDWATER CONSERVATION DISTRICT, THAT:

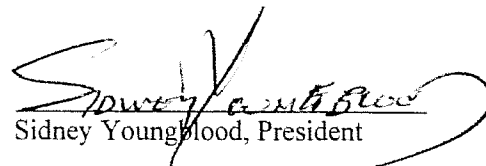
1. The District will commit to the financial obligations described in the grant application for Reclamation titled “Operations and Management Model to Enhance Water Resource Sustainability and Climate Resiliency in Central Texas” in response to Notice of Funding Opportunity No. R22AS00165.
2. The District will work with Reclamation to meet established deadlines for entering into a grant or cooperative agreement.

Adopted and Approved this the 12th day of April, 2022.

Post Oak Savannah Groundwater Conservation District

Attest:


Gary Westbrook, Ass’t. Secretary and General Manager


Sidney Youngblood, President





11 – UNIQUE ENTITY IDENTIFIER AND SYSTEM FOR AWARD MANAGEMENT

The Post Oak Savannah GCD's Unique Entity Identifier (UEI) number is X238FQRURHE8. This number has been entered under item 8c on Standard Form (SF) 424, Application for Federal Assistance.





12 – CONFLICT OF INTEREST DISCLOSURE

Per the Financial Assistance Interior Regulation (FAIR), 2 CFR §1402.112, the Post Oak Savannah GCD has no actual or potential conflict of interest at the time of submission of this application.





13 – UNIFORM AUDIT REPORTING STATEMENT

Since the Post Oak Savannah GCD did not expend \$750,000 in U.S. dollars or more in Federal award funds in the most recently closed fiscal year, the District was not required to submit a Single Audit report through the Federal Audit Clearinghouse's Internet Data Entry System, in accordance with 2 CFR 200 subpart F.





APPENDIX

Letters of Support





April 11, 2022

Bureau of Reclamation
Water Resources and Planning Division
Attn: Avra Morgan
PO Box 25007, MS 86-63000
Denver, CO 80225

RE: Support for WaterSMART Applied Science Grant Application: An Operations and Management Model to Enhance Water Resource Sustainability and Climate Resiliency in Central Texas

Dear Ms. Morgan & Members of the Application Review Committee:

I am writing this letter in support of the above-referenced grant application being submitted by the Post Oak Savannah Groundwater Conservation District (POSGCD or District).

The Texas Alliance of Groundwater Districts (TAGD) is a 501(c)(3) non-profit organization that was established in 1988 to provide a means for groundwater conservation districts, the regulatory arm of groundwater management in Texas, to stay current in groundwater science, policy and management. TAGD's membership includes 90 of the 99 groundwater conservation districts in Texas. As an organization, we work to promote sound management of groundwater based on local conditions and good science. Science is essential in managing groundwater and TAGD supports efforts to improve the science surrounding aquifers through research and study.

Under Texas law, groundwater conservation districts are responsible for conserving, preserving, protecting, recharging, and preventing the waste of groundwater. The Texas Water Code (§36.0015) provides that groundwater conservation districts "are the State's preferred method of groundwater management in order to protect property rights, balance the conservation and development of groundwater to meet the needs of this state, and use best available science in the conservation and development of groundwater." As the demands on groundwater to meet water supply needs continue to increase, so do the associated management challenges. In order to effectively address those challenges, groundwater conservation districts look to advancing scientific understanding of the groundwater resource. In turn, improvements in available science will allow for data-driven decision-making and lead to more effective groundwater management.

TAGD supports POSGCD's efforts to advance scientific understanding through the development and application of the proposed Operations and Management Model. This project will enable the POSGCD to use the best available science in developing a comprehensive and adaptive set of rules, policies, and strategies to address water resource management challenges facing the District. These challenges, which include balancing the conflicting responsibilities to





conserve and protect groundwater while at the same time protecting private property rights and allowing development of groundwater to meet needs of the State, are not unique to the POSGCD. These challenges are faced by groundwater conservation districts throughout Texas.

With support from this WaterSMART grant, the Operations and Management Model will deliver numerous benefits:

- Improved understanding of the future pumping on aquifer conditions;
- Better science for more informed planning and permitting decisions;
- Increased flexibility for pumping through a data-driven adaptive management process, especially during times of drought; and
- Greater resilience through both adaptive management and the conjunctive management of multiple water sources at the local and regional level.

These benefits will extend beyond POSGCD. The lessons learned from this project have the potential to be leveraged and applied by other groundwater conservation districts and inform improved groundwater management more broadly.

Thank you for the opportunity to express our support for POSGCD's WaterSMART Applied Science Grant Application. We urge your thoughtful consideration of funding to support this deserving project.

Sincerely,

Leah Martinsson
Executive Director
leah@texasgroundwater.org
(512) 596-3101





Tracy O. King
State Representative

April 6, 2022

Bureau of Reclamation
Water Resources and Planning Division
Attn: Avra Morgan
PO Box 25007, MS 86-63000
Denver CO 80225

RE: Support for WaterSMART Applied Science Grant Application: An Operations and Management Model to Enhance Water Resource Sustainability and Climate Resiliency in Central Texas

Dear Ms. Morgan and Members of the Application Review Committee:

Please accept this letter in support of the above-referenced grant application being submitted by the Post Oak Savannah Groundwater Conservation District (POSGCD or District). The proposed Operations and Management Model is a crucial component that will enable the District to apply the best available science in developing a comprehensive and adaptive set of rules, policies, and strategies to address numerous water resource management challenges.

These challenges, which include balancing the conflicting responsibilities to conserve and protect groundwater while protecting private property rights and allowing development of groundwater to meet needs of the State, are not unique to the POSGCD. These same challenges are being faced by nearly every GCD in Texas and many other water management agencies in the western U.S. These challenges are most acute in areas experiencing rapid rates of industrial and population growth, which has led to substantial increases in water demands. Currently, the POSGCD has some 123,000 acre-feet per year (AFY) of groundwater permitted for transport to 11 other counties in central Texas. Since the Vista Ridge Project began exporting 50,000 AFY of groundwater to the City of San Antonio in 2020, water level declines of several hundred feet have occurred in existing wells within the POSGCD.

With support from this Bureau of Reclamation grant, the development and application of the Operations and Management Model will deliver the following benefits:

P.O. Box 2910 • Austin, Texas 78768-2910 • 512-463-0194 • Email: district80.king@house.texas.gov



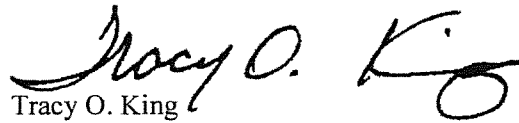


- An improved understanding of the future pumping on aquifer conditions,
- Better science for more informed permitting and planning decisions,
- Less uncertainty regarding the permitting process,
- Increased flexibility for pumping through adaptive management, especially during times of drought,
- Greater resilience through conjunctive management of multiple water sources at the local and regional level, and
- Serve as a high-profile example of increased water resources resilience based on a data-driven adaptive management process.

The proposed project is consistent with the March 2022 Interim Committee Charges from the 87th Texas Legislature, which include a directive to examine the State's groundwater management policy and regulatory framework, and to review large-scale water transfers and their impacts on groundwater resources.

Again, I am confident that this project will prove invaluable to many stakeholders in central Texas and throughout the state. I enthusiastically support the POSGCD's WaterSMART Applied Science Grant Application.

Sincerely,


Tracy O. King





April 8, 2022

Bureau of Reclamation
Water Resources and Planning Division
Attn: Avra Morgan
PO Box 25007, MS 86-63000
Denver CO 80225

RE: Support for WaterSMART Applied Science Grant Application: An Operations and Management Model to Enhance Water Resource Sustainability and Climate Resiliency in Central Texas

Dear Ms. Morgan and Members of the Application Review Committee:

On behalf of the Environmental Defense Fund, I am writing this letter in support of the above-referenced grant application being submitted by the Post Oak Savannah Groundwater Conservation District (POSGCD or District). Founded in 1967, EDF is a leading international environmental non-profit organization representing more than 2.5 million members. Guided by science and economics, EDF focusses on strong science to inform policy and develop innovative solutions that address the most serious environmental problems. The proposed Operations and Management Model is a crucial component that will enable the District to apply the best available science in developing a comprehensive and adaptive set of rules, policies, and strategies to address numerous water resource management challenges.

These challenges, which include balancing the conflicting responsibilities to conserve and protect groundwater while protecting private property rights and allowing development of groundwater to meet needs of the State, are not unique to the POSGCD. These same challenges are being faced by nearly every GCD in Texas and many other water management agencies in the western U.S. These challenges are most acute in areas experiencing rapid rates of industrial and population growth, which has led to substantial increases in water demands. Currently, the POSGCD has 100,000 acre-feet per year (AFY) of groundwater permitted for transport to 11 other counties in central Texas. Since the Vista Ridge Project began exporting 50,000 AFY of groundwater to the City of San Antonio in 2020, water level declines of more than several hundred feet have occurred in existing wells within the POSGCD.

With support from this Bureau of Reclamation grant, the development and application of the Operations and Management Model will deliver the following benefits:

- An improved understanding of the future pumping on aquifer conditions,
- Better science for more informed permitting and planning decisions,
- Less uncertainty regarding the permitting process,
- Increased flexibility for pumping through adaptive management, especially during times of drought,
- Greater resilience through conjunctive management of multiple water sources at the local and regional level, and
- Serve as a high-profile example of increased water resources resilience based on a data-driven adaptive management process.

301 Congress
Suite 1300
Austin, TX 78701

T 512 478 5161
F 512 478 8140
edf.org

New York, NY / Austin, TX / Bentonville, AR / Boston, MA / Boulder, CO / Raleigh, NC
Sacramento, CA / San Francisco, CA / Washington, DC / Beijing, China / La Paz, Mexico
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The proposed project is also consistent with the March 2022 Interim Committee Charges from the 87th Texas Legislature, which include a directive to examine the state's groundwater management policy and regulatory framework, and to review large-scale water transfers and their impacts on groundwater resources.

The proposed project clearly supports the goals and objectives of EDF by providing stakeholders with the means to proactively manage groundwater through the development of science-based policy decision. EDF is very enthusiastic about this project and supports the grant proposal. EDF believes that a viable solution to water resource sustainability requires both strong science and broad support. The latter is achieved by engagement with groups and people from all sides to tackle challenges from many perspectives. Given our expertise and interest, EDF would advise and potentially assist in an outreach role to augment community participation and engagement. Examples would be communicating the objectives, efforts, and results to stakeholders and helping to develop policy outcomes based on the results of the science. These actions would elicit input from stakeholders and provide feedback to the research team throughout the project, applying valuable data and science to real world management solutions.

Again, we are confident that this project will prove invaluable to many stakeholders in central Texas and throughout the state. I enthusiastically support the POSGCD's WaterSMART Applied Science Grant Application and look forward to participating as a stakeholder and learning from the project outcomes.

Sincerely,

Vanessa Puig-Williams
Director, Teas Water Program
Environmental Defense Fund
vpuigwilliams@edf.org





RHETTA ANDREWS BOWERS
★
TEXAS STATE REPRESENTATIVE

April 6, 2022

Bureau of Reclamation
Water Resources and Planning Division
Attn: Avra Morgan
PO Box 25007, MS 86-63000
Denver CO 80225

RE: Support for WaterSMART Applied Science Grant Application: An Operations and Management Model to Enhance Water Resource Sustainability and Climate Resiliency in Central Texas

Dear Ms. Morgan and Members of the Application Review Committee:

I am writing this letter in support of the above-referenced grant application being submitted by the Post Oak Savannah Groundwater Conservation District (POSGCD or District). The proposed Operations and Management Model is a crucial component that will enable the District to apply the best available science in developing a comprehensive and adaptive set of rules, policies, and strategies to address numerous water resource management challenges.

These challenges, which include balancing the conflicting responsibilities to conserve and protect groundwater while protecting private property rights and allowing development of groundwater to meet needs of the State, are not unique to the POSGCD. These same challenges are being faced by nearly every GCD in Texas and many other water management agencies in the western U.S. These challenges are most acute in areas experiencing rapid rates of industrial and population growth, which has led to substantial increases in water demands. Currently, the POSGCD has some 123,000 acre-feet per year (AFY) of groundwater permitted for transport to 11 other counties in central Texas. Since the Vista Ridge Project began exporting 50,000 AFY of groundwater to the City of San Antonio in 2020, water level declines of several hundred feet have occurred in existing wells within the POSGCD.

With support from this Bureau of Reclamation grant, the development and application of the Operations and Management Model will deliver the following benefits:

- An improved understanding of the future pumping on aquifer conditions,
- Better science for more informed permitting and planning decisions,
- Less uncertainty regarding the permitting process,
- Increased flexibility for pumping through adaptive management, especially during times of drought,
- Greater resilience through conjunctive management of multiple water sources at the local and regional level, and
- Serve as a high-profile example of increased water resources resilience based on a data-driven adaptive management process.

P.O. BOX 2910 • AUSTIN, TX 78768-2910 • 512-463-0464 • 512-463-9295 FAX
RHETTA.BOWERS@HOUSE.TEXAS.GOV





RHETTA ANDREWS BOWERS
★
TEXAS STATE REPRESENTATIVE

The proposed project is consistent with the March 2022 Interim Committee Charges from the 87th Texas Legislature, which include a directive to examine the State's groundwater management policy and regulatory framework, and to review large-scale water transfers and their impacts on groundwater resources.

Again, I am confident that this project will prove invaluable to many stakeholders in central Texas and throughout the state. I enthusiastically support the POSGCD's WaterSMART Applied Science Grant Application, and look forward to participating as a stakeholder and learning from the project outcomes.

Sincerely,

A handwritten signature in cursive script that reads "Rhetta Andrews Bowers".

Rhetta Andrews Bowers

State Representative House District 113

P.O. BOX 2910 • AUSTIN, TX 78768-2910 • 512-463-0464 • 512-463-9295 FAX
RHETTA.BOWERS@HOUSE.TEXAS.GOV





PETE SESSIONS
17TH DISTRICT, TEXAS
COMMITTEE ON FINANCIAL SERVICES
SUBCOMMITTEE ON NATIONAL SECURITY,
INTERNATIONAL DEVELOPMENT, AND
MONETARY POLICY
TASK FORCE ON FINANCIAL TECHNOLOGY
COMMITTEE ON OVERSIGHT
AND REFORM
RANKING MEMBER
SUBCOMMITTEE ON
CIVIL RIGHTS AND CIVIL LIBERTIES



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House of Representatives
Washington, DC 20515-4317

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□ 400 AUSTIN AVE., STE 302
WACO, TX 76701-2139
(254) 633-4500
□ 2700 EARL RUGGER FWY
SOUTH HIGHWAY 6, STE 4500
COLLEGE STATION, TX 77845-2804
(979) 431-6340

April 13, 2022

Avra Morgan
Bureau of Reclamation
Water Resources and Planning Division
PO Box 25007, MS 86-63000
Denver, CO 80225

RE: Support for WaterSMART Applied Science Grant Application: An Operations and Management Model to Enhance Water Resource Sustainability and Climate Resiliency in Central Texas

Dear Avra and Members of the Application Review Committee:

I am writing this letter in support of the above-referenced grant application being submitted by the Post Oak Savannah Groundwater Conservation District (POSGCD or District). The proposed Operations and Management Model is a crucial component of conservation in our district. It will enable the District to apply the best available science in developing a comprehensive and adaptive set of rules, policies, and strategies to address numerous water resource management challenges.

These challenges, which include balancing the conflicting responsibilities to conserve and protect groundwater while protecting private property rights and allowing development of groundwater to meet needs of the State, are not unique to the POSGCD. These same challenges are being faced by nearly every GCD in Texas and many other water management agencies in the western U.S. These challenges are most acute in areas experiencing rapid rates of industrial and population growth, which has led to substantial increases in water demands. Currently, the POSGCD has some 123,000 acre-feet per year (AFY) of groundwater permitted for transport to 11 other counties in central Texas. Since the Vista Ridge Project began exporting 50,000 AFY of groundwater to the City of San Antonio in 2020, water level declines of several hundred feet have occurred in existing wells within the POSGCD.

With support from this Bureau of Reclamation grant, the development and application of the Operations and Management Model will deliver the following benefits:

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- Greater resilience through conjunctive management of multiple water sources at the local and regional level, and
- Serve as a high-profile example of increased water resources resilience based on a data-driven adaptive management process.

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The proposed project is consistent with the March 2022 Interim Committee Charges from the 87th Texas Legislature, which include a directive to examine the State's groundwater management policy and regulatory framework, and to review large-scale water transfers and their impacts on groundwater resources.

Again, I am confident that this project will prove invaluable to many stakeholders in central Texas and throughout the state. I enthusiastically support the POSGCD's WaterSMART Applied Science Grant Application and look forward to participating as a stakeholder and learning from the project outcomes.

Sincerely,

Pete Sessions
Member of Congress
Texas 17th Congressional District

