AEWSD Drought Recovery Wells and Conjunctive Use Modeling Tool Project

Request for Funding Opportunity Announcement No. R23AS00005

U.S. Department of the Interior, Bureau of Reclamation

WaterSMART Drought Response Program: Drought Resiliency Projects for FY2023

Applicant:
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Kern County, CA

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Executive Summary

The Arvin-Edison Water Storage District (AEWSD or District) located in Arvin, Kern County, California is applying for federal funds from the USBR WaterSMART Drought Resiliency Grant Program FY2023 (R23AS00005) as a Category A applicant under Funding Group II, Tasks B and C. The District intends to construct and develop the Drought Recovery Wells and Conjunctive Use Modeling Tool (Project). The Project proposes to construct two new recovery wells at existing groundwater banks to improve extraction and return capabilities during dry years. AEWSD has five different primary recharge areas known "spreading works" located throughout their conjunctive use District. The AEWSD Groundwater Bank initiated in 1964 reflects the implementation of a plan for integrated water management of a supplemental imported surface water supply with banked groundwater reserves providing a true conjunctive use program for firm deliveries to contract holders in the District's Surface Water Service Area (SWSA) as well as stabilized groundwater levels in the region. With the onset of the California Sustainable Groundwater Management Act (SGMA) in 2014 and development of the South of Kern River Groundwater Sustainability Plan (SOKR GSP) in 2022, there is a heightened urgency to implement projects to better manage the finite water supply. The two new wells would yield approximately 8,040 acre-feet per year during drought periods. To avoid potential undesirable results, as defined by SGMA, related to groundwater levels, groundwater storage, subsidence, and advective water quality migration pathways, the Project will include development of a Conjunctive Use Modeling Tool consisting of a coupled numerical groundwater flow model and Decision Support Tool (DST) for the District that will support its efforts to improve water banking and delivery operations in the face of increasing water supply uncertainty, including the increasingly severe Kern County impacts resulting from drought conditions. The Project is supported by the Arvin Community Services District (ACSD) which provides drinking water to the severely disadvantaged community of Arvin, and the Kern Integrated Regional Water Management Plan (IRWMP) Executive Committee because it is a critical drought relief project that will increase short- and long-term supply resiliency and water management. The Project will increase the capacity and reliability of AEWSD's water supply portfolio and support optimized water management decision making, while simultaneously providing increased transparency and reliability to all groundwater users, including ACSD, especially during drought periods. This Project is identified in the SOKR GSP and aligns with AEWSD's Drought Management Plan by increasing groundwater banking recovery capacity. Work has already commenced on the development of the Modeling Tool and will inform well design. Project construction of this non-Federal facility will commence in March 2024 and last approximately 10 months. The Project will be owned, operated, and maintained by AEWSD.

Project Location

The Project is located in AEWSD, southeast of the City of Bakersfield, in Kern County, CA. Through the development and implementation of the DST over the next year, the various preferred recovery well sites will be modeled to determine two optimal sites that best fit the operations of the conjunctive use basin. The respective locations of the proposed recovery wells are shown in **Figure 1**, **Figure 2**, and in **Appendix A.**

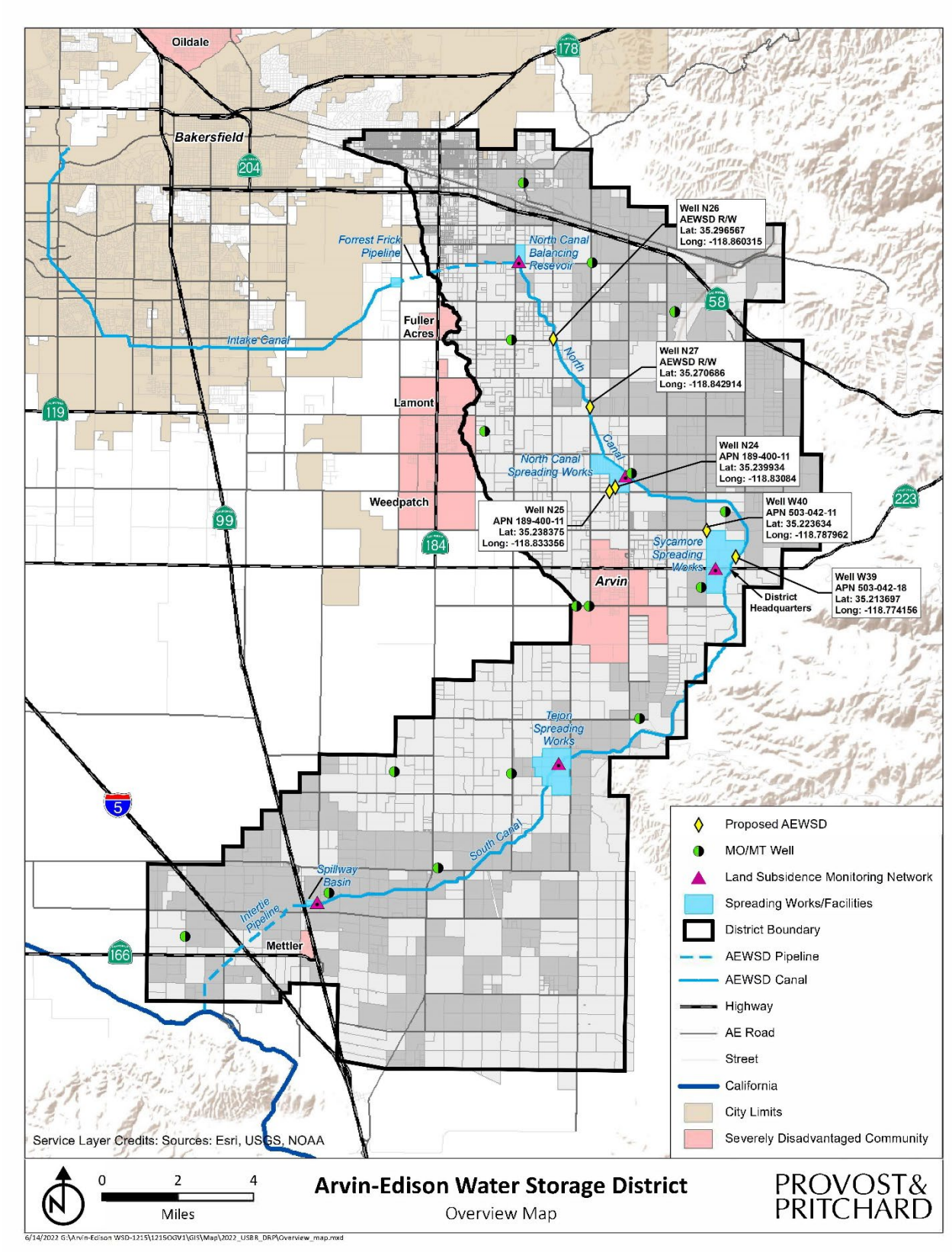

Figure 1 - Project Vicinity Map

Technical Project Description

The Project encompasses both well construction and model development components.

Groundwater Bank Recovery Wells

The Project will construct two new recovery wells at existing AEWSD spreading works. The recovery wells will be designed for a flowrate of approximately 2,600 gpm. From the District's prior experience, the wells are expected to be approximately 1,300 feet deep with 300-600 HP motors in 18-inch diameter perforated casings equipped with sounding tube, gravel fill pipe, and discharge flowmeter. The Preliminary Well Design Schematic is included in **Appendix A**.

Each well pump and flowmeter will be powered by a new PG&E electrical service under Power and Water Resources Pooling Authority (PWRPA). Proximate PG&E service is available. Project electrical components include a service pole, meter, conduit, wires, panel backboard, control panel, cables, raceways, and grounding system. Recovery well discharge pipelines will be constructed and connected to existing District infrastructure capable of returning flows to the AEWSD North Canal. Once the extracted groundwater has reached the AEWSD North Canal, the water can then be conveyed through existing AEWSD facilities to areas and users in demand.

Conjunctive Use Modeling Tool

The Project will include development of a coupled numerical groundwater flow model and DST for the AEWSD service area that will support AEWSD efforts to improve water banking and delivery operations in the face of increasing water supply uncertainty, including impacts resulting from drought conditions.

The numerical groundwater flow model will represent the physical characteristics of the groundwater system in the AEWSD service area (e.g., geologic structure, spatial distribution of water storage and transmitting properties, interactions with the adjacent groundwater systems) and key District infrastructure and operational features (e.g., recharge ponds, extraction wells, critical infrastructure such as canals, sensitive beneficial users). Once constructed, the model will use physics-based equations of groundwater flow processes to quantify the groundwater system response to specified inputs (e.g., available surface water supply, spreading basin recharge, and well extractions). The model will be developed using the United States Geological Survey's modular finite-difference flow model (MODFLOW) and will be calibrated to historical groundwater level data.

The groundwater flow model will be coupled with the DST to support the District's operational decision making. The DST will: (1) evaluate of a range of operational alternatives, and (2) identify those that perform "best" under District-defined constraints, management objectives, and performance metrics, including drought-induced constraints such as reduced imported water availability. The DST will facilitate optimization of District operations towards defined performance metrics and targets (e.g., maximizing average end-of-year banked water balance over specified number of years; maximizing deliveries to customers; minimizing subsidence along critical infrastructure, etc), using advanced numerical techniques (e.g., artificial intelligence and machine learning) to provide enhanced water resources management recommendations. The District can then use the best ranking scenario to inform their delivery, pumping and banking operations under a variety of hydrologic conditions, including drought conditions.

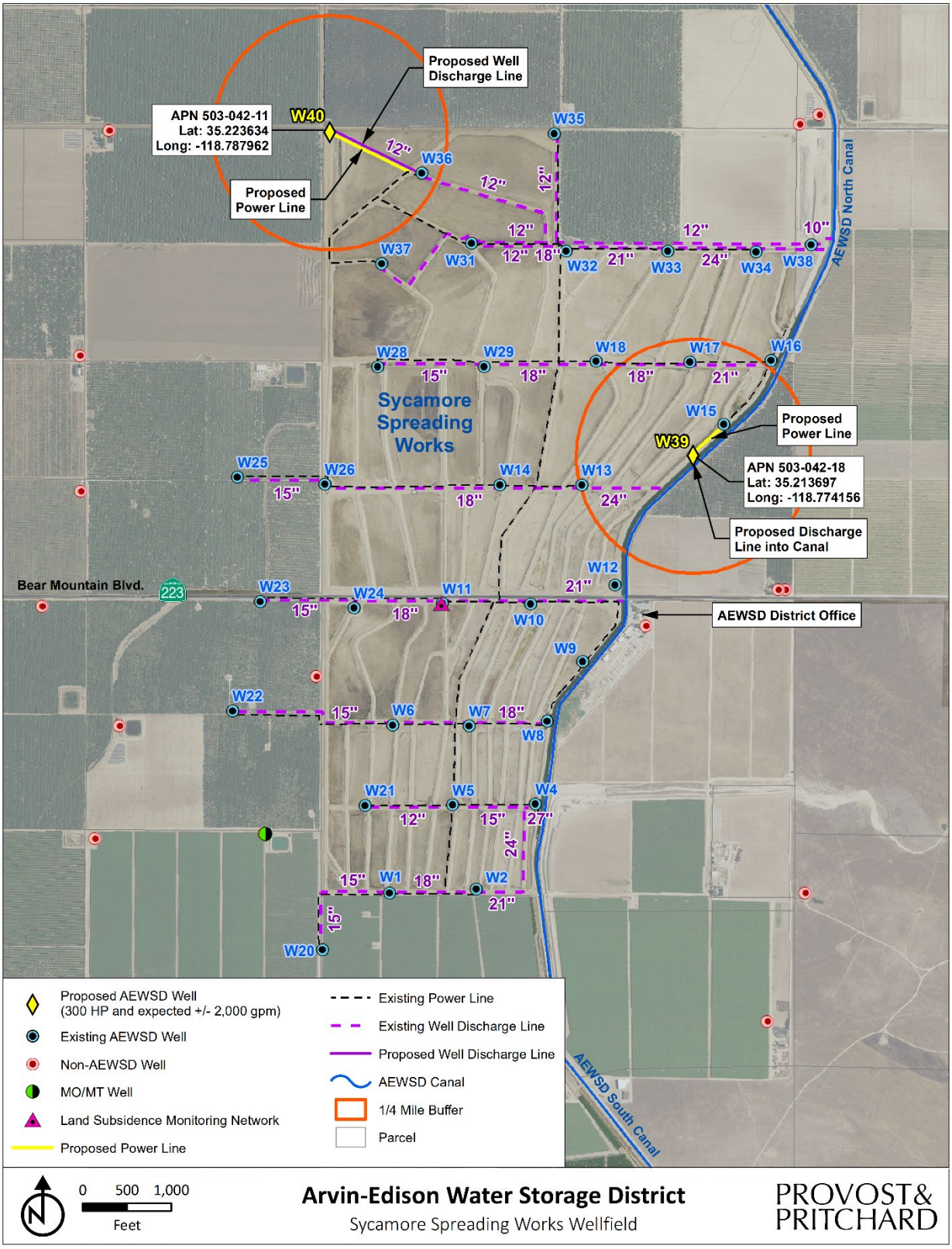

Figure 2 – Proposed Recovery Wells at Existing AEWSD Spreading Works

Performance Measures

The performance measure to quantify the Project benefit is the total volume of recovered water. The total volume of water in acre-feet (AF) will be measured to +/-0.5% accuracy and recorded by the magnetic flowmeter totalizer at each well. District operators will use their standard procedures for maintaining written records when wells are operated and tabulate monthly.

Evaluation Criteria

Evaluation Criterion A—Project Benefits (30 points)

- *How will the project build long-term resilience to drought? How many years will the project continue to provide benefits?*

Long-term Resilience to Drought: The Project will provide AEWSD with increased groundwater bank recovery and delivery flexibility, transfer/exchange potential between AEWSD and its banking partners, assist/alleviate canal conveyance limitations/prorates, as well as improve operational efficiency, improve water quality, and mitigate subsidence impacts. The project will provide regional benefits over the entire District, since new drought water supplies will increase availability for all SWSA users. The project is not intended to provide water supply for population growth or new cropping, but rather to help improve water reliability in future droughts, helping the area reach sustainability. Further, the Conjunctive Use Modeling Tool will improve the District's water management decision making in light of drought-induced water shortages and constraints and will allow management of the District's water supply portfolio throughout drought conditions without creating Undesirable Results as defined per SGMA. For example, operational decisions could include how to allocate imported water supplies (direct delivery versus banking) and optimizing District spreading works and well field operations under project water year conditions (i.e., drought versus non-drought years).

Project Life Expectancy: This Project will continue to provide benefits for the service life of the well infrastructure, minimum 50 years, and years more with proper maintenance and repairs to keep the infrastructure operating as designed. The model is anticipated to undergo both annual updates of input datasets and a more comprehensive model update and recalibration effort that would take place every five years (coordinated with the SGMA compliance timeline). The Conjunctive Use Modeling Tool is able to provide continued benefits for the District for as long as it is maintained as an up-to-date functional model.

- *Will the project improve the management of water supplies?*

The Project will improve the management of water supplies through informed operational decision making, increased operational flexibility, improved operational efficiency, and facilitation of water transfers/exchanges between AEWSD and its various partners and growers, while supporting avoidance of SGMA Undesirable Results. The reach and impact of the Project benefits is convincing with a better understanding of the District's unique water infrastructure, geographical location, and existing relationships with agricultural, rural, municipal, and domestic partners.

District Background of Conjunctive Use: The District has a contract with the USBR who holds appropriative water rights on the San Joaquin River to supply water from the Friant Division of the Federal Central Valley Project (CVP) through the Friant-Kern Canal. AEWSD's Friant water

supply contract provides for the annual delivery of 40,000 AF of Class 1 (firm) water and up to 311,675 AF of Class 2 (non-firm) water. This contract began in 1966, with subsequent renewals, and was converted to a permanent (9d) water supply contract in 2011 pursuant to conditions of the San Joaquin River Restoration Settlement. The CVP supplies are utilized directly by the District and to effect direct delivery, water transfers and/or exchanges. AEWSD operates its water delivery system approximately 50 weeks per year with only a 2-week maintenance period. The District participates in numerous water transfers and exchanges. In a typical year AEWSD will participate in water transfers and exchanges with 15 to 20 other agencies in various locations throughout the State. The District's strategic geographic location, its interconnections to major Federal, State, and local water conveyance facilities, and its versatile facilities gives it a unique ability to implement these transfers and exchanges.

Historically the District has also purchased other supplies for groundwater recharge when it is available and recharge capacity is available in the District. Typically, such water is available in relatively "wet" years, in which Friant Class 2 water is also allocated to the District. These historical purchases have included its own contracted supplies and both Friant Section 215 water (San Joaquin River water released for flood protection), and floodwater from the Kern River, Kaweah River, Tule River and Kings River System. Floodwaters originating in the Sacramento Valley and available in the California Aqueduct (CVP Section 215 and State Water Project (SWP) Article 21 Water) have also been banked by AEWSD and Metropolitan Water District (MWD). These flood waters otherwise would flood lands in the Central Valley and/or would be lost (for example to the ocean) for beneficial uses.

Future domestic and irrigation water demands in AEWSD are expected to remain similar to current demands for the foreseeable future until SGMA implementation and further water conservation efforts are required. However, the advent of the permanent water supply contract, which does not carry Federal excess-lands water charges, has increased opportunities for the District to provide surface water to more lands in the groundwater service area (GWSA) when it is available in excess of the normal demands of the SWSA. The District calls this practice "Temporary Water Service Contracts", as the customers do not have regular water supply contracts with the District. Since that practice results in GWSA growers turning off groundwater wells they would otherwise use to supply their crops, the localized groundwater is conserved in these areas by such delivery of Temporary Water from AEWSD banking facilities. This operation of conjunctive-use and in-lieu recharge provides greater flexibility to avoid Undesirable Results as detailed in the SOKR GSP.

- *If so, how will the project increase efficiency or operational flexibility?*

With the construction of two new recovery wells, the Project will increase the efficiency of banked water extractions at AEWSD's spreading works by utilizing modern high-energy efficient equipment and will increase the overall efficiency of total extractions by providing more timely deliveries which align with the varying water demands. Recovering the water into AEWSD's North Canal provides significant operational flexibility because the North Canal can convey flows to nearly all SWSA users within the District. The Conjunctive Use Modeling Tool will improve the District's decision making by supporting water banking and delivery operations, evaluating prorate/allocation timing and volume, supporting water management programs with unbalanced transfers/exchanges, investigating well replacements and usages, and evaluating on-farm recharge/landowner banking programs, among others.

- *What is the estimated quantity of water that will be better managed as a result of this project? How was this estimate calculated? Provide this quantity in acre-feet per year as the average annual benefit over ten years.*

The District is very familiar with the construction of extraction wells and has a long history of groundwater experience at its facilities. AEWSD's existing Sycamore Spreading Works Well Field shown in **Figure 2** and the additional preferred well sites near the North Canal Spreading Works included in **Appendix A** show more than 60 existing AEWSD extraction wells. The District actively maintains and monitors these facilities as part of their conjunctive use basin management. AEWSD continuously operates their wells running 50 weeks per year during dry periods and approximately 26 weeks per year during normal conditions (refer to **Appendix A)**. Based on recent recovery well construction and existing production rates at these spreading works, the District expects the new recovery wells to produce between 2,000 gpm and 3,200 gpm. For calculation purposes, an average of 2,600 gpm was utilized for each well. **Table 1** shows recovery volumes in acre-feet in different water year types over an assumed 10-year period, beginning and ending with normal years. Though hydrologic cycles do vary year to year, and decade to decade, drought periods have historically occurred approximately every 3 years.

Table 1 – Recovery Volumes in AF Over a 10-Year Period

Year	Year Type	Weeks/Year	Annual
1	Normal	26	4,180
2	Dry	50	8,040
3	Wet	0	0
4	Normal	26	4,180
5	Dry	50	8,040
6	Wet	0	0
7	Normal	26	4,180
8	Dry	50	8,040
9	Wet	0	0
10	Normal	26	4,180
	Total	254	40,840
	Average	25.4	4,084

The two proposed extraction wells will yield approximately 8,040 AF during drought periods. The average annual benefit is approximately 4,084 AF/year. The average annual benefit over ten years is 40,840 AF and over the minimum infrastructure service life of 50 years is **95,000 AF of new water supply**.

- *What percentage of the total water supply does the water better managed represent? How was this estimate calculated?*

With the construction of the two additional recovery wells, AEWSD will be able to add an average annual benefit of 4,084 AF to the total average water supplied by the District. AEWSD delivers

an average of 141,000 AF of water per year (not including losses) to SWSA customers. The additional extractions from the new recovery wells will represent 2.9% of the water supply.

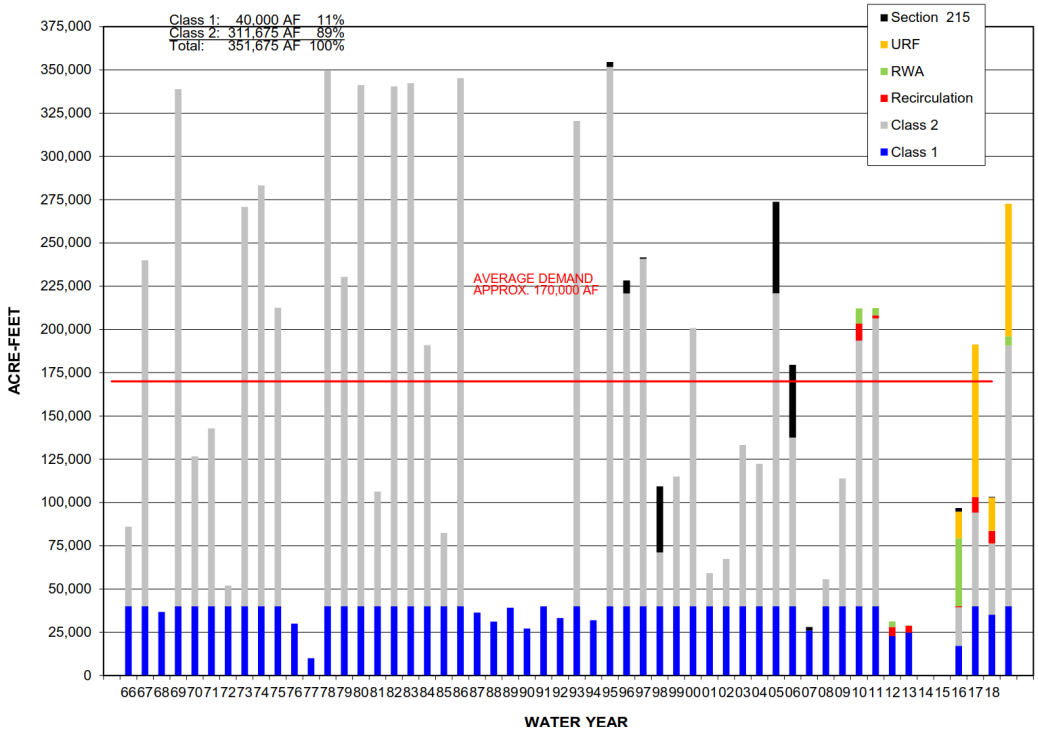

Figure 3 - AEWSD History of Friant-Kern Allocation

From 2003-2012 the District imported an average of 161,388 acre-feet/year (AF/yr) and extracted an average of 59,381 AF/yr from its groundwater wells. The proposed new annual average extraction volume of 4,084 AF will increase water supply available to customers during times of drought by 6.9%.

- *Provide a qualitative description of the degree/significance of anticipated water management benefits.*

The Project benefits can be quantified, as described above, but the qualitative significance of Project benefits is best demonstrated by the included Letters of Support from ACSD and Kern IRWMP Executive Committee. The rural severely disadvantaged communities (SDACs) of Arvin, Mettler, and Lamont who rely solely on groundwater for drinking water supplies, look to AEWSD to construct and operate water infrastructure sustainably and conjunctively to manage the underlying basin. Through sustainable groundwater recharge and recovery programs, the aquifer can provide long-term assurance and drought resiliency for all beneficial users and uses of groundwater within the region.

Specifically, groundwater recharge and recovery allows the District to utilize surface water supplies for direct use and recharge during wet years and to recover the stored water during dry years when surface water supplies are scarce to maintain a reliable water supply, irrespective of climatic conditions. Additionally, successful operation of the groundwater recharge facility benefits all groundwater users through the stabilization of water levels, increased storage capacity in the aquifer, and improved groundwater quality through recharge with high-quality surface

supplies. The goal of the Conjunctive Use Modeling Tool is to provide the District with a tool to assess and maximize benefits and ensure that water levels are projected to maintain above their SGMA metrics and thereby protect against Undesirable Results.

- *Will the project make new information available to water managers? If so, what is that information and how will it improve water management?*

The Conjunctive Use Modeling Tool will provide the District with a tool with which to base both long- and short-term project planning and prioritization. The groundwater flow model will facilitate the calculation of a water budget for both the District as a whole and for specified subareas within the District, supporting a greater understanding of the District's water supplies and demands and allowing the District to operate within its Sustainable Yield. The model will also provide information related to water levels, water quality and subsidence so that the District can optimize operations to avoid Undesirable Results.

The DST will consider external constraints, such as drought conditions and District management objectives, to evaluate potential benefits and impacts of proposed projects and/or operational decision making (e.g., evaluating prorate/allocation timing and volume, considering the benefits of unbalanced transfers/exchanges, investigating well replacements and usages, and evaluating on-farm recharge/landowner banking programs, among others). The DST will facilitate optimization of District operations towards defined performance metrics and targets (e.g., maximizing average end-of-year banked water balance over specified number of years; maximizing deliveries to customers; minimizing subsidence along critical infrastructure, etc), using advanced numerical techniques (e.g., artificial intelligence and machine learning) to provide enhanced water resources management recommendations. The District can then use the best ranking scenario to inform their delivery, pumping and banking operations under a variety of hydrologic conditions, including drought conditions.

Wells

- *What is the estimated capacity of the new well(s), and how was the estimate calculated?*

Based on similar recent well construction, well depth, pump horsepower, knowledge of local geology, and existing production rates at AEWSD spreading works, the District can expect the new recovery wells to produce between 2,000 gpm and 3,200 gpm, or 2,600 gpm on average.

- *How much water do you plan to extract through the well(s), and how does this fit within state or local laws, ordinances, or other groundwater governance structures applicable to the area?*

AEWSD plans to utilize the new wells to their fullest extent to meet current demands and safely operate the conjunctive use basin. AEWSD's significant CVP Class 2 supply and extensive groundwater banking facilities coupled with a consistent water demand, make the limiting factor of banking extractions the wellfield recovery rate. Based on existing operations at the spreading works (see **Appendix A**), the District anticipates the Project will yield approximately 8,040 AF during drought periods, with an average annual benefit of approximately 4,084 AF/year.

The Conjunctive Use Modeling Tool will be used to project well operations to ensure that the proposed well locations and extractions will not cause Undesirable Results or exceed previously

banked supplies. This aligns with the Governor's Executive Order N-7-22 Action 9a in which a Groundwater Sustainability Agency (GSA) must verify that a proposed well would not be inconsistent with any sustainable groundwater management program established for a basin. AEWSD must achieve groundwater sustainability by 2040 to be compliant with California's SGMA. AEWSD has a goal to obtain groundwater sustainability through extensive projects and management actions.

- *Will the well be used as a primary supply or supplemental supply when there is a lack of surface supplies?*

The wells will be used as a supplementary supply when there are limited surface water supplies available. The Project would supplement private groundwater pumping during droughts.

- *Does the applicant participate in an active recharge program contributing to groundwater sustainability?*

AEWSD operates three recharge facilities: the North Canal Spreading Works, Sycamore Spreading Works, and Tejon Spreading Works. Additionally, the North Canal Balancing Reservoir, used to balance imported water inflows prior to distribution to AEWSD customers, is also operated for recharge in wetter periods. The first AEWSD recharge facility, the Sycamore Spreading Works, received water for the first time in 1966. The Sycamore Spreading Works was expanded twice, and now consists of 75 ponds with a combined area of 551 acres. The Tejon Spreading Works was constructed in 1972 and consists of 72 ponds with a combined area of 447 acres. The North Canal Spreading Works was constructed in 1999 and consists of 12 ponds with a combined area of 300 acres. The North Canal Balancing Reservoir was constructed in 2000 and consists of 2 ponds with an area of 54 acres. The Spillway Basin at the end of the South Canal, used as a regulation basin, is un-lined and recharge occurs there as well.

Between July 1966 and September 2015, a total of over 2.2 million AF of water has been delivered to these facilities, an average of approximately 44,200 AFY. In addition to these existing spreading grounds, a new parcel in the west-central portion of the Arvin-Edison Management Area was recently acquired by AEWSD, in partnership with Kern Delta Water District, for future use as a spreading works. AEWSD operates a total of 82 recovery wells to recover the groundwater previously stored via spreading operations.

- *Please provide information documenting that proposed well(s) will not adversely impact the aquifer it/they are pumping from.*

The principal aquifer in which the proposed recovery wells would be screened in is comprised of the Kern River Formation, which consists of unconsolidated beds of sand and conglomerate with interbeds of siltstone and mudstone, and is generally poorly-sorted with medium- to large-scale cross-bedding. A significant regional aquitard within the principal aquifer, the "E"-Clay, underlies the western portion of the northern half and the northern portion of the southern half of the District's service area (see SOKR GSP Figure HCM-10).

During well siting, the Conjunctive Use Modeling Tool will be utilized to identify preferred sites based on groundwater flow rates and directions; proximity to related infrastructure; consideration of SGMA compliance (e.g., water levels and subsidence trends); and understanding of nearby well design and production rates. The respective locations of the proposed recovery wells are shown in

Figure 1, **Figure 2**, and in **Appendix A.** Furthermore, the Conjunctive Use Modeling Tool may be used to assess the potential impacts on well interference, reduction in groundwater levels, groundwater storage, subsidence, and advective water quality migration pathways.

- *If available, information should be provided on nearby wells (sizes, capacities, yields, etc.), aquifer test results, and if the area is currently experiencing aquifer overdraft or land subsidence.*

Based on publicly available remote sensing data, the proposed well locations have experienced little to near zero measured subsidence between June 2015 and January 2022. Furthermore, the nearest representative monitoring site has groundwater levels over 70 feet above the minimum thresholds established in the SOKR GSP. These conditions are constantly changing and likely to degrade with the current drought conditions.

- *Please describe the groundwater monitoring plan that will be undertaken and the associated monitoring triggers for mitigation actions.*

The SOKR GSP establishes a District monitoring network consisting of 16 representative monitoring sites for groundwater elevations and five representative monitoring sites for land subsidence. These sites are monitored pursuant to monitoring protocols adopted for the Basin. The SOKR GSP identifies minimum thresholds at these representative monitoring sites, which are either groundwater elevations or maximum rate of subsidence that when exceeded may cause Undesirable Results. Based on data collected from this monitoring network, mitigation actions are triggered if and when minimum thresholds are reached in any of the monitoring sites, per the Exceedance Policy described below.

- *Describe how the mitigation actions will respond to or help avoid any significant adverse impacts to third parties that occur due to groundwater pumping.*

The SOKR GSP aims to maintain groundwater levels so that well dewatering and increased subsidence does not occur. In coordination with the other Basin GSPs, the SOKR GSP establishes an Exceedance Policy that will be triggered if any of the representative monitoring sites reach or exceed their minimum thresholds. This Policy outlines steps that the District will undertake to further investigate impacts and, if necessary, implement Projects and/or Management Actions. These Management Actions may include modifications to pumping schedules and/or rates to the extent needed to prevent impacts to third parties or Undesirable Results. Further, AESWD has committed to developing a Well Mitigation Policy that will address any SGMA-related impacts to domestic wells (e.g., lowering of water levels). Application of the groundwater flow model can help identify any vulnerable wells and support optimization of well pumping operations to mitigate impacts as well.

Evaluation Criterion B—Drought Planning and Preparedness (20 points)

For purposes of evaluating this criterion, please:

- *Provide a link to the applicable drought plan, and only attach relevant sections of the plan that are referenced in the application, as an appendix to your application.*

The applicable drought plans for this Project are the SOKR GSP and the AEWSD Drought Management Plan (DMP). Relevant sections of the SOKR GSP and the entire DMP are attached

in **Appendix H**. The link for the public draft SOKR GSP is https://aewsd.org/wp-content/uploads/South-Kern-GSP_PublicDraft_2022-06-13.pdf. This Project was also identified in the Kern IRWMP and AEWSD Water Management Plan.

- *Explain how the applicable plan addresses drought.*

The SOKR GSP establishes projected conditions water budgets, including climate change scenarios in which precipitation, evapotranspiration, and surface water availability are projected under 2030 and 2070 central tendencies. These future climate scenarios project a reduction in precipitation and available surface water imports, which results in a projected groundwater storage deficit. As such, Projects and Management Actions have been identified to close the projected groundwater storage deficit by 2040. Implementation of such Projects and Management Actions will ensure the District maintains a balanced and sustainable water supply for all lands, irrespective of climatic impacts, especially drought conditions under future climate change.

- *Does the drought plan contain drought-focused elements including a system for drought monitoring, sector vulnerability assessments related to drought, prioritized mitigation actions, and response actions that correlate to different stages of drought?*

The DMP and SOKR GSP incorporate elements of drought monitoring and prioritized mitigation actions through projects and management actions. The Conjunctive Use Modeling Tool will be developed to include capabilities of conducting sector vulnerability assessments related to drought and other SGMA Undesirable Results, as well as response actions correlating to different stages of drought. The Project will ultimately inform new revisions and updates to the DMP and SOKR GSP in the succeeding years.

- *Explain whether the drought plan was developed with input from multiple stakeholders. Was the drought plan developed through a collaborative process?*

The AEWSD Board has monthly Board Meetings at their offices where updates to the SOKR GSP and AEWSD DMP are provided by Staff and/or their consultants, and stakeholders are provided the opportunity to provide input. Additionally, in June 2018, AEWSD adopted a Stakeholder Communication and Engagement Plan (SCEP) to fulfill SGMA notice and communication requirements. The SCEP includes sections on goals and desired outcomes of the GSP development process, stakeholder identification and mapping, messaging, venues for engagement, implementation schedule, and a stakeholder survey.

- *Does the drought plan include consideration of climate change impacts to water resources or drought?*

As mentioned above, the SOKR GSP includes climate change impacts when developing the projected water budget scenarios that were used for sustainability planning, including establishment of Projects and Management Actions. Specifically, precipitation and evapotranspiration were adjusted based on climate change factors provided by the California Department of Water Resources (DWR) for both 2030 and 2070 central tendency scenarios. (See Section 9.1 of the SOKR GSP for Arvin-Edison Management Area projected water budget, and use this link to DWR's climate change document.) Additionally, CVP surface water supplies were adjusted based on modeling projections provided by the Friant Water Authority and SWP surface water supplies were adjusted based on modeling projections provided by DWR's CalSim water

resources planning model and historical operations data adjusted based on new operational regulations pursuant to the 2008/2009 Long-Term Operations Criteria and Plan Biological Opinion. Finally, AEWSD-specific projected SWP and Kern River imports were reduced by 50% to account for uncertainty surrounding the future availability of surface water supplies through transfers, purchases, exchanges, and banking programs that have historically been used to increase supply during extended periods of drought. This approach therefore provides a conservative estimate of the potential future impacts of reduced surface water supply reliability to AEWSD due to prolonged drought conditions, and therefore provides the maximum planning potential when developing Projects/Management Actions to meet the locally-defined Sustainable Management Criteria (SMC) and prevent Undesirable Results.

- *Describe how your proposed drought resiliency project is supported by an existing drought plan.*

The Project provides assurance to all groundwater users within AEWSD, including ACSD, by increasing the capacity and reliability of the water supply during critically dry years. This water management project is identified in the SOKR GSP (PMA AE-31 and AE-32) and aligns with AEWSD's Drought Management Plan to increase groundwater banking recovery capacity and sustain the conjunctive-use basin.

  - *Does the drought plan identify the proposed project as a potential mitigation or response action?*

Specific projects were not prioritized in the existing DMP, but this Project was prioritized in the SOKR GSP because it was a multi-benefit project with credible project yield. The SOKR GSP includes a description of the Projects and Management Actions that the Arvin GSA has determined are needed to achieve local sustainability and support achievement of the Sustainability Goal for the basin. The SOKR GSP provides a summary list of all Projects and Management Actions being considered for implementation by each member agency including the project title, implementation status, a brief description of the project, and benefits associated with the project. This Project is listed as AE-31 and AE-32 in the SOKR GSP summary table, Table PMA-1 in **Appendix H**. AEWSD has prioritized this Project from within their list of capital projects, and secured funding through a recent Proposition 218 election process to complete the Project if grant funding is received.

  - *Does the proposed project implement a goal or need identified in the drought plan?*

Yes, the Project is aligned with the needs outlined in both the SOKR GSP and the DMP, and is relevant to water banking and water regulation, monitoring hydraulic levels or conditions, utilizing alternate water supplies, and improved conjunctive use basin management. The Project will allow the District to maximize its conjunctive use program to ensure a sustainable water supply to all users within the District's service area. As conjunctive use is a fundamental principle for the District, it will be critical for the District to implement conjunctive use projects such as this Project to meet the Sustainability Goal as outlined in the SOKR GSP.

  - *How is the proposed project prioritized in the referenced drought plan?*

Specific projects were not prioritized in the DMP, but this Project was prioritized in the SOKR GSP because it was a multi-benefit project with credible project yield.

Evaluation Criterion C— Sustainability and Supplemental Benefits (15 points)

1. Climate Change:

- *In addition to drought resiliency measures, does the proposed project include other natural hazard risk reductions for hazards such as wildfires or floods?*

Any increase in availability of water will typically help to mitigate the possible effects of wildfires by decreasing the amount of dry vegetation in the area. Additionally, by increasing the amount of available water to the agricultural industry, fields will be maintained, rather than left fallow further mitigating the prevalence of risk of fires and dust storms.

- *Does the proposed project include green or sustainable infrastructure to improve community climate resilience such as, but not limited to, reducing the urban heat island effect, lowering building energy demands, or reducing the energy needed to manage water? Does this infrastructure complement other green solutions being implemented throughout the region or watershed?*

This Project wells will be equipped with high-efficient electric pumps and motors. The Project Conjunctive Use Modeling Tool will improve water management decision making and aim to stabilize groundwater levels, thus keeping existing groundwater pumps working more efficiently and reducing energy costs associated with increased lift.

- *Will the proposed project establish and use a renewable energy source?*

The electrical energy supplied to the well pump as part of the project will be supplied by Pacific Gas & Electric Co. (PG&E), who delivered 50% of their electricity from renewable resources in 2021 that qualify under California's Renewable Portfolio Standard (RPS) (https://www.pge.com/en_US/about-pge/environment/what-we-are-doing/clean-energy-solutions/clean-energy-solutions.page?WT.mc_id=Vanity_cleanenergy retrieved 06/02/2022). Therefore 50% of energy used by the project will be renewable.

- *Does the proposed project seek to reduce or mitigate climate pollutions such as air or water pollution?*

While the Project does not directly mitigate water pollution, the Project will help to alleviate water level and quality issues with the use of the Conjunctive Water Monitoring Tool which will be able to simulate advective migration pathways of water quality constituents of concern.

- *Will the proposed project reduce greenhouse gas emissions by sequestering carbon in soils, grasses, trees, and other vegetation?*

The Project will help the District reduce greenhouse gas emissions by increasing the availability of alternative sources of water during periods of drought when surface water supply is low. With increased water supply security, the District will be able to provide water for agriculture, the primary water use within the District, which will increase vegetative cover and sequester carbon in soil. Additionally, the DST will allow the District to identify the most efficient ways to meet water demands, thereby reducing emissions created by pumping water from a declining groundwater table.

- *Does the proposed project have a conservation or management component that will promote healthy lands and soils or serve to protect water supplies and its associated uses?*

As stated previously, the Project will help the District ensure efficient production and distribution of water by using the Conjunctive Use Modeling Tool to guide decisions on the best course of action for the available water supply. The Conjunctive Use Modeling Tool will help guide decisions regarding land and water use. Two projected scenarios will be developed and utilized: (1) a 5-year simulation will forecast District operations in the near term, and (2) a 50-year simulation will forecast long-term sustainability planning. Both simulations will incorporate various water year types, including critically dry years, to assess District operations and their associated impacts to supply reliability and the groundwater system. Furthermore, the Conjunctive Use Modeling Tool will simulate groundwater level fluctuations and subsidence directly to ensure that no Undesirable Results are projected to occur under various climactic considerations. Finally, the Modeling Tool will be able to simulate advective migration pathways of water quality constituents of concern.

- *Does the proposed project contribute to climate change resiliency in other ways not described above?* No.

2. **Disadvantaged or Underserved Communities:**
   Please describe in detail how the community is disadvantaged or underserved.

Figure 1 shows the SDACs within the District. The State of California has defined a SDAC as a community with a minimum household income (MHI) less than 60 percent of the statewide MHI. Based on a statewide MHI of $75,235, Arvin has been designated as a SDAC, having an MHI of $38,464. Majority of the residents living in Arvin are Hispanic, equating to over 20,000 people or 94% of the residents, 48% of whom live in poverty, 70% are U.S. citizens and 38% were born outside the USA, 64% of residents drive to work alone with an average commute of 24 minutes. According to the U.S. Census Bureau, the employment rate in Arvin is 55%, compared to 72% statewide.

The District has an agreement with the MWD to recover banked water. MWD's member agencies have large numbers of people living in poverty above the USA average of 11.4% including Compton 19.5%, Fullerton 12.7%, Anaheim 13.8%, Glendale 13.9%, Long Beach 16.2%, Los Angeles 16.9%, Pasadena 14.0%, and Santa Ana 13.4%. According to the 2022 update of the SB 535 Disadvantaged Communities list the disadvantaged communities (DACs) served by the MWD are Anaheim, Burbank, Compton, Glendale, Long Beach, Los Angeles, San Fernando, Santa Ana, and Santa Monica.

3. **Tribal Benefits:** No direct benefits to Tribal Nations.
4. **Environmental Benefits:**

- *Does the project seek to improve ecological climate change resiliency of a wetland, river, or stream to benefit to wildlife, fisheries, or habitats? Do these benefits support an endangered or threatened species?*

The proposed project will add to AEWSD's portfolio of drought water supply options, and will reduce demand for other water supplies, or the timing of demand, from the San Joaquin River. This may result in providing greater storage capacity available behind the dams on the river or reduce flood flows in the river. This could benefit federally-recognized candidate species,

threatened species and endangered species. It is not feasible to precisely quantify the Project's environmental benefits due to the complexity of river operations and endangered species habits and life cycles. However, reducing reliance on river water could have a real and tangible benefit to numerous threatened and endangered species.

5. **Other Benefits:** *Will the project address water sustainability in other ways?* Yes!
   - *Will the project assist States and water users in complying with interstate compacts?* No.
   - *Will the project benefit multiple sectors and/or users?*

The Project will benefit many users across agricultural, rural, and urban sectors. The Project will directly increase the available drought water supply by increasing the extraction of banked water. AEWSD also has an agreement with MWD to provide a supplemental surface water supply up to 75,000 AFY. MWD serves 19 million people in various sectors, including homes and businesses. The project will make more water available for this transfer or other water marketing opportunities.

- *Will the project benefit a larger initiative to address sustainability of water supplies?*

The Project will use the Conjunctive Use Modeling Tool to assist with SGMA compliance. The Conjunctive Use Modeling Tool will quantify groundwater levels and storage volume changes to support both SGMA reporting requirements and effective management decisions to ensure that projected groundwater extractions do not cause SMC violations or Undesirable Results, thereby allowing the District to operate within its Sustainable Yield. The model can also quantify the effectiveness of proposed Projects and Management Actions, can serve as a check on Subbasin-wide models and analyses, and can support implementation of a well mitigation program, well permit application review, and water supply verifications.

Evaluation Criterion D—Severity of Actual or Potential Drought Impacts to be addressed by the Project (15 points)

- *What are the ongoing or potential drought impacts to specific sectors in the project area if no action is taken, and how severe are those impacts?*

Agricultural, rural residential and municipal water users are impacted by droughts in AEWSD. These service sectors could all suffer from the following impacts. These impacts can all be serious due to the severity of droughts in the region.

- Groundwater level declines and reduction in groundwater storage
- Wells going dry and reduction in well yield
- Higher water costs for water users
- Mandatory water conservation programs and restrictions on groundwater pumping
- Lower crop yield, crop losses and land fallowing

  - *Whether there are public health concerns or social concerns associated with current or potential drought conditions?*

Public Health Concerns: Public health concerns include impacts to rural domestic and municipal water supplies that could prevent residents from having sufficient water for basic health and sanitation needs. During droughts, shallow domestic wells are the most susceptible to going dry. ACSD provides drinking water to the SDAC of Arvin and is also susceptible to groundwater level

declines. The Project Conjunctive Use Modeling Tool can utilize simulated groundwater levels to inform decisions helping to address these concerns.

Social Concerns: The primary social concerns from drought are impacts to jobs and the economy, and the spread of poverty. Agriculture is the economic driver of the region. Job security could be jeopardized for farmers, farm workers, as well as those working in agriculture management, food processing and agricultural equipment and supplies.

- *Whether there are ongoing or potential environmental impacts?*

The reduced flows in local rivers and the reduced storage behind the local dams are impacting, and will continue to impact, endangered and threatened species until the current drought abates. Ongoing and potential environmental impacts include: losses or destruction of fish and wildlife habitat loss, increased disease in wild animals (due to reduced food and water supplies), wildlife migration, increased stress on endangered species or even extinction, lower water levels in reservoirs, lakes, and ponds, loss of wetlands, wind and water erosion of soils, increased greenhouse gases and heat index (due to vegetation loss), and other unknown impacts.

- *Whether there are local or economic losses associated with current drought conditions that are ongoing, occurred in the past, or could occur in the future?*

Past drought impacts to groundwater users have resulted in a decline of groundwater levels and an increase in groundwater pumping costs. The SOKR GSP has maps showing the historical and recent AEWSD *Groundwater Elevation Hydrographs* (Figures GWC-5 and GWC-6). The GWSA of the AEWSD service area experiences the greatest decline because surface water supplies are not available to offset groundwater pumping and/or recharge the primary aquifer. During the peak of the 2014-2016 drought, a decline in elevation of 50 feet or more can be seen in several well hydrographs. The cost increase of declining water levels during peak drought can be calculated as follows (Refer to **Appendix I**, *An Analysis of the Energy Intensity of Water in California* white paper and *PG&E AG-5 B* rate for value sources): (50 feet) x (1.46 kWH/acre-foot/foot of lift) x ($0.24/kWh) = $17.52 /AF increase. Unless the decline is reversed, the $17.52 /AF continues to increase further reducing profit margins and increasing economic losses.

Table 2 - Savings of Potential Crop Value Loss

Crop	ET (AF/Acre)	Acres Lost	$/acre	Value of Crop Loss	Value Loss over 4 years
Grapes	2.67	3011	$13,825	$9,831,995	$39,327,980
Almond	3.78	2127	$5,539	$2,786,830	$11,147,320
Pistachios	3.35	2400	$8,937	$5,063,867	$20,255,468

Drought also causes wells to go dry and/or loss of crop production. The economic loss to fallow crops depends on the crop type. The top three crop types within Kern County include grapes, almond, and pistachios. From the 2018 Kern County Ag Commissioner Report in **Appendix I**, The Value of Crop Loss per acre to fallow land is summarized in **Table 2**. This table does not include the cost of the land. Given that these are permanent crops, the loss of crop $/acre would then be multiplied by three to five years depending on crop type/varietal because new permanent crops take many years to bear fruit and mature. Assuming the one year of fallowing plus a

conservative three years to maturity, the Value loss $/acre based on recovery well supply of 8,040AF during drought is shown below:

- *Whether there are other drought-related impacts not identified above.*

As we all know, water is a precious commodity and new water-related conflicts arise every year. With the adoption of the SOKR GSP and the over-arching coordination occurring within the Kern County Subbasin, AEWSD has been proactive in attempting to mitigate water-related conflicts before they arise. AEWSD continues to invest in the future by initiating projects to build drought resiliency, such as this Project, to thwart future crisis, conflict, hardship, and economic loss.

- *Describe recent, existing, or potential drought conditions in the project area.*

The Project area is currently in an extreme drought, where this year has been the third driest year over the past 128 years (https://www.drought.gov/states/california/county/kern). According to the United States Drought Monitor (https://droughtmonitor.unl.edu/Data/Timeseries.aspx), there have been three long term droughts since the year 2000. In addition to this year, the next most recent drought was from 2012-2018 with a severe drought from 2014-2016. **Figure 4** shows the percent of Kern County in a drought since 2000 as well as a graph of the drought severity and coverage for Kern County since 2000.

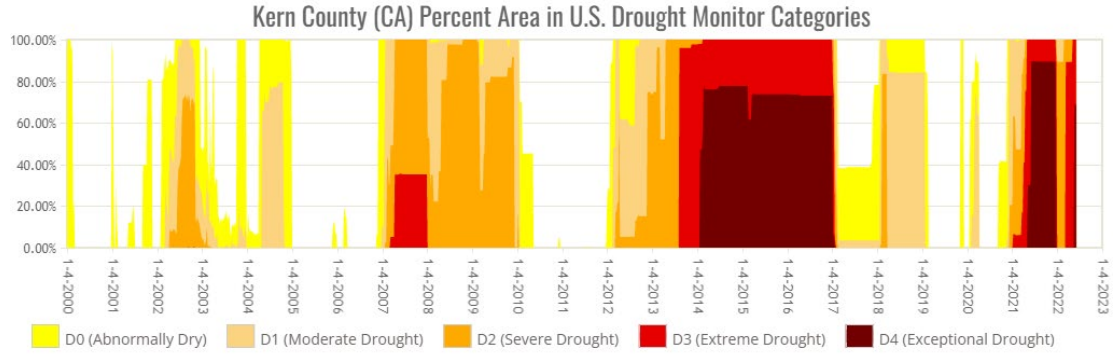

Figure 4 - Percentage of Drought in Kern County since 2000

- *Describe any projected increases to the severity or duration of drought in the project area resulting from changes to water supply availability and climate change.*

The SOKR GSP included an analysis of future water budgets, including the impacts of climate change by 2030 and 2070. The 2030 Climate Scenario indicates a net deficit of approximately -31,600 AFY from 2021 to 2070, and the 2070 climate scenario indicates a deficit of -56,300 AFY over the same period. The projected deficit is largely due to projected reduction in surface water supplies as a result of decreases in precipitation and earlier snowmelt, and increases in evapotranspiration as a result of warmer temperatures.

Evaluation Criterion E—Project Implementation (10 points)

- *Describe the implementation plan of the proposed project.*

The development of the Conjunctive Use Modeling Tool began in March 2022 and is anticipated to be completed in September 2023. It is assumed that the grant contract will be signed on April 1, 2023. Following immediately thereafter, Project planning, design, and National Environmental

Policy Act (NEPA)/cultural compliance will commence and be completed by December 2023. Construction will commence in March 2024 and be completed by January 2025 within the contractual deadline. The Project Schedule is included in **Appendix C**.

- *Describe any permits that will be required, along with the process for obtaining them.*

CA Environmental Quality Act (CEQA) Notice of Exemption (NOE) was filed in June 2022. USBR will prepare the NEPA/cultural resources compliance environmental documentation. AEWSD will secure the well permits from Kern County and/or GSA. AEWSD will secure a PWRPA/PG&E electrical service application for Project power.

- *Identify and describe any engineering or design work performed on the proposed project.*

Work on the Extraction Wells includes: site selection and preliminary well schematic design.
Work on the Conjunctive Use Modeling Tool includes: identification of groundwater model features, input data, and considerations; development of a model development work plan; groundwater model construction and calibration against historical data; model validation and projections (5-year and 50-year scenarios); design of the DST including identification of District performance metrics and key assumptions; construction of the DST user interface; and, development of an optimization engine (i.e., an artificial intelligence or machine learning model).

- *Describe any new policies or administrative actions required to implement the project.*

No new policies will be required. AEWSD has constructed numerous similar projects in the past.

Evaluation Criterion F—Nexus to Reclamation (10 points)

- *Does the applicant have a water service, repayment, or O&M contract with Reclamation?*

AEWSD's Friant water supply contract began in 1966. AEWSD has operated as Contractor of Project Water from the Friant Division of the CVP with the following USBR contracts:

- Contract No. 14-06-200-229A from 8/30/1992 to 2/28/1995.
- Interim renewal contracts identified as Contracts No (s). 14-06-200-229A-IR1, IR2, IR3 and IR4 which provide for continued water service from 12/1/2000 through 2/28/2001.
- Long-Term Renewal Contract between the United States and AEWSD, Contract No. 14-06-200-229A-LTR1 of 1/20/2001, effective 3/1/2001 through 11/30/2011.
- Perpetual 9d Contract.

- *Will the proposed work benefit a Reclamation project area or activity?*

Yes, the project and the District are both located within the CVP Friant Division, and the District is within the CVP Place of Use. AEWSD is dependent on their CVP supplies to meet their full water demands. The project will directly benefit a Reclamation Project Area.

- *Is the applicant a Tribe?* No.

~~~~ END OF TECHNICAL PROPOSAL AND CRITERIA SECTION ~~~~

Project Budget

AEWSD believes that this Project is foundational to Drought Planning and Water Supply Operations. Therefore, AEWSD has planned to solely cover the non-Federal cost share of this Project in the 2023 FY budget. There are no other sources of Project funding.

The applicant will be contributing the funding necessary to meet cost share requirements at a minimum of 50% total Project cost. The source of funds are mainly water sales revenue and land assessments. The funds are available in AEWSD accounts and no time constraints or contingencies exist on the funds. There is no other grant funding and no third-party in-kind costs associated with this Project.

There are Project costs that may be incurred prior to award related to the Conjunctive Use Modeling Tool development. The cost of completing this portion of the Project is detailed in the Consultant Estimated Staffing Plan and Cost Breakdown in **Appendix D**.

Budget Proposal

The total Project cost is the sum of all allowable items of costs, including all required cost sharing, that are necessary to complete the Project. **Table 3** provides the total Project cost and **Table 4** shows funding by source. **Table 5** shows a breakdown of the costs by budget category. Indirect costs are not included in this grant budget. All necessary supplies, materials, and equipment will be supplied by the contractor in the construction phase and are included in the Implementation cost. Detailed Engineer's Opinion of Probable Construction Cost (EOPCC) estimates for each well site and a summary of consultant fees are included below. Budget backup for each line item and detailed consultant hourly fees are presented in **Appendix D**.

Table 3 - Total Project Cost Table

SOURCE	AMOUNT
Costs to be reimbursed with requested Federal funding	$2,000,000
Costs to be paid by the applicant	$2,160,421
Value of third-party contributions	$0
TOTAL PROJECT COST	**$4,160,421**

Table 4 - Summary of Non-Federal and Federal Funding Sources

FUNDING SOURCES	AMOUNT
Non-Federal Entities	
Arvin Edison Water Storage District	$2,160,421
Non-Federal Subtotal	$2,160,421
REQUESTED RECLAMATION FUNDING	**$2,000,000**

Table 5 - Budget Proposal

Salaries and Wages				
Laird Meadows, Engineering Tech	$32.70	160	HRS	$5,232
Micah Clark	$11.45	160	HRS	$1,832
Contractual/Construction				
Implementation	$3,256,200	1	EA	$3,256,200

Table 6 – Consultant Fee Summary

Grant Reporting (P&P)	$13,728
Well Inspection & Sampling (P&P)	$104,344
Technical Support for NEPA (EKI)	$78,469
Groundwater Model Validation and Projections (EKI)	$196,811
DST Implementation for Operational Optimization (EKI)	$71,532

Item No.	Description	Quantity	Unit	Unit Price	Item Cost
1	Mobilization/Demobilization, Bonds, Insurance, and Permits	1	LS	$75,000	$75,000
2	F&I 36" Diameter Conductor Casing	50	LF	$730	$36,500
3	Drill Pilot Hole (to 1,500 feet total depth)	1,300	LF	$76	$98,800
4	Electric Log, Deviation Log, Caliper Log	1	LS	$15,000	$15,000
5	Depth Zone Water Samples	8	EA	$20,000	$160,000
6	Open Pilot Hole to 30"/28" Diameter	1,300	LF	$90	$117,000
7	F&I 18" Diameter Blank Casing	410	LF	$120	$49,200
8	F&I 18" Diameter Perforated Casing	860	LF	$214	$184,000
9	F&I 20 feet long Casing Compression Sections	1	EA	$9,900	$9,900
10	F&I 2" Diameter Sounding Tube with Compression Sections	905	LF	$25	$22,600
11	F&I 3" Diameter Gravel Pipe	65	LF	$41	$2,700
12	F&I Gravel Pack	1,240	LF	$56	$69,400
13	F&I Cement Annular Seal	60		$105	$6,300
14	Preliminary Development	96	HR	$550	$52,800
15	Mob/Demob Development Pump and Pump up to 40 Hours	1	LS	$59,000	$59,000
16	Additional Pump Development and Test Pumping Time	60	HR	$325	$19,500
17	Construct Well Pump Foundation	1	LS	$16,200	$16,200
18	Video Log	1	LS	$2,200	$2,200
19	Well Equipping (Includes column, tube, shaft, pump, motor, metered discharge, electrical, & startup)	1	LS	$416,000	$416,000
20	F&I 12" Dia. Discharge Pipe	500	LF	$150	$75,000
21	Extend Overhead Electric	1	LS	$69,000	$69,000
				TOTAL WELL CONSTRUCTION	$1,556,100.00

Figure 5 – Engineer's Opinion of Probable Construction Cost Estimate – W39

Item No.	Description	Quantity	Unit	Unit Price	Item Cost
1	Mobilization/Demobilization, Bonds, Insurance, and Permits	1	LS	$75,000	$75,000
2	F&I 36" Diameter Conductor Casing	50	LF	$730	$36,500
3	Drill Pilot Hole (to 1,500 feet total depth)	1,300	LF	$76	$98,800
4	Electric Log, Deviation Log, Caliper Log	1	LS	$15,000	$15,000
5	Depth Zone Water Samples	8	EA	$20,000	$160,000
6	Open Pilot Hole to 30"/28" Diameter	1,300	LF	$90	$117,000
7	F&I 18" Diameter Blank Casing	410	LF	$120	$49,200
8	F&I 18" Diameter Perforated Casing	860	LF	$214	$184,000
9	F&I 20 feet long Casing Compression Sections	1	EA	$9,900	$9,900
10	F&I 2" Diameter Sounding Tube with Compression Sections	905	LF	$25	$22,600
11	F&I 3" Diameter Gravel Pipe	65	LF	$41	$2,700
12	F&I Gravel Pack	1,240	LF	$56	$69,400
13	F&I Cement Annular Seal	60		$105	$6,300
14	Preliminary Development	96	HR	$550	$52,800
15	Mob/Demob Development Pump and Pump up to 40 Hours	1	LS	$59,000	$59,000
16	Additional Pump Development and Test Pumping Time	60	HR	$325	$19,500
17	Construct Well Pump Foundation	1	LS	$16,200	$16,200
18	Video Log	1	LS	$2,200	$2,200
19	Well Equipping (Includes column, tube, shaft, pump, motor, metered discharge, electrical, & startup)	1	LS	$416,000	$416,000
20	F&I 12" Dia. Discharge Pipe	1,000	LF	$150	$150,000
21	Extend Overhead Electric	1	LS	$138,000	$138,000
				TOTAL WELL CONSTRUCTION	$1,700,100.00

Figure 6 – Engineer's Opinion of Probable Construction Cost Estimate – W40

Budget Narrative

Salaries and Wages

The Project manager for AEWSD will be Laird Meadows, Engineering Technician. Labor rates and total estimated hours to be spent on the Project are listed above in **Table 5** and the breakdown of estimated time to be spent on tasks outlined in the Project schedule are shown in **Table 6**. Hours allocated for Reporting include approximately 3 hours for review of each semi-annual report and the final Project report to be prepared by the engineering consultant. Hours allocated for Project Administration, Reporting, Planning, and Implementation include billing, coordination with USBR staff, consultants and contractors, meetings, design review, construction oversight, project closeout, and various other grant related tasks.

Table 7 - Estimated District Staff Hours

Laird Meadows	10	50	40	60	160

Fringe Benefits

The hourly rates for Fringe Benefits of AEWSD employees is listed in **Table 5**. Fringe Benefit costs include District contributions toward Social Security & Medicare, pension plan, life and AD&D insurance, long term disability, medical & vision insurance, dental insurance are calculated in accordance with established District policy and approved by the AEWSD Board of Directors. A complete breakdown of AEWSD employee Fringe Benefit rates is presented in **Appendix D**.

Travel

Travel will not be included in the requested grant funding.

Equipment

Project equipment will include the recovery well pumps and flowmeters to be provided by the Contractor, with their costs falling under *Contractual/Construction* as Implementation.

Materials and Supplies

Materials and supplies will be furnished and installed as part of the construction contract and are therefore included under *Contractual/Construction* as Implementation. The EOPCC presented in **Appendix D** itemizes the contractor's scope of work as furnished and installed costs. Costs for individual line items were estimated from recent bid canvases of similar projects, quotes from contractor's, and engineer's past experience with projects similar in size and scope. All budget backup items are included in **Appendix D**. EOPCC values shown attempt to capture all Project costs including, but not limited to manufacturer's list price, taxes, shipping, installation, incidentals, and contractor's profit.

Contractual

Work to be accomplished by consultants or contractors includes design engineering, construction management, and Conjunctive Use Modeling Tool development. Detailed consultant fee estimates

are included as **Appendix D** showing the expected number of hours associated with each task. Procurement of engineering contracts will be done in accordance with AEWSD professional services contracting policy. The procurement method for the construction contract will be publicly advertised, bid, and awarded to the lowest responsible, responsive bidder.

Third-Party In-Kind Contributions

There are no third-party contributions for this Project.

Environmental and Regulatory Compliance Costs

AEWSD has completed CEQA compliance. The Grant Notice of Funding Opportunity (NOFO) states any costs to the recipient associated with Federal environmental and cultural resources compliance will be identified during the process of developing a final project budget for inclusion in the financial assistance agreement.

Other Expenses

No other expenses are included in the Project budget.

Indirect Costs

Indirect costs will not be included in this grant funding request.