Small Surface Water and Groundwater Storage Projects

NOFO No. R24S00010

November 2023

Groundwater Banking Joint Powers Authority (GBJPA)

Phase 1 - Kern Fan Groundwater Storage Project

Fiona Sanchez
Project Manager, Groundwater Banking Joint Powers Authority
Director of Water Resources, Irvine Ranch Water District
(949) 453-5325
sanchezf@irwd.com

Dan Bartel
General Manager, Groundwater Banking Joint Powers Authority
Engineer-Manager, Rosedale-Rio Bravo Water Storage District
(661) 589-6045
dbartel@rrbwsd.com

Table of Contents

Appendix I – Thomas Harder & Co. Recharge and Recovery Suitability Reports
Appendix J – Letters of Support
Appendix K – Multi-benefit Recharge Diagram
Appendix L – US Drought Monitor Data Kern County (2018-2022)
Appendix M – USDA Secretarial Drought Designation Maps (2019-2023)
Appendix N – Kern Fan Project Phase 1 Proposed and Capital Budget
Appendix O – Kern Fan Project DEIR and FEIR
Appendix P – GBJPA Official Resolution No. 2022-05
Appendix Q – GBJPA Auditor's Report
Appendix R – Replacement Costs Backup
Appendix S – Operation and Maintenance Backup

1. Technical Proposal and Evaluation Criteria

1.1 Executive Summary

The executive summary should include:

- ***the date, applicant name, city, county, and State,***
- ***a one-paragraph summary that briefly describes the work for which the applicant requests funding, including how funds will be used to accomplish specific project activities.***
- ***The length of time and estimated completion date for the proposed project (month/year).***
- ***Whether or not the proposed planning efforts are focused on a Federal facility or will involve Federal land.***

The Phase 1 - Kern Fan Groundwater Storage Project ("Project", "Phase 1") is a joint effort between Irvine Ranch Water District ("IRWD", "Irvine") and the Rosedale-Rio Bravo Water Storage District ("RRBWSD", "Rosedale") operating collectively as the Groundwater Banking Joint Powers Authority ("GBJPA"). See **Figure 1** below to view Rosedale and Irvine service areas. The GBJPA is in the process of developing the Kern Fan Project, a regional groundwater bank in Kern County, California, immediately west of the City of Bakersfield that has the potential to store up to 100,000 acre-feet of surplus water made available during wet years. Due to the large scale of the Kern Fan Project, implementation has been broken up into multiple independent operational phases, with Phase 1 being a standalone project. Phase 1 includes the acquisition of 350 acres in Kern County for the construction and operation of recharge basins, recovery wells, and conveyance infrastructure and interconnections. The GBJPA proposes to utilize resources in a cost-share agreement with the United States Bureau of Reclamation ("Reclamation", "USBR") to implement the proposed Project. The Phase 1 project was awarded Small Storage Program 2022 funding, and the GBJPA executed an agreement in November 2023 (Agreement No. R23AP00368) in the amount of $4,742,929, which provided partial funding based on eligible benefits to Reclamation. This application seeks additional Small Project Program funding up to the eligible funding amount.

Once implemented, the Project has the potential to provide approximately 28,000 acre-feet of new groundwater storage capacity and 14,480 acre-feet per year of drought year supply to provide long-term water supply reliability for agriculture, municipal and industrial (M&I) users, and disadvantaged communities. USBR funds would be used to accomplish the following Project activities:

- West Enos and North Stockdale Recharge Basins - Construction of approximately 300 net wetted acres (85% of total acres) of direct recharge basins on the West Enos property (approximately 201 acres) and the Stockdale North property (approximately 147 acres).
- West Enos and North Stockdale Recovery Wells - Well drilling and equipping of four (4) conjunctive use recovery wells. Two wells will be located on the West Enos property, and two wells will be located on the Stockdale North property.

The above-described Project facilities support the program requirements set forth by USBR. Phase 1 will be operated to meet the following planning objectives:

- Capture, recharge, and store water from the State Water Project (SWP) and Central Valley Project ("CVP") and other available water supplies, for later use during dry periods;
- Provide Rosedale and IRWD customers and banking partners with increased water supply reliability;
- Provide ecosystem benefits through intermittent wetland habitat for migratory birds and other waterfowl along the Pacific Flyway;
- Provide ecosystem benefits by increasing operational flexibility for managing stored water pools throughout the state;
- Provide water supply benefits for agricultural, municipal, and industrial users
- Assist in achieving groundwater sustainability within the Kern Sub-basin
- Improve water management and increase operational flexibility.

Water supplies in California continue to be stressed due to over-pumping of groundwater basins, constraints on the State Water Project and Central Valley Project, increased competition for water supplies, and reoccurring droughts among other factors. The proposed Project is critical for enhancing water storage, creating a reliable water supply for future generations, and meeting landmark California Sustainable Groundwater Management Act ("SGMA") goals. See **Table 1** below for Project and applicant information.

Table 1: Project and Applicant Information

Project Information	
Date	November 30, 2023
Project Name	Phase 1 - Kern Fan Groundwater Storage Project
Applicant Name	Groundwater Banking Joint Powers Authority (GBJPA)
City, County, State	Bakersfield, Kern County, California
Estimated Project timeline	10/3/2022-12/30/2026
Project focused on a Federal facility or	The Project is not focused on a Federal facility and does not involve Federal Land. However, the Project's water can be conveyed to the Friant Kern Canal to satisfy Federal Water demands. A critical piece of the

involve Federal Land	Project is connecting the proposed new wells with pipelines to existing conveyance facilities so that the water can be accessible for both the State and Federal Water Contractors in dry years.

Figure 1. RRBWSD and IRWD Boundaries and Location

1.1.1. Project Location

The Project is located in Kern County, California, approximately 5 miles west of the City of Bakersfield, and within the boundaries of the Rosedale-Rio Bravo Water Storage District. The Project locations are as follows:

1. The West Enos property latitude is {35°22’35.33’’N} and longitude is {119°15’24.90’’W} (approximately 201 acres).
2. The Stockdale North property latitude is {35°21’29.24’’N} and longitude is {119°15’57.02’’W} (approximately 149 acres).

See the technical project description and **Figure 2 below** for a more detailed description of the project sites.

1.1.2. Project Schedule

Milestone/Task/Activity	Planned Start Date	Planned Completion Date
Task 1. Environmental Compliance (CEQA & NEPA)	10/3/2022	11/3/2023
Task 2. Permitting	5/8/2023	12/30/2025
Task 3. Design Phase	6/1/2022	6/30/2025
Task 4. Construction Bid Phase	1/9/2023	1/31/2026
Task 5. Construction Phase	1/31/2024	9/30/2026
5.1 Recharge Basin Construction	1/3/2024	6/30/2025
5.2 Well Drilling	1/2/2025	2/28/2026
5.3 Well Equipping	6/1/2025	12/30/2026

See **Appendix C** for a more detailed Project Schedule.

1.2 Technical Project Description

The project description should describe the work, including any specific activities the work will accomplish. The goals and objectives of the project, and the approach to complete the work, should be included. This section is an opportunity for the applicant to provide a clear description of the technical nature of the project and to address any aspect of the project that reviewers may need additional information to understand.

Describe in detail the project tasks to substantial completion, if applicable. For each task, describe planned activities and expected outcomes and milestones. Information provided should be consistent with the Project Schedule. Describe the staff levels and expertise, the number of staff hours, and the schedule for completing each task.

The proposed Project is located in Kern County, California, approximately 5 miles west of the City of Bakersfield, and within the boundaries of the Rosedale-Rio Bravo Water Storage District. The Project includes the acquisition of 350 acres in Kern County for the construction and operation of recharge basins, recovery wells, conveyance infrastructure, and interconnections with existing conveyance facilities. The properties have been acquired by the GBJPA and include the West Enos property (sometimes referred to as "Bolthouse" in technical studies) and the Stockdale North property (sometimes referred to as "Diamond" in technical studies) to be converted from farmland to groundwater recharge basins. The West Enos property latitude is {35°22'35.33''N} and longitude is {119°15'24.90''W} (approximately 201 acres) and the Stockdale North property latitude is {35°21'29.24''N} and longitude is {119°15'57.02''W} (approximately 149 acres). The GBJPA intends to construct approximately 300 wetted acres of recharge basins on both properties and two (2) recovery wells on each property, for a total of four (4) recovery wells. Both the West Enos and Stockdale North properties are located adjacent to existing Rosedale and IRWD groundwater recharge basins and conveyance facilities, which provide advantages in the development of new water banking and recovery facilities. These facilities are shown in **Figure 2** below and referred to as 'Existing Conjunctive Use Facilities'.

Figure 2. Project Location – West Enos (pink) and Stockdale North (green)

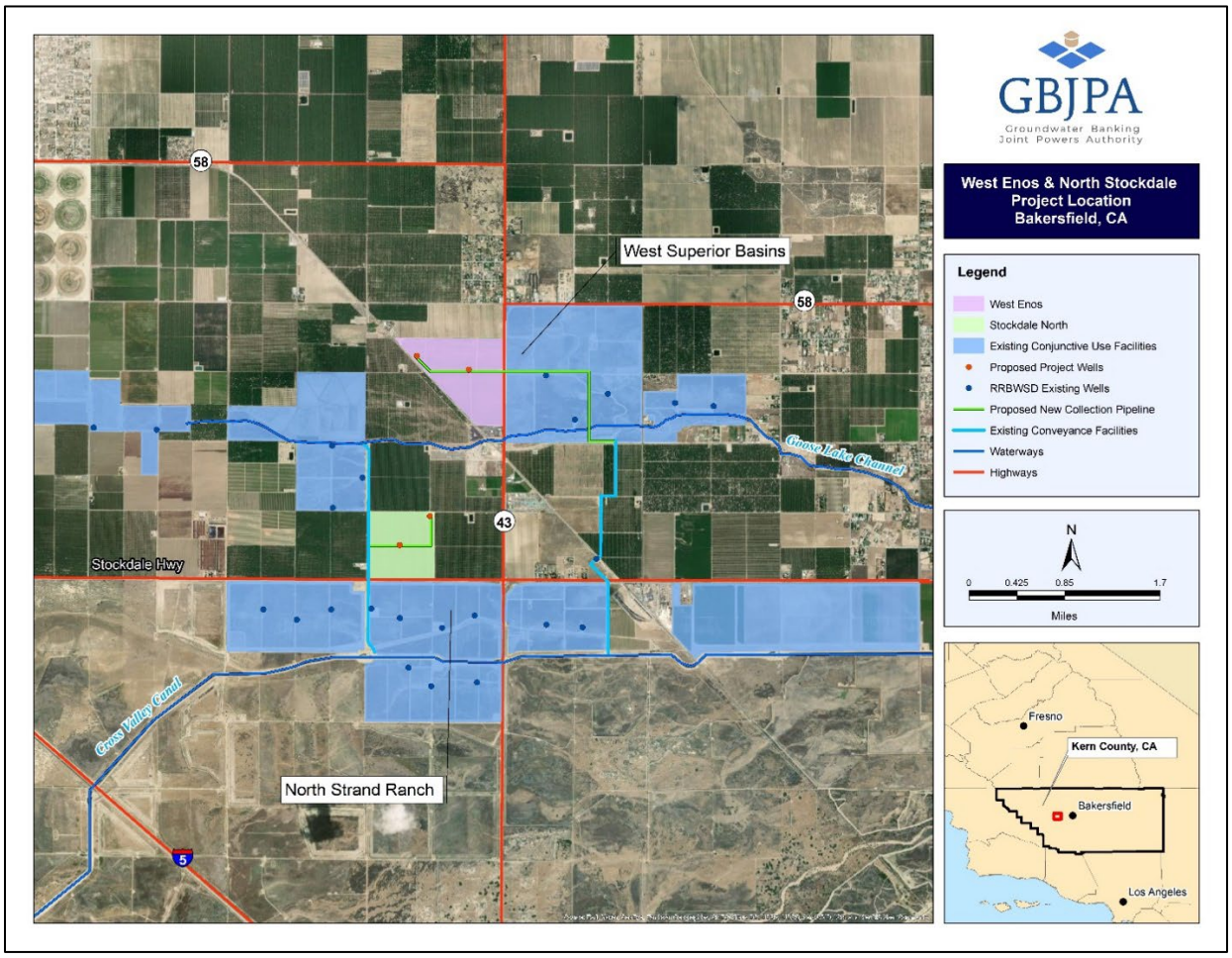


Figure 2 shows the location of the proposed West Enos and Stockdale North recharge basins as well as a preliminary estimate of the locations of the wells and conveyance facilities that will deliver water to and from the Stockdale North and West Enos Phase 1 project site.

Phase 1 is designed to improve the GBJPA's water storage opportunities by increasing groundwater storage by capturing and storing wet year water supplies and recovering groundwater during periods of drought and limited water supply. The project tasks include:

1. Environmental Compliance
2. Permitting
3. Design Phase
4. Construction Bid Phase
5. Construction Phase

Environmental Compliance: As described further in Section 3, the proposed project's impacts were analyzed in the Kern Fan Groundwater Storage Project Environmental Impact Report (EIR). The EIR and a Mitigation Monitoring Reporting Program (MMRP) were certified and adopted by the GBJPA on December 28, 2020. On October 23, 2023, Reclamation determined

the Project was excluded from the National Environmental Policy Act (NEPA) under exclusion category 43 CFR § 46.210(c).

Permitting: The proposed Project would comply with all federal, state, local laws and ordinances applicable to the Project. Anticipated permitting requirements are further described in Section 4. Permitting for the Project may be phased consistent with the project final design of the various components. All required permits for all of the project components are expected to be acquired by December 2025.

Design Phase: Technical memoranda based on a completed Preliminary Design Report have been prepared that evaluated the major design elements of the full Kern Fan Project, including the Phase 1 Project, and provided a basis for design. The technical memoranda include further details relating to the requirements for conveyance pipeline, recharge basins, recovery wells and other appurtenant facilities. The Phase 1 Project recharge, conveyance and recovery facilities will be designed based on the requirements set forth in the technical memoranda. Final design of all facilities is expected to be completed in June 2025.

Construction Bid Phase: Following completion of final design and acquisition of required permits, the Project will be advertised for competitive bidding to qualified contractors. The Construction Bid Phase will be over several years as the project will be constructed in phases. It is anticipated that the final bid phase will be completed by January 2026.

Construction Phase:

Recharge Basins: The first step in the construction phase will be the recharge basins. The GBJPA will construct recharge basins on the recently acquired West Enos property (201 acres) and Stockdale North property (149 acres). Current agricultural practices will be ceased, existing almond trees and other crops will be removed from the properties, and levees will be constructed to build approximately 2-3 separate recharge basins on each property. Precast concrete structures fitted with weir board slots or gates will be used to control flows between individual recharge basins but also to deliver high flows to the Stockdale North and West Enos recharge basins.

Well Drilling and Equipping: The second step will be the drilling and equipping of four (4) production wells, two on each of the project sites. Earthen well pads will be constructed as part of the recharge basin construction, serving as drill islands. Wells will be drilled approximately based on the hydrogeology of the area and local experience. Equipping will be done after the drilling is completed, see **Appendix A** for a layout of the well equipping facilities.

Conveyance Pipelines: The final major step will be the installation of the recovery conveyance pipelines which will deliver recovered groundwater to existing conveyance facilities. It will require jack and boring under state highways, as well as a significant amount of piping to provide connections to existing conveyance facilities. Fortunately, major pipelines and channels have already been constructed by Rosedale with capacity to deliver recovery flows from both the Stockdale North and West Enos properties. These existing facilities run north and south and convey water to and from the Cross Valley Canal which can run to or from the California Aqueduct (state water) and the Friant Kern Canal (federal water).

Additional details of the four project components are described below.

1. Recharge Basins – GBJPA seeks to construct approximately 300 net acres (85% of total acres) of direct recharge basins via the placement of 320,000 cubic yards (CY) of compacted levees that are approximately 2-5 feet in height. Upwards of 14,000 acre-feet per year (AFY) (on average wet year 120 days/year) of recharge water will be conveyed from recharge basin to recharge basin via inter-basin check structures. During wet years, when water supplies are abundant throughout the year, the Project could provide approximately 28,000 acre-feet of storage into the Kern Subbasin. Water would be conveyed to the recharge facilities using the existing Cross Valley Canal and Gooselake Channel conveyance facilities and subsequently diverted through inverted siphons with sluice gates. Approximately 60 cfs (cubic feet per second) of intake capacity would be required to serve the Stockdale North property from the existing North Strand Recharge Project, and 80 cfs of intake capacity to be built off the existing West Superior property. See **Figure 2** for project component locations.

2. Well Drilling – GBJPA seeks to drill four (4) conjunctive use recovery wells. Two wells will be located on the West Enos Property and the Stockdale North property will accommodate the other two wells. At an estimated 5 cfs per well, these wells can recover a total of 20 cfs, which correlates to a maximum of 14,425 acre-feet per year (AFY). The GBJPA has hired a hydrogeologist to perform a groundwater impact analysis using a groundwater model to study any negative effects on current facilities as well as local landowner wells. The GBJPA will use previous logs from nearby wells, historical water levels in the area, zone water quality sampling data, and local knowledge to assist with well design and water quality implications. Wells will be drilled to an approximate depth of 650-850 feet, with perforations from approximately 400-700 feet. The final design is subject to change based on field data collected during the pilot hole drilling, sampling, and the well development process. See **Appendix B** for an example of a similar well design in the area.

3. Well Equipping – The GBJPA uses a standardized design when equipping its wells. Apart from the pump, which is designed specifically for each well, each facility will have variable frequency drives (VFDs), vacuum relief valve, sleeve coupling with joint harness, high-pressure switch, pressure transmitter, sample port, check valve, pressure gauge, flowmeter, butterfly valve, pipe supports, and a combination air vent. Well discharge piping will be 12-inch fusion bonded epoxy lined and coated steel piping. See **Appendix A** for a typical well-equipping design.

4. Water Conveyance Connections – The GBJPA currently has 3 main ways to convey recovered groundwater, all of which run north-south and connect current recovery facilities to the Cross Valley Canal. The water then can be conveyed west to the California Aqueduct to satisfy State Water Project Contractor demands, or east to the Friant Kern Canal to satisfy Federal Water Contractor demands. A critical piece of the project is connecting the new wells with current delivery facilities so that the water can be accessible for both the State and Federal Water Contractors in dry years. The return pipeline from the West Enos recovery facility will run under Enos Lane (Hwy 43) through a newly constructed culver and will run parallel to existing conveyance until it connects to the existing Central Intake Pipeline, running south to the Cross Valley Canal, through approximately 10,000 feet (ft) of 24" PVC pipe. The Stockdale North property will have two recovery wells, both tying back into Rosedale Turnout No. 2 where the water is conveyed south to the Cross Valley Canal, approximately 2,500 ft of 18" PVC pipe, and 1,200 ft. of 24" PVC pipe.

As with most major projects, many project components from each of the listed steps require parallel progression and overlap is necessary to produce an efficient project schedule. It is estimated that the Project, including permitting, will be completed in approximately 39 months. Please see **Appendix C** for a preliminary Project Schedule.

IRWD and Rosedale staff will work with design and construction consultants to implement the Project. A brief description of the key personnel that will be working on the Project is provided below in **Table 2**. An estimate of staff hours and planned completion date for each task is also provided below in **Table 3**.

Table 2: Description of Key Personnel

Key Personnel	Description
GBJPA General Manager/ Rosedale Engineering Manager	Manages the entire GBJPA, the project manager and oversees the budget, design, and construction of each project component.
GBJPA Project Manager/ IRWD Director of Water Resources	Manages the project and facilitates communication between all main parties to secure necessary contracts, permits, agreements etc.
IRWD Engineer	Reviews design and construction plans submitted by design and construction consultants.
IRWD Water Resources Manager	Assists with project administration including environmental review work and grant administration.
Rosedale Engineer – Tech	Assist with design, bidding, procurement of material and projects, and construction management

Table 3: Estimated Staff Hours for Each Project Task

Task	**Planned Completion Date**	**Estimate Number of Staff Hours**
1. Environmental Compliance	**Complete**	**0**

2. Permitting	**12/30/2025**	**75**
3. Design Phase	**6/30/2025**	**200**
4. Construction Bid Phase	**1/31/2026**	**50**
5. Construction Phase	**12/30/2026**	**300**

With limited opportunities in California to develop and construct new above-ground water storage, the Phase 1 Project provides an achievable way to increase water storage opportunities in the State via groundwater banking. The Phase 1 Project facilities will be operated to meet the following goals and objectives:

- Capture, recharge, and store water from the SWP and CVP and other available water supplies for later use during dry periods.
- Provide Rosedale and IRWD customers and other banking and exchange partners with increased water supply reliability and drought resiliency during periods when other supply sources may be reduced or interrupted.
- Provide ecosystem benefits and water supply benefits for agricultural and M&I uses.
- Provide increased operating flexibility for Rosedale's existing and future Conjunctive Use Programs.
- Assist in achieving groundwater sustainability within the Kern County Sub-basin of the San Joaquin Valley Groundwater Basin.

Additional project benefits include:
- Provide enhanced protection against extended drought and climate change;
- Reduce groundwater pumping lifts and resulting energy savings;
- Support third-party banking and transfer partners;
- Provide intermittent wetland habitat for wildlife environmental benefits;
- Provide intermittent upland habitat for wildlife environmental benefits;
- Preservation of permanent crops as result of increased agricultural water supply reliability; and
- Increased operational flexibility and improved water management.

1.3 Evaluation Criteria

E.1.1. Evaluation Criterion 1—Water Supply Reliability (35 points)

E.1.1.1. Sub-criterion No. 1a—Enhanced Water Supplies (20 points)

How much additional storage capacity does the project add to the system (relative to current system capacity)? How many additional acre-feet of water will the project make available, on average, each year upon completion? What percentage of the service area's overall water supply will the project's water provide upon project completion? Use the total average project water production over the anticipated life of the project.

Upon completion of the project, an additional 28,000 AF of additional storage capacity will be available within the aquifer. In a single year, an estimated 14,940 AF can be recharged, and approximately 14,480 AF can be recovered. Based on the existing recharge capacity of approximately 150,000 AF over a 4-month span, the project adds just below 10% of additional recharge capacity to the system. The calculation basis for each of these volumes is provided below.

Recharge Calculation:
The infiltration rate is the depth of the water that is banked in the aquifer per day. The infiltration rates used in this calculation are from a technical memorandum prepared by a professional hydrogeologist in the Kern Fan Project Final Environmental Impact Report (EIR) (see **Appendix O**), estimated at 0.5 ft/day (West Enos recharge basins) and 0.3 ft/day (Stockdale North recharge basins). In California, high-flow state and federal waters are typically available for four months (March-June) during wet years, so this analysis is being done for an average wet year. The wetted area, which is approximately 85% of the total acreage of each property, is also used for the calculation.

West Enos:
0.5 ft/day (infiltration rate) x 174 wetted acres (85% wetted area) x 120 days/year (4 months) = 10,440 AF per year (AFY)

Stockdale North:
0.3 ft/day (infiltration rate) x 125 wetted acres (85% wetted area) x 120 days/year (4 months) = 4,500 AF per year (AFY)

Total Phase 1 recharge = 14,940 AFY

Recovery Calculation:
Based on local knowledge and historical records, a conservative estimate of 5 cubic feet per second (cfs) was used for the flow rate at each recovery well. A conversion factor worth noting for the calculation is that 1 cfs = 1.983 acre-feet/day. Four wells, as stated in the project description will be drilled and equipped. In critical and some dry years these wells run continuously for the entire year.

West Enos:
5 cfs (flow rate) x 1 cfs/1.983 AFD (acre-feet/day) x 365 days/year x 2 wells = 7,240 AF / year

Stockdale North:
5 cfs (flow rate) x 1 cfs/1.983 AFD (acre-feet/day) x 365 days/year x 2 wells

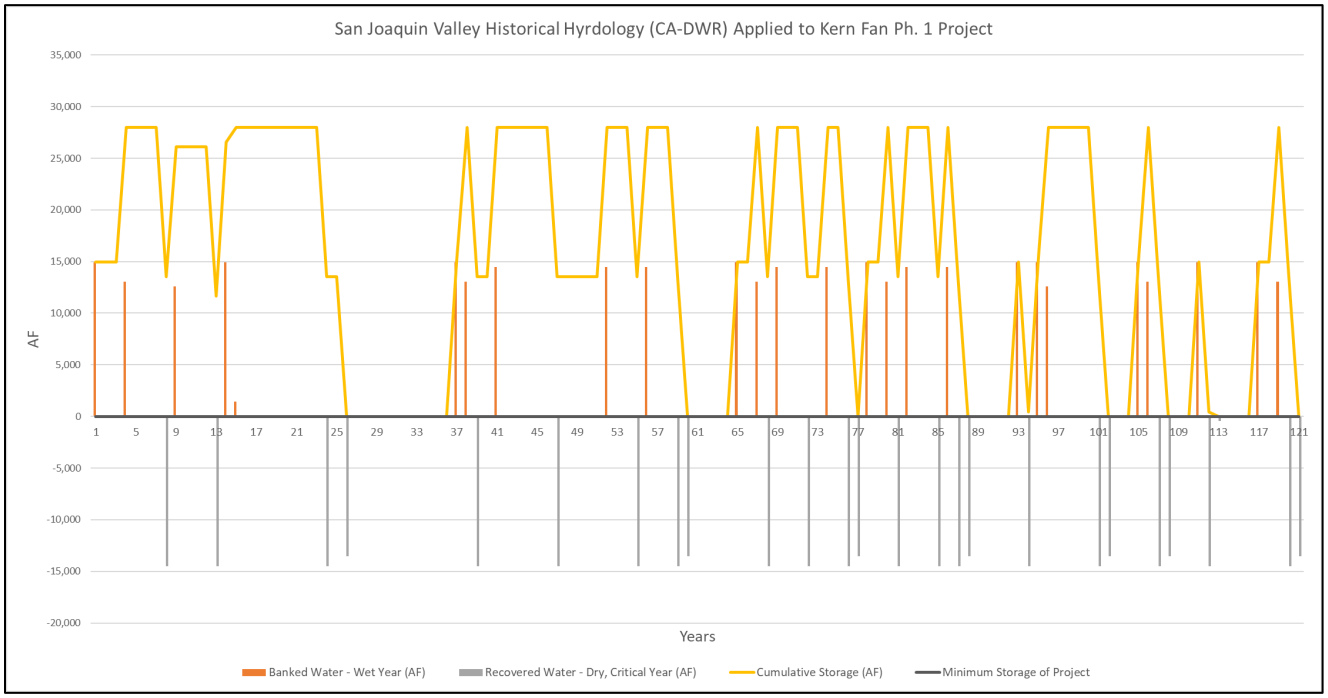
= 7,240 AF / year

Total Phase 1 recovery = 14,480 AFY

The expected recharge and recovery capacities for Phase 1 will allow the Project sponsor to recharge and recover water into and from the aquifer. This water will be stored in the 28,000 AF storage account assigned to Phase 1. Water recharged on Phase 1 will fill the 28,000 AF storage account assigned to Phase 1. Similarly, water recovered from Phase 1, will be withdrawn from the 28,000 AF storage account assigned to Phase 1.

The available recharge and recovery capacities given the 28,000 AF storage limitation were modeled for the 1901-2021 hydrology from DWR's Bulletin 120, for the San Joaquin Valley Watershed water year indices as shown in the graphic below (**Figure 3**). It shows that approximately **2,940 AFY (acre-ft/year)** of average annual water supply benefit (banked/recovered) is realized over the period. Using this model, water was stored for 26 of the 121 years (22% of the time) and likewise water was recovered in critically dry years, 26 of the 121 years (22% of the time). This 2,940 AFY was calculated by analyzing historical hydrology, utilizing recharge capacity in "wet" year and recovery capacity in "critical" and "dry" year.

Figure 3. San Joaquin Valley Historical Hydrology



The GBJPA also uses an alternative method to calculate the annual water supply benefit of the Project. In the Project Feasibility Study modeling results provided by consultants at MBK Engineers performed a hydrologic analysis using the CalSim II baseline Benchmark model with 2035 Central Tendency Climate data, published by Reclamation in March 2022. For purposes of this calculation, the results from MBK's analysis attributed solely to the 100,000 AF storage of the full Kern Fan Project were scaled down proportionally to the 28,000 AF of groundwater

storage provided in Phase 1. The expected average annual water supply for the Phase 1 Project is approximately 2,482 AF per year, which is comparable to the other benefit calculation 2,940 AFY computed in the previous section.

The typical lifespan of wells is approximately 50 years. Motors, pumps, and electrical systems are about 10-20 years, while typical conveyance facilities are estimated to be about 50-100 years. For purposes of the application criteria, the proposed anticipated 'life' of the Project could provide water supply benefits for 50-plus years until facilities would need to be replaced and/or repaired. This timeframe for life cycle analysis was used in the Small Storage Program Feasibility Study.

RRBWSD's average annual water supply (1993-2013) for agricultural use is about 85,000 AFY from various sources (i.e., Kern River, SWP, CVP, banked groundwater, and exchanges). Since RRBWSD is an equal participant in the Project, RRBWSD's annual benefit during a dry year is half of the 14,480 AFY, which is **7,240 AFY**. This number divided by RRBWSD's supply is the percent of the total water supply calculation, during a dry year.

IRWD's average annual potable water supply from the last twenty years (2002 – 2021) is approximately 59,000 AFY. Unlike RRBWSD, a majority of IRWD's demand is domestic/residential users, so only potable supply will be considered for this calculation. Since IRWD is an equal participant in the Project, IRWD's annual benefit during a dry year is half of the 14,480 AFY, which is **7,240 AFY**. This number divided by IRWD's potable water supply is the percent of the total water supply calculation, during a dry year.

RRBWSD Water Supply (dry year) -

Estimated Amount of Project Additional Water Supply	7,240 AFY
Average Annual Water Supply	85,000 AFY
Project Percentage of Total Water Supply	8.5%

IRWD Water Supply (dry year)-

Estimated Amount of Project Additional Water Supply	7,240 AFY
Average Annual Water Supply	58,810 AFY
Project Percentage of Total Water Supply	12.3 %

For the average annual water supply calculation, MBK's modeling results were used. It is estimated that 1,375 AF/year average annual yield is available for Rosedale and 1,108 AF/year average annual yield is available for IRWD. The difference in average annual yields is due to different applicable loss factors for Rosedale and IRWD. Water recharged for IRWD is subject

to an additional 5% loss factor which is applied to water that is ultimately used outside of Kern County.

RRBWSD Water Supply (average) -

Estimated Amount of Project Additional Water Supply	1,375 AFY
Average Annual Water Supply	85,000 AFY
Project Percentage of Total Water Supply	1.6%

IRWD Water Supply (average)-

Estimated Amount of Project Additional Water Supply	1,108 AFY
Average Annual Water Supply	58,810 AFY
Project Percentage of Total Water Supply	1.9 %

Will the project reduce or eliminate the reliance on imported water or other sources of surface water supplies that are less reliable? Explain.

Yes. The proposed Project will reduce the reliance on imported water supplies. The Project will capture, recharge, and store excess water from the SWP, CVP, and other available water supplies during wet years. During dry periods with limited water availability, the Project will be able to recover these previously stored wet-year water supplies for the water users; therefore, reducing the reliance on imported surface water supplies.

Will the project reduce groundwater overdraft and positively contribute to the sustainable yield of a groundwater basin or local aquifer? Explain.

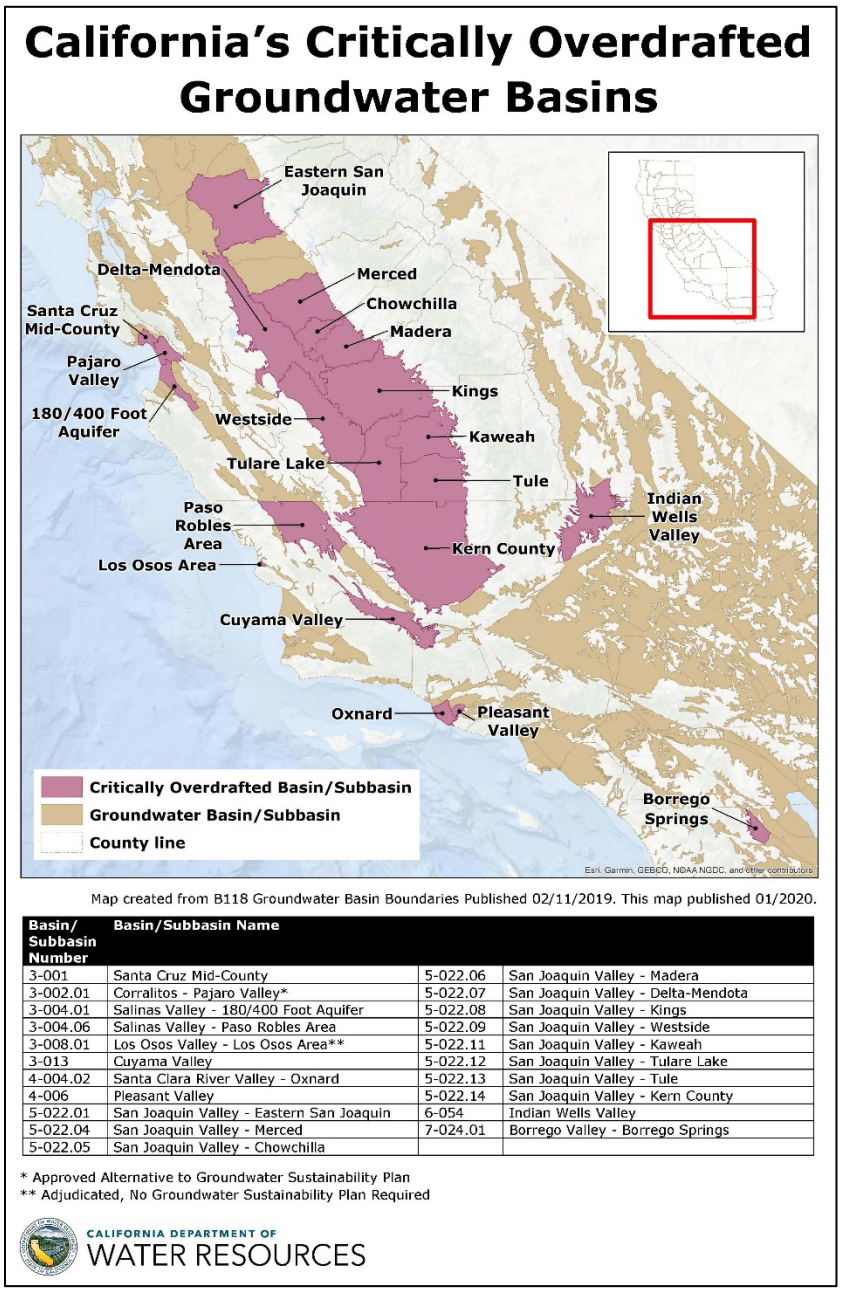
The Project will reduce groundwater overdraft and positively contribute to the sustainable yield of the Kern Sub-basin. The Sustainable Groundwater Management Act (SGMA) requires governments and water agencies of high and medium-priority basins to halt groundwater overdraft and bring groundwater basins into balanced levels of pumping and recharge. The California Department of Water Resources ("DWR") has determined that the Kern Sub-basin, where the proposed Project is located, is a critically over-drafted sub-basin of high and medium priority (DWR, 2022). There is a critical need to develop additional groundwater recharge in the Kern Sub-basin area to improve sustainable water management. See **Figure 4** below.

Phase 1 would contribute to sustainable groundwater storage through the development of the West Enos and Stockdale North recharge basins, approximately 350 acres of recharge basins that would provide approximately 28,000 AF of new groundwater storage. The project will be a net

reduction of overlying water use in Rosedale's service area by converting irrigated land to recharge basins (a compatible agricultural use) to capture excess water supplies.

The full Kern Fan Project will consist of approximately 1,280 acres and has been allocated a maximum storage capacity of 100,000 AF in Rosedale's Conjunctive Use Program. Phase 1 of the Kern Fan Project is the first phase to implement the full Kern Fan Project. To estimate the storage capacity associated with Phase 1, the Project sponsor estimated the maximum storage capacity per acre based on the maximum storage capacity of the full Kern Fan Project and the total acres of land that will be acquired (100,000 AF / 1,280 acres = 78.125 AF/acre). The maximum storage capacity per acre rate was then multiplied by the number of acres of land in Phase 1 to estimate an approximate storage capacity for Phase 1 (78.125 AF/acre x 350 acres = 27,344 AF). Using this approximation as a general basis, the Project sponsor has assigned 28,000 AF of the full Kern Fan Project's 100,000 AF maximum storage capacity to Phase 1. To confirm that there is at least 28,000 AF of storage capacity associated with Phase 1 lands, hydrogeologists at Thomas Harder & Co. prepared a technical memorandum, provided as **Appendix E**, that summarizes an analysis of aquifer storage potential beneath the Phase 1 properties. The aquifer storage capacity of Phase 1 properties was estimated as the volume of groundwater that can be stored in the aquifer directly beneath the sites. The aquifer storage capacity was estimated by multiplying the total aquifer volume beneath the sites by the specific yield of the aquifer sediments. Using this methodology, the estimated storage capacity for the Phase 1 properties is approximately 29,700 AF (Thomas Harder & Co., 2022).

Figure 4. SGMA Critically Overdrafted Basins



Map created from B118 Groundwater Basin Boundaries Published 02/11/2019. This map published 01/2020.

Basin/ Subbasin Number	Basin/Subbasin Name		
3-001	Santa Cruz Mid-County	5-022.06	San Joaquin Valley - Madera
3-002.01	Corralitos - Pajaro Valley*	5-022.07	San Joaquin Valley - Delta-Mendota
3-004.01	Salinas Valley - 180/400 Foot Aquifer	5-022.08	San Joaquin Valley - Kings
3-004.06	Salinas Valley - Paso Robles Area	5-022.09	San Joaquin Valley - Westside
3-008.01	Los Osos Valley - Los Osos Area**	5-022.11	San Joaquin Valley - Kaweah
3-013	Cuyama Valley	5-022.12	San Joaquin Valley - Tulare Lake
4-004.02	Santa Clara River Valley - Oxnard	5-022.13	San Joaquin Valley - Tule
4-006	Pleasant Valley	5-022.14	San Joaquin Valley - Kern County
5-022.01	San Joaquin Valley - Eastern San Joaquin	6-054	Indian Wells Valley
5-022.04	San Joaquin Valley - Merced	7-024.01	Borrego Valley - Borrego Springs
5-022.05	San Joaquin Valley - Chowchilla		

* Approved Alternative to Groundwater Sustainability Plan
** Adjudicated, No Groundwater Sustainability Plan Required

CALIFORNIA DEPARTMENT OF WATER RESOURCES

The Project is not expected to adversely impact the aquifer, overdraft, or cause land subsidence, as the GBJPA intends to replenish groundwater supplies via multiple existing and future aquifer recharge facilities and projects (see **Figure 5** for District facilities and nearby surface water supplies). The West Enos and Stockdale North properties will be converted from intensive agricultural activities to groundwater recharge facilities and will be utilized in conjunction with Rosedale and Irvine's existing 2,200 acres of recharge facilities. As part of SGMA compliance, monitoring wells are measured monthly to ensure that water levels do not exceed established water level minimum thresholds and do not trigger undesirable results.

In addition, the Phase 1 Project will improve water levels in the Kern Sub-basin and provide local groundwater benefits based on a 2003 Memorandum of Understanding (MOU) between Rosedale and other adjacent water banking entities in Kern County. Per the MOU, a portion of banked groundwater, referred to as leave-behind water, is not recovered by the banking entity and remains in ground to bolster local groundwater levels. The Project is a planned supplemental water supply project and is not related to mitigation for basin overdraft.

Will the project alleviate pressure on existing water supplies and/or facilities? If so, please identify the supplies and/or facilities and explain how they will benefit from the project, including quantifications where applicable. Please include a description of the conditions that exist in the area and projections of the future with, and without, the project.

Yes. Due to California's highly variable hydrology, during wet years there are generally surplus surface supplies in the state and federal systems in excess of demands that are oftentimes lost to the ocean due to inadequate storage capacities. Conversely, during dry years, there are insufficient surface supplies to meet demands creating water shortages. Water supply shortages due to drought and the associated impacts of climate change are further exacerbated by increased competition for limited surface and groundwater supplies.

In recent years, water supplies in major reservoirs throughout the state have been at some of the lowest levels and legal and environmental restrictions have reduced the amount of water through the Delta, making dry-year surface supplies increasingly stressed and less reliable to users South of the Delta. Storage capacity south of the Delta, as provided by the proposed Project, is especially valuable as effects of climate change continue to affect reliability of dry-year supplies especially to users south of the Delta. By storing excess wet year water supplies, the Project will alleviate drought-year water supply demands on the SWP and CVP supply systems. A description of each source of water supply and how each water supply will benefit from the Project is included below.

<u>State Water Project (SWP):</u>
DWR delivers water to 29 SWP Contractors, including 21 contractors south of the Delta. The California Aqueduct is a primary part of the SWP and carries water from the Delta to the San Joaquin Valley and Southern California. SWP Contractors can request delivery of water up to their Table A amounts under a given allocation set by DWR based on hydrologic conditions. Rosedale currently receives SWP water for its Conjunctive Use Program through a water supply contract with the Kern County Water Agency ("KCWA"), one of the SWP Contractors. IRWD receives SWP from the Metropolitan Water District of Southern California (MWD) through the Municipal Water District of Orange County ("MWDOC").

IRWD is also a landowner in the Dudley Ridge Water District ("DRWD"), a SWP contractor located in Kings County. Through IRWD's land ownership in DRWD, IRWD is entitled to a portion of DRWD's Table A SWP allocation. IRWD has obtained approvals from DWR, DRWD, KCWA, and MWD to store its SWP water at its Water Bank on a 2-for-1 unbalanced exchange basis. Although the water belongs to IRWD, one half of all SWP supplies that are stored at the Strand Ranch are returned to and used on IRWD's lands in DRWD, per DRWD local rules and regulations.

***Relieving Pressure on SWP Supplies**:*

The State of California's hydrology fluctuates from reoccurring wet and dry year cycles. During wet hydrologic years, DWR may declare Article 21 water available, which is uncontrolled water that exceeds SWP Contractors Table A requests and cannot be stored in State reservoirs. Article 21 supplies are usually available for a short duration and can be diverted and stored in non-SWP facilities for future use. If this water cannot be stored during this short period, it will ultimately be lost to the ocean. Article 21 water that will be captured and stored by the proposed Project can be used in dry years when the SWP supplies are short which will help to reduce demands and pressure on the SWP system.

Additionally, during dry years, Project operations will reduce impacts on threatened environmental resources in the Delta by recovering banked water from the Project and reducing water exports thus alleviating stress in the Delta during critical periods. The Project offers exceptional flexibility to better manage available supplies, which supports improved operations of the state and federal water systems.

Central Valley Project (CVP):
Reclamation delivers CVP supplies to federal contractors in California. The additional water that could be captured and stored by the Phase 1 Project is defined under Section 215 of the Reclamation Reform Act of 1982, as excess irrigation water to be released due to flood control criteria or un-managed, un-storable flood flows from the Delta. As a result of these flood flows occurring in short duration, Section 215 authorizes Reclamation to declare the availability of Section 215 water for CVP south-of-Delta contractors and enter into temporary water service contracts for this surplus water for south-of-Delta contractor use. Other federal water supplies could also be available for the Project.

Rosedale's service area is within the CVP place of use for banking and direct use of CVP water, and Rosedale has historically entered into contracts with Reclamation for Section 215 water. The availability period for Section 215 water delivery depends on hydrologic conditions and water demands. The excess Section 215 water made available to Rosedale is through the Friant-Kern Canal and Rosedale primarily takes delivery through its existing capacity rights and connections to the Cross Valley Canal (CVC) and Kern River conveyances. See **Figure 5** below for the Project's proximity to conveyance facilities. Rosedale currently has a turnout off the Kern River Channel with a capacity of 600 cfs. Rosedale can take delivery of both Friant-Kern and Kern River flows through this turnout. Currently, Rosedale has an obligation of 367 cfs, of its 600 cfs turnout capacity, for various banking partners and programs. The remaining 233 cfs of turnout capacity is available for other programs. Rosedale shares the Kern County Sub-Basin with many federal contract districts. The Project could be used to help fulfill obligations to both state and federal contractors. The Section 215 water and/or other available federal water supplies that could be captured would be stored by the project for the benefit of Rosedale and IRWD through exchanges that ensure the water is used in the CVP Place of Use.

Additionally, excess federal water supplies, such as Recovered Water Account ("RWA") water could be recharged and stored in the Phase 1 Project and then returned to federal contract districts via banking and exchange agreements. RWA water is available to Friant Division long-

term water contractors during wet hydrologic conditions when water is not required to meet other Federal obligations. The RWA water is available to long-term Friant Division contractors who experience a reduction in water deliveries due to requirements outlined in the San Joaquin River Settlement. See **Appendix F** for a list of historical banking and recovery exchanges/contracts within RRBWSD.

Project Benefits to CVP and SWP Systems:

Due to the variable nature of California's hydrology, there are often wet-year surplus flows in the SWP and CVP systems that could be diverted to storage. Currently, there is insufficient storage capacity and conveyance infrastructure to capture and store this water, which is then lost to the ocean. The proposed Project can help to improve water supply reliability and operational flexibility of the SWP and CVP systems. By integrating the SWP and CVP supplies with groundwater storage in the proposed Project, water supplies that would have been lost to the ocean can be made available for use in dry years. This integration will help to relieve stress of increased competition for imported water supplies from these systems during dry years. The Project will also provide opportunities to fulfill Reclamation's obligations by storing excess federal water supplies for increased reliability for Friant Division Contractors during dry years.

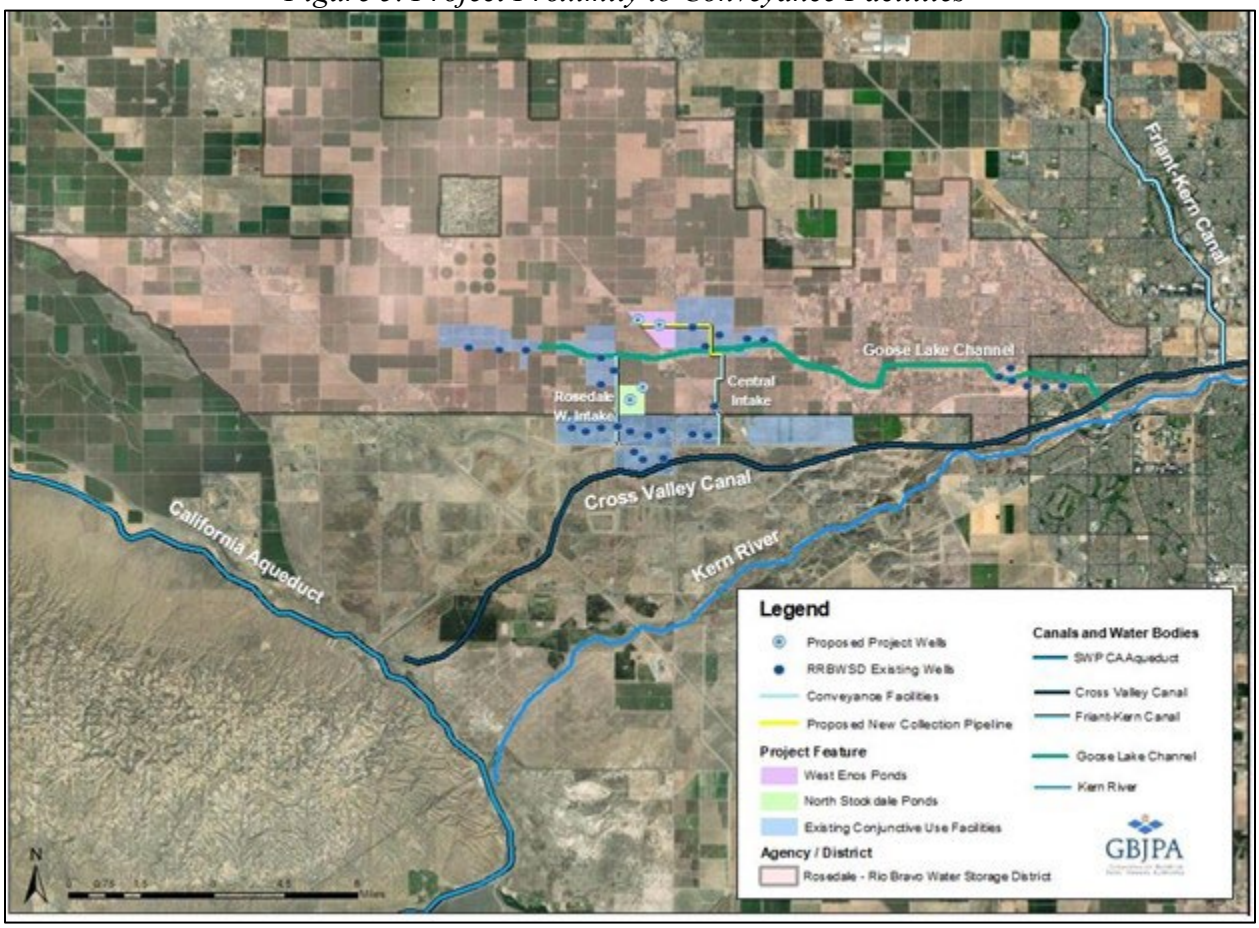
The GBJPA utilized modeling results provided by consultants at MBK Engineers to estimate the anticipated water supply that could be available for the Project. MBK Engineers performed a hydrologic analysis using the CalSim II baseline Benchmark model with 2035 Central Tendency Climate data, published by Reclamation in March 2022. The analysis looked at the availability of Article 21 and Section 215 water supplies that could be delivered to the full Kern Fan Project. The Phase 1 Project can operate as a stand-alone project. Therefore, the water supply yield results from MBK's analysis were scaled down proportionally from the full Kern Fan Project storage of 100,000 AF to the Phase 1 storage of 28,000 AF of groundwater storage (MBK, 2022). Projected water supplies from the SWP and CVP systems are quantified on an average annual basis for the Phase 1 Project presented in **Table 4** below.

While only Article 21 and Section 215 water supplies were used in the analysis, other SWP and Federal surplus water supplies could be delivered to the Project. MBK's analysis is included in **Appendix G**.

Table 4: Projected Water Supply for Phase 1

Water Supply Type	*Amount (AF per year)*
Article 21 (SWP)	1,737
Section 215 (CVP)	745
Total	**2,482**

Figure 5. Project Proximity to Conveyance Facilities



What performance measures will be used to quantify actual benefits upon completion of the project?

Performance measurements will be a key instrument for quantifying the water benefits of this Project. After Project completion, pertinent data will be included in the annual operations report with a monthly summary of recovery flow rates, the total volume of recharged water, and a summary of return obligations to state and federal contractors. The data will also include the calculated estimate of recharge water that would stay within the basin and comprises the

increased groundwater levels benefit from the Project. The data will be compared with the projected annual water recovered and recharged as calculated in this grant application.

For the intermittent wetland benefit, it is expected that performance measures would be included in an agreement for public benefits that is currently in development with the California Department of Fish and Wildlife. This agreement is expected to be required as a condition of state funding for the overall Kern Fan Project, although Phase 1 of the project is a standalone project that does not require state funding.

E.1.1.2. Subcriterion No.1b—Contributions to Water Supply Sustainability (15 points)

Explain the role of the project in addressing any of the below concerns and the extent to which the project will address them. Consider the number of acre-feet of water that the project will make available and the severity of the concerns addressed. Specific concerns may include, but are not limited to:

a) Water Supply Shortages

Water supplies in California continue to be stressed due to the over-pumping of groundwater basins, implementation of SGMA, increased competition for water supplies, shortages from the Colorado River, population growth, supply limitations from environmental constraints in the Delta, climate change, and recurrent droughts among other factors. Under such conditions, the GBJPA, along with countless other water agencies, are pursuing projects and/or programs that will address these challenges and allow for the acquisition and storage of water supplies. By capturing water during wet years when excess supplies are available, Rosedale and IRWD will be able to utilize the stored water during dry years when water supplies are extremely limited. Water supplies from the Project can also be utilized during other water supply shortages such as a Delta levee failure event. The Project is anticipated to provide approximately **28,000 AF** of additional groundwater storage and **14,480 AF** of annal water supply. (see section E.1.1.1. and **Appendix E** for further Project storage analysis).

b) Water Supply Reliability

Groundwater banking projects help to coordinate the management of surface water and groundwater resources to maximize the availability and reliability of water supplies. Additional groundwater storage and banked water supplies provided by the proposed Project are crucial for Rosedale and IRWD to meet future dry year demands and maintain long-term water supply reliability. As previously described under Section E.1.1.1, the Project is anticipated to make an additional **14,480 AFY** of water supplies available for the GBJPA and its beneficiaries that can be utilized during dry years. This dry year supply would provide Rosedale and IRWD customers with increased water supply reliability.

c) Groundwater Depletion

See **Appendix H** for groundwater level reports in Rosedale. After years of chronic regional over-pumping of groundwater supplies and the implementation of the landmark Sustainable Groundwater Management Act (SGMA), groundwater is no longer a reliable source of water supply without sufficient replenishment. SGMA requires governments and water agencies of high and medium-priority basins to halt overdraft and bring groundwater basins into balanced levels of pumping and recharge. DWR has determined the Kern County Subbasin, where the proposed Project is located, is a critically over-drafted subbasin of high priority (see **Figure 4**).

The additional water stored in Kern County as a result of the proposed Project will help to improve water levels in the Kern Sub-basin and support groundwater sustainability. The groundwater basin in Kern County is operated such that a portion of Rosedale's and IRWD's banked groundwater is not recovered by the banking entity and remains in the ground to bolster local groundwater levels. It is estimated that on average, nearly **200 AF per year** of additional water will accrue for the benefit of the groundwater basin as result of the Project. The improved groundwater level benefit in Kern County as a result of the Project's leave-behind water will help the Kern County Sub-basin comply with SGMA goals. Pursuant to SGMA compliance requirements, monitoring wells are measured monthly to ensure that water levels do not exceed established water level minimum thresholds to avoid undesirable results under SGMA.

d) Water Quality Issues

Water quality impacted by the Project has been analyzed in the Kern Fan Project Final Environmental Impact Report (EIR). The water quality of all the existing Rosedale recovery wells meets the DWR's Water Quality Policy for Acceptance of Non-Project Water into the SWP, except for a few naturally occurring constituents in a few wells. Impacts on water quality due to the Project were determined as less than significant with mitigation. It is the GBJPA's responsibility to ensure that all water quality is sufficient to meet applicable water quality requirements. Based on preliminary sampling results, the underlying groundwater is mostly within drinking water standards, and the only constituents that were found to be above the drinking water Maximum Contaminant Levels ("MCLs") were gross alpha, 1,2,3-TCP, and arsenic, which are known regional issues. Gross alpha concentrations detected were not substantially above the MCL and the underlying groundwater quality would likely benefit from the high-quality surface water used for recharging. The Project recharge water would not have elevated concentrations of arsenic and its addition would be expected to reduce the concentrations of arsenic in the deeper portions of the aquifer. Therefore, the addition of recharge water would have a beneficial impact on groundwater quality. Less is known about the extent of 1,2,3-TCP in the regional aquifer. With the recent adoption in 2017 of an MCL for 1,2,3- TCP, banking projects and water purveyors continue to learn the extent and mitigation techniques to best manage the contaminant. As stated above, water extracted for the proposed Project will meet applicable requirements for water quality. The proposed recharge water supply would not have elevated concentrations of 1,2,3-TCP (Kern Fan Project EIR, 2020). For more information regarding water quality and mitigation, please see **Appendix O** to access the Kern Fan Project EIR.

Additionally, before acquiring both the West Enos and Stockdale North properties, the GBJPA consulted with hydrogeologists at Thomas Harder & Co. to conduct a Recharge and Recovery

Suitability Report for both properties (See **Appendix I**). The analysis consisted of reviewing background documents, data, and reports associated with the parcels and the surrounding areas to evaluate whether managed recharge at the West Enos and Stockdale North properties were feasible and whether the Project would pose a risk to groundwater quality resulting from the proposed recharge activities (Thomas Harder & Co., 2021). A summary of findings from the reports is as follows:

- The proposed Project sites have historically been used for irrigated agriculture.
- Constituents of expected concern in the groundwater beneath the proposed Project sites include TDS, chloride, nitrate, arsenic, and pesticides (1,2,3-TCP and EDB/DBCP).
- Naturally occurring arsenic has been detected in groundwater samples from nearby wells at concentrations that exceed the MCL. This constituent can be avoided in future project wells through site-specific testing and designing the wells to avoid the aquifer zones that contain high arsenic concentrations.
- 1,2,3-TCP is a pesticide that has been detected in groundwater from wells throughout the Kern Fan area. Concentrations in the discharge of project recovery wells may be addressed through blending and may be reduced over time with the recharge of water that does not contain detectable 1,2,3-TCP.

e) Natural disasters that may impact water supply infrastructure

The natural disasters that most commonly affect the area of this project would be drought, flooding, and earthquakes. Specifically at risk is the Sacramento-San Joaquin Delta which contains vulnerable levees which could collapse in the event of a major earthquake and cause saltwater from the ocean to contaminate the freshwater in the Delta. This event could impact the availability of a critical source of water supply for up to 26 million people South of the Delta for up to two to three years. The Project will provide groundwater storage and banked water supplies south of the Delta which can be made available in the event of such a catastrophic natural disaster in the Delta.

The Project positively impacts the water supply in years of drought and flooding, by capturing extra flood water and adding supply in dry years. The operational flexibility that the Project provides by delivering water to either State (California Aqueduct) or Federal (Friant-Kern Canal) facilities can be used advantageously if an emergency happens to either facility via natural disaster. A 2016 IRWD Water Supply Reliability Evaluation, using a comprehensive distribution system simulation model, cited IRWD's water banking capabilities as essential to eliminating potable water shortages during simulated earthquake induced California Delta Levee failures.

f) Heightened Competition for Water Supplies

The Phase 1 Project will provide sustainable water management and offer noteworthy, measurable benefits. By storing excess water supplies when available, the Project will provide increased water supply reliability when water supplies are short, which will alleviate the stress of increased competition for water supplies from the state and federal systems.

g) Availability of Alternative Supplies

Due to the nature of California's hydrology, during wet seasons there are often surplus flows in the SWP and CVP systems that may be diverted to storage. Currently, there is insufficient storage capacity and conveyance infrastructure to capture and store this water, which is then lost to the ocean. The Phase 1 Project can help to improve water supply availability and operational flexibility of the SWP and CVP systems during these high flow periods by capturing this surplus water and storing it in the ground for later use. As noted, dry year water supplies can be extremely inadequate to meet demands, so recovered water from the Project provides an alternative dry year supply to users across the basin and state.

h) Increasing Cost of Water Supplies

Increases in the cost of water supplies will be addressed by the proposed Project. Rosedale and IRWD customers are supportive of the Phase 1 Project as it will provide a cost-effective and reliable supplemental source of water. Since the Project will bank water during wet years when there is excess supply, these water supplies will be low-cost compared to purchasing water supplies in dry years when supplies are limited and are extremely high cost. During periods of drought, many farmers are forced to fallow their lands, which includes loss of permanent crops, due to the inability to purchase costly water supplies (up to $2,000/AF). The Phase 1 Project will provide agricultural customers with an affordable water supply during periods of drought. See attached **Appendix J** for Stakeholder Support Letters.

EO 14008, focuses on increasing resilience to climate change and supporting climate resilient development. EO 14008 also emphasizes the need to prioritize and take robust actions to reduce climate pollution; increase resilience to the impacts of climate change; protect public health; and conserve our lands, waters, oceans, and biodiversity.

a) Will the project address climate change in the service area? Explain.

California's climate has been trending toward one that cycles between periods of large amounts of precipitation and times of drought. The California Department of Water Resources estimates a 10% reduction in water supply by 2040 in a planning scenario that considers increased temperatures and decreased runoff. *California's Water Supply Strategy – Adapting to a Hotter, Drier Future (Aug 2022)* identifies the need to expand average annual groundwater recharge by at least 500,000 AF, and specifically includes the overall Kern Fan Groundwater Storage Project, which the Project is a phase of, as a key component in meeting California's expanded water storage objective and helping address climate change, and at the same time address local GBJPA climate change adaptation. While there are still uncertainties associated with the future impacts of climate change on California's weather cycles, it is expected that changes to weather cycles will result in more rainfall and less snow in the mountains, earlier snowmelt, more intense rain events, and increasingly frequent droughts. These climate conditions will cause more intense periods of available excess supplies and longer periods of supply shortages. The Project will provide increased water supply reliability benefits for multiple stakeholders that are crucial in mitigating the effects of climate change. Groundwater storage provided by the Project will allow for these excess supplies to be captured and utilized when needed, increasing resilience to climate change and satisfying the demands within the Project's service area. Additional Project

benefits include intermittent wetland habitat that will be created for waterfowl and migratory birds along the Pacific Flyway, improved groundwater levels in the Kern County Sub-Basin, and preservation of permanent agriculture crops.

b) Will water made available by this project be resilient to the impacts of climate change? Particularly in consideration of alternative water supply options that exist in the service area, to what extent does the project represent a resilient alternative? Explain.

The Phase 1 Project will provide sustainable water management and offer noteworthy, measurable benefits. By storing excess water supplies when available, the Project will provide increased water supply reliability which will alleviate the stress of increased competition for water supplies from the Delta and climate change impacts. Environmental uncertainties relevant to the benefits provided by the Project include climate change, variation in snowpack, and periods of multi-year drought because the project benefits depend upon water supplies available for recharge and storage in the Project. The operations of the Project as a whole were modeled by MBK Engineers to demonstrate the ability to maintain benefits under a range of hydrologic conditions and climate change conditions (**Appendix G**). Climate change in California is expected to result in warmer winters with increased rainfall and less snowpack. Currently, much of California's water supply is stored within the snowpack and is slowly released into existing surface storage reservoirs over the springtime. As this shifts to increased rainfall, the wet periods with excess supplies will be more frequent and intense, and new groundwater storage will be needed to manage this change. The Kern Fan Project Phase 1 will help address this change, and store water that would otherwise be lost to ocean, for the expected more frequent and extended dry periods. As a result of storing water that would otherwise be lost, the Project will create a new, climate resilient water supply.

As further described in the Project Feasibility Study, the GBJPA developed alternatives that address defined resource challenges and achieve Reclamation requirements. The GBJPA analyzed an Existing Water Bank Alternative that would involve participation in the Willow Springs Water Bank ("WSWB"). WSWB is an existing facility located in the Antelope Valley in Southern California capable of storing 500,000 acre-feet of water underground. As part of this alternative plan, Rosedale and IRWD would pay WSWB to buy into the developed capacities (if available) of the WSWB to store up to 28,000 AF of water. The water stored by Rosedale and IRWD could consist of a mix of unallocated Article 21 and other SWP water. No Kern River water or federal water supplies would be able to be captured by the WSWB alternative since there is no federal conveyance to WSWB. Since the water would be stored in an existing water banking facility, only a portion of the benefits identified as part of the Project would be realized. Unlike the proposed Project, participation in the WSWB would not generate any new intermittent wetland benefits, agricultural benefits resulting from crop substitution, or improved groundwater level benefits in the Kern Fan area of Kern County. Therefore, the proposed Project represents a more resilient alternative to Climate Change than the WSWB alternative. Additionally, the alternative does not fully meet all of the Small Storage Program priorities such as projects with multiple stakeholders and projects that provide multiple benefits including ecosystem benefits and groundwater enhancements.

c) Does the project contribute to climate change resiliency in other ways not described above? Explain.

The Project will include sustainable infrastructure to improve community climate resilience. The Project will utilize high-efficiency electric motors and variable frequency drives (VFDs) to best match supply and demand and not waste energy via manually back-pressuring the system. Additionally, the Project would contribute to climate change resiliency benefits through the creation of intermittent wetland habitats for migratory birds along the Pacific Flyway, improved groundwater levels in the Kern County Sub-Basin, and preservation of permanent agriculture crops. The construction of recharge basins will promote healthy lands and soils, as well as protect water supplies and their associated users. Included in **Appendix K** is a visual representation of the multiple ecosystem benefits provided by groundwater recharge basins.

The severity of actual or potential drought impacts that the project will address is an important consideration in assessing its contribution to water supply resiliency. Describe recent, existing, or potential drought conditions in the project area, including the severity of actual or potential drought impacts that the project will address.

California regularly experiences water supply shortages due to reoccurring drought, aggravated by the effects of climate change and increased competition for limited surface and groundwater resources. Prior to the exceptional wet winter of 2023, when California experienced 7 atmospheric rivers, the state had been grappling with a multi-year drought. During that time, snowpack and rainfall levels fell significantly below normal, leading to challenges such as:

- State Water Project allocations reduced to only five percent of requested supplies.
- Major reservoirs across the state operating at critically low levels.
- Legal and environmental restrictions impeding the State Water Project's ability to transport water through the Delta, particularly impacting users south of the Delta, such as RRBWSD and IRWD.

The dramatic shift from extreme dry conditions to extreme wet conditions exemplifies the profound impact of climate change on California's hydrological system. To provide a clear contrast, **Figure 6** displays the U.S. Drought Monitor's assessment from October 2022, indicating severe to exceptional drought conditions, while **Figure 7**, from October 2023, shows a complete absence of drought conditions.

Given these extreme weather fluctuations and the uncertain outlook for water year 2024, it is of paramount importance to seize opportunities for water storage when they arise. The proposed project aims to proactively address potential drought conditions by capturing excess water during wet years and storing it for use during periods of drought. This strategic water management approach will significantly enhance the region's water supply resiliency and help mitigate the impacts of future droughts and climate change.

Figure 6. California Drought Monitor as of October 2022

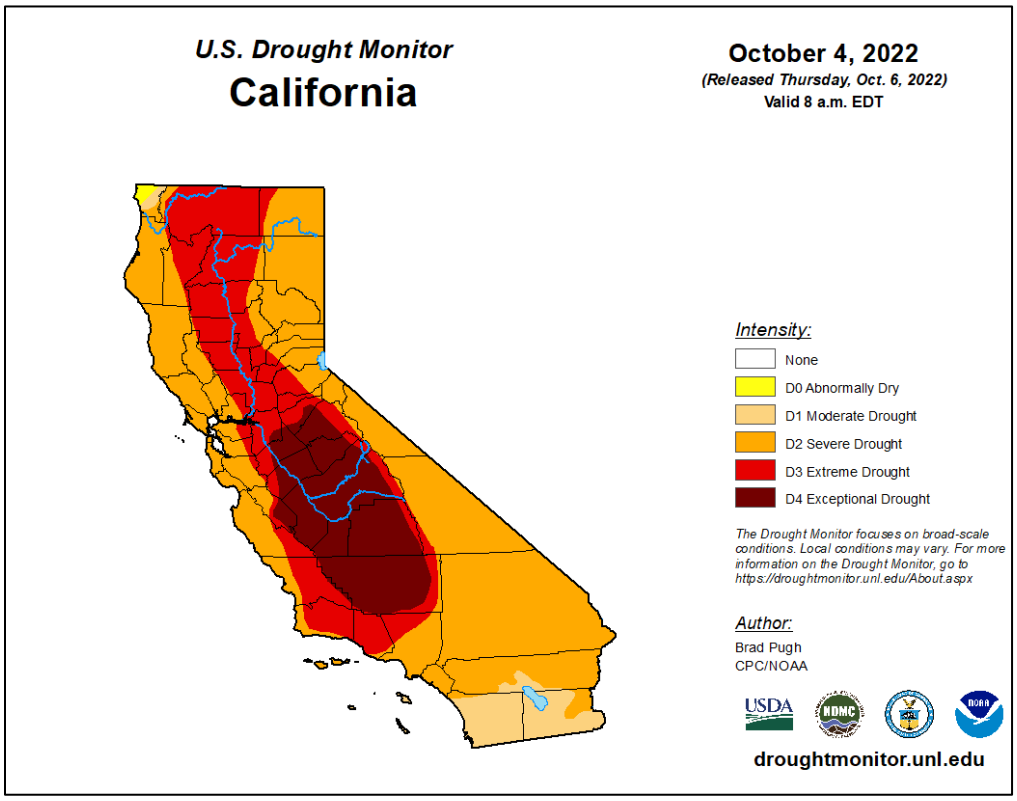
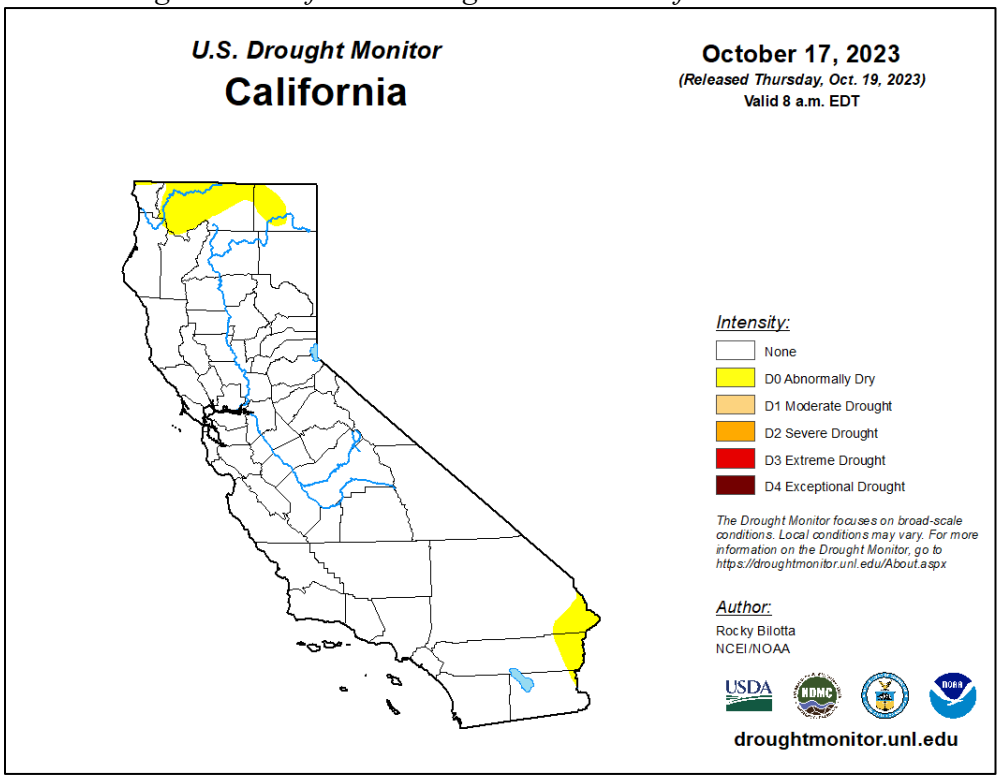


Figure 7. California Drought Monitor as of October 2023



a) Will the project help create additional flexibility to address drought? Will water made available by this project continue to be available during periods of drought? To what extent is the water made available by this project more drought resistant than alternative water supply options? Explain.

Phase 1 will help create additional flexibility to address drought. In response to the decreased reliability of water supplies due to reoccurring drought, the GBJPA is pursuing the proposed Project to capture and recharge water into groundwater storage when water supplies are available during wet year cycles. This stored water may then be extracted during dry years when needed to provide environmental, agricultural, and water supply benefits. Additional groundwater storage is needed because groundwater storage projects allow the coordinated management of surface water and groundwater resources to maximize the availability and reliability of water supplies.

As previously described in this application and further detailed in the Project Feasibility Study, the GBJPA analyzed a No Project Alternative and an Existing Water Bank Alternative that would involve participation in the Willow Springs Water Bank. Since the water would be stored in an existing water banking facility, only a portion of the benefits identified as part of the Project would be realized. Unlike the proposed Project, participation in the WSWB would not generate any new intermittent wetland benefits, agricultural benefits resulting from crop substitution, or improved groundwater level benefits in the Kern Fan area of Kern County. Therefore, the proposed Project would represent a more resilient alternative to Climate Change.

b) Has the area served by the project been identified by the United States Drought Monitor as experiencing extreme or exceptional drought for at least one consecutive year in the last four years? Explain.

Yes. The area served by the Project has experienced both extreme and exceptional drought conditions for at least one consecutive year in the last four years (from December 2020-December 2021). Please see **Appendix L** for the last four years of Kern County drought data (calculated via cumulative percent area) taken from the U.S. Drought Monitor website, as well as a fact sheet describing the calculation of the Drought Severity and Coverage Index. According to the data provided in **Appendix L**, from December 15, 2020, to December 28, 2021, Kern County experienced levels of both severe (D3) and exceptional (D4) drought conditions. See also **Figure 7** above for the most current drought conditions in the area. You may also use the following link for more information regarding drought conditions in Kern County via the United States Drought Monitor website: https://droughtmonitor.unl.edu/DmData/DataTables.aspx?county,06029.

c) Has the area served by the project been designated as a drought disaster area by the State in the last four years? Explain.

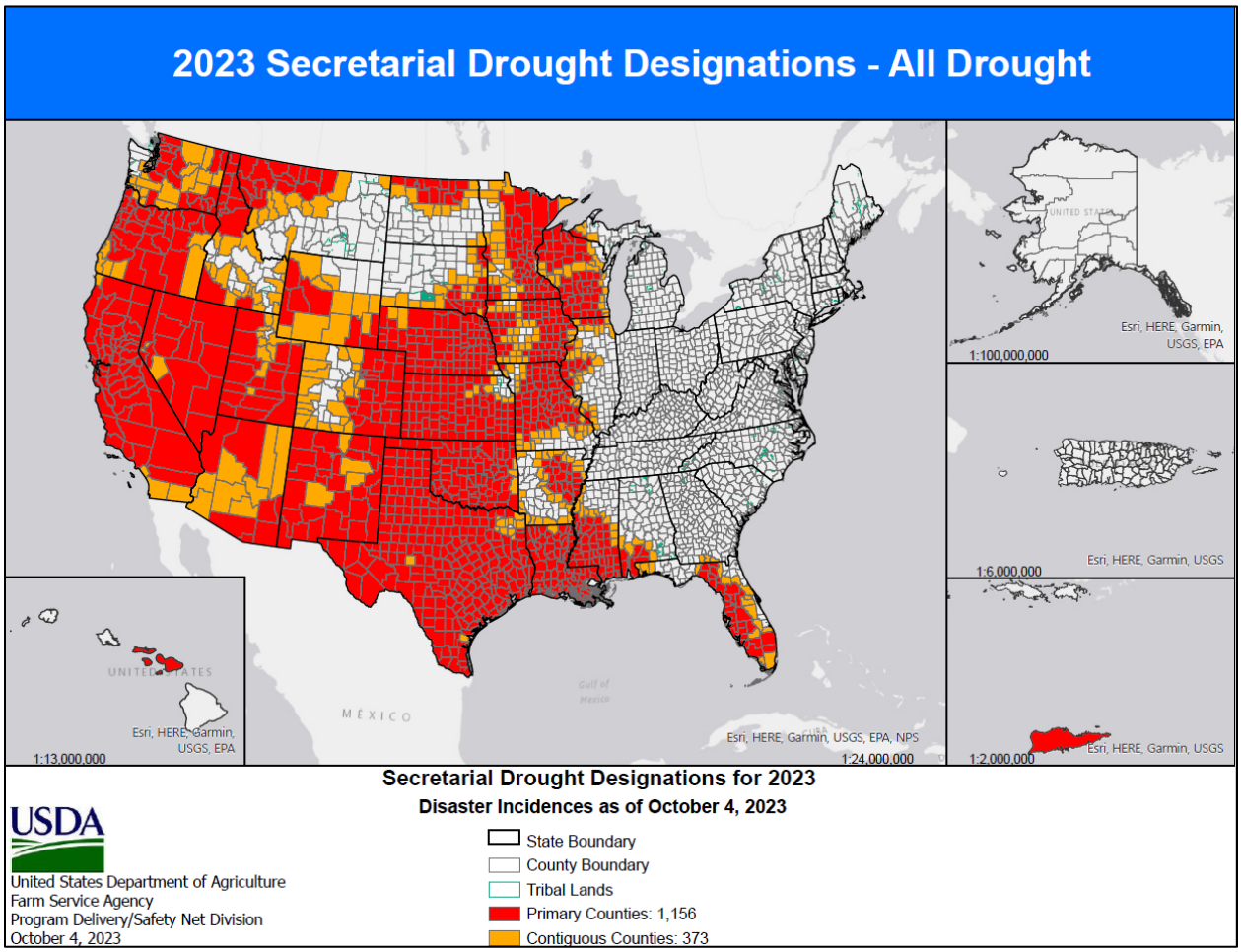
Yes. In the years leading up to the winter of 2023, California experienced an unprecedented drought, with the previous three years being the driest on record. In response to the escalating drought conditions, California Governor Gavin Newsom declared states of emergency in April, May, July, and October of 2021. He also issued Executive Order N-7-22 to enhance regional conservation efforts and protect against drought impacts. It is worth noting that these emergency

measures extended across the entire state of California, including the areas served by the Project. A copy of Newsom's Proclamation and Executive order can be found using the following links:

- Proclamation of a State of Emergency: https://www.gov.ca.gov/wp-content/uploads/2021/10/10.19.21-Drought-SOE-1.pdf
- Executive Order N-7-22: https://www.gov.ca.gov/wp-content/uploads/2022/03/March-2022-Drought-EO.pdf

Within IRWD's service area, consistent with the Governor's Executive Order, IRWD implemented Level 2 of its Water Shortage Contingency Plan and continued to implement actions to reduce potable water demands during the drought. Moreover, Kern County, one of the areas served by the project, was designated as a Secretarial Drought Designated area by the United States Department of Agriculture (USDA). This designation allowed for emergency loans (EM loans) to be made available to producers facing losses in Kern County and contiguous counties. Kern County's inclusion in the Secretarial Disaster Designation Process was due to severe drought conditions. The fast-track process automatically designates an area when it reaches a certain level of drought intensity, as reported by the U.S. Drought Monitor. **Figure 8** depicts the Secretarial Drought Designations for 2023, with Kern County listed as a primary county. **Appendix M** provides information on the Secretarial Drought Designation maps for the last four years, where Kern County was consistently designated either as a primary or contiguous county. Additionally, the USDA's Disaster Assistance fact sheet in **Appendix M** offers more details about the disaster designation and declaration processes.

Figure 8. 2023 Secretarial Drought Designations



E.1.2. Evaluation Criterion 2—Water Management Flexibility (16 points)

E.1.2.1. Subcriterion No. 2a—Operational Flexibility (10 points)

Will the project help create additional operational flexibility to improve the management of water supplies? If so, how?

Yes, the project will create additional operational flexibility to improve the management of water supplies on a fundamental level, by storing excess water in wet years and calling upon those supplies during droughts. This project will also increase operational flexibility by allowing the GBJPA to meet return obligations and potentially form more exchanges and partnerships throughout the state, with both SWP and Federal supplies and obligations. See **Appendix F** for a historic log of exchanges/contracts that Rosedale has participated in. The project will also create operational flexibility throughout local and State entities by providing a dry year water supply, a beneficial tool for better water management during prolonged drought.

The Project is intended to be integrated with Rosedale's Conjunctive Use Program. The proposed Project will provide flexibility for the GBJPA to integrate the operation of the project recovery facilities within the project area with other recovery facilities in Rosedale's Conjunctive Use Program, including other existing Rosedale facilities, the Strand Ranch and Stockdale Projects' onsite and offsite facilities. As part of this project, to optimize the operational flexibility of groundwater and facility management, Rosedale could recover groundwater on behalf of itself and/or IRWD, at any facility available to Rosedale within its Conjunctive Use Program (Final EIR, 2021). Overall, the Project offers exceptional flexibility to better manage available supplies, utilizing the groundwater basin as storage and existing infrastructure for the conveyance of water, all of which supports improved operations of the state and federal water systems.

Will the project protect or improve the quality of surface water or groundwater? If so, explain how the project will accomplish this and the extent to which the project will do this.

In general, when groundwater levels stay high, lower arsenic levels are present in the groundwater. Testing will be done at the pilot well hole sites for certain constituents of concern and at the direction of a hydrogeologist to minimize water quality impacts. An extremely strenuous water quality testing procedure is also completed while recovering water back to the Cross Valley Canal and will be required of the four additional wells in this project. The recharge of high-quality water into the aquifer is also expected to improve groundwater quality in the vicinity of the recharge basins. See section E.1.1.2 (d) for more information regarding water quality in the Project area.

Will steps be taken to minimize the environmental impacts of source water acquisition (intakes or groundwater pumping) as part of the project? If so, explain.

Yes. Phase 1 of the Kern Fan Project is uniquely geographically located to take advantage of innovative water management actions that minimize the environmental impacts of source water acquisitions/diversions. Operational exchanges of source water types (i.e., surface water exchanges) limit the quantity of water needed to be diverted through canals or open stream systems, taking advantage of the infrastructure already in place. Operational exchanges of source water types for groundwater (i.e., surface water supplies for previous banked groundwater supplies) allow for groundwater that has been previously recharged within the aquifer to remain within the aquifer. These surface water supplies can subsequently be diverted and/or utilized to lessen the environmental impacts at the source water point of diversion. In addition, all diversions to the Project for groundwater recharge will create temporary wetland habitats for migratory birds within the Project vicinity.

Will the project provide water or habitat for non-listed species? If so, how?

Yes, as previously stated recharge basins act as a great source of habitat for a large variety of species due to the variable management of said recharge basins. During recharge years with water supply availability, ducks, herons, shorebirds, and various other non-listed species can nest and roost at the Project site. During dry years, the recharge basins with native grasses and weeds act as a great source of upland habitat for quail, dove, and various other birds, mammals, and reptiles. On the back end, providing additional surface water supplies will in part be directed to providing water and habitat for non-listed species during threatening droughts.

E.1.2.2. Subcriterion No. 2b—Legal and Contractual Water Supply Obligations (6 Points)

Does the project help fulfill any of Reclamation's legal or contractual obligations such as providing water for Tribes, water right settlements, river restoration, minimum flows, legal court orders, or other obligations? Explain.

Yes. The Project will provide Rosedale and IRWD, both public water districts, with a more reliable water supply that can be utilized during drought or other periods of supply interruption. The project could provide opportunities to fulfill Reclamation's obligations by storing excess federal water supplies for increased Federal water supply reliability in dry years.

Will the project provide water or habitat for Federally listed threatened or endangered species? If so, how?

Yes. The Project will provide intermittent wetland benefits for migratory birds along the Pacific Flyway and other waterfowl in Kern County. The Project area will also support suitable foraging and hunting habitat for several raptor species, reptiles, and mammals that are typical to the western Mojave Desert region. Several Federally listed threatened or endangered species that could be supported by such habitat include the San Joaquin kit fox, Tipton kangaroo rat, Nelson's antelope squirrel and the American badger. These three species have a medium or high potential to occur on Project site based on past detections and observed suitable habitat.

Does the local area depend in whole or in part on imported water from the Colorado River Basin or other basins experiencing comparable levels of long-term drought? If so, will the project reduce reliance on imports specifically from the Colorado River or other basins experiencing severe drought? Explain.

Yes. IRWD receives imported water through the Municipal Water District of Orange County (MWDOC), which is a member agency of the Metropolitan Water District (MWD). MWD provides imported water to Orange County which consists of a blend of water from the Colorado River and the State Water Project. IRWD will utilize water stored within the Project to meet its imported needs when MWD is allocating water to its member agencies, potentially reducing the necessary supplies diverted from the Colorado River.

E.1.3. Evaluation Criterion 3—Disadvantaged Communities (12 points)

Will the proposed project deliver the anticipated water supply benefits to communities identified as disadvantaged by the CEJST? If so, please identify these communities and discuss the extent to which the additional water supply will benefit them (for example, are these communities served in whole or in part? How much of the overall water supply generated by the proposed project will be delivered to these communities). Please be sure to indicate whether the project will provide water supply to a Federally Recognized Tribe.

Yes, the project provides benefits to communities identified as disadvantaged by the Climate and Economic Justice Screening Tool (CEJST). Many landowners living in the Rosedale-Rio Bravo WSD boundary are not connected to public water lines and are reliant on groundwater and private or community wells to deliver drinking water to their households. During severe droughts, residential users of the groundwater have had wells go dry and lose access to clean drinking water. These communities are outside of the greater Bakersfield area and are identified as disadvantaged because they meet more than one burden threshold and the associated socioeconomic threshold per CEJST.

Additionally, the GBJPA has groundwater banking projects with agencies that serve areas that include disadvantaged communities such as Lamont, Arvin, Delano, Firebaugh, Dos Palos, Los Banos, Gustine, and Newman. The Project would be able to provide essential drought water supplies to these areas. All of the previously mentioned communities lie within the gray-blue areas of the map, see **Figure 9** below, representing census tracts classified as overburdened and underserved based on the CEJST criteria.

To provide a clear breakdown, **Table 5** below highlights the CEJST disadvantaged communities served by the Project, with categories exceeding CEJST thresholds marked in red.

Table 5: Climate and Economic Justice Screening Tool – Categories of Burden for Lamont, Arvin, Delano Firebaugh, Dos Palos, Los Banos, Gustine, and Newman

Climate and Economic Justice Screening Tool										
Categories of Burden			Communities							
			Lamont	Arvin	Delano	Firebaugh	Dos Palos	Los Banos	Gustine	Newman
Climate Change	**Expected agriculture loss rate**	*Economic loss to agricultural value resulting from natural hazards each year*	95th	95th	94th	86th	86th	86th	86th	85th
	Expected building loss rate	*Economic loss to building value resulting from natural hazards each year*	86th	86th	38th	87th	0th	2nd	24th	7th
	Expected population loss rate	*Fatalities and injuries resulting from natural hazards each year*	9th	9th	1st	88th	10th	10th	10th	7th
	Projected flood risk	*Projected risk to properties from projected floods, from tides, rain, riverine and storm surges within 30 years*	1st	6th	34th	96th	42nd	99th	90th	12th
	Projected wildfire risk	*Projected risk to properties from wildfire from fire fuels, weather, humans, and*	94th	88th	92nd	83rd	86th	74th	85th	95th

		fire movement in 30 years								
Energy	**Energy Cost**	*Average annual energy costs divided by household income*	77th	61st	90th	72nd	68th	59th	89th	46th
	PM2.5 in the air	*Level of inhalable particles, 2.5 micrometers or smaller*	96th	93rd	99th	95th	96th	94th	95th	96th
Health	**Ashma**	*Share of people who have been told they have asthma*	70th	75th	56th	75th	60th	63rd	60th	54th
	Diabetes	*Share of people ages 18 years and older who have diabetes other than diabetes during pregnancy*	81st	88th	84th	90th	69th	65th	68th	52nd
	Heart Disease	*Share of people ages 18 years and older who have been told they have heart disease*	41st	67th	59th	59th	49th	35th	72nd	31st
	Low life expectancy	*Average number of years a person can expect to live*	81st	56th	66th	66th	31st	46th	61st	32nd
Housing	**Housing Cost**	*Share of households making less than 80% of the area median family income and spending more than 30% of income on housing*	87th	75th	78th	77th	59th	73rd	56th	51st
	Lack of green space	*Amount of land, not including crop land, that is covered with artificial materials like concrete or pavement*	94th	93rd	88th	94th	93rd	92nd	45th	93rd
	Lack of indoor plumbing	*Share of homes without indoor kitchens or plumbing*	21st	86th	21st	21st	89th	21st	21st	64th
	Lead Paint	*Share of homes that are likely to have lead paint*	40th	46th	35th	22nd	61st	22nd	54th	49th
Legacy Pollution	**Abandoned mine land**	*Presence of one or more abandoned mine land within the tract*	No	No	No	No	No	No	No	No
	Formerly used defense sites	*Presence of one or more Formerly Used Defense Site within the tract*	No		No					

	Proximity to hazardous waste facilities	*Count of hazardous waste facilities within 5 kilometers*	65th	65th	45th	5th	9th	49th	28th	56th
	Proximity to Risk Management Plan facilities	*Count of Risk Management Plan (RMP) facilities within 5 kilometers*	95th	95th	93rd	59th	14th	78th	75th	81st
	Proximity to Superfund sites	*Count of proposed or listed Superfund (or National Priorities List (NPL)) sites within 5 kilometers*	65th	96th	25th	17th	21st	23rd	30th	36th
Transportation	**Diesel particulate matter exposure**	*Amount of diesel exhaust in the air*	46th	33rd	75th	28th	33rd	38th	27th	31st
	Transportation barriers	*Average of relative cost and time spent on transportation*	80th	83rd	49th	44th	88th	85th	87th	77th
	Traffic proximity and volume	*Count of vehicles at major roads within 500 meters*	57th	50th	44th	43rd	26th	33rd	28th	26th
Water and Wastewater	**Underground storage tanks and releases**	*Formula of the density of leaking underground storage tanks and number of all active underground storage tanks within 1500 feet of the census tract boundaries*	70th	35th	39th	81st	49th	69th	60th	28th
	Wastewater discharge	*Modeled toxic concentrations at parts of streams within 500 meters*		3rd		42nd			15th	
Workforce development	**Linguistic isolation**	*Share of households where no one over age 14 speaks English very well*	99th	99th	98th	98th	92nd	94th	94th	85th
	Low median income	*Comparison of median income in the tract to median incomes in the area*	64th	77th	84th	78th	59th	49th	31st	39th
	Poverty	*Share of people in households where income is at or below 100% of the Federal poverty level*	85th	82nd	93rd	86th	65th	65th	81st	30th
	Unemployment	*Number of unemployed people as a part of the labor force*	87th	84th	85th	98th	95th	93rd	81st	92nd
	High school education	*Percent of people ages 25 years or older whose high school education is less than a high school diploma*	64%	69%	44%	56%	34%	35%	27%	22%

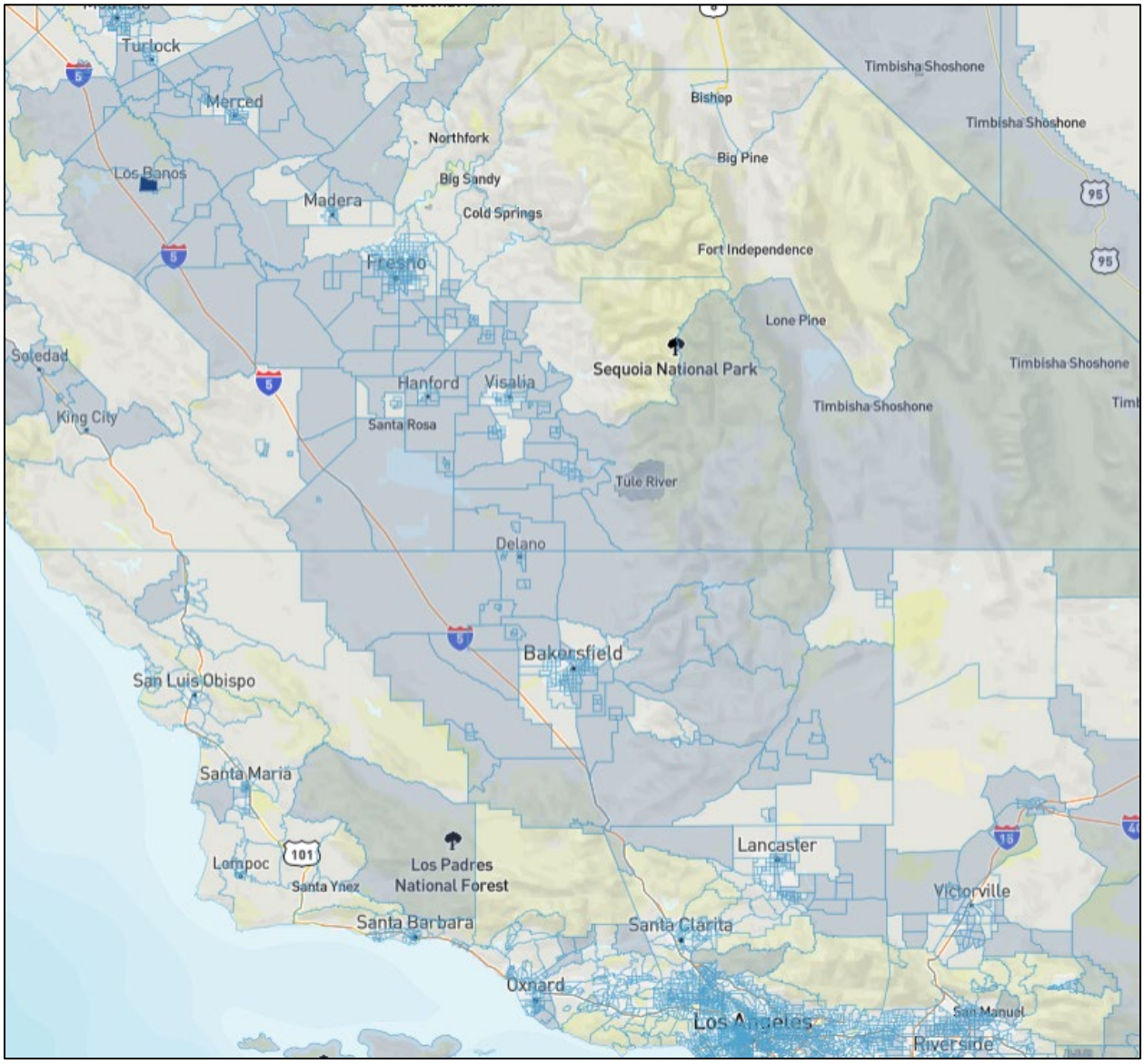
Low Income	*People in households where income is less than or equal to twice the federal poverty level, not including students enrolled in higher ed*	93rd	93rd	88th	95th	74th	81st	72nd	67th

Will the proposed project provide any additional benefits (such as economic growth opportunities, increases to short or long-term local employment, water quality, etc.) to communities identified as disadvantaged by the CEJST. If so, please identify these communities and discuss the extent to which the project will realize these additional benefits (for example, are these communities served in whole in part?).

Yes. The proposed project will provide additional benefits to disadvantaged communities that extend beyond water supply reliability. The Project has the potential to promote economic growth opportunities for communities served by the GBJPA. Because the Project will be constructed and operated within RRBWSD's boundaries, the Project would stimulate local economies by generating jobs and utilizing resources from local businesses. Additionally, the Project's construction and long-term operation would increase short-term and long-term employment for local residents, ensuring that these communities have access to employment opportunities and supporting their socioeconomic well-being. The Project would also improve water quality. By addressing water supply resiliency and ensuring a consistent and reliable water supply, the Project directly contributes to improved water quality for disadvantaged communities.

The increased reliability for agricultural water supply also contributes to the preservation of permanent agricultural crops. By providing a reliable agricultural water supply, permanent agricultural crops could stay in production and would not need to be replaced with low-value crops that can be fallowed if water is not available. The preservation of permanent agriculture also results in secondary economic impacts. The additional permanent agriculture output would contribute positively to the agricultural industry's increased purchase of goods and services from other local industries, as well as the impact on the local economy from an increase in household spending due to an increase in jobs.

Figure 9. Climate and Economic Justice Screening Tool – Disadvantaged Communities Designation (in gray-blue)



E.1.4. Evaluation Criterion 4—Stakeholder Support (12 points)

Does the project promote collaborative partnerships to address water and related issues? Please describe these partnerships and the nature of the collaboration.

Yes, the Project will promote collaborative partnerships throughout the State. For one, IRWD and Rosedale-Rio Bravo will be working together to maximize supplies banked in wet years and recover those supplies in years of drought for the benefit of both urban and agricultural sectors. The Project is a regional project that will also promote regional partnerships that will provide a reduced reliance on the Delta and Friant water systems during periods of drought. The Project will provide increased water supplies for multiple stakeholders including IRWD, Rosedale,

DRWD, and potentially federal water districts which will help to provide a more reliable supply for local agencies and communities, especially during dry years when surface water supplies are short. Lastly, the Project will build drought resiliency for local stakeholders by maintaining groundwater levels and creating opportunities for other water exchanges throughout the State. Please see attached **Appendix J** for Stakeholder support letters and support letters from other entities regarding the full Kern Fan Project.

Does the project implement a regional or State water plan or an integrated resource management plan? Explain.

Yes. The Project aligns with State and regional water plans. The California Water Plan is the State's strategic plan for sustainably and equitably managing, developing, and stewarding water resources. The California Water Plan is updated every 5 years and provides guidance on how elected officials, government agencies, tribes, water resource managers, businesses, academia, and the public can collaborate on findings and make informed decisions regarding California's water future. The Project also aligns with RRBWSD's regional and SGMA Groundwater Sustainability Plans (GSP). As required by SGMA, Groundwater Sustainability Agencies (GSAs) are required to implement comprehensive GSPs designed to ensure the sustainable management of groundwater resources. These plans outline strategies for maintaining sustainable groundwater levels, managing groundwater basins, and preventing overdraft. The Project is part of RRBWSD's GSP to meet its measurable objectives and achieve sustainability.

As mentioned, in 2020, California state agencies released the Water Resilience Portfolio that identified strategies to improve California's water resiliency along with corresponding actions. One of strategies of the Portfolio is to help regions secure groundwater supplies by supporting the transition to sustainable use. Recommended actions included in the Portfolio encourage groundwater recharge and banking efforts. The Project will directly implement the action identified in the Portfolio and support California state agencies' goals for improved water resiliency.

Does the project include outreach and opportunities for the public to learn about the project beyond what environmental compliance requires? Please describe these opportunities, including future opportunities, at the following phases of the project:

a) planning and design,
b) construction, and
c) implementation.

The project has included outreach and opportunities for the public/stakeholders to voice concerns and support for the project for the past two years. The construction on both of these project sites are adjacent to state highways and will be visible for stakeholders and the general public for the duration of the Project. The Project also has a website available to the public for more information on the project. (https://www.kernfanproject.com/)

Rosedale routinely encourages its Stakeholders to attend monthly Board meetings and Stakeholder Advisory Committee meetings that occur every other month. The Stakeholder Group is made up of representatives from four key interests within the Rosedale Groundwater

Sustainability Area ("RRBGSA"): Agricultural, Urban, areas outside of the Rosedale service area boundary, and Groundwater Banking entities. These meetings provide stakeholders within the RRBGSA an opportunity to participate in the development and implementation of the Groundwater Sustainability Plan.

To maintain groundwater sustainability, the RRBGSA plans to implement a combination of water banking projects and water management actions. The proposed overall Kern Fan Groundwater Storage Project is a planned supplemental water supply project included in the Groundwater Sustainability Plan. Rosedale works closely with its landowners to discuss the implementation of the Groundwater Sustainability Plan. The Stakeholder Group is made up of representatives from four key interests within the RRBGSA: Agricultural, Urban, areas outside of the Rosedale service area boundary, and Groundwater Banking entities. These meetings provide stakeholders an opportunity to participate in the development and implementation of the Groundwater Sustainability Plan. IRWD also encourages public participation and invites customers to attend Board meetings and comment on agenda items or other issues in front of their Board. The GBJPA gave a presentation regarding Kern Fan Project conveyance alternatives on October 26, 2022, where the public was invited to attend in person or via Zoom, provide comments, ask questions, and access and download presentation materials.

How has the project addressed competing or conflicting interests from either affected stakeholders and/or the public?

The Project has proactively addressed competing and conflicting interests from affected stakeholders and the public through an inclusive engagement process. This process has led to valuable insights and strong support for the project.

As previously mentioned, both the Rosedale-Rio Bravo Water Storage District and IRWD have taken steps to foster open communication and collaboration. RRBWSD consistently encourages its stakeholders to participate in monthly Board meetings, technical presentations, and Stakeholder Advisory Committee meetings. Similarly, IRWD actively promotes public participation and extends invitations to customers to attend Board meetings.

These inclusive forums have proven instrumental in identifying and addressing competing interests. They have enabled stakeholders to voice their concerns, provide feedback, and engage in constructive dialogue with the Project team. As a result, various viewpoints have been considered, and conflicts have been mitigated through transparent decision-making processes.

In **Appendix J**, you will find letters of support from stakeholders, underscoring the success of this engagement approach in building consensus and securing endorsements for the project.

Does the project have documented support from Tribes? If so, please identify these Tribes and describe the nature of their support for the project.

The Project does not have documented support from Tribes, as there are no tribes affected in the area.

E.1.5. Evaluation Criterion 5—Economic Benefits (25 points)

E.1.5.1. Subcriterion No. 5a—Cost Effectiveness (15 points)

1. ***Reclamation will calculate the cost per acre-foot of water produced by the project using information provided by project sponsors. Please provide the following information for this calculation:***

   (a) the total estimated construction costs, by year, for the project (include all previous and planned work) as shown in Table 6.

   The estimated construction costs by year can be found in **Table 6** below and are backed up in **Appendix N.**

   Table 6: Estimated Construction Costs by Fiscal Year

Fiscal Year	***Construction Cost***
1. 2022-23	***$9,525,398*****
2. 2023-24	***$3,680,838***
3. 2024-25	***$14,929,576***
4. 2025-26	***$6,676,599***

   *** Please note the costs associated with 2022 and property acquisition costs Costs are shown in 2022 dollars*

   (b) total estimated or actual costs to plan and design the project.

   $1,245,000 for the design of the facilities for the project and an additional $250,000 for the design of the SCADA components. As part of the environmental planning of the project an additional $130,000 was estimated and $75,000 for Reclamation's costs associated with NEPA review. Total planning/design = $1,700,000. Please note construction management and inspection services were not included in this. See **Appendix N** and the Budget Proposal (**Table 14**) for more detail and backup.

   (c) the average annual operation and maintenance costs for the life of the project. Please do not include periodic replacement costs in the operation and maintenance costs. Periodic replacement costs should be provided separately in response to Question (f) below. Note: This is an annual cost, not total cost.

The average annual estimated operation and maintenance (O&M) costs for the Phase 1 Project is $335,242 in 2022 dollars. The Project sponsor estimated the O&M annual costs of the Phase 1 Project based on the 2021 Preliminary Design Report prepared by Dee Jaspar & Associates for the full Kern Fan Project, which includes Phase 1 facilities (**Appendix S**). The Preliminary Design Report includes the estimated operation and maintenance costs for the Kern Fan Project for three types of operating years: Recharge, Recovery, and Idle. The estimated costs were based on Rosedale's actual costs and extensive experience operating and maintaining recharge basins, recovery wells, and other appurtenant facilities. The number of Recharge, Recovery and Idle years expected over the life of the Project were based on the modeling results of MBK Engineers (**Appendix G**). The proportions of Recharge, Recovery and Idle years were used to calculate a weighted annual O&M cost. This annual value was applied to the 50 years of expected operation to determine an appropriate present value of O&M costs.

(d) the year the project will begin to deliver from stored water upon completion.

The GBJPA estimates that water deliveries to the Phase 1 Project for storage will be available by 2026.

(e) the projected life (in years) that the project is expected to last. Note: this should be measured from the time the project starts delivering water.

The typical lifespan of wells is approximately 50 years. Motors, pumps, and electrical systems are about 10-20 years, and typical conveyance facilities are estimated to be about 50-100 years. For purposes of the application criteria, the proposed anticipated 'life' of the Project could provide water supply benefits for 50-plus years until facilities would need to be replaced and/or repaired. The project sponsor estimated the replacement costs of the Phase 1 Project based on the 2021 Preliminary Design Report.

(f) all estimated replacement costs by year as shown in Table 7. If there are multiple replacement costs in 1 year, or at the same interval, please total them and put them on one line with the year or interval.

Table 7: Replacement Costs by Year

Description of Replacement Requirement	Year	Cost
Interbasin Recharge Basin Structures (West Enos)	**2074**	**$436,037**
Interbasin Recharge Basin Structures (Stockdale North)	**2075**	**$290,692**
Conveyance Pipeline and Crossings (West Enos)	**2100**	**$14,911,669**

Conveyance Pipeline and Crossings (Stockdale North)	**2101**	**$17,425,991**
(2) Well Replacement (West Enos)	**2075**	**$6,418,938**
(2) Well Replacement (Stockdale North)	**2076**	**$6,220,464**
(2) Pump, Motor, Well Appurtenances (West Enos)	**2036**	**$3,442,363**
(2) Pump, Motor, Well Appurtenances (Stockdale North)	**2036**	**$3,442,363**

The assumptions made in the table above closely follow a standard engineering lifespan calculation. The interbasin structures in the recharge basins typically last 50 years, the pipeline which will be PIP PVC pipe, an estimated 75 years, the well replacement approximately 50 years, and the pump and motor, and other well appurtenances every 10 years. Using an engineer's recommendation, a flat 2% for inflation was applied to all replacement costs. See **Appendix R** for backup.

(g) The maximum volume of new water (in acre-feet) that will be available for delivery annually upon completion of the project. This volume of water must correspond to the costs provided above. If costs are only provided for a portion of the project, then only the water produced by that same portion or phase of the project will be considered.

The Project will be able to deliver water based on the availability of water supply which is dependent upon the hydrology of that year. The GBJPA utilized modeling results provided by consultants at MBK Engineers to estimate the anticipated water supply that could be available for the Project. MBK Engineers performed a hydrologic analysis using the CalSim II baseline Benchmark model with 2035 Central Tendency Climate data, published by Reclamation in March 2022. The results from MBK's analysis attributed solely to the 100,000 AF storage of the full Kern Fan Project in the full project Feasibility Study were scaled down proportionally to the 28,000 AF of groundwater storage provided in Phase 1. The expected average annual water supply for the Phase 1 Project is approximately 2,482 AF per year (**Appendix G**). An alternative method of calculating the annual water supply, as shown in Evaluation Criteria E.1.1, produced a very comparable 2,940 AF per year.

In extremely wet years the Project sponsor could potentially use the recharge basins year-round to store water in the aquifer. The GBJPA estimates that in a typical wet year, the recharge basins will be used for 4 months out of the year and can recharge approximately 14,940 AF of water into the aquifer.

The total costs and estimated water supplies estimated for the Project are summarized in **Table 8** below.

2. ***Reclamation will calculate the cost per acre-foot for the project using the information requested in Section E.1.5.1, Question 1, and compare it to any other water supply options identified by the applicant as a potential alternative to evaluate the cost effectiveness of the project. Please provide the following information for this comparison:***

    (a) the cost per acre-foot of other water supply alternatives that could be implemented by the non-Federal project sponsor in lieu of the project.

The cost-effectiveness of the Project has been compared to IRWD and Rosedale purchasing alternative water supplies during dry years. Without the project, IRWD's only alternative is to continue to purchase imported water from the Metropolitan Water District of Southern California (MWD) to supplement its water supply during dry periods to meet demands. Without the Project, Rosedale, and DRWD would have to purchase water through a water market, likely north of the Delta.

The GBJPA completed an analysis comparing the proposed Project supply costs to purchasing imported water from MWD and a water market north of the Delta. The "Other Water Supply Alternative" includes the cost to purchase MWD untreated water and the cost to purchase water north of the Delta through a water market over the same 50-year operating period. Under the "Other Supply Alternative, the Project sponsor would need to purchase at least 124,100 AF of imported water. For the Phase 1 Project supply, the GBJPA considered all costs associated with the Project supply including capital, interest during construction, O&M, and replacement costs. The GBJPA's calculated cost per AF of these water supply alternatives is shown in **Table 8**.

Table 8: Cost/AF Comparison of Water Supply Alternatives

Description (Based on 50-year operating period)	Phase 1 Project Supply Alternative	Other Water Supply Alternative
Total imported water purchases from MWD (AF)	-	55,350
Total imported water purchases from north of the Delta (AF)	-	68,750
Net present value of imported water purchases from MWD	-	$53.4 million
Net present value of imported water purchases from north of the Delta	-	$34.5 million
Total avoided imported water purchases (AF)	124,100	-
Net present value of all project costs	$45.9 million	-
Cost per AF (50 years, net present value basis)	**$370.23**	**$708.56**

The net present value of the cost of the "Other Water Supply Alternative" (imported water purchases) over the 50-year period is $708.56 per AF. The net present value unit cost of the "Phase 1 Project Supply Alternative" is $370.23 per AF, a savings of $338 per AF. The analysis demonstrates that the Phase 1 Project is cost-effective as compared to the "Other Water Supply Alternative" (dollars per AF). The details and assumptions used to determine the cost of purchasing water from MWD and through a water market north of the Delta are described in the "Project Benefits" section below.

(b) if available, the cost per acre foot of one water supply project with similar characteristics to the project. This information does not have to be provided if it is not available. It is intended to provide another possible comparison to demonstrate the cost effectiveness of the project.

The GBJPA has evaluated the approximate cost per acre-foot of participating in an existing water bank, the Willow Springs Water Bank (WSWB). WSWB is an existing facility located in the Antelope Valley in Southern California capable of storing 500,000 AF of water underground. The WSWB is situated on highly permeable soils near three major water conveyance facilities (East Branch of the California Aqueduct, the Antelope Valley-East Kern West Feeder, and the Los Angeles Aqueduct) and offers water storage opportunities to both upstream and downstream water agencies.

If available, Rosedale and IRWD would pay WSWB to buy into the developed capacities (if available) of the WSWB to store up to 28,000 AF of water. The water stored by Rosedale and IRWD could consist of a mix of unallocated Article 21 and other SWP water. No Kern River water or federal water supplies such as Section 215 or RWA supplies would be able to be captured by the WSWB alternative since there is no federal conveyance to WSWB.

The cost to buy into a developed water bank was determined based on acquiring shares that would provide at least 28,000 AF of storage, approximately 14,940 AF of recharge capacity per year, and 14,480 AF of recovery capacity per year. The GBJPA would need to purchase shares where one share is equal to 5 AF of storage, 1/3 AF per year of recharge capacity, and 1 AF per year of recovery capacity. To acquire the minimum capacities stated, approximately 45,455 shares at a total cost of $79.5 million would need to be purchased. The annual operations and maintenance (O&M) cost associated with the WSWB includes the additional cost of power to pump the available Article 21 and other SWP supplies to the project diversions off the California Aqueduct.

Participation in the WSWB would potentially allow the GBJPA to store approximately 1,730 AF of water on an average annual basis based on projected average annual Article 21 supplies. It should be noted that only Article 21 and other SWP supplies can be stored in the WSWB as the WSWB would not be able to store other available supplies such as Federal CVP or Section 215 water. The cost of project water on a dollar per AF basis was calculated based on the total cost to participate in WSWB divided by the projected water supply over the life of the Project (1,730 AF x 50 years).

Table 9 shows feasibility-level cost estimates for the Existing Water Bank Alternative Plan in 2022 dollars.

Table 9: Existing Water Bank Alternative Plan Cost Estimates

	Existing Water Bank Participation
Buy-in Cost for 45,455 Shares	$79.5 million
Annual Operation and Maintenance Costs[1]	$2.0 million
Total Annual Costs	$4.63 million

Dollar per AF Cost	$1,590

Notes:

[1] O&M cost reflect an average annual put/take of 1,730 AFY associated with Article 21 and other water supplies

(c) discussion of the degree to which the project is cost-effective, including, where applicable, a discussion of why the project may be cost effective even if the overall project cost appears to be high.

The net present value of the cost of imported water purchases from MWD and through a water market north of the Delta over the 50-year period is $708.56 per AF. The net present value unit cost for the Project is $370.23 per AF, a savings of $338 per AF.

Without the Project, the GBJPA's estimated costs would be $87.9 million ($53.4 million + $34.5 million) as shown in **Table 8** over the 50-year operating period. With the implementation of the Project, GBJPA's estimated costs would be approximately $45.9 million (see **Table 8**). The Phase 1 Project represents a net present value savings of $42 million over the 50-year period. This demonstrates that the Project is highly cost-effective.

E.1.5.2. Subcriterion No. 5b—Economic Analysis and Project Benefits (10 points)

1. ***Summarize the economic analysis performed for the project, including information on the project's estimated benefits and costs. Describe the methodologies used for the analysis that has been conducted. Points will be awarded based on a comparison of the benefits and costs of the project. The information provided should include:***
   - ***(a) quantified and monetized project costs, including capital costs and operations and maintenance costs.***
   - ***(b) quantified and monetized project benefits. This includes benefits that can be quantified and expressed as a monetized benefit per acre-foot. This may include, but is not limited to: benefits related to water supply quantity and water supply reliability, recreational benefits, ecosystem benefits, water quality, flood risk mitigation, and energy efficiency. Benefits may also include the avoided costs of no action (i.e., the costs that would be incurred if the project were not implemented), and the willingness of users or customers to pay for a benefit or to avoid a negative outcome (i.e., the willingness of households to pay for a water supply system that would reduce the chance of a drought emergency within a locality or State).***
   - ***(c) if quantified and/or monetized information for these benefits is not available, they may be addressed in response to Question 2 below.***
   - ***(d) A comparison of the project's quantified and monetized benefits and costs. Note: applicants must include information in the proposal to be considered. Reclamation will not base scores on information provided in the project's feasibility study if applicants do not include the information in the proposal.***

2. ***Describe any economic benefits of the project that are difficult to quantify and/or monetize. Provide a qualitative discussion of the economic impact of these benefits.***

Points will be awarded based on the potential economic impact of the project-related benefits. Some examples of benefits may include, but are not limited to, benefits to habitat or species, local impacts on residents and/or businesses, job creation, and regional impacts. This may also include benefits listed in Section E.5.1.2, Question 1, if they have not been monetized (e.g., water reliability, water quality, recreation, flood risk mitigation, etc.).

3. ***Reclamation will evaluate projects based on if the proposed project would provide multiple benefits, including water supply reliability, ecosystem benefits, groundwater management and enhancement, and water quality improvements. Does the project provide multiple benefits, or is it a single purpose facility? Explain.***

The GBJPA performed a comprehensive quantification and monetization evaluation of the costs and benefits of the Phase 1 Project. The following costs and benefits have been identified and quantified.

Project Costs

The GBJPA has quantified and monetized the Project costs, including operations, maintenance, and replacement costs. The capital cost estimate for the Phase 1 Project is considered a Class 3 Level Cost Estimate per the AACE International guidelines. The Class 3 estimate includes the contract costs which are the estimated construction costs; the field costs which include a twenty percent (20%) contingency and design contingencies for unlisted items; and the construction costs which include the land acquisition costs, easement procurement costs, mitigation costs fees, and the non-contract costs which include project management, engineering design, bid administration, and construction management and inspection. The 20% contingency utilized is consistent with the Class 3 estimate criteria per AACE International Practice No. 18R-97 and the Reclamation Manual Directives and Standards document FAC 09-01. The capital cost estimate for the Phase 1 Project Alternative Plan is $34.9 million.

As mentioned, a Preliminary Design Report was prepared for the full Kern Fan Project, which includes the Phase 1 Project facilities. The Preliminary Design Report includes the estimated operation, maintenance, and replacement costs for the Kern Fan Project for three types of operating years: Recharge, Recovery, and Idle. The estimated costs were based on Rosedale's actual costs and extensive experience operating and maintaining recharge basins, recovery wells, and other appurtenant facilities. The operation, maintenance, and replacement costs for the Phase 1 Project were estimated using costs documented in the Kern Fan Project Preliminary Design Report. The estimated operations, maintenance, and replacement cost for the 50-year operations period starting in 2026 is $11.06 million.

The net present value of the capital, operations, maintenance, and replacement costs for the Phase 1 Project is $45.95 million (see **Table 8**).

Project Benefits

The Phase 1 Project is a regional project that will provide increased water supplies for multiple stakeholders including IRWD, Rosedale, DRWD, and potentially other federal water districts which will help to provide a more reliable supply for local agencies and communities, especially during dry years when surface water supplies are short. The Phase 1 Project is intended to be integrated with Rosedale's Conjunctive Use Program. The Project would provide flexibility for the GBJPA to integrate operations of the Project with existing IRWD and Rosedale recharge and recovery facilities, thereby maximizing operational efficiency and effectively managing water supplies. The Project could provide opportunities to fulfill Reclamation's obligations by storing excess federal water supplies for increased water supply reliability for many Friant federal water districts during dry years. In addition, during dry years, Project operations will reduce impacts on threatened environmental resources in the Delta by recovering banked water from the Project and reducing water exports thus alleviating stress in the Delta during critical periods. The Project offers exceptional flexibility to better manage available supplies, which supports improved operations of the state and federal water systems.

Additionally, the Phase 1 Project will provide increased water supply reliability benefits that are crucial in mitigating the effects of climate change in California. Climate change is expected to result in California becoming hotter and drier, with more periods of extended drought, a shift from snowfall to rainfall with significant potential for flooding, and the need for more storage to capture supplies during wet periods. Additional Project benefits include intermittent wetland habitat that will be created for waterfowl and migratory birds along the Pacific Flyway, improved groundwater levels in the Kern County Sub-Basin, and preservation of permanent agriculture crops.

The basis for the quantification of benefits provided by the Project is the modeled water supplies anticipated for the Project. MBK Engineers performed a hydrologic analysis, presented in **Appendix G**, using the CalSim II baseline Benchmark model with 2035 Central Tendency Climate data, published by Reclamation in March 2022. The Baseline scenario for this analysis is the Reclamation Benchmark Model dated March 3, 2022. Regulatory requirements in the model included all existing regulatory requirements, actions detailed in the 2019 United States Fish and Wildlife Service (USFWS) and the 2019 National Oceanic and Atmospheric Administration (NOAA) Fisheries Biological Opinions for delta smelt and listed salmonid species, as well as the March 31, 2020, Incidental Take Permit, issued by the California Department of Fish and Wildlife (CDFW) for the SWP. The benchmark model also included the changes to operating criteria and requirements put in place under the 2018 Coordinated Operations Agreement Addendum. The hydrologic analysis was performed for the full Kern Fan Project consisting of 100,000 AF of groundwater storage. The availability of Article 21 and Section 215 water supplies were modeled in this analysis, however additional water supplies may be available for recharge at the Project. The results from MBK's analysis were scaled proportionally to the 28,000 AF of groundwater storage provided by the Phase 1 Project. Based on previous investigations by MBK Engineers, project yield is more dependent on available water supply than groundwater storage capacity. Therefore, the Project Sponsors consider this approach acceptable, as it still depicts the availability of water supplies.

A spreadsheet model was prepared by consultants at M.Cubed to evaluate the economic benefits of the full Kern Fan Project. An accompanying technical memorandum detailing the methods

and assumptions used for calculating the economic benefits of the full Kern Fan Project was also prepared. For Phase 1 of the Project, the spreadsheet model was updated with water supply inputs and project capacities specific to the Phase 1 Project. The methods and assumptions detailed in the technical memorandum are applicable to the Phase 1 Project economic analysis. Further detail on the methods and assumptions used for calculating the economic benefits is provided in the Feasibility Study. The M.Cubed technical memorandum for the Phase 1 Project is included in **Appendix D** and described in the following sections.

M&I Water Supply Benefits

The Phase 1 Project would result in a net increase of M&I water supply due to increased capacity to capture and store surplus Article 21 and other sources of water supplies. It should be noted that Section 215 supplies are not considered M&I water supplies because they can only be used in the CVP Place of Use.

To quantify the benefits to M&I water users, consultant M.Cubed (**Appendix D**) performed an analysis utilizing an alternative cost approach to estimate the water supply benefits of the project. The Article 21 water supply from the project is divided between agricultural (75%) and M&I uses (25%), which have different alternative costs of water. The Phase 1 Project is expected to provide approximately 21,400 AF of SWP Article 21 water for M&I purposes over the life of the project.

For M&I uses by IRWD, the alternative supply cost is the Tier 1 untreated rate from the MWD, DWR variable OMPR component, and Pacific Gas and Electric (PG&E) pumping costs, which was approximately $676 per AF in 2015. This rate was escalated over time using MWD's forecast of Tier 1 prices as found in their Ten-Year Financial Forecast provided at a February 9, 2016, MWD Board Meeting. According to the forecast of Full-Service Untreated Tier 1 water, prices are projected to increase by an average of 5.6% from 2016 to 2026. Over the same period, average CPI inflation is projected to be 2.3%, resulting in an average real price increase of 3.3%. This rate of increase was applied to the MWD Tier 1 rates over the life of the project. Conveyance costs in the SWP were applied using data provided by DRWD, which includes monthly conveyance costs from 2001 to 2017. Conveyance costs average $17.10 per AF in 2015 dollars.

The net present value in 2022 dollars of the M&I water supply benefit over the life of the project is estimated to be $21.14 million. The GBJPA estimates the M&I water supply benefit to be $987.89 per AF ($21.14 million divided by 21,400 AF of SWP Article 21 water). It should be noted that this benefit is attributed only to 25% of the Article 21 water from the Project for M&I uses.

Agricultural Water Supply Benefits

The incremental change in annual agricultural water supply provided by the Phase 1 Project is the basis for agricultural water supply benefits. As mentioned, the Article 21 water supply from the project is divided between agricultural (75%) and M&I uses (25%), and all Section 215 water is attributed to agriculture since it can only be used in a CVP Place of Use. The Phase 1 Project

is expected to provide approximately 124,100 AF of SWP Article 21 water and Section 215 water for agricultural purposes over the life of the project.

The alternative cost approach described for the M&I water supply benefits is applied to estimate the benefits of improved agricultural water supply (**Appendix D**). Delta export unit values[1] are provided for the 2030 and 2045 years, which are re-weighted according to the water year types during which Rosedale and IRWD are expected to recover stored groundwater based on hydrologic modeling by MBK Engineers. Since Rosedale and IRWD are projected to accrue water supplies in different water year types (with Rosedale drawing on their supplies mainly in dry and critically dry years) two different water values are required – one weighted for IRWD's supply and one weighted for Rosedale's supply. Water cost anchor points were used for 2030, 2045, and 2070 – 2030 unit values weighted at 2030 recovery levels, 2045 unit values weighted at 2030 recovery levels, and 2045 unit values weighted at 2070 recovery levels. Unit values for 2026 to 2075 were determined by interpolating between these unit values. The full range of unit values ranges from $293/AF for IRWD and $305/AF for Rosedale in 2030 to $744/AF for IRWD and $797/AF for Rosedale in 2045, in 2015 dollars. Conveyance costs in SWP were also applied using data provided by DRWD, which includes monthly conveyance costs from 2001 to 2017. Conveyance costs average $17.10/AF in 2015 dollars. The agricultural benefits were calculated in 2015 dollars and then escalated to 2022 dollars.

The net present value in 2022 dollars of the agricultural water supply benefit over the life of the project is estimated to be $51.2 million. The GBJPA estimates the agricultural water supply benefit to be $498.48 per AF ($51.2 million divided by 102,700 of SWP Article 21 and Section 215 water).

Groundwater Level Improvement Benefit

The additional water stored in Kern County as a result of the proposed Phase 1 Project will improve water levels in the Kern Sub-basin and support groundwater sustainability. The Phase 1 Project would provide local groundwater benefits based on a 2003 Memorandum of Understanding (MOU) between Rosedale and other adjacent water banking entities in Kern County. Per the MOU, a portion of banked groundwater, referred to as leave-behind water, is not recovered by the banking entity and remains in the ground to bolster local groundwater levels. The Phase 1 Project is a planned supplemental water supply project to provide the GBJPA with additional water supplies and is not related to mitigation for basin overdraft.

For the Phase 1 Project, groundwater basin leave-behind percentages vary depending on the water supply account – 9% of water in the M&I account and 4% of water in the agricultural account will be left behind to help recharge local basins, according to groundwater modeling assumptions used by MBK Engineers. These percentages are consistent with the MOU. Based on

[1] The Delta export unit values were developed by the California Water Commission in their Water Storage Investment Program Technical Reference (November 2016). The unit values were developed from a statistical analysis based on water transfer prices from 1992 to 2015, the Statewide Agricultural Production Model (SWAP), and assumptions regarding groundwater sustainability requirements in California by 2045. The Technical Reference can be found here: https://cwc.ca.gov/Water-Storage

these values, a weighted average leave-behind rate of 6.5% was utilized to calculate the total groundwater level benefit.

For evaluating groundwater benefits from the project alternative plans, the alternative cost of recharging groundwater was considered to be the cost of purchasing water through a water market, likely north of the Delta. Average costs for purchasing Delta export water on the water market were based on unit values developed by the CWC in the WSIP Technical Reference. These unit values were developed from a statistical analysis based on water transfer prices from 1992 to 2015, the Statewide Agricultural Production Model (SWAP), and assumptions regarding groundwater sustainability requirements in the state by 2045. These unit values were developed for various water year types (wet, above normal, below normal, dry, and critical) for 2030 and 2045, the year it is assumed that groundwater basins will reach sustainable levels. Delta export costs used for the analysis were weighted according to historic water year type frequency according to the San Joaquin River Water Year Index to arrive at benchmark values for 2030 and 2045. SWP conveyance costs were also added to Delta Export costs.

The net present value in 2022 dollars of the groundwater level improvement benefit over the life of the project is estimated to be $4.0 million. The GBJPA estimates the groundwater level improvement benefit to be $32.31 per AF ($4.0 million divided by 124,100 AF of the Project water supply).

Agricultural Impact Benefit

The Phase 1 Project would provide a greater degree of reliability for agricultural water supply, which creates benefits to local agriculture that go beyond the value of the water supply itself. Not only would the project capture and store water for the benefit of agricultural uses, but an additional agricultural benefit is the preservation of permanent crops that would need to be replaced with low-value crops that could be fallowed if water was not available. The Phase 1 Project firms up the dry year supplies available for agricultural use by storing water that can be withdrawn for irrigation use in dry years and thus providing a greater degree of reliability for permanent crops. Permanent crops such as nuts and fruit require irrigation in all years and cannot be fallowed during dry years. So, without a reliable dry year water supply, the probable alternative is to switch to row crops, which may be fallowed when water supplies are short. With increased reliability, it is estimated that this acreage could instead be converted to higher-value permanent crops, such as fruit or nut trees. While the value of agricultural water to the existing mix of crops is already included under the calculation of agricultural water supply benefit, the positive effects of preserving permanent agriculture are a separate benefit.

Without water provided through the Phase 1 Project, it is estimated that the alternative plans would prevent impacts to approximately 570 acres of crops from being fallowed in critically dry years when supplies are low. Per the Kern Groundwater Authority, the Groundwater Sustainability Agency in the Kern County Sub-Basin, an average annual native yield of 0.15 AF is allocated per acre to developed irrigated lands. The average annual precipitation for Rosedale's service area is estimated at 0.44 AF per acre, as described in the Groundwater Sustainability Plan Chapter. Permanent crops, such as almonds, require approximately 3 AF of water per year per farmed acre. The total of Project water, plus the native yield of the Kern

County Sub-Basin, plus precipitation provides 3 AF of water which is enough to irrigate approximately 570 acres, as shown below in **Table 10.**

Table 10: Agricultural Benefit Calculation Assumptions (Annual Water Demands per Crop)

Water Supplied by the Project per acre:	2.41 AF per acre (1,375 AF / 570 acres)
Native (safe) yield of basin:	0.15 AF per acre
Average annual precipitation:	0.44 AF per acre
Total AF per acre available for permanent crops:	3.00 AF per acre

Only Rosedale's water supply from the Phase 1 Project was considered when calculating the agricultural impact benefit. With 1,375 AF of Rosedale's annual water supply provided by the project, it is estimated that 570 acres of permanent crops could stay in production in Kern County. Impact Analysis for Planning (IMPLAN) data for Kern County was used to estimate the effects of crop conversion. IMPLAN is an input-output modeling software that allows users to estimate how economic changes in particular sectors impact the local economy. The value of cotton and permanent tree crops was used as an input into the IMPLAN model. The IMPLAN results estimate the direct impacts of crop conversion. It should be noted that only the direct benefits measured from IMPLAN were used in the benefit calculation and the indirect and induced benefits were excluded.

The net present value in 2022 dollars of the agricultural impact benefit over the life of the project is estimated to be $32.2 million. Backup can be found in the M.Cubed technical memorandum in **Appendix D**. The GBJPA estimates the agricultural impact benefit to be $467.75 per AF ($32.2 million divided by Rosedale's water supply over the life of the Project, 68,750 AF).

Intermittent Wetland Habitat Benefit

The Phase 1 Project would provide important intermittent wetland habitat for migratory birds during the years that the Project takes and recharges water into storage. During those years, the approximately 300 acres of wetted area that comprise the project's recharge basins will be inundated with water to percolate into the groundwater basin. The Pacific Flyway is a major migration route for waterfowl that extends from Alaska to South America, passing through Canada, California, and Mexico. In California, 95% of historic wetlands have been lost. The Central Valley in California is the most important waterfowl wintering area along the Pacific Flyway. The open water and vegetation that will be provided as intermittent wetland habitat by the Phase 1 Project will provide substantial benefits to wintering waterfowl, shorebirds, raptors, and other native and migrating birds. Water will typically be recharged at the Phase 1 Project during the winter and spring months and will provide temporary habitat during wet and normal years when recharge activity occurs. The intermittent wetland habitat that will be provided by the Phase 1 Project will be approximately 300 acres.

Per the USFWS classification of wetlands in the United States, the Project will provide a wetland habitat that will most closely resemble a classification of Intermittent Flooded Riverine Wetlands with Unconsolidated Sandy Bottoms. Accordingly, the recharge basins constructed for the Project will be designed to meet intermittent wetland requirements during recharge operations.

The recharge basins will provide intermittent wetland habitat to support waterfowl, shorebirds, raptors, and other migratory bird species along the Pacific Flyway.

Rosedale has been working with the Environmental Defense Fund (EDF) to construct and operate recharge facilities that have multiple benefits, including intermittent wetlands and bird habitats. EDF partnered with Point Blue Conservation Science, Audubon California, and Sustainable Conservation to develop a guide on how to build this kind of preferred recharge basin that provides operational benefits to basin management while also creating valuable water bird habitats. **Appendix K** is the guide prepared by EDF that describes the wildlife benefits associated with the multi-uses of recharge basins as intermittent wetlands.

To estimate the benefits associated with the creation of intermittent wetland habitat, an alternative cost approach was utilized. Under this approach, it is assumed that the GBJPA would purchase the land to create an equivalent acreage of wetlands over a similar period as those created by the Phase 1 Project and deliver the same volume of water through water purchases. To estimate the value of land required, the cost of a permanent easement for the wetlands and a long-term easement for constructing water conveyance facilities to the wetland was determined. Costs were estimated for a canal connection to the California Aqueduct, a conveyance canal to the site, canal siphons, and lift stations in addition to significant earthwork and interbasin structures to keep water in the recharge basins. Also included were the costs of restoring the land to its pre-wetland condition at the end of the project, based on a subset of costs from the project budget. For this approach, since the alternative project would only take excess water in wet years, the Delta Export unit value for wet years provided in the WSIP Technical Reference was utilized, which ranges from $204 in 2030 to $414 in 2045. Conveyance costs were added in from the period from 2001 to 2017 – $17.10 per AF. The annual benefit was estimated by interpolating between these values and leaving prices beyond 2045 at $414/AF to be conservative.

The net present value in 2022 dollars of the intermittent wetland benefit over the life of the project is estimated to be $62.2 million. See benefit summary in **Table 11**. The GBJPA estimates the intermittent wetland benefit to be $500.98 per AF ($62.2 million divided by 124,100 AF of the Project water supply).

The total cost per acre foot for the project, including replacement, is approximately $370.23 per AF. The total sum of benefits is approximately $1,375.28 per AF demonstrating that the project is highly cost-effective.

Table 11: Monetized Project Costs and Benefits Per AF

COSTS		
Project Capital Costs:	$	34,887,412
NPV of O&M Costs:	$	10,001,746
NPV of Replacement Costs:	$	1,056,138
Total Costs:	$	45,945,295
Total AF Water Supplied:		124,100
Cost/AF:	**$**	**370.23**

BENEFITS		
M&I Water Supply Benefit:	$	21,140,855
Agricultural Water Supply Benefit:	$	51,193,439
Groundwater Level Improvement Benefit:	$	4,009,057
Agricultural Impact Benefit:	$	32,157,933
Intermittent Wetland Benefit:	$	62,171,008
Total Benefits:	$	170,672,292
Total AF Water Supplied:		124,100
Benefits/AF:	**$**	**1,375.28**
Benefit-Cost Ratio		**3.7**

Project benefits that are difficult to quantify or monetize include:

- Climate change resiliency;
- Flood control;
- Secondary economic impacts from the preservation of permanent agricultural crops; and
- Increased operational flexibility.

Climate Change Resiliency

California's climate has been trending toward one that cycles between periods of large amounts of precipitation and times of drought. The California Department of Water Resources estimates a 10% reduction in water supply by 2040 in a planning scenario that considers increased temperatures and decreased runoff[2]. While there are still uncertainties associated with the future impacts of climate change on California's weather cycles, it is reasonable to expect that changes to weather cycles will result in more rainfall and less snow in the mountains, earlier snowmelt, more intense rain events, and increasingly frequent droughts. These climate conditions will cause shorter periods of available excess supplies and longer periods of supply shortages. Groundwater storage provided by the Project will allow for these excess supplies to be captured and utilized when needed, increasing IRWD, Rosedale, and DRWD's resiliency to climate change. The additional benefits of climate change resiliency provided by the Project have not been quantified, but the Project sponsor recognizes the importance of mitigating the effects of climate change. Potable water system simulation models, used in a 2016 IRWD Water Supply Reliability Evaluation, demonstrated that IRWD's water banking capabilities were essential to maintaining a potable water supply during severe simulated climate change conditions.

Flood Control

In the event of a large flood event on the Kern River, the Phase 1 Project could potentially divert sufficient flood flows to avoid damage to federally insured crops downstream on the Kern River. The Phase 1 Project does offer some flood control protections in the form of reducing peak cfs flow on the Kern River during large flooding events downstream of the Project. Expected benefits include reduced flood damage on crops bordering the Kern River (e.g.,

[2] California's Water Supply Strategy – Adapting to a Hotter, Drier Future, Aug 2022

potatoes, carrots, lettuce, and alfalfa) and the potential for fewer affected crops overall in the broader floodplain as well as the Buena Vista and Tulare Lake beds downstream – depending on the event and peak flow distribution. Although exceedingly rare, in the case of a 100 to 500-year flood event with upwards of 10,000 cfs in peak flow (before the Project site), the additional diversion capacity offered by the Project has the potential to reduce damage to federally insured crops in contribution with other diversions and efforts in the area. These benefits were not quantified as part of the Feasibility Study and are described here as a qualitative benefit of the Project.

Secondary Economic Impacts from the Preservation of Permanent Agricultural Crops

The expected benefit from preserving permanent agriculture will also result in secondary economic impacts. Although not monetized in the Feasibility Study, the additional permanent agriculture output is expected to contribute positively to the agricultural industry's increased purchase of goods and services from other local industries, as well as the impact on the local economy from an increase in household spending due to an increase in jobs.

Increased Operational Flexibility

In 2017, the Association of California Water Agencies (ACWA) completed a Storage Integration Study (June 2017). The purpose of this study was to define and quantify the benefits of integrating the operations of new storage projects with the existing SWP and the CVP. The study also analyzed how improved Delta conveyance capability could increase the benefits of integrated operations of proposed and existing storage facilities to help fulfill statewide water supply needs and priorities.

The ACWA study shows that significant surplus water was available almost every year, which could be stored for later use during water-short years. Due to the nature of California's hydrology, there are often surplus flows in the SWP and CVP systems that may be diverted to storage. Surplus water in the ACWA report is defined as flow above what is necessary to satisfy all current water demands, including existing environmental mitigation measures and compliance obligations. This water cannot all be captured and stored with existing storage and conveyance infrastructure. Per the study, the Delta has the greatest availability of surplus flows, with an average annual of over 10 million AF. In wet years, there is an average of over 22 million AF of Delta surplus water. If there are no uses or demands for the surplus water and it cannot be diverted into storage, flooding can occur, and then ultimately this water is lost to the ocean.

ACWA identified the Kern Fan Groundwater Storage Project, as proposed by the GBJPA, as a means improve water supply reliability and operational flexibility of the SWP and CVP systems during periods of drought. By integrating the operation of SWP and CVP surface reservoirs with groundwater banking in the Kern River Fan Project, water supply reliability could be improved at a minimum cost. The Phase 1 Project will provide greater operational flexibility by utilizing up to 28,000 AF of contingency groundwater storage to augment supplies during periods when other water sources may be limited or unavailable.

2. Project Budget

2.1 Funding Plan

Describe how the non-Federal share of project costs will be provided. Reclamation will use this information in making a determination of financial capability

The GBJPA, which is made up of Irvine Ranch Water District and Rosedale-Rio Bravo Water Storage District, have different ways of funding the GBJPA's contribution to the cost share requirement of this funding opportunity. Rosedale's cost-match will be covered by the District's capital facility improvement portion of the regular budget. Rosedale-Rio Bravo maintains a capital improvement account and receives revenue through water sales and banking operations as well as land assessments. Irvine Ranch Water District will be contributing through a reserve account. The approved Project Feasibility Study includes more information on Rosedale and IRWD's Funding Plan for Capital, Operation, Maintenance and Replacement Costs.

Please identify the sources of the non-Federal cost share contribution for the project, including: any monetary contributions by the applicant towards the cost-share requirement and source of funds (e.g., reserve account, tax revenue, and/or assessments)

The sources of the non-Federal cost share contribution are broken down in the paragraph above. Rosedale-Rio Bravo's contribution will come from a capital improvement account, revenue through existing water sales and banking operations, and land assessments. Irvine Ranch Water District will be contributing through a reserve account. The approved Project Feasibility Study includes more information on Rosedale and IRWD's Funding Plan for Capital, Operation, Maintenance and Replacement Costs.

Please identify any costs that will be contributed by the applicant.

The GBJPA will be contributing just over 75% of the costs towards the project or $26,165,559. See **Table 12** below for the breakdown of the funding sources.

Table 12. Funding Sources

Funding Source	**Funding Amount**
Non-Federal Entities	
Groundwater Banking Joint Powers Authority	$26,165,559
Groundwater Banking Joint Powers Authority (in-kind)	$ 0
Non-Federal Subtotal	**$26,165,559**

Requested Reclamation Funding	**$ 8,721,853**
Total Project Funding	***$34,887,412***

The Phase 1 project was awarded Small Storage Program 2022 funding, and the GBJPA executed an agreement with Reclamation in November 2023 in the amount of $4,742,929, which provided partial funding based on eligible benefits to the Bureau. This application seeks additional Small Project Program funding up to the full eligible funding amount of $8,721,853, less the prior award.

Please identify any third-party contribution costs (i.e., goods and services provided by a third party)

There will be no third-party contribution costs associated with the project funding.

Please identify any cash requested or received from other non-Federal entities and any pending funding requests (i.e., grants or loans) that have not yet been approved and explain how the project will be affected if such funding is denied.

There will be no third-party contribution costs to this project. At this time there are no other pending funding requests for the proposed Project.

Please identify whether the budget proposal includes any project costs that have been or may be incurred prior to award. For each cost, describe:

- ***the project expenditure and amount,***
- ***the date of cost incurrence, and***
- ***how the expenditure benefits the project.***

Included in the budget proposal are the property acquisition costs, which between both properties totaled $8,995,398. The West Enos property was acquired in January 2022 and the Stockdale North property was acquired in December 2021. These expenditures were necessary for the project because the acquisition of the land is critical for the construction of the facilities. These properties were ideally located near existing conveyance as well as to other existing recovery wells. Along with property acquisition costs the GBJPA has incurred feasibility, environmental permitting, and conceptual design/consultant costs from Dee Jaspar and Associates, Meyers Civil Engineering and Harder Company, and Environmental Science Associates for approximately $350,000. These costs were incurred in 2021-2022 and were critical work for analyzing the proposed location of the recovery wells, environmental impacts, and the effectiveness of the recharge ground.

Please refer to **Table 13** (below) for a summary of all funding sources.

Table 13: Summary of Funding Sources

Funding Sources	Percent of Total Project Cost	Total Cost by Source

Recipient Funding	75%	$ 26,165,559
Reclamation Funding	11.4%	$ 3,978,924
Other Federal Funding	13.6%	$ 4,742,929
Total	**100%**	**$ 34,887,412**

The Phase 1 project was awarded Small Storage Program 2022 funding, and the GBJPA executed an agreement in November 2023 in the amount of $4,742,929, which provided partial funding based on the eligible benefits. This application seeks additional Small Project Program funding in the amount of $3,978,924 which together represents funding up to the full eligible amount of $8,721,853.

2.2 Budget Proposal

The estimated cost of the project including feasibility study, environmental assessments, all associated construction costs, and permitting is **$34,887,412**. (See **Table 14** - Budget Proposal). A detailed and itemized breakdown of each facility and component of the project in **Table 14** can be found in **Appendix N**. The GBJPA is requesting approximately **$8,721,853** (or just less than 25% of total project costs) in federal funding from the Reclamation for this Project. The GBJPA is estimated to provide 75% of project funding if the requested award amount is granted. At this time, the GBJPA is solely responsible for the funding of the Project. Additionally, the GBJPA submitted detailed documentation to support the Project costs as part of the Reclamation's previous funding award.

Table 14. Budget Proposal

Groundwater Banking Joint Power Authority										
R24AS00010 Phase 1 - Kern Fan Groundwater Storage Project										
			GBJPA Project Costs			**Budget**				
Item		**Budget Item Description**	**$/Unit**	**Unit**	**QTY**	**GBJPA Funding**	**USBR Agreement No. R23AP00368**	**Reclamation Funding (NOFO R23AS00010)**	**Total**	**Explanation of Estimate**
1		***Contractual / Construction***							**31,687,412**	
	a	Land Acquisition	8,995,398	LS	1	8,995,398			8,995,398	engineers est.
	b	Well Drilling	1,173,973	LS	4	2,817,534	1,878,356		4,695,890	engineers est.
	c	Well Equipping	1,411,968	LS	4	3,388,724	2,259,149		5,647,873	engineers est.
	d	Conveyance	7,323,113	LS	1	3,863,444	530,424	2,929,245	7,323,113	engineers est.

	e	Recharge Ponds	12,706	Ac.	360	3,524,459		1,049,679	4,574,138	engineer s est.
	f	SCADA and PLC Programming	451,000	LS	1	451,000			451,000	engineer s est.
2		***Environmental and Regulatory Compliance***							**205,000**	
	a	Reclamation NEPA Review (Agreement No.	75,000	LS	1		75,000		75,000	Per Agreeme nt No. R23AP00 368
	b	Environmental studies, surveys, groundwater impact analysis, and biological education	130,000	LS	1	130,000			130,000	prior project
3		E&R percent of total cost ***Engineering and Administration***							**2,995,000**	
	a	Engineering Design	1,245,000	LS	1	1,245,000			1,245,000	past project
	b	Construction Management & Inspection	1,500,000	LS	1	1,500,000			1,500,000	past project
	c	Communicatio n Design & Equipment	250,000	LS	1	250,000			250,000	past project
4		***Total***							**$34,887,411.81**	
	a	GBJPA Contribution				**$26,165,558.86**				
	b	USBR Agreement No. R23AP00368					**$4,742,929.00**			
	c	Reclamation Contribution						**$3,978,923.95**		
	d	Percent Funded by GBJPA							**75%**	

2.3 Budget Narrative

Table 15. Budget Narrative Form

Summary **Figures in this summary table are calculated from entries made in subsequent categories, only blank white cells require data entry.**

6. Budget Object Category	Total Cost	Federal Estimated Amount	Non-Federal Estimated Amount
a. Personnel	$0		
b. Fringe Benefits	$0		
c. Travel	$0		
d. Equipment	$0		
e. Supplies	$0		
f. Contractual	$8,995,398		
g. Construction	$25,892,014		
h. Other Direct Costs	$0		
i. Total Direct Costs	$34,887,412		
i. Indirect Charges	$0		
Total Costs	$34,887,412	$8,721,853	$26,165,559
Cost Share Percentage		25%	75%

The following is a description of the line items in **Table 14** in the budget proposal and the required Budget Narrative Form in **Table 15.**

Contractual / Construction – Work in this section will be done by contractors and consultants. All required materials as shown in detailed project budgets from the Project and Capital Budget are shown in **Appendix N**.

Environmental and Regulatory Compliance - The GBJPA has worked with Reclamation to determine the potential environmental effects the proposed Project may have with the National Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA), Endangered Species Act (ESA), and the Clean Water Act to ensure compliance with all applicable environmental laws. The proposed project's impacts were analyzed in the Kern Fan Groundwater Storage Project Environmental Impact Report (EIR). The EIR and a Mitigation Monitoring Reporting Program (MMRP) was adopted by the GBJPA on December 28, 2020. On October 23, 2023, Reclamation determined the Project was excluded from the National Environmental Policy Act (NEPA) under exclusion category 43 CFR § 46.210(c). The MMRP contains mitigation measures that RRBWSD and its contractors would adhere to during construction, to ensure impacts to Air Quality, Water Quality and Quantity, and any sensitive animal species would be mitigated and reduced to a less-than-significant level.

The GBJPA provided all funding related to environmental and regulatory compliance for the Project regarding CEQA and NEPA compliance requirements.

Engineering and Administration - This is the estimated cost for engineering design and specifications for facility design, surveying, and construction management (including inspection) as well as contractor construction activities for each component. Design is estimated at 5% of total project costs, surveying and testing 1%, and inspection 2% for a combined 8% of project costs. This is consistent with prior RRB and IRWD projects.

Total Costs – These are the totals for GBJPA contribution, Reclamation contribution, and the total estimated cost of the project. See **Tables 12, 13, and 14** for the total Federal and Non-Federal cost-share amounts.

2.4 Letters of Commitment

No project funding will be provided by a source other than the GBJPA, thus, no letters of commitment were necessary.

3. Environmental and Cultural Resources Compliance

Submission of the environmental and regulatory compliance within the application is recommended, but not required. Submission of environmental and cultural resources compliance is mandatory prior to issue of an award. Please answer the questions from Section H.1., Environmental and Cultural Resource Considerations, in this section.

To allow Reclamation to assess the probable environmental and cultural resources impacts and costs associated with each application, all applicants must respond to the following list of questions focusing on NEPA, ESA, and NHPA requirements. Applicants are to answer the following questions to the best of their knowledge. If any question is not applicable to the project, please explain why. The application should include the answers to the following questions.

Will the proposed project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.

The proposed Project components are both near and within developed agriculture and recharge basins. The proposed Project will require significant earth-disturbing activities. When considering the potential surface area to be disturbed the most surface area. This would require clearing and grubbing of approximately 360 acres of area that is currently heavily disturbed with ongoing intensive farming activities. The installation of the conveyance would also be a ground-disturbing activity that would occur primarily on or next to the existing recharge ground. The drilling and equipping of the wells, as well as the installation of interbasin structures, would require minimal excavation to construct. RRBWSD, as well as local contractors, have extensive experience with excavating activities and utilize best management practices concerning dust and erosion control.

The proposed project's impacts were analyzed in the Kern Fan Groundwater Storage Project Environmental Impact Report (EIR). The EIR and a Mitigation Monitoring Reporting Program (MMRP) was adopted by the GBJPA on December 28, 2020. On October 23, 2023,

Reclamation determined the Project was excluded from the National Environmental Policy Act (NEPA) under exclusion category 43 CFR § 46.210(c). The MMRP contains mitigation measures that RRBWSD and its contractors would adhere to during construction, to ensure impacts from the Project are mitigated and reduced to a less-than-significant level. Additionally, RRBWSD or its contractor would follow all state, county, and air pollution control board requirements to minimize dust on to the surrounding areas.

All earth-disturbing activities will be done absent of local irrigation or drain water in the canals or drains. Disturbed earth will have no contact with flowing water and therefore will have no impact on irrigation supply water or drain water. Project activities would not occur on natural streams or river channels. The presence of working facilities along with routine RRBWSD and farmer activities make it unlikely for animals to use project sites as habitats. Potential impacts have been analyzed and relevant mitigation measures have been adopted by the GBJPA. All necessary compliance required for both CEQA and NEPA has and will continue to be implemented.

Is the applicant 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? If so, would they be affected by any activities associated with the proposed project?

Although all Project activities are going to be conducted on land that is routinely disturbed by farming operations and existing recharge basin land cover, Kern County is known to have a habitat that can support endangered and threatened species. The project areas contain suitable habitats for three special-status mammal species, including an additional special-status species that were observed on-site during the reconnaissance survey. San Joaquin kit fox, Tipton kangaroo rat, and Nelson's antelope squirrel are three species that have a medium or high potential to occur on-site based on past detections and observed suitable habitat in the area. The additional special-status species observed on-site is the American badger. The proposed project could result in adverse impacts on migratory birds protected under the MBTA and special-status bird species, including the Burrowing owl, Swainson's hawk, California horned-lark, and Tricolored blackbird. However, the proposed Project's impacts were analyzed in the Kern Fan Project EIR which was adopted along with the MMRP which includes mitigation measures that would reduce impacts to less-than-significant levels for Federally listed or proposed to be listed endangered species or designated critical habitats during construction and operation of the proposed Project. Please see **Appendix O** for access to the Kern Fan Project DEIR and FEIR.

In addition, the GBJPA provided Project-specific information to Reclamation pursuant to Section 7 Endangered Species Act consultation with the United States Fish and Wildlife Service (USFWS). Reclamation's review of the proposed Project information and available data resulted in a "No Effect" determination to the USFWS which then concluded the Section 7 Endangered Species Act consultation process.

Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as "Waters of the United States?" If so, please describe and estimate any impacts the proposed project may have.

According to the U.S. Fish and Wildlife Service National Wetlands Inventory, there are no wetlands within Project boundaries. There are, however, wetlands indicated in the nearby vicinity of the Project site, but they are not expected to be negatively impacted by the Project due to the limited nature of the ground disturbance.

When was the water delivery system constructed?

RRBWSD operates a surface water delivery system with more than 25 miles of earthen canals. The water delivery system was developed in the 1970s. Many of the canal alignments have been realigned or modified over that time. Additionally, almost all of the check and gate structures have been replaced or updated over the same period to maintain a working water delivery system. Due to increases in water demand over time, additional water delivery features and enlargements have been constructed for better water management and increased operational flexibility.

Will the proposed project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.

There will be no modifications to an existing irrigation distribution system.

Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at the applicant's local Reclamation office or the State Historic Preservation Office can assist in answering this question.

There are no registered historical landmarks within the project boundaries. The GBJPA retained cultural resources management consultant ASM Affiliates to conduct a Class III Inventory/Phase I Survey within a 350-acre Area of Potential Effect. The report prepared by ASM Affiliates was used to facilitate a State Historic Preservation Officer consultation pursuant to the National Historic Preservation Act. Reclamation made a finding of *No Historic Properties Affected* and prepared a memorandum to the State Historic Preservation Officer.

Are there any known archeological sites in the proposed project area?

The GBJPA does not have any knowledge of known archeological sites within or in the vicinity of the proposed Project sites. A Class III Inventory/Phase I Survey was conducted within a 350-acre Area of Potential Effect and found no previously recorded sites identified in the Area of Potential Effect. Prior to construction, the GBJPA will contract with a qualified archaeologist to prepare a Cultural Resources Mitigation and Monitoring Program.

Will the proposed project have a disproportionately high and adverse effect on low income or minority populations?

The proposed Project will not have a disproportionately high and adverse effect on low income or minority populations. Construction of the Project will support the agricultural-based economy in the Southern San Joaquin Valley.

Will the proposed project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?

The proposed Project will not limit access to the 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?

The proposed Project will not contribute to the introduction, continued existence, or spread of noxious weeds or non-native species in the region.

4. Required Permits or Approvals

There are multiple required permits for a Project with this many components. For environmental compliance, all CEQA and NEPA requirements have been satisfied. Other project approvals and permits that will be obtained prior to construction include:

1. A California State Water Resources Control Board approved Stormwater Pollution Prevention Plan (SWPPP) is required to be filed through the Stormwater Multiple Application and Report Tracking System (SMARTS).
2. Caltrans permits will be required for the crossing underneath Stockdale Highway and State Highway 43.
3. County of Kern Environmental Health Department well drilling permits are required for any drilling or construction of new wells in Kern County.
4. In compliance with Executive Order N-7-22, coordination with the applicable Groundwater Sustainability Agency will also be required.

5. Overlap or Duplication of Effort Statement

Applicants must also state if the proposal submitted for consideration under this program does or does not in any way duplicate any proposal or project that has been or will be submitted for funding consideration to any other potential funding source—whether it be Federal or non-Federal. If such a circumstance exists, applicants must detail:

- ***when the other duplicative proposal(s) were submitted,***
- ***to whom (agency name and Financial assistance program), and***
- ***when funding decisions are expected to be announced. If at any time a proposal is awarded funds that would be duplicative of the funding requested from***

Reclamation, applicants must notify the NOFO point of contact or the program coordinator immediately.

This grant application submitted for consideration under the USBR's Small Storage Projects does duplicate a similar proposal that was submitted by the GBJPA on June 15, 2022, to the Bureau of Reclamation. The previous application was submitted for consideration under the WaterSMART Drought Response Program: Drought Resiliency Projects for the Fiscal Year 2023 (R23AS00005). Grant funds were anticipated to be used towards the construction of the West Enos and Stockdale North Recharge and Recovery Project. The GBJPA was notified a few months after submission that the proposal was not awarded any federal funds, due to the size of the project. Because no funds were awarded, the GBJPA was encouraged to submit a similar proposal under the USBR's Small Surface Water and Groundwater Storage Project funding opportunity No. R23AS00019.

In December 2022, the GBJPA applied for funding under opportunity No. R23AS00019 for the Phase 1 Project. A notice of award for the funding opportunity was received in April 2023, and a funding agreement was executed (No. R23AP00368). The GBJPA received a notice to proceed on October 26, 2023. Due to additional funding being made available within USBR's Small Surface Water and Groundwater Storage Projects program, the GBJPA is seeking further financial support under funding opportunity No. R24AS00010 for the same Phase 1 Project that was awarded earlier this year (Agreement No. R23AP00368). The previous award only provided partial funding based on the total eligible federal benefits. This application seeks additional Small Project Program funding up to the full eligible funding amount.

Additionally, the GBJPA has been conditionally awarded state funding through the Water Storage Investment Program administered by the California Water Commission. Since a final funding agreement has not been executed with the California Water Commission yet, state funding will not be used to construct the proposed Phase 1 Project. It is expected that once a final funding agreement is executed, state funding will be used for later phases of the Kern Fan Project.

6. Letters of Support

Please see **Appendix J** for Letters of Support for the Kern Fan Project and Phase 1 of the Kern Fan Project.

7. Official Resolutions

The GBJPA intends to adopt an official resolution at its December 7, 2023, Board Meeting. Since the resolution will be adopted after the submission of this grant application, the applicant will submit the official resolution to the Reclamation Small Storage Program Coordinator. Since this project is similar to last year's application under NOFO R23AS00019, that Board Resolution is attached in **Appendix P.**

8. Conflict of Interest Disclosure

Per the Financial Assistance Interior Regulation (FAIR), 2 CFR §1402.112, no actual or potential conflict of interest exists.

9. Uniform Audit Reporting Statement

Please see **Appendix Q** for the GBJPA's Auditor's Report.

10. References

ASM Affiliates. Class III Inventory/Phase I Survey, Groundwater Banking JPA, West Enos and North Stockdale Recharge Ponds Project, Kern County, California. July 2023, PN 30580.03.

California Department of Water Resources (DWR), 2022. *Critically Overdrafted Basins Map*. Retrieved from DWR: https://water.ca.gov/programs/groundwater-management/bulletin-118/critically-overdrafted

California, State of. "California Water Plan Update 2023." Department of Water Resources, water.ca.gov/Programs/California-Water-Plan/Update-2023. Accessed 26 Oct. 2023.

California's Water Supply Strategy – Adapting to a Hotter, Drier Future, August 2022.

Climate and Economic Justice Screening Tool, screeningtool.geoplatform.gov/en/#3/33.47/-97.5. Accessed 26 Oct. 2023.

Curtis M. Skaggs, PE, 2022. Preliminary Design Report. *Kern Fan Groundwater Storage Project – Proposed Projects and Capital Budget for 2022-23 through 2024-25*

Groundwater Banking JPA (GBJPA), 2020. Kern Fan Groundwater Storage Project Draft Environmental Impact Report SCH No. 2020049019. Prepared by Environmental Science Associates (ESA), 2020.

M. Cubed, 2022. Technical Memorandum. Estimate of Benefits from the Kern Fan Groundwater Storage Project – Phase 1 for the Small Surface Water and Groundwater Storage Projects Program

MBK Engineers, 2022. Technical Memorandum. *Updated Analysis of Kern Fan Groundwater Storage Project*

Thomas Harder & Co., 2021. Technical Memorandum. *Recharge and Recovery Suitability Report for the Bolthouse Property.*

Thomas Harder & Co., 2021. Technical Memorandum. *Recharge and Recovery Suitability Report for the Diamond Property.*

Thomas Harder & Co., 2022. Technical Memorandum. *Aquifer Storage Potential for the West Enos and North Stockdale Portions of the Kern Fan Storage Project*

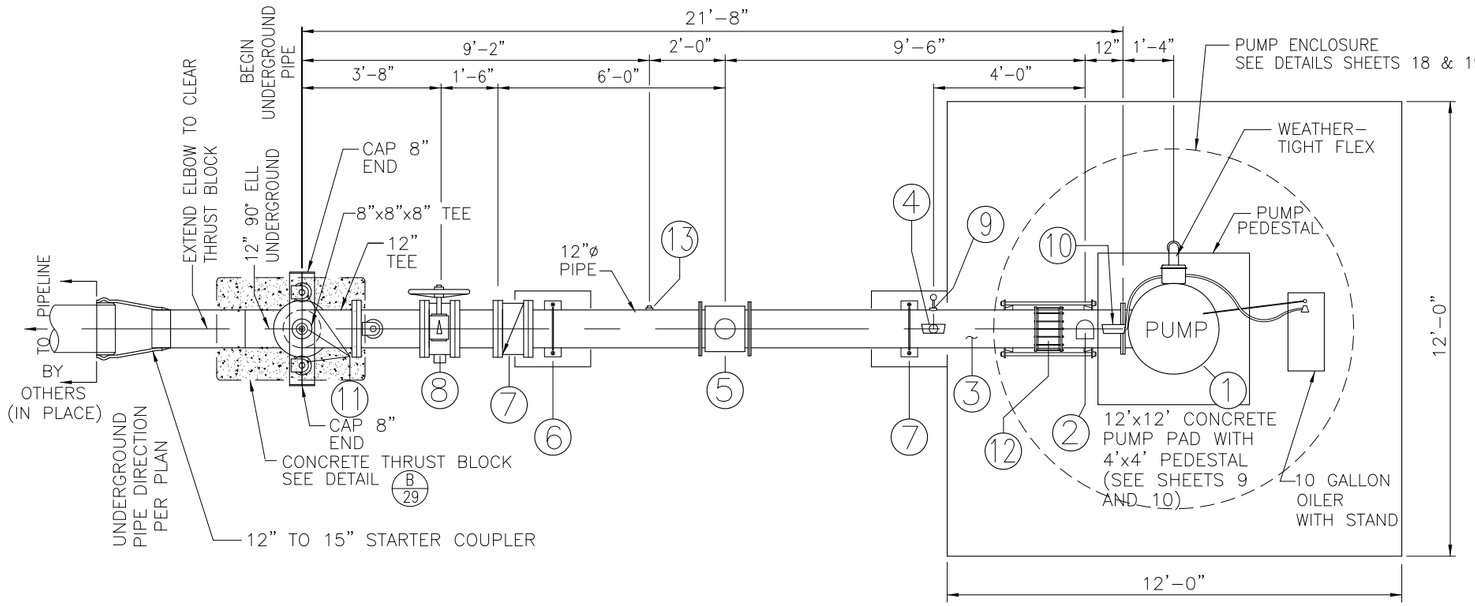
U.S. Drought Monitor, droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?West. Accessed 26 Oct. 202

Appendix A – Well-Equipping Layout

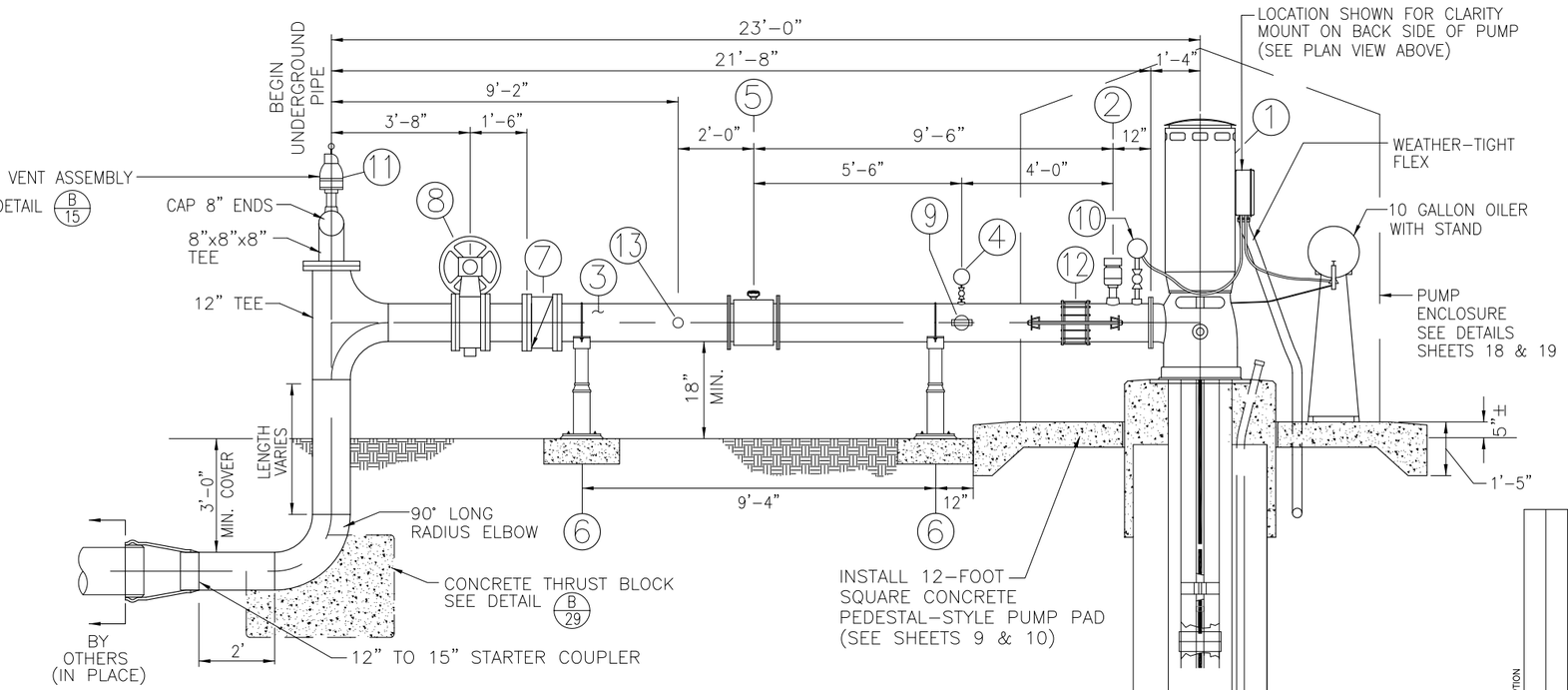
SCOPE OF WORK

1. PUMPHEAD AND MOTOR ASSEMBLY
2. 3" WATERMAN AV–150 AIR VENT
3. 12" DISCHARGE PIPE
4. PRESSURE GAUGE – 3" OIL FILLED, TO 100 PSI
5. 12" FLOWMETER – 12" SEAMETRICS AG3000P IN–LINE MAG METER (READS IN CFS AND TOTALIZES IN ACRE–FEET – 0 TO 8 CFS)
   NOTE: REQUIRES ALTERNATING CURRENT
6. (2) ADJUSTABLE SADDLE TYPE SUPPORT (SEE DETAIL A/15)
7. 12" WAFER CHECK VALVE – FRESNO VALVE SERIES 3700, WATERMAN PC–150 OR APPROVED EQUAL
8. 12" BUTTERFLY VALVE – GRAYLINE 8400 SERIES BFV WAFER STYLE VALVE W/ WORM GEAR OPERATOR AND HAND WHEEL OR APPROVED EQUAL
9. 1" BALL VALVE (MOUNTED ON SIDE OF 12" PIPE)
10. HIGH PRESSURE KILL (SHUT–OFF) SWITCH (OFF @ 80 PSI) MERCOID DAW–7000 OR APPROVED EQUAL
11. (3) VENT – 4" WATERMAN CR101 (SEE DETAIL B/15)
12. 12" DRESSER TYPE COUPLING (CONSTRAINED) DRESSER STYLE 253 OR APPROVED EQUAL
13. 1" THREADED COLLAR W/ PLUG (FOR RATING WELL)

NOTE:
THIS DETAIL APPLIES TO THE FOLLOWING WELLS:
SE–1 & SE–2



A/14 TYPICAL WELL DISCHARGE PLAN
WELLS SE–1 & SE–2 SCALE: 1" = 2'



B/14 TYPICAL WELL DISCHARGE PROFILE
WELLS SE–1 & SE–2 SCALE: 1" = 2'

REGISTERED PROFESSIONAL ENGINEER
WILLIAM W. ZEIDERS
Lic. No. 40031
Expires 12/31/19
CIVIL
STATE OF CALIFORNIA

REV.	DATE	DESCRIPTION
1		

DATE: AUGUST 20, 2019
SCALE: AS NOTED
DRAWN BY: A. TAYLOR
CHECKED BY: W. ZEIDERS
FILE NAME: RRBWSD–STOCKDALE–EAST–WELLS

2014 DROUGHT RELIEF PROJECT
STOCKDALE EAST
RECOVERY WELLS AND PIPELINE PROJECT
TYPICAL WELL DISCHARGE DETAILS

ZEIDERS CONSULTING
1655 CREELEY ROAD
BAKERSFIELD, CA. 93314
(661) 589–8366

849 ALLEN ROAD
P.O. BOX 20820
BAKERSFIELD, CA. 93390

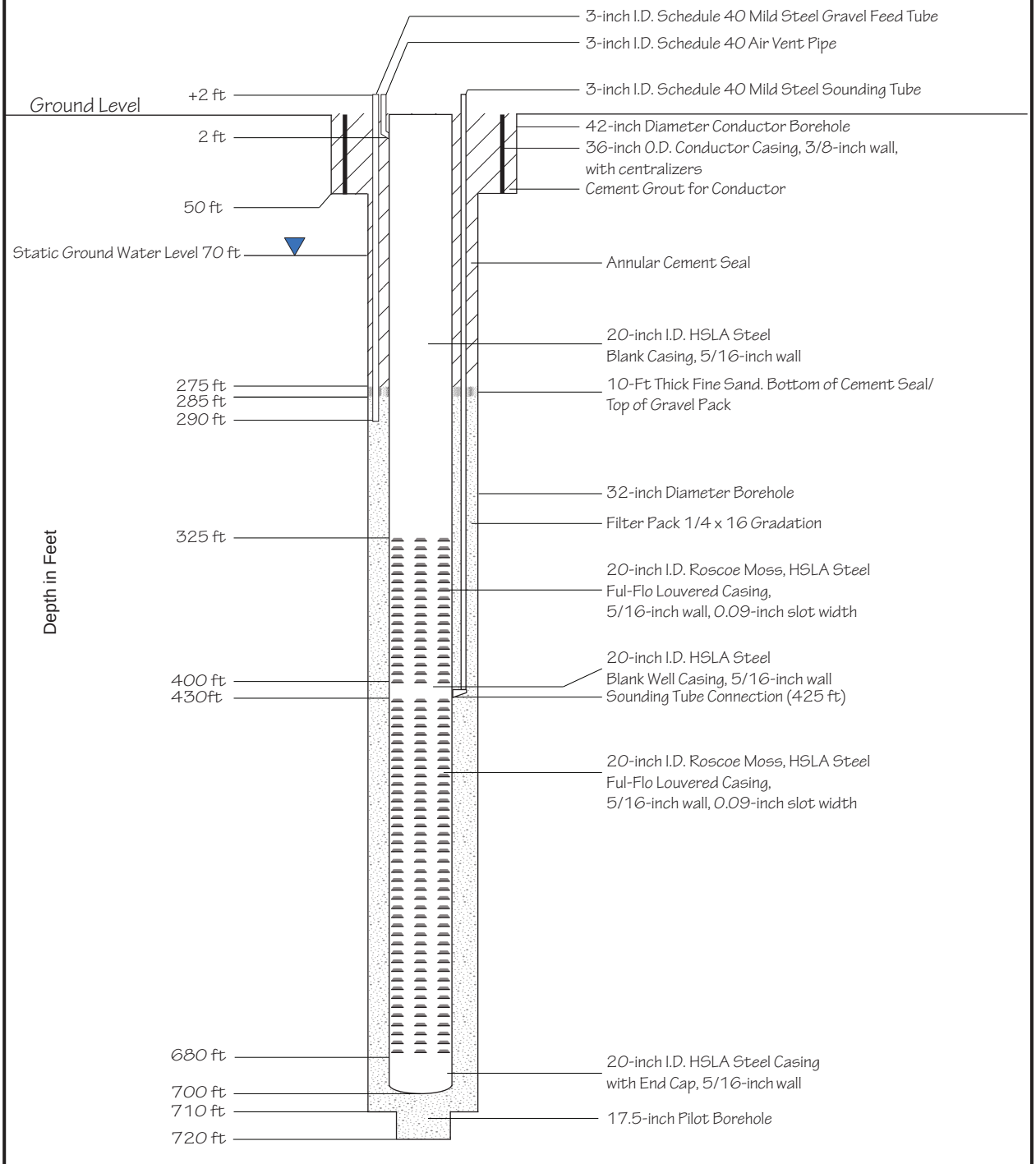
Appendix B – Well Design

DRAFT

Recommended Casing, Screen and Filter Pack Design
Well SE-1

Rosedale-Rio Bravo Water Storage District

19-Feb-20



Notes:

1. Not to Scale.
2. Casing centralizers installed every 80 ft (not shown).

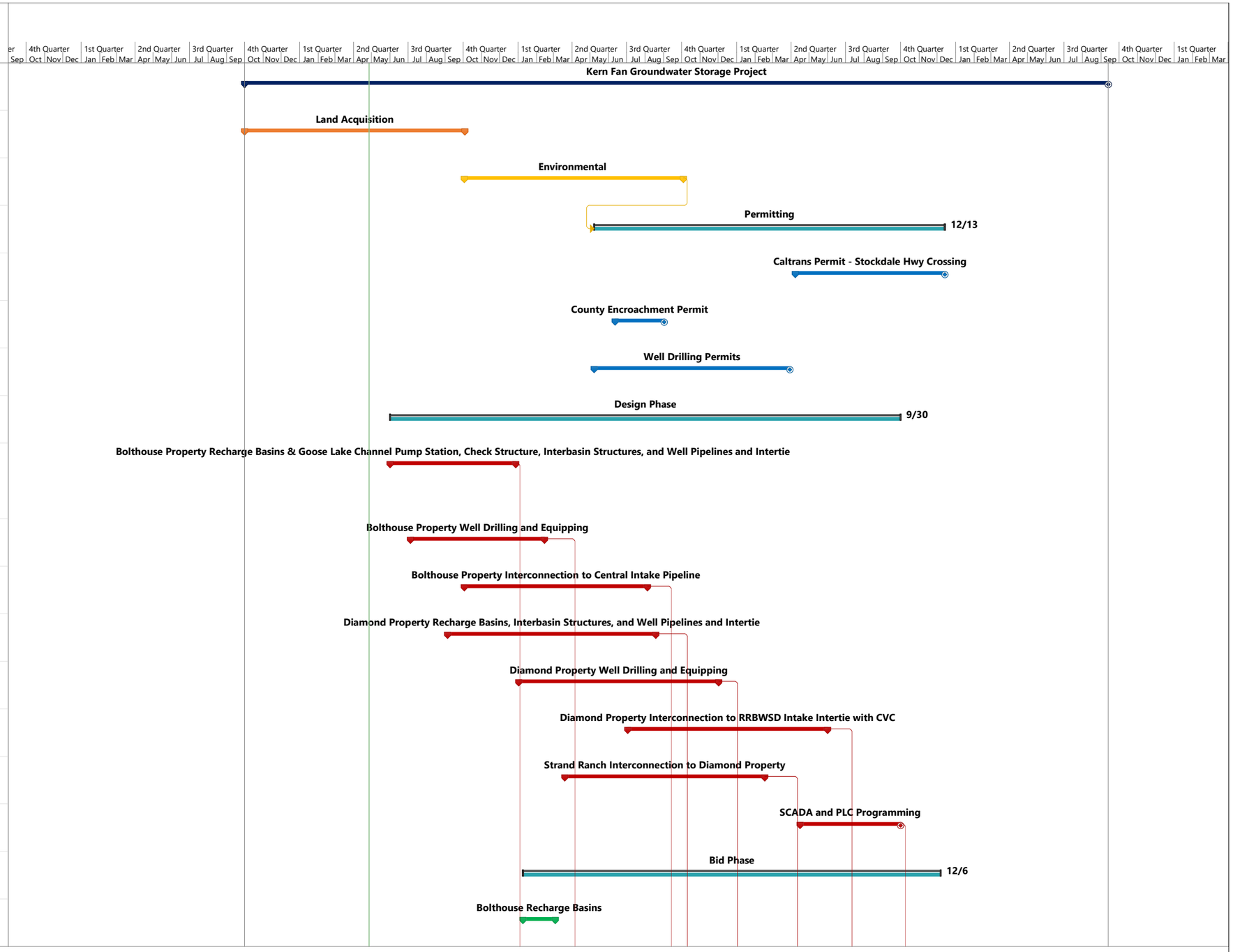
Thomas Harder & Co.
Groundwater Consulting

Recommended Well Design
Figure 2

Appendix C – Project Schedule

2023 Updated Project Schedule (per USBR Agreement No. R23AP00368)				
Milestone/Task/Activity	**Planned Start Date**	**Planned Completion Date**		***Comments/Notes***
Task 1. Environmental Compliance (CEQA & NEPA)	10/3/2022	11/3/2023		
Task 2. Permitting	5/8/2023	12/30/2025		Caltrans Permits, Well Drilling Permits, & SJVAPCD Permit
Task 3. Design Phase	6/1/2022	6/30/2025		60-100% Recharge, Well Drilling, & Well Equipping Plans
Task 4. Construction Bid Phase	1/9/2023	1/31/2026		
Task 5. Construction Phase	1/31/2024	9/30/2026		
5.1 Recharge Basin Construction	1/3/2024	6/30/2025		West Enos 1/3/24 thru 6/30/24 & Stockdale North 1/3/25 thru 6/30/25
5.2 Well Drilling	1/2/2025	2/28/2026		West Enos 8/1/24 thru 2/28/25 & Stockdale North 8/1/25 thru 2/28/26
5.3 Well Equipping	6/1/2025	12/30/2026		West Enos 3/1/25 thru 3/30/26 & Stockdale North 3/1/26 thru 9/30/26

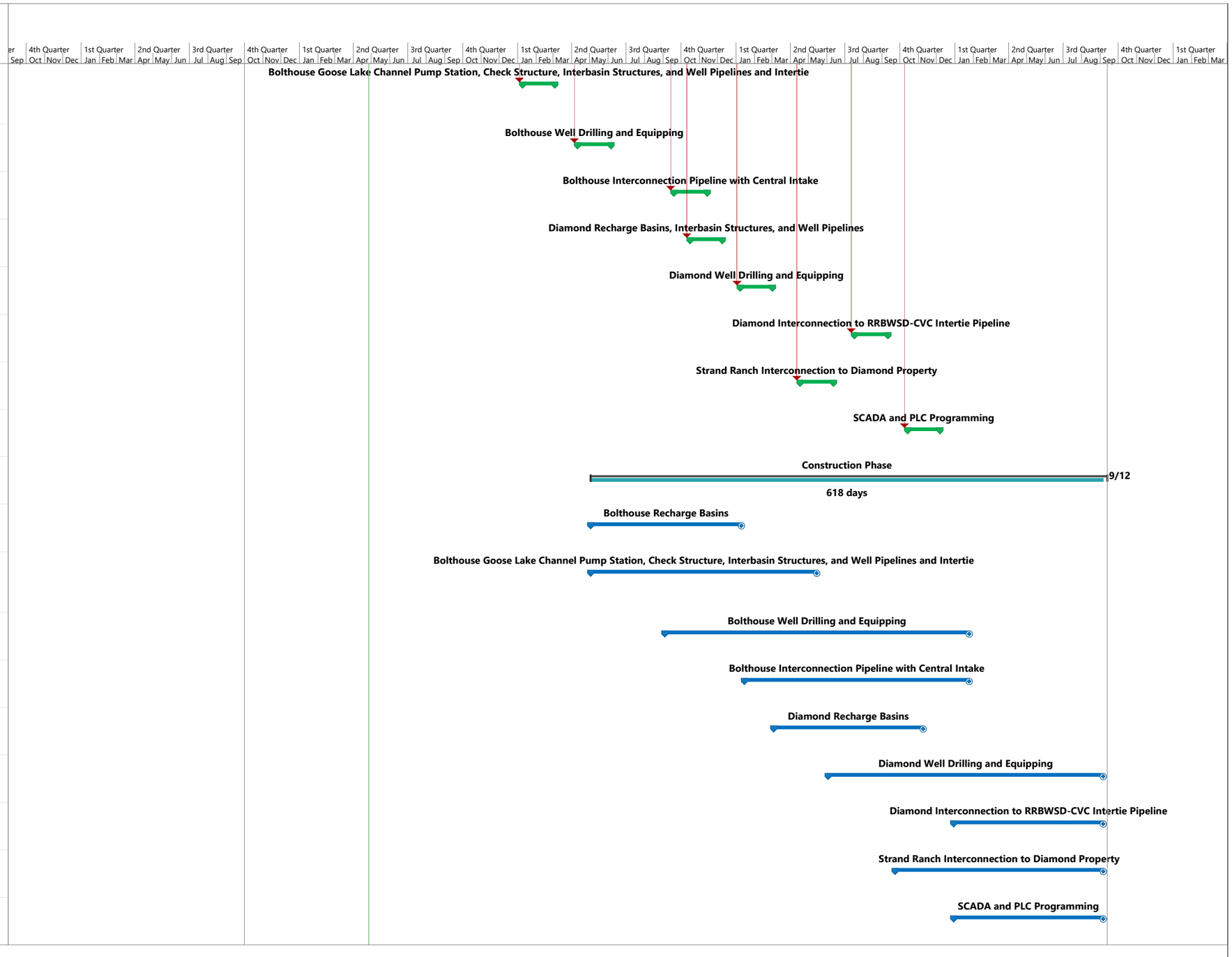
ID	Task Name	Duration	Start	Finish
0	**Kern Fan Groundwater Storage Project**	**1031 days**	**Fri 10/1/21**	**Fri 9/12/25**
1	Land Acquisition	262 days	Fri 10/1/21	Mon 10/3/22
2	Environmental	262 days	Mon 10/3/22	Tue 10/3/23
3	**Permitting**	**420 days**	**Mon 5/8/23**	**Fri 12/13/24**
4	Caltrans Permit - Stockdale Hwy Crossing	180 days	Mon 4/8/24	Fri 12/13/24
5	County Encroachment Permit	60 days	Mon 6/12/23	Fri 9/1/23
6	Well Drilling Permits	235 days	Mon 5/8/23	Fri 3/29/24
7	**Design Phase**	**609 days**	**Wed 6/1/22**	**Mon 9/30/24**
8	Bolthouse Property Recharge Basins & Goose Lake Channel Pump Station, Check Structure, Interbasin Structures, and Well Pipelines and Intertie	150 days	Wed 6/1/22	Tue 12/27/22
9	Bolthouse Property Well Drilling and Equipping	8 mons	Tue 7/5/22	Mon 2/13/23
10	Bolthouse Property Interconnection to Central Intake Pipeline	11 mons	Mon 10/3/22	Fri 8/4/23
11	Diamond Property Recharge Basins, Interbasin Structures, and Well Pipelines and Intertie	250 days	Mon 9/5/22	Fri 8/18/23
12	Diamond Property Well Drilling and Equipping	12 mons	Mon 1/2/23	Fri 12/1/23
13	Diamond Property Interconnection to RRBWSD Intake Intertie with CVC	12 mons	Mon 7/3/23	Fri 5/31/24
14	Strand Ranch Interconnection to Diamond Property	240 days	Mon 3/20/23	Fri 2/16/24
15	SCADA and PLC Programming	120 days	Tue 4/16/24	Mon 9/30/24
16	**Bid Phase**	**500 days**	**Mon 1/9/23**	**Fri 12/6/24**
17	Bolthouse Recharge Basins	40 days	Mon 1/9/23	Fri 3/3/23



Project: Kern Fan Groundwater
Date: Wed 4/27/22

Task	Summary	Inactive Milestone	Duration-only	Start-only	External Milestone	Path Successor Summary Task	Critical Split
Split	Project Summary	Inactive Summary	Manual Summary Rollup	Finish-only	Deadline	Path Successor Normal Task	Progress
Milestone	Inactive Task	Manual Task	Manual Summary	External Tasks	Path Successor Milestone Task	Critical	Manual Progress

ID	Task Mode	Task Name	Duration	Start	Finish
18		Bolthouse Goose Lake Channel Pump Station, Check Structure, Interbasin Structures, and Well Pipelines and Intertie	40 days	Mon 1/9/23	Fri 3/3/23
19		Bolthouse Well Drilling and Equipping	40 days	Tue 4/11/23	Mon 6/5/23
20		Bolthouse Interconnection Pipeline with Central Intake	40 days	Tue 9/19/23	Mon 11/13/23
21		Diamond Recharge Basins, Interbasin Structures, and Well Pipelines	40 days	Mon 10/16/23	Fri 12/8/23
22		Diamond Well Drilling and Equipping	40 days	Mon 1/8/24	Fri 3/1/24
23		Diamond Interconnection to RRBWSD-CVC Intertie Pipeline	40 days	Wed 7/17/24	Tue 9/10/24
24		Strand Ranch Interconnection to Diamond Property	40 days	Wed 4/17/24	Tue 6/11/24
25		SCADA and PLC Programming	40 days	Mon 10/14/24	Fri 12/6/24
26		**Construction Phase**	**618 days**	**Wed 5/3/23**	**Fri 9/12/25**
27		Bolthouse Recharge Basins	180 days	Wed 5/3/23	Tue 1/9/24
28		Bolthouse Goose Lake Channel Pump Station, Check Structure, Interbasin Structures, and Well Pipelines and Intertie	270 days	Wed 5/3/23	Tue 5/14/24
29		Bolthouse Well Drilling and Equipping	365 days	Mon 9/4/23	Fri 1/24/25
30		Bolthouse Interconnection Pipeline with Central Intake	270 days	Mon 1/15/24	Fri 1/24/25
31		Diamond Recharge Basins	180 days	Mon 3/4/24	Fri 11/8/24
32		Diamond Well Drilling and Equipping	330 days	Mon 6/3/24	Fri 9/5/25
33		Diamond Interconnection to RRBWSD-CVC Intertie Pipeline	180 days	Mon 12/30/24	Fri 9/5/25
34		Strand Ranch Interconnection to Diamond Property	250 days	Mon 9/23/24	Fri 9/5/25
35		SCADA and PLC Programming	180 days	Mon 12/30/24	Fri 9/5/25



Project: Kern Fan Groundwater
Date: Wed 4/27/22

Task	Summary	Inactive Milestone	Duration-only	Start-only	External Milestone	Path Successor Summary Task	Critical Split				
Split	Project Summary	Inactive Summary	Manual Summary Rollup	Finish-only	Deadline	Path Successor Normal Task	Progress				
Milestone	Inactive Task	Manual Task	Manual Summary	External Tasks	Path Successor Milestone Task	Critical	Manual Progress				

Appendix D – M. Cubed Tech Memo

October 2022

SMALL SURFACE & GROUNDWATER STORAGE PROJECT FEASIBILITY STUDY

Phase 1 - Kern Fan Groundwater Storage Project

APPENDIX E

Irvine Ranch Water District

ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT

GBJPA Groundwater Banking Joint Powers Authority

POLICY ANALYSIS FOR THE PUBLIC AND PRIVATE SECTORS

M.CUBED

October 5, 2022

To: Fiona Sanchez, Irvine Ranch Water District

From: Richard McCann, Partner

RE: Estimate of Benefits from the Kern Fan Groundwater Storage Project- Phase 1 for the Small Surface Water and Groundwater Storage Projects Program

Introduction

This technical memo outlines the data and methodological approach for calculating the economic benefits of Irvine Ranch Water District's (IRWD) and Rosedale Rio Bravo Water Storage District's (Rosedale) proposed Kern Fan Groundwater Storage Project Phase 1 in support of a feasibility study under the Small Surface and Groundwater Storage Projects Program. Total estimated benefits amount to $170.7 million.

Overview

The Kern Fan Integrated Groundwater Storage Project will provide ecosystem benefits for the Delta and its tributaries and other public and non-public benefits by recharging and storing up to 100,000 acre-feet (AF) of unallocated State Water Project (SWP) Article 21 water, unallocated Kern River floodwater, and other water, as available, in the Kern County groundwater basin. Water would be stored for subsequent extraction and recovery to offset surface water demands during periods of need. Deliveries of unallocated Article 21 water would be made on behalf of Irvine Ranch Water District (IRWD) as a landowner in Dudley Ridge Water District (DRWD) and Rosedale as a sub-unit of the Kern County Water Agency. During droughts or times of need when surface supplies are reduced, stored groundwater will be recovered from the Project with up to 12 new extraction wells and conveyed to points of use in DRWD, IRWD and Rosedale's service areas. Phase 1 of the Kern Fan Groundwater Storage Project (Project), will provide approximately 28,000 AF of groundwater storage, 300 acres of recharge basins, and 4 recovery wells. The project will provide a variety of benefits, including water supply, groundwater improvement, ecosystem, and agriculture benefits. Based on project information provided by IRWD, Rosedale, MBK Engineers, M.Cubed completed estimates of the economic benefits in these five benefit categories. Estimates of the net present value (NPV) of total benefits in 2022 dollars are outlined in Table 1.

Table 1. Summary of Benefit Estimates – Phase 1

Type of Benefit	NPV of Benefits (2.25% Discount Rate)
Water Supply Benefits—M&I	$21.1
Water Supply Benefits—Agriculture	$51.2
Water Supply Benefits--Groundwater	$4.0
Environmental Benefits—Incidental Wetland Habitat	$62.2
Agricultural Benefits	$32.2
Total Benefits	$170.7

Project benefits are expected to begin in 2026 and continue throughout the 50-year life of the project, through 2075. We calculate net present value at the project start in 2026. The net present value calculation uses a discount rate of 2.25%, which is the rate Federal agencies use in water resources planning.[1]

Throughout this analysis we rely primarily on work already produced for the Kern Fan Project to apply for funding under California's Water Storage Investment Program (WSIP).

Benefits

Water Supply--Municipal and Industrial

Municipal and Industrial (M&I) Water Supply benefits are non-public benefits that will accrue to IRWD, Rosedale, and Dudley Ridge, and their service area customers. According to modeling results from MBK Engineers, considering only Article 21 water supplies, the project will provide on an average annual basis 2,482 acre-feet of water. Approximately three-quarters of the total water supply will be available to Rosedale and Dudley Ridge for agricultural use, and the remaining one-quarter will be available to IRWD under both future conditions.

We use the alternative cost approach to estimate the water supply benefits of the project. The water supply benefit is divided between agricultural (75%) and urban uses (25%), which face different alternative costs of water. Urban supplies will be augmented an average of 428 acre-feet per year on average.

For urban municipal and industrial uses by IRWD, the alternative supply cost is the Tier 1 untreated rate from Metropolitan Water District of Southern California (MWDSC), which was $676 per AF in 2015. We escalate this rate over time using MWDSC's forecast of Tier 1 prices as found in their Ten-Year Financial Forecast provided at a February 9, 2016 MWDSC Board Meeting.[2] According to the forecast of Full Service Untreated Tier 1 water, prices are projected to increase by an average of 5.6% from 2016 to 2026. Over the same period, average CPI inflation is projected to be 2.3%, resulting in an average real price increase of 3.3%. We apply this rate of increase to MWDSC Tier 1 rates over the life of the project. We consider documentation provided by MWDSC on their expected price increases to be sufficient rationale and documentation of urban water price escalation. We also apply conveyance costs using data provided by

[1] U.S. Bureau of Reclamation, "Change in Discount Rate for Water Resources Planning," https://www.federalregister.gov/documents/2022/02/03/2022-02295/change-in-discount-rate-for-water-resources-planning, February 3, 2022.

[2] MWDSC Board meeting minutes with forecast summary included in the Appeal Supplement.

Dudley Ridge, which includes monthly conveyance costs from 2001 to 2017.[3] Conveyance costs average $21.15 per AF in 2022 dollars.

Applying the 2.25% discount rate to the stream of alternative water supply costs, we arrive at the total net present value of non-public water supply benefits of **$21.1 million** in 2022 dollars.

Water Supply--Agricultural

We use the alternative cost approach to estimate the water supply benefits of the project. The water supply benefit is divided between agricultural (75%) and urban uses (25%), which face different alternative costs of water. All of Rosedale's water supply is used for agriculture, and half of IRWD's water supply goes toward agricultural end uses in Kern County. Agriculture will be augmented an average of 2,054 acre-feet annually.

For agricultural water use, we use the Delta Export unit value described in the groundwater benefit section above as the value of an alternative water supply for Rosedale and Dudley Ridge. Delta export values are provided for 2030 and 2045, which we re-weight according to the water year types during which IRWD and Rosedale are expected to recover stored groundwater according to MBK Engineers. Since IRWD and Rosedale are projected to accrue water supplies in different water year types (with Rosedale drawing on their supplies mainly in dry and critically dry years, while IRWD's supply benefits occur in above normal through critically dry years) two different water values are required—one weighted for IRWD's supply and one weighted for Rosedale's supply. These weights are available for 2030 and 2070 based on MBK's Engineering analysis. We therefore use water cost anchor points of 2030, 2045, and 2070—2030 unit values weighted at 2030 recovery levels, 2045 unit values weighted at 2030 recovery levels and 2045 unit values weighted at 2070 recovery levels. We interpolate between these points and extrapolate to find unit values for 2026 to 2075. These unit values range from $391 per AF for IRWD, and $400 per AF for Rosedale in 2030 to $1,039 per AF for IRWD and $1070 per AF for Rosedale in 2045 in 2022 dollars. We also apply conveyance costs using data provided by Dudley Ridge, which includes monthly conveyance costs from 2001 to 2017.[4] Conveyance costs average $21.15 per AF in 2022 dollars.

Applying the 2.25% discount rate to the stream of alternative water supply costs, we arrive at the total net present value of non-public water supply benefits of **$51.2 million** in 2022 dollars.

Water Supply--Groundwater

To evaluate the groundwater benefit, we use the alternative cost approach to estimate how much it would cost to purchase the same volume of water for groundwater recharge in Kern County as that provided by the project.

According to groundwater policy in Kern County, a portion of banked groundwater is not recovered by the banking entity and remains in the ground to bolster local groundwater levels. For this project groundwater basin leave-behind percentages vary depending on the water supply account--9% of water in the urban account and 4% of water in the agricultural account will be left to help recharge local basins, according to groundwater modeling assumptions used by MBK Engineers. These numbers are also consistent with an existing Memorandum of Understanding (MOU) between Rosedale and other Kern Fan banking entities. For the environmental account, we apply an average of these two rates, or 6.5%. Based on these values, we find a weighted average leave-behind rate of 6.6% in 2030 and 6.5% in 2070 and use these shares to calculate the total groundwater level benefit.

For the purpose of recharging groundwater, the alternative cost is considered to be the cost of purchasing water through a water market, likely in northern California, that would be exported through the Sacramento-San Joaquin Delta. For an estimate of average costs of purchasing Delta export water on the

[3] Data from Dudley Ridge WD included the Appeal Supplement.

[4] Data from Dudley Ridge WD included the Appeal Supplement.

water market, we use unit values developed by the California Water Commission in their Water Storage Investment Program Technical Reference.[5] These unit values were developed from a statistical analysis based on water transfer prices from 1992 to 2015, the Statewide Agricultural Production Model (SWAP), and assumptions regarding groundwater sustainability requirements in the state by 2045. These unit values were developed for various water year types (wet, above normal, below normal, dry, and critical) for 2030 and 2045, the year it is assumed that groundwater basins will reach sustainable levels. We weight Delta Export costs according to historic water year type frequency according to the San Joaquin River Water Year Index[6] to arrive at benchmark values for 2030 and 2045. As in the Non-Public Water Supply benefit above, we also added SWP conveyance costs to Delta Export costs. We use the same conveyance cost of $21.15 in 2022 dollars based on 2001-2017 conveyance cost data provided by Dudley Ridge. Interpolating between 2030 and 2045 values and taking the sum across all project years, we find a net present value of **$4.0 million** at the project start, in 2022 dollars.

Environmental—Incidental Wetland Habitat

The water storage project will provide incidental wetland habitat for migratory birds during the years that the Kern Fan Project takes and recharges water into storage. During those years, the 300 acres that comprise the project will be inundated with water to percolate into the groundwater basin. The ponds will provide temporary habitat to migratory bird species along the Pacific Flyway.

To estimate the benefits associated with this habitat, we used the alternative cost approach.

In an alternative approach scenario IRWD would purchase the land to create an equivalent amount of wetlands over a similar period as those created by the project. To estimate the land value, we use the cost of a permanent easement rather than outright purchase. Based on the Project cost estimates the cost of a long-term easement, suitable for constructing water conveyance facilities on would cost $12,613 per acre in 2022 dollars. Costs used include significant earthwork and interbasin structures to keep water in the basins, and conveyance facilities to deliver water to the basins. We also include the costs of restoring the land to its pre-wetland condition at the end of the project, based on a subset of costs from the project budget. For this approach, since the alternative project would only take excess water in wet years, we use the Delta Export unit value for wet years provided in the WSIP TR, which ranges from $231 in 2030 to $469 in 2045. We add in the conveyance cost from the period from 2001 to 2017, $21.15 per acre-foot. We interpolate between these values and leave prices beyond 2045 at $469 per AF to be conservative. Taking the net present value of this stream of benefits results in a total benefit of **$62.2 million** at the project start in 2022 dollars.

Agricultural Impact

The Phase 1 Project provides a greater degree of reliability for agricultural water supply, which creates benefits to local agriculture that go beyond the value of the water supply itself. According to Rosedale Rio Bravo Water Storage District the Kern Fan project would prevent approximately 570 acres of field crops from being fallowed in critically dry years when supplies are low. With increased reliability, they estimate that this acreage could instead be converted to higher value permanent crops, such as fruit or nut trees. While the value of agricultural water to the existing mix of crops is already included under the calculation of agricultural water supply benefit, the impact of crop conversion is a separate benefit.

To estimate the effects of crop conversion we use IMPLAN data for Kern County. IMPLAN is an input-output modeling software that allows users to estimate how economic changes in particular sectors impact the local economy. IMPLAN is an industry standard in modeling local economic impacts.

---

[5] California Water Commission. Technical Reference. November 2016. https://cwc.ca.gov/-/media/CWC-Website/Files/Documents/2017/WSIP/TechnicalReference.pdf

[6] California Department of Water Resources. http://cdec.water.ca.gov/reportapp/javareports?name=WSIHIST

We first gathered agricultural data from the Kern County Department of Agriculture and UC Davis Agricultural Extension's Cost and Return Studies. Using these data we estimate the per acre impact to agricultural output from a 570 acre increase in fruit and nut crops and a 570 acre decrease in field crops. Cotton accounts for the largest share of field crops both in terms of acreage and income. We therefore assume that cotton is the most likely field crop to be fallowed during drought years. We also include an assumption that the cotton would be fallowed only in critically dry years, which occur approximately 20% of the time, according to historic water year type data for the San Joaquin River. Permanent tree crops would add economic benefits in every year. We use the overall output value for these two crop categories as an input into the IMPLAN model. Based on this scenario, IMPLAN estimates direct impacts of crop conversion at $938,000 per year in 2022 dollars on a value added basis. To be conservative we do not scale this number up over time. We use the future stream of these economic impacts to estimate an NPV of **$32.2 million** over the life of the project in 2022 dollars.

Though not covered in this analysis, the expected crop conversion will also result in secondary economic impacts. Indirect and Induced Effects of the additional agricultural output account for the economic boost from the agricultural industry's increased purchase of goods and services from other local industries, and the impact on the local economy from an increase in household spending due to an increase in jobs, respectively. While we do not include these secondary impacts in this analysis, we estimate that the Indirect impacts would be approximately $465,000 and Induced Impacts would be $289,000 annually over the life of the project, based on IMPLAN modeling (both in 2022 dollars).

Summary of Benefits **NPV in 2026 of benefits** Discount rate: 2.25%

Dollar Basis 2015	**Primary Approach** Present Value	**Primary Approach** PV escalated to 2022$	**Average Annual** **2015**	**Average Annual** (escalated to 2022$)
Water Supply Benefits--M&I (alternative cost)	**$ 16,604,010**	$ 21,140,855	$ 556,539	$ 708,607
Groundwater (alternative cost)	**$ 3,148,710**	$ 4,009,057	$ 105,540	$ 134,377
Water Supply Benefits--Agriculture	**$ 40,207,283**	$ 51,193,439	$ 1,347,682	$ 1,715,920
Environmental Benefits--Incidental wetland habitat (alterna	**$ 48,829,056**	$ 62,171,008	$ 1,636,670	$ 2,083,870
Agricultural Direct Benefits of Crop Substitution	**$ 25,256,813**	$ 32,157,933	$ 846,567	$ 1,077,881
TOTAL Public Benefits	**$ 134,045,872**	$ 170,672,292	$ 4,492,998	$ 5,720,655

Appendix E – Thomas Harder & Co. Tech Memo for Phase I Aquifer Storage

Technical Memorandum

To: Ms. Kellie Welch
Groundwater Banking Joint Powers Authority

From: Thomas Harder, P.G., CH.G.
Thomas Harder & Co.

Date: 29-Nov-22

Re: Aquifer Storage Potential for the West Enos and North Stockdale Portions of the Kern Fan Storage Project

1. Introduction

This Technical Memorandum (TM) summarizes an analysis of aquifer storage potential beneath the West Enos (also known as the "Bolthouse Property") and North Stockdale (also known as the "Diamond Property") portions of the Kern Fan Storage Project (the Project), located in the Rosedale-Rio Bravo Water Storage District's (RRBWSD's) service area west of Bakersfield, California (see Figure 1). The West Enos and North Stockdale sites (collectively "the Sites") will be used for the construction of recharge basins and production wells for the Project. Thomas Harder & Co., (TH&Co) reviewed background documents, data, and reports associated with the Sites, including the following:

- TH&Co, 2011. Hydrogeological Impact Evaluation Related to Operation of the Kern Water Bank and Pioneer Projects. Prepared for RRBWSD. Dated September 9, 2011.
- TH&Co, 2015. Recommended Casing, Screen, and Filter Pack Design – Drought Relief Well SUP-2. Letter Report Prepared for Rosedale-Rio Bravo Water Storage District. Dated August 13, 2015.
- TH&Co, 2020. Kern Fan Groundwater Storage Project - Hydrogeological Analysis. Technical Memorandum prepared for RRBWSD. Dated October 12, 2020.
- Wildermuth Environmental, 2011. Drilling, Construction, Development and Testing of Well SREX-2. Strand Ranch Water Banking Facility, Kern County, California. Prepared for Irvine Ranch Water District.

The aquifer storage capacity was estimated as the volume of groundwater that can be stored in the aquifer directly beneath the Sites. The aquifer storage capacity was estimated by multiplying the total aquifer volume beneath the sites by the specific yield of the aquifer sediments:

$$A_s = V \times S_y$$

where:

A_s = Aquifer storage capacity (acre-ft)

V = Total aquifer volume (acre-ft)

S_y = Specific yield of aquifer sediments (dimensionless)

The total aquifer volume is a function of the surface area of the Sites, the depth of useable aquifer, and a minimum groundwater depth (see Table 1). The aquifer storage capacity estimates assume that only the aquifer directly beneath the sites is available for storage. Thus, the surface area of the West Enos and Stockdale North Sites multiplied by the useable aquifer thickness define the total aquifer volume. The useable aquifer thickness at West Enos is estimated to extend from 10 feet below ground surface (ft bgs) to 630 ft bgs. At Stockdale North, the useable aquifer thickness is estimated to extend from 10 ft bgs to 610 ft bgs. The top depth corresponds to the shallowest practical limit that groundwater can be mounded while maintaining infiltration in the basins. The bottom depth for the West Enos site corresponds to the deepest useable aquifer, as determined from drilling and testing of extraction wells at the adjacent Superior Basins.[1] The bottom depth for the North Stockdale Site corresponds to the deepest useable aquifer as determined from drilling and testing of extraction wells at the adjacent Strand Ranch facility.[2]

Specific yield is the ratio between the volume of water the aquifer will release from storage due to gravity drainage to the total volume of aquifer. Specific yields of 0.18 and 0.16 were used for the shallow and intermediate aquifer systems, respectively, based on calibrated parameters from the 2020 version of the Rosedale-Rio Bravo Water Storage District Kern Fan Model.[3] A specific

[1] TH&Co, 2015. Recommended Casing, Screen, and Filter Pack Design – Drought Relief Well SUP-2. Letter Report Prepared for Rosedale-Rio Bravo Water Storage District. Dated August 13, 2015.

[2] Wildermuth Environmental, 2011. Drilling, Construction, Development and Testing of Well SREX-2. Strand Ranch Water Banking Facility, Kern County, California. Prepared for Irvine Ranch Water District.

[3] TH&Co, 2020. Kern Fan Groundwater Storage Project - Hydrogeological Analysis. Technical Memorandum prepared for RRBWSD. Dated October 12, 2020.

yield of 0.10 was used for the deep aquifer based on the lithologic characteristics of the sediments from borehole logs near the Project.[4]

Using the above methodology, the total storage capacity for the West Enos Site is approximately 17,000 acre-ft and the total storage capacity for the Stockdale North site is approximately 12,700 acre-ft (see Table 1). The total storage capacity beneath both sites is approximately 29,700 acre-ft.

The methodology used herein to estimate aquifer storage capacity has been applied elsewhere in the Kern Fan Area although assumptions for the useable aquifer thickness vary. The Kern Water Bank Authority (KWBA) has indicated they have 1.5 million acre-ft of readily accessible aquifer storage in their service area, which covers approximately 20,000 acres.[5] Assuming a specific yield range of 0.10 to 0.14, the KWBA storage estimate requires a useable aquifer thickness between 535 ft and 750 ft, which is consistent with the aquifer thickness assumed for this analysis (approximately 600 to 620 ft).

[4] TH&Co, 2011. Hydrogeological Impact Evaluation Related to Operation of the Kern Water Bank and Pioneer Projects. Prepared for RRBWSD. Dated September 9, 2011.
[5] KWBA, 2022. www.kwb.org/about. Accessed on November 23, 2022.

Aquifer Storage Capacity Estimates for the West Enos and North Stockdale Sites

	West Enos	North Stockdale
Property Size (acres)	201	147
Shallow Subsurface West Enos (10-115 ft bgs[1]) North Stockdale (10-125 ft bgs)	105	115
Intermediate Subsurface West Enos (115-380 ft bgs) North Stockdale (125-380 ft bgs)	265	255
Deep Subsurface West Enos (380-630 ft bgs) Stockdale West (380-610 ft bgs)	250	230
Shallow Subsurface Specific Yield[2]	0.18	0.18
Intermediate Subsurface Specific Yield	0.16	0.16
Deep Subsurface Specific Yield	0.10	0.10
Shallow Subsurface Storage Capacity (acre-ft)[3]	4,200	2,800
Intermediate Subsurface Storage Capacity (acre-ft)	8,200	6,200
Deep Subsurface Storage Capacity (acre-ft)	4,600	3,700
Total Storage Capacity (acre-ft)	**17,000**	**12,700**
		29,700

Notes:

[1]bgs = below ground surface.

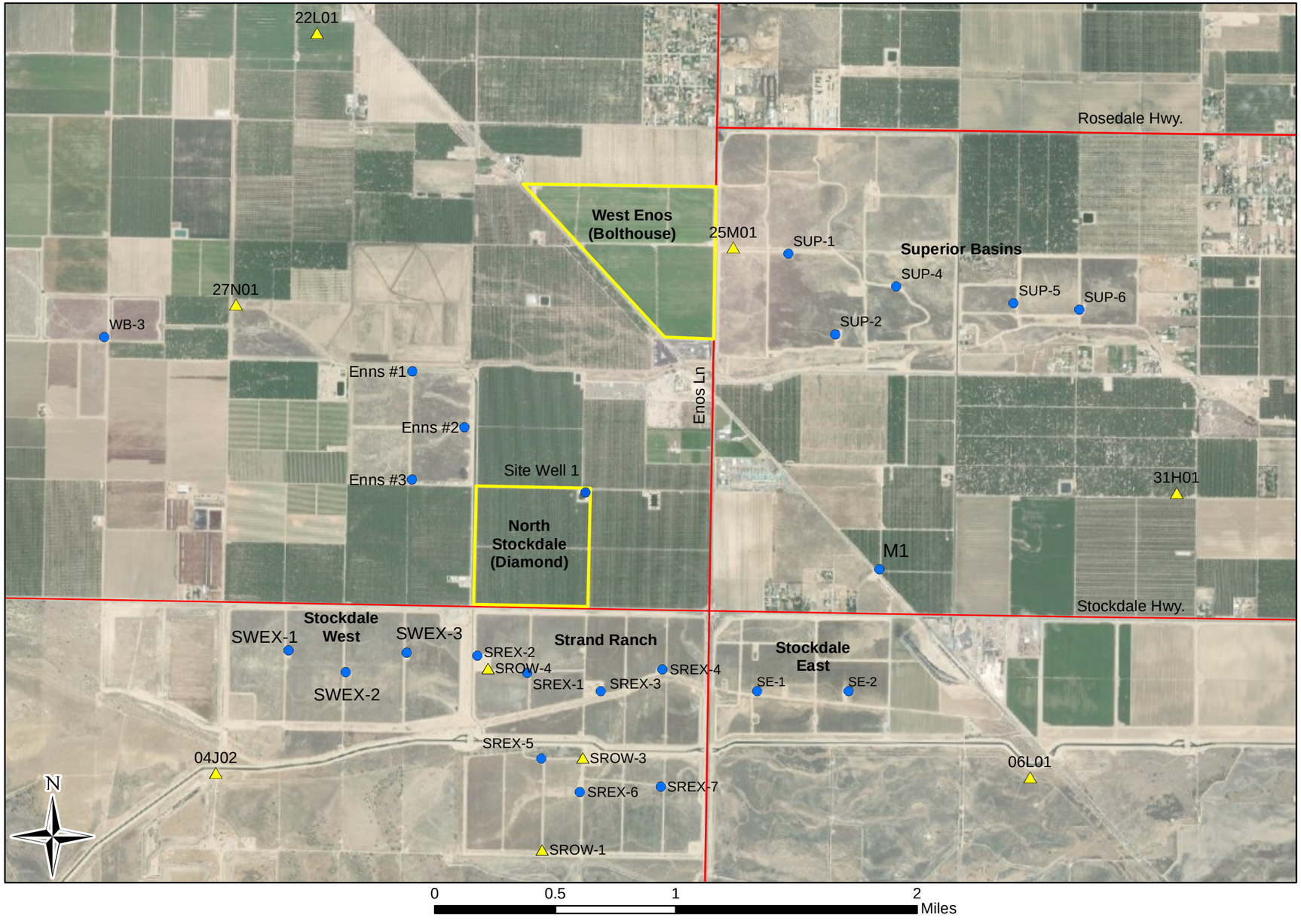
[2]Specific yield values from the 2020 version of the calibrated Kern Fan groundwater flow model.

[3]acre-ft = acre-feet.

Groundwater Banking Joint Powers Authority

November 2022

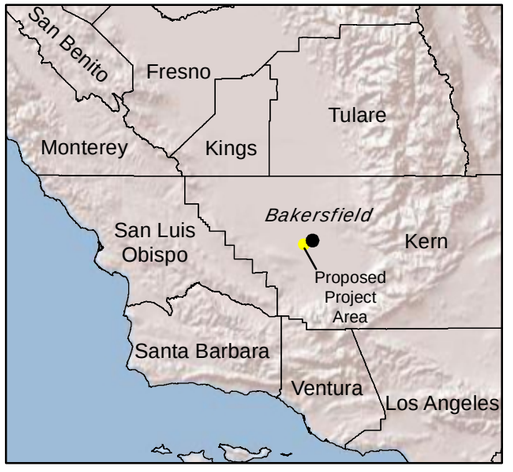
Kern Fan Storage Project



NAD 83 Stateplane Zone 5

Map Features

- Extraction Well
- Observation Well
- Highway/Road
- Proposed Project Area



Thomas Harder & Co.
Groundwater Consulting

DRAFT

Aquifer Storage Potential for West Enos and North Stockdale Sites

Figure 1

Appendix F – RRBWSD Historical Banking and Recovery Exchanges/Contracts

Historical Banking and Recovery Exchanges/Contracts within RRBWSD

RRBWSD has developed and enjoys partnerships with many different state, federal, and local entities to help improve water management and meet future water demand needs. Currently and historically, RRBWSD has worked with the U.S. Department of the Interior, Bureau of Reclamation ("USBR") and Fish and Wildlife Service to provide water to the Kern National Wildlife Refuge ("KNWR") to the northwest of the RRBWSD and to obtain water from the Central
Valley Project ("CVP"). RRBWSD also partners with multiple Federal Friant-Kern water agencies for mutually beneficial recharge and recovery projects, namely: Arvin-Edison WSD, Kern-Tulare WD, and Delano-Earlimart ID. Below is a list of the various contracts involving RRBWSD and Federal agencies:

KNWR Purchase & Conveyance Agreements

Year 2007

CVP Short-Term/Temporary Water Service Contracts (non-CVP Contractor)

Year 1965, No. 14-06-200-769A
Year 1973, No. 14-06-200-229A
Year 1973, No. 14-06-200-4162A
Year 1993, No. 3-07-20-W1058
Year 2001, No. 01-WC-20
Year 2011, No. 11-WC-20-0090
Year 1973, No. 14-06-200-4032
Year 1973, No. 14-06-200-7228A
Year 1978, No. 14-06-200-229A
Year 1995, No. 5-07-20-W12
Year 2003, No. 03-WC-20-2654
Year 2011, No. 11-WC20-0104

Federal Exchange and Banking Agreements

Arvin-Edison WSD, 1997, 2003, 2009, 2011, 2012, 2013
Delano-Earlimart ID, 2009
Kern-Tulare WD, 2001, 2004, 2005, 2007
San Joaquin River Exchange Contractors Water Authority, 2017, 2019, 2020, 2021

Appendix G – MBK Engineers Tech Memo for the Kern Fan Project

MBK ENGINEERS
Water Resources ◆ Flood Control ◆ Water Rights

TECHNICAL MEMORANDUM

DATE: September 18, 2022

TO: Paul Weghorst, Fiona Sanchez, and Natalie Palacio, of Irvine Ranch Water District

PREPARED BY: Lee Bergfeld, P.E., and Shankar Parvathinathan, P.E., of MBK Engineers

SUBJECT: Updated Analysis of Kern Fan Groundwater Storage Project

Introduction

This Technical Memorandum presents information on the numerical modeling analysis for the Kern Fan Groundwater Storage Project (Project). The Project will recharge and store up to 100,000 acre-feet (af) of water from the Sacramento-San Joaquin Delta (Delta) and surplus water from the San Joaquin River (SJR), when available. The Project will provide both public and non-public benefits by storing additional water in the aquifers that underlie the Kern River Fan in wet years, and by extracting water in dry years, to provide both ecosystem and water supply benefits.

This Technical Memorandum reflects updated analysis based on revised CalSim II baseline Benchmark model with 2035 Central Tendency Climate data, published by Reclamation in March 03, 2022. Additionally, this Technical Memorandum updates the results summarized in our two previous Technical Memorandum dated February 23, 2018, and November 18, 2021. The 2018 Technical Memorandum provides background on the Project operations for Article 21 supplies. The 2021 Technical Memorandum describes the assumptions and simulated operation of the SJR surplus supplies, and updates results for simulated Project operations that utilize these two sources of water. This memorandum is an update of the 2021 memo using the 2022 Reclamation Benchmark CalSim II model as inputs to the groundwater model.

Analytical Approach

The analytical approach involves the use of CalSim II model results to depict the without-Project (Baseline) scenario. The CalSim II model simulates operations of CVP and State Water Project (SWP) to meet existing environmental and regulatory requirements, contract obligations, and other system requirements. The operation of the Project is then simulated in a spreadsheet model that layers the Project onto the Baseline operation of the CVP and SWP, as simulated in CalSim II. The spreadsheet model simulates the with-Project scenario. The Project benefits and effects are then determined and quantified by comparison of the with-Project and without-Project scenarios.

The Baseline scenario for this analysis is the Reclamation Benchmark Model, dated March 03, 2022. The Project scenario is simulated using a spreadsheet operations model which operates on a monthly time-step similar to CalSim II for the period October 1921 through September 2003 and utilizes a CalSim II baseline depiction of CVP/SWP operations.

Spreadsheet Model Assumptions for Article 21

The spreadsheet model calculates the water supply available to the Project as additional Article 21 available from the Delta. The CalSim II Baseline simulation includes existing Article 21 demands and deliveries. The spreadsheet model simulates the additional Article 21 demand of the Project and the associated increase in SWP Delta exports. Additional Article 21 deliveries to the Project are simulated when:

a. Available surplus in the Delta in excess of the existing regulatory requirements and demands.

b. Available export capacity at Banks Pumping Plant.

c. The SWP portion of San Luis Reservoir is full in the Baseline.

The spreadsheet model simulates the additional Article 21 export from the Delta at times when there is available capacity in the California Aqueduct to convey the water to the Project, and to recharge the water based on Project recharge capacity. There is an estimated conveyance loss of three percent between the Delta and the Project.

Spreadsheet Model Assumptions for San Joaquin River Surplus

The spreadsheet model calculates the available Section 215 water at Friant Dam. The spreadsheet model simulates the availability of Section 215 at the Project using the following constraints:

a. Unstorable flows (flood control releases) from Friant Dam after consideration of current Friant Division demands for Section 215.

b. Available capacity to convey the Section 215 water to the most downstream end of the Friant-Kern Canal and into the CVC.

c. Estimated conveyance loss of three percent.

d. An additional assumed demand for groundwater recharge of 750 cfs, representing future Friant Division demands for Section 215 that are met before the Project.

e. 125 cfs of available capacity to move water from the CVC to the Project.

Spreadsheet Model Assumptions for Recharge and Recovery

Water is simulated as stored in the Project in three accounts. The public or ecosystem account stores only Article 21 supplies. The IRWD and Rosedale accounts both store Article 21 and SJR Surplus. All water stored in each account is subject to a loss percentage of 10 percent for Rosedale, 12.5 percent for ecosystem, and 15 percent for IRWD. These losses include an estimated 6 percent loss for evaporation. Project recharge rates are simulated as a function of recharge in preceding months based on information provided by IRWD (Figure 1).

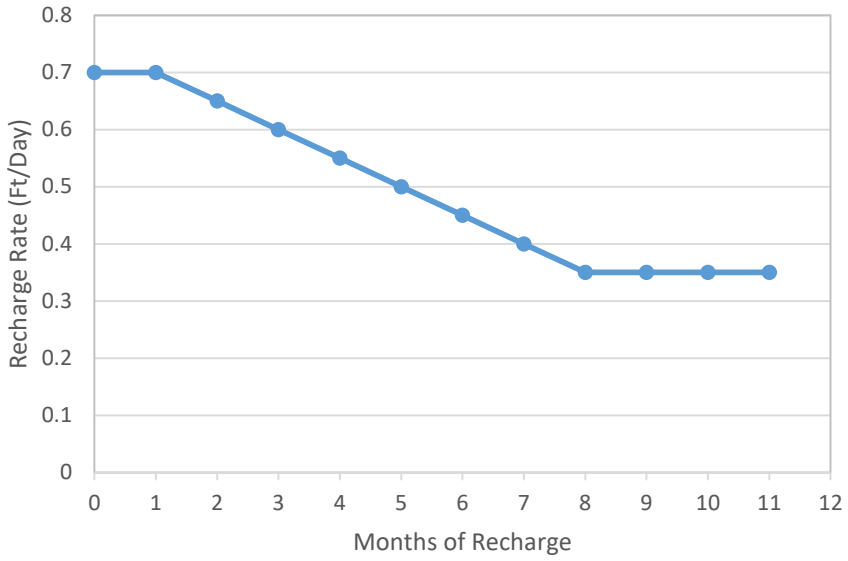


Figure 1. Project Recharge Rate

Water is recovered from the Project to provide both public and non-public benefits. Public benefits are achieved when the volume of water stored in the public benefits or ecosystem account is adequate to provide an Ecosystem Pulse flow of sufficient magnitude to create benefits. A volume of 18 thousand acre-feet (TAF), or 300 cfs for a period of one month, was assumed in the spreadsheet model as the threshold to create ecosystem benefits. Additionally, this volume includes Delta carriage[1] water savings in the year the Ecosystem Pulse is released. The reduced carriage water costs are a benefit of the Project because Project water is exported during periods of Delta surplus with no carriage water cost and is stored in the export service area. The spreadsheet model assumes 20 percent carriage water can be saved when extracting water from the Project for delivery within the export service area instead of meeting those demands from Oroville Reservoir.

The spreadsheet model simulates water recovered from the Project for water supply benefits to Rosedale and IRWD based on SWP Table A allocations, with more water recovered when Table A allocations are lower. The spreadsheet model assumptions for recovery of banked water by IRWD and Rosedale were updated to reflect expected operations with both Article 21 and SJR Surplus supplies.

Available Water Supply

This section presents a summary of the available water supply from the two sources: Article 21 available through the California Aqueduct and SJR surplus from the CVC.

[1] Carriage water is defined as marginal export costs, or the extra water needed to carry a unit of water across the Delta to the CVP and SWP pumping plants in the South Delta while maintaining a constant salinity. Or more practically, when the exports are increased by one unit, the Sacramento flow is increased by one unit plus the amount of carriage water to maintain a constant Delta salinity. In other words, carriage is the water cost of Delta exports when salinity standards are controlling.

Article 21 Water Supply

Figure 2 shows a summary of available Article 21 supply by water year type (Sacramento Valley Year Type Index) at the Project based on 2035 Reclamation Benchmark CalSim II modeling results. This available supply is calculated by considering constraints on available Banks pumping capacity, conveyance capacities in the California Aqueduct, capacity to convey water from the California Aqueduct to the Project, and conveyance losses.

On an average annual basis, available Article 21 supply at the Project is 15 TAF, with most of the supply available during Wet years. There is no Article 21 supply during Critical years. Figure 3 is a summary of Article 21 supply by month. March shows the greatest supply of Article 21 followed by February. Article 21 may be available between December and June, with no supply available during the remainder of the year. Figure 4 shows available supply on an annual basis with 18 of the 82-year simulation period showing available Article 21 supply.

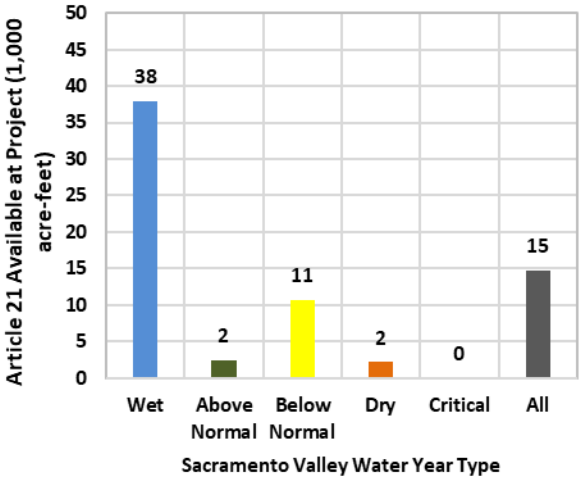


Figure 2. Available Article 21 Supply at Project by Sacramento Valley Water Year Type

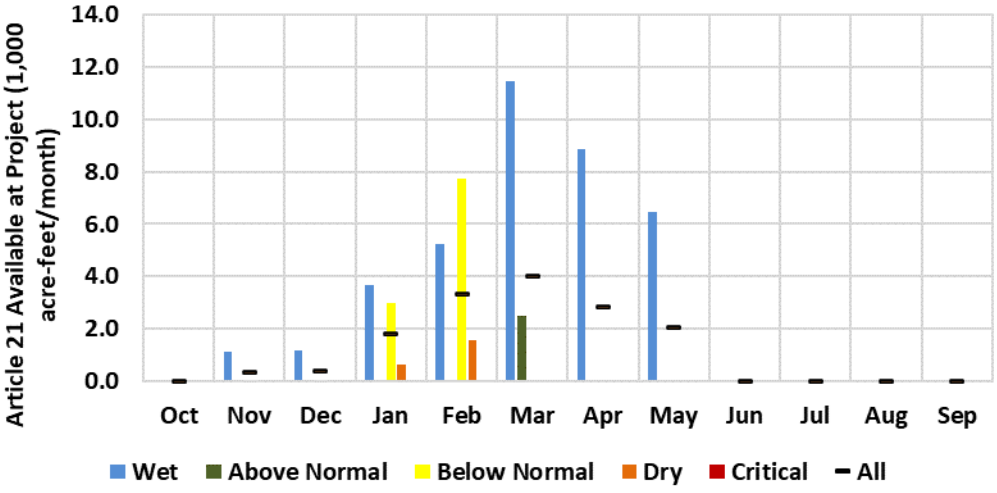


Figure 3. Average Monthly Available Article 21 Supply at Project

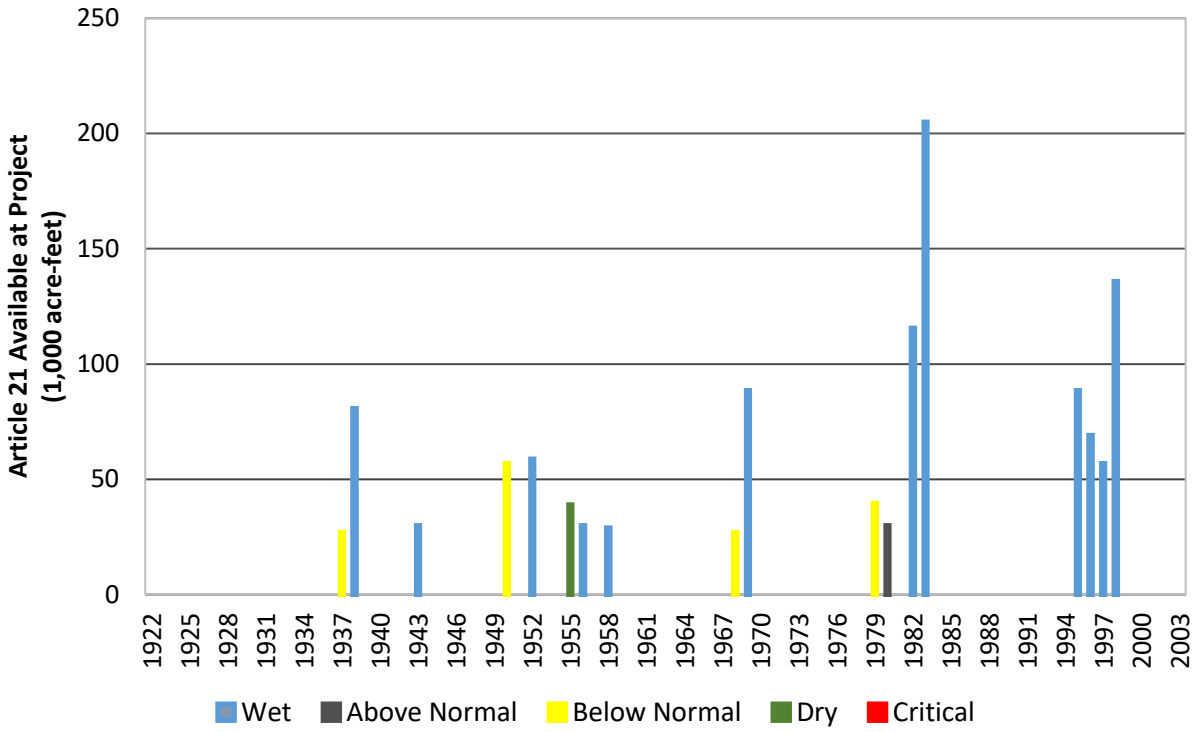


Figure 4. Annual Time-Series of Available Article 21 Supply at Project

San Joaquin River Surplus Water Supply

Figure 5 shows a summary of SJR Surplus supply by Sacramento Valley Water Year Type at the Project. On an average annual basis, available SJR Surplus at the Project is 9 TAF with most of the supply available during Wet years. Figure 6 shows a summary of SJR Surplus by month. SJR Surplus can be available between September and June, with more water available during the winter and spring period and the most water available in May. Figure 7 shows available SJR Surplus for each year of the simulation, with water available in 43 of the 82 years simulated.

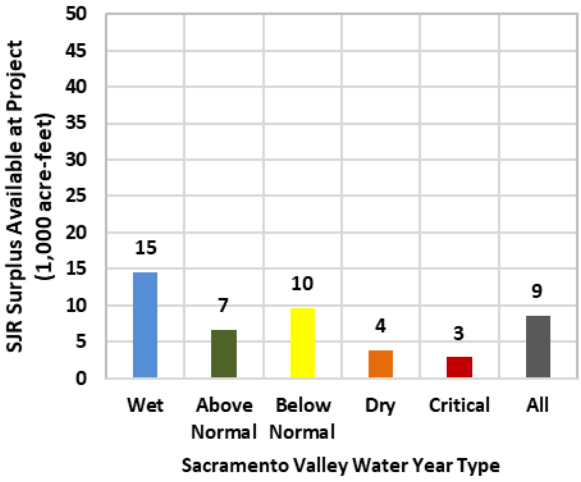


Figure 5. Average Annual Available SJR Surplus Supply at Project by Water Year Type

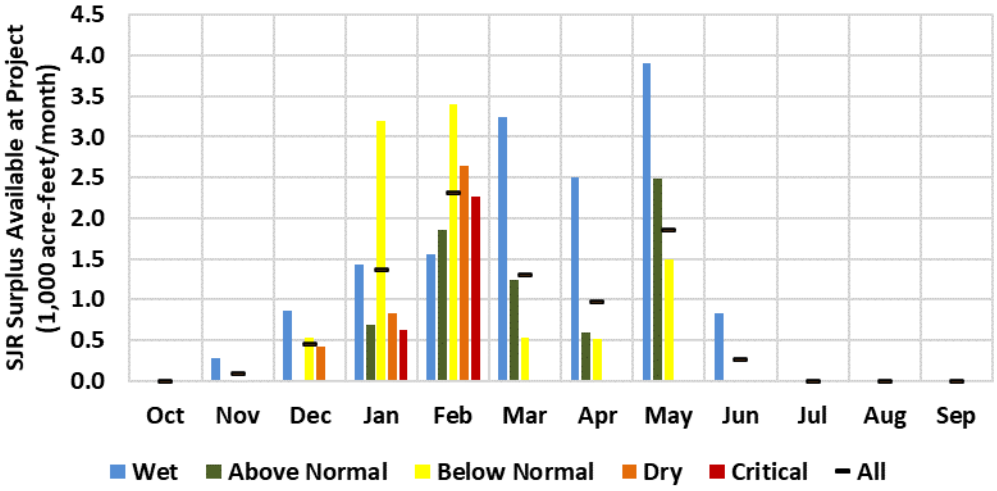


Figure 6. Average Monthly Available SJR Surplus Supply at Project by Water Year Type

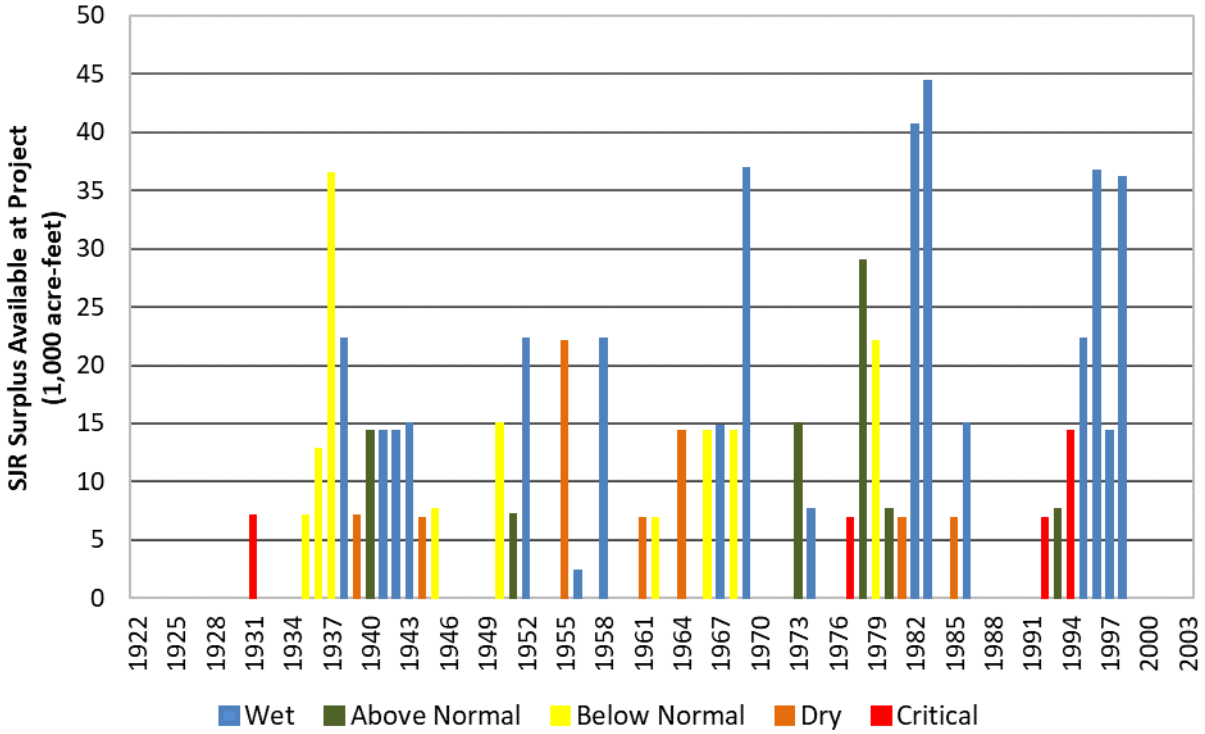


Figure 7. Annual Available SJR Surplus Supply at Project by Year

Results

This section summarizes the results for the Project operations. Results include the annual average volumes recharged and recovered from the three different accounts. Additional results are based on a comparison of Baseline and with-Project results from the spreadsheet model. Results are presented as the change from Baseline operations to quantify the effects of the Project.

Table 1 is a summary of the Ecosystem account recharge and recovery. The difference between the annual average recharge and recover reflects the losses associated with recharge, and can also include water remaining in storage at the end of the simulation period. The Ecosystem account is used to generate a total of seven Feather River pulse flows.

Table 1. Summary of the Ecosystem Account Performance

Year Type	Ecosystem Recharge (TAF)	Number of Pulses (Years)	Ecosystem Recovery (TAF)
Wet	5	0	0
Above Normal	1	0	0
Below Normal	0	1	1
Dry	0	5	5
Critical	0	1	2
All Years	**1.7**	**7**	**1.7**

Table 2 is a summary of the water recharged and recovered from the IRWD account by water source. Results in Table 2 illustrate how the Project is used to recharge surplus water in wetter years and recover the water in dry years. The annual average additional water supply from the Project to IRWD is approximately 3,000 af.

Table 2. Summary of the IRWD Account Performance

Year Type	Article 21 Recharge (TAF)	SJR Surplus Recharge (TAF)	Article 21 Recovery (TAF)	SJR Surplus Recovery (TAF)	Total Water Supply (TAF)
Wet	8	2	1	0	1
Above Normal	2	1	1	0	1
Below Normal	0	1	3	1	3
Dry	0	0	4	0	4
Critical	0	0	3	3	6
All Years	**2.7**	**1.0**	**2.3**	**0.7**	**3.0**

Table 3 is a summary of the water recharged and recovered from the Rosedale account by water source. The annual average additional water supply from the Project to Rosedale is approximately 3,700 af.

Table 3. Summary of the Rosedale Account Performance

Year Type	Article 21 Recharge (TAF)	SJR Surplus Recharge (TAF)	Article 21 Recovery (TAF)	SJR Surplus Recovery (TAF)	Total Water Supply (TAF)
Wet	7	3	1	0	1
Above Normal	2	2	0	0	0
Below Normal	0	1	2	1	3
Dry	0	0	5	3	8
Critical	0	0	4	3	7
All Years	**2.6**	**1.5**	**2.4**	**1.3**	**3.7**

Figure 8 shows the frequency of the Ecosystem Pulses by water year type. As noted earlier, the pulses are made during Dry and Critical years when Feather River flows are lower, and pulses may create a higher potential for benefits to the ecosystem.

Figure 9 shows an average pulse flow rate by month. In this analysis, April was selected as the month for Ecosystem Pulses. In actual operations, the Ecosystem Pulses may be created in April or May.

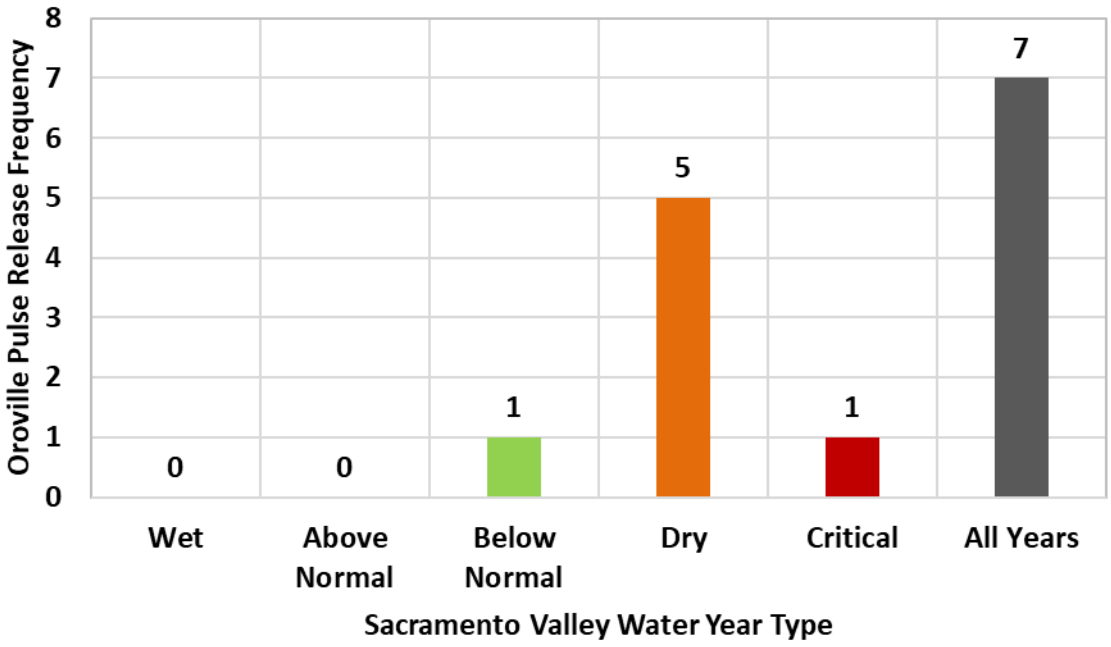


Figure 8. Frequency of Ecosystem Pulses

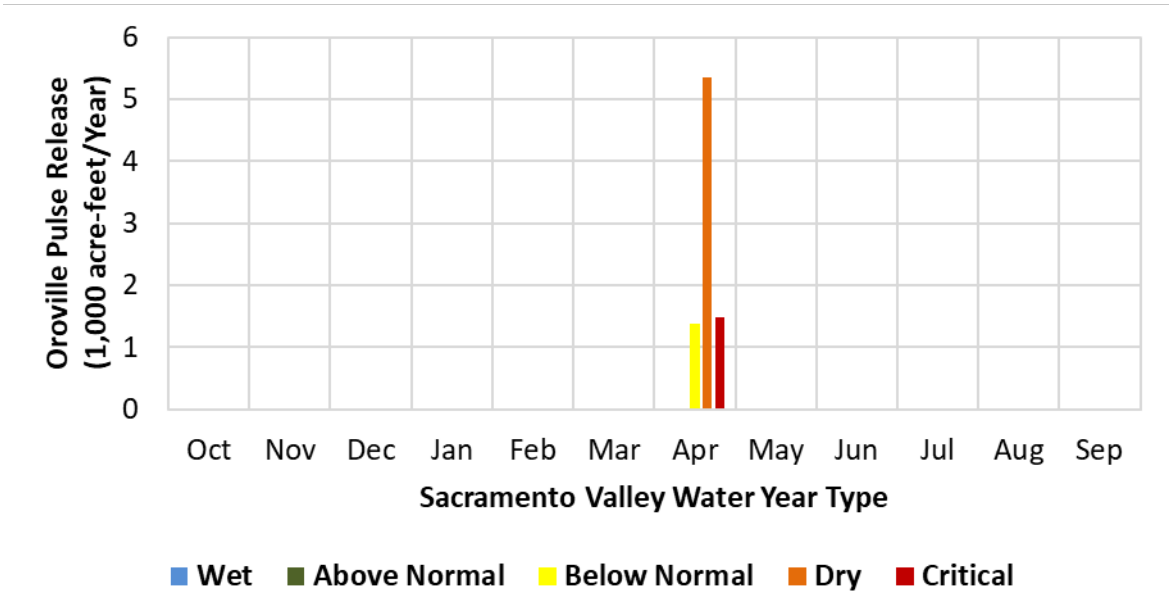


Figure 9. Pulse Release Volume

Figure 10 shows changes in Oroville Reservoir releases under with-Project conditions. Flows in the Feather River are higher under the Project conditions during April when Ecosystem Pulses are made from Oroville. The release of Ecosystem Pulses results in lower Oroville storage under the Project conditions after making Ecosystem Pulse releases. Storage in Oroville would be recovered in later months by reducing releases from Oroville when Feather River flows are in excess of the minimum instream flow requirements, and Oroville is releasing water to support SWP Delta exports. Oroville Reservoir is typically releasing water to support Delta exports in the July through September period. Oroville releases are reduced in this period to compensate for the Ecosystem Pulses, resulting in lower Feather River flows under the Project conditions to recover the volume of the Ecosystem Pulse. Analysis in the spreadsheet model attempts to recover the Ecosystem Pulse volume in Oroville in the same year as when the pulse is made, such that Oroville carryover storage is not affected.

The reduction of Oroville Reservoir release occurs in May, June, and July following release of Ecosystem Pulse in April. Simulated changes in Oroville releases are expected to create the same change in Feather River flows below Oroville, and Sacramento River flow from the confluence with the Feather into the Delta.

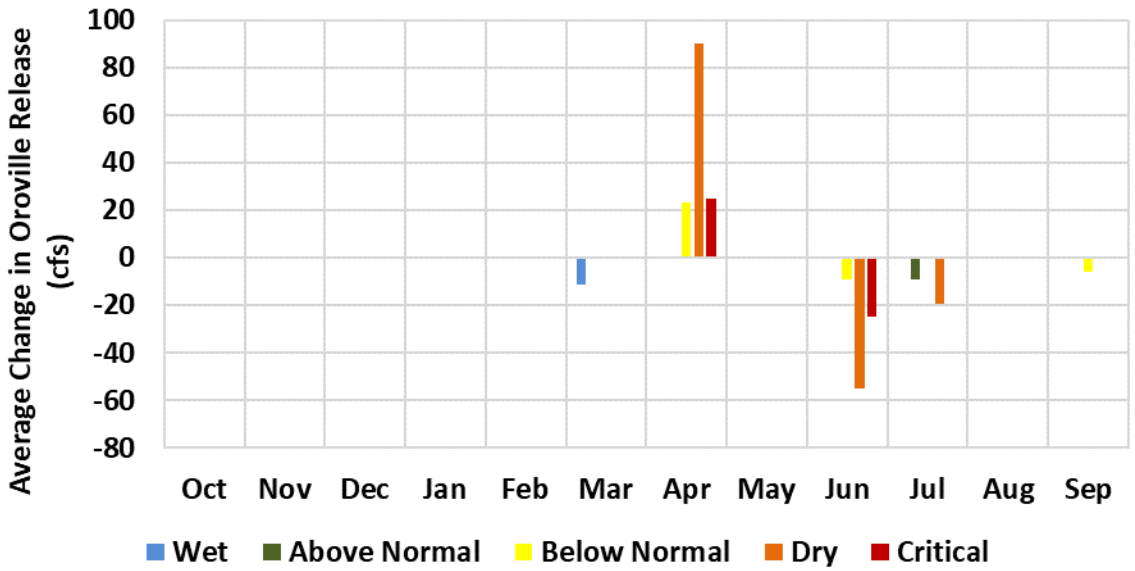


Figure 10. Change in Oroville Releases

An important consideration in evaluation of the pulse flow operation is whether Table A allocations to Project participants are adequate to offset the volume of the Feather River pulse flow. The spreadsheet model ensures pulse flows are not released when Table A allocations to Project participants are not adequate to provide the needed offset in Table A deliveries. Additionally, Project recovery capacity must be available to extract water to offset Table A deliveries in years when pulse flows are released. Therefore, less water is extracted for water supply benefits to Rosedale and IRWD when Table A allocations are above the threshold for pulse flows, and more water is extracted for water supply when Table A allocations are not adequate to support a pulse flow. While the total volume of the pulse flow is 18 TAF, the volume of the pulse flow includes the avoided losses for moving Table A water from Oroville to Kern County. As previously stated, the spreadsheet model includes Delta carriage water losses of 20 percent and conveyance losses of 3 percent. Therefore, 23 percent of the pulse flow volume is avoided losses and the remaining 13,860 af is offset Table A delivery in Kern County.

Project participants have contracts for a maximum Table A volume of 41,350 af for Dudley Ridge Water District and 29,900 af for Rosedale-Rio Bravo Water Storage District from the Kern County Water Agency contract, for a maximum volume at 100 percent Table A allocation of 71,250 af. Therefore, the minimum Table A allocation needed to offset 13,860 af is approximately 20 percent (13,860 of Table A offset divided by 71,250 of Table A contract). The following table shows the year of the simulated pulse flow, and the final Table A allocation from the CalSim II model.

Table 4. Pulse Flow Years and SWP Table A Supplies

Pulse Flow Year	Table A Offset Volume (TAF)	SWP Table A Allocation (% Contract)
1939	13.9	39%
1947	13.9	26%
1960	13.9	28%
1976	13.9	27%
1981	13.9	53%
1985	13.9	53%
2002	13.9	41%

Results in Table 4 show Project participants would be allocated more than 20 percent or 13,860 af of Table A offset needed to support the associated pulse flow volume in each year.

Figure 11 shows changes in Delta outflows under the Project conditions. Delta outflows are greater during April of Dry and Critical years under the Project condition when Oroville is making Ecosystem Pulses. Ecosystem Pulses in April or May of Dry and Critical years are expected to increase Delta outflow because Delta exports are typically constrained in these months by regulatory requirements, such as San Joaquin River inflow-to-export ratio or Old and Middle River flow requirements. Delta outflows can be lower in January through May of wetter years when Delta outflow is diminished due to export of Article 21 water for the Project, a reduction in Oroville releases, or a reduction in San Joaquin River surplus flows. Figure 12 presents a similar plot, showing change in SWP Delta exports under the Project conditions. SWP Delta exports are typically greater under Project conditions, as surplus flows are captured at the export pumps and delivered to the Project. SWP Delta exports show a reduction in Dry and Critical years, as compared to the Baseline due to a reduction in Oroville releases.

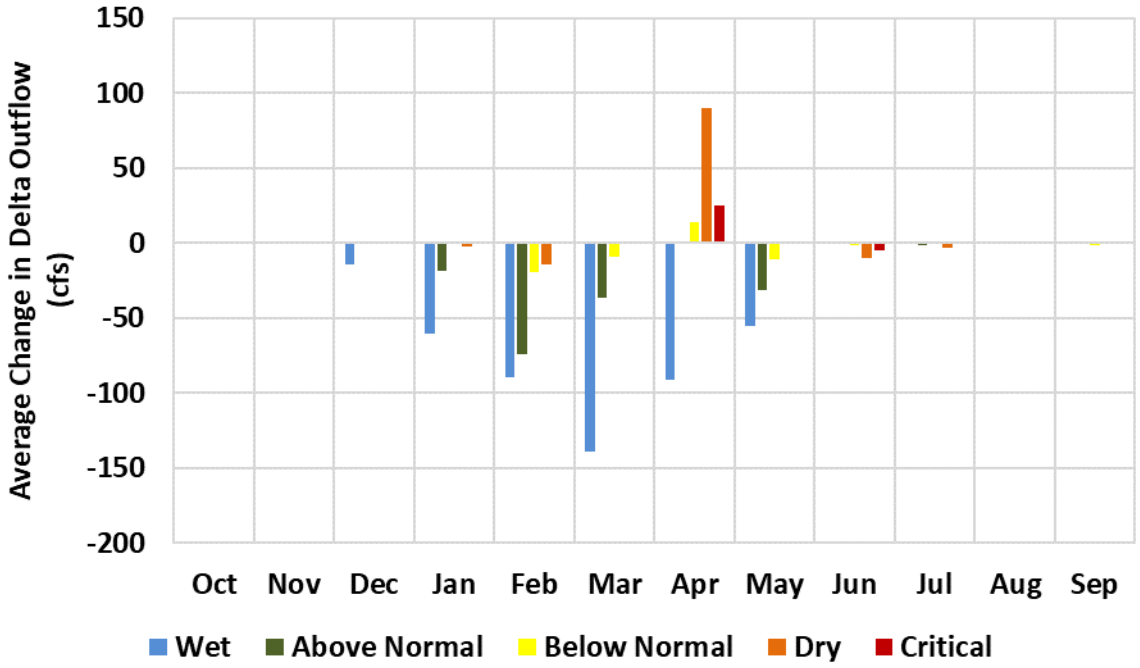


Figure 11. Change in Delta Outflow

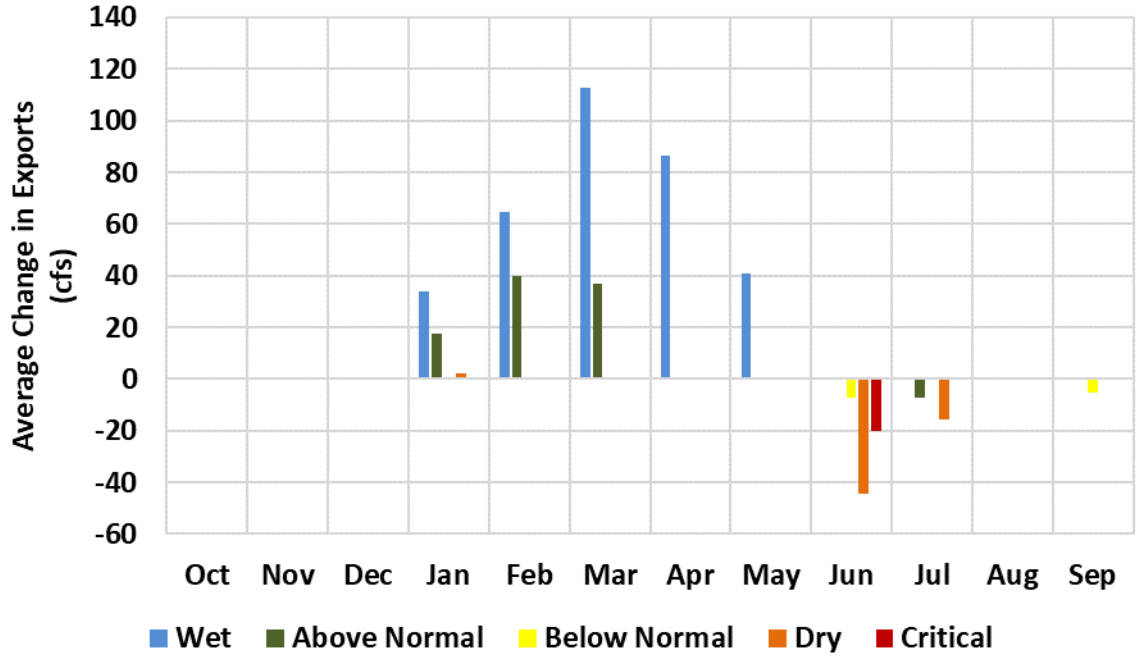


Figure 12. Change in SWP Delta Exports

Figure 13 shows end of October storage in the Project by water year type. On an average annual basis, Project storage is 68 TAF at the end of October. Project storage varies significantly by year type, from 107 TAF in Wet years to 14 TAF in Critical years. Higher storage in Wet years is expected, as it

corresponds to periods where surplus is available. Project storage during a Dry or Critical year is water carried over from previous years. Overall, Project storage is dependent on water supply, demand, and operations. Project storage at the end of October may be an indication of potential water available as an emergency supply for IRWD, Rosedale, or for other purposes.

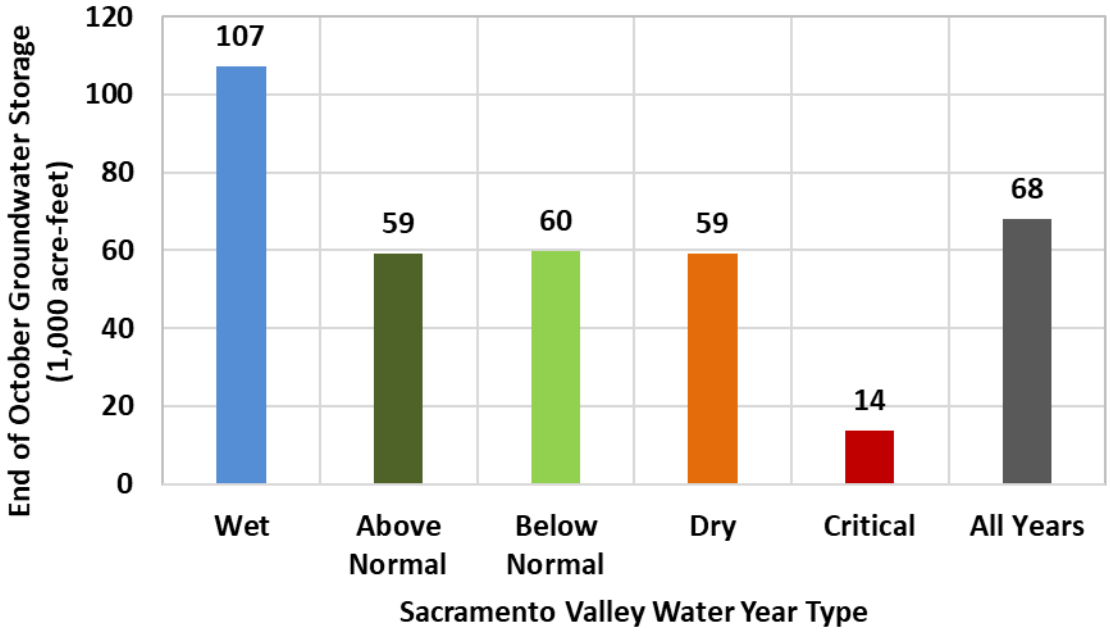


Figure 13. End of October Project Groundwater Storage

Evaluation of Phase 1 of Kern Fan Groundwater Storage Project

This memo describes an evaluation of yield from Phase 1 of the Kern Fan Groundwater Storage Project (Kern Fan Project). Phase 1, which can operate as a stand-alone project, is the first phase in the implementation of the Kern Fan Project. Phase 1 will consist of 350 acres, with approximately 300 acres of recharge basins (85% of the total acreage), four new recovery wells, and new conveyance pipelines that would connect Phase 1 to existing conveyance facilities. Approximately 28,000 acre-feet (AF) of groundwater storage is associated with Phase 1 and will be allocated entirely to Irvine Ranch Water District (IRWD) and Rosedale Rio Bravo WSD (Rosedale).

Table 1 shows water supply yield for IRWD and Rosedale with full implementation of the Kern Fan Project, computed using a spreadsheet model and is described in detail in the MBK Engineers Technical Memorandum dated September 18, 2022. Table 2 shows the water supply yield from Phase 1 that is computed by scaling the values in Table 1 by a factor of 0.3733. Under Phase 1 it is assumed there will be 28,000 AF of groundwater storage for IRWD and Rosedale compared to the 75,000 AF under full project implementation analyzed to produce the values in Table 1. The fraction of 0.3733 was calculated as 28,000 divided by 75,000. This approach is very simple. Water supply yield is a function of several parameters, not just groundwater storage capacity. It is possible the Kern Fan Project yield for Phase 1 may be over-estimated or under-estimated. It is also noted from our previous investigations that the project yield is more dependent on available water supply than groundwater storage capacity. A comprehensive numerical modeling of water supply yield with Phase 1 implementation requires additional data and assumptions and is beyond the scope of this analysis.

Table 1: Water Supply Yield for IRWD and Rosedale with Full Implementation of Project

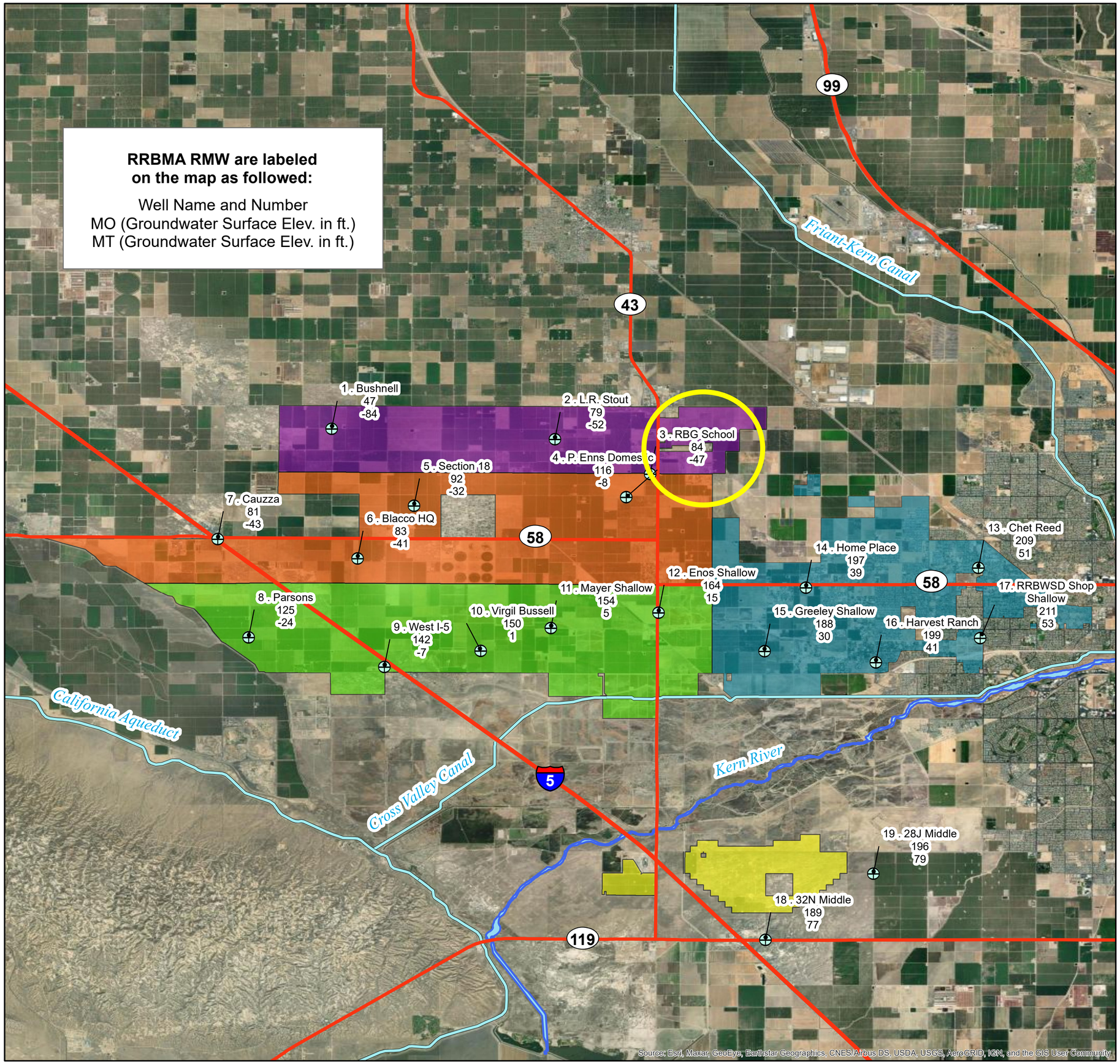
WY Type	Recharge				Extraction			
	IRWD		Rosedale Rio Bravo WSD		IRWD		Rosedale Rio Bravo WSD	
	Article 21	San Joaquin Surplus	Article 21	San Joaquin Surplus	Article 21	San Joaquin Surplus	Article 21	San Joaquin Surplus
Wet	7.50	1.98	7.26	3.01	0.85	0.12	0.66	0.00
Above Normal	2.30	1.22	2.29	1.89	0.68	0.00	0.00	0.00
Below Normal	0.00	1.14	0.00	1.05	2.60	0.77	1.73	1.15
Dry	0.05	0.14	0.05	0.40	4.24	0.31	5.10	2.81
Critical	0.00	0.00	0.00	0.00	3.35	2.98	4.32	3.12
Total (TAF)	2.70	1.01	2.62	1.47	2.29	0.67	2.36	1.32

Table 2: Estimated Water Supply Yield for IRWD and Rosedale with Phase 1

WY Type	Recharge				Extraction			
	IRWD		Rosedale Rio Bravo WSD		IRWD		Rosedale Rio Bravo WSD	
	Article 21	San Joaquin Surplus	Article 21	San Joaquin Surplus	Article 21	San Joaquin Surplus	Article 21	San Joaquin Surplus
Wet	2.80	0.74	2.71	1.12	0.32	0.04	0.24	0.00
Above Normal	0.86	0.46	0.86	0.70	0.25	0.00	0.00	0.00
Below Normal	0.00	0.42	0.00	0.39	0.97	0.29	0.65	0.43
Dry	0.02	0.05	0.02	0.15	1.58	0.12	1.90	1.05
Critical	0.00	0.00	0.00	0.00	1.25	1.11	1.61	1.16
Total (TAF)	1.01	0.38	0.98	0.55	0.86	0.25	0.88	0.49

Appendix H – RRBWSD Groundwater Levels Report

RRBMA Monitoring Areas - RMW Water Level MOs and MTs



Legend

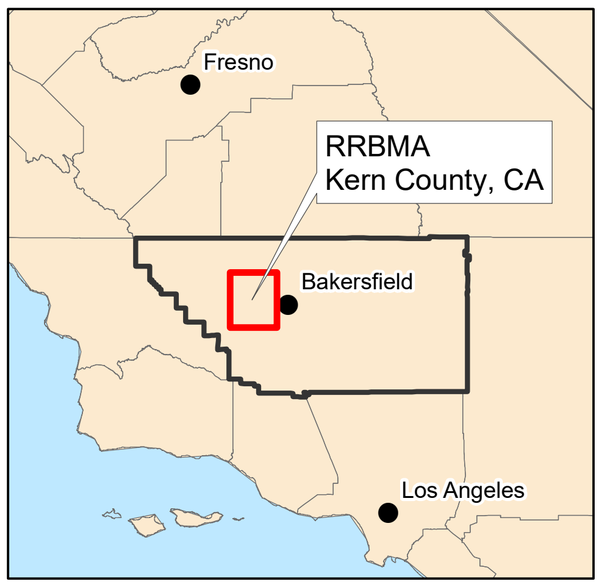
- RRBMA RMW (Water Level)
- Major Highways
- Major Conveyance Facilities
- KernRiver
- North Monitoring Area
- Central Monitoring Area
- South Monitoring Area
- East Monitoring Area
- South of the River Monitoring Area

RMW = Representative Monitoring Well
MO = Measurable Objective
MT = Minimum Threshold

N

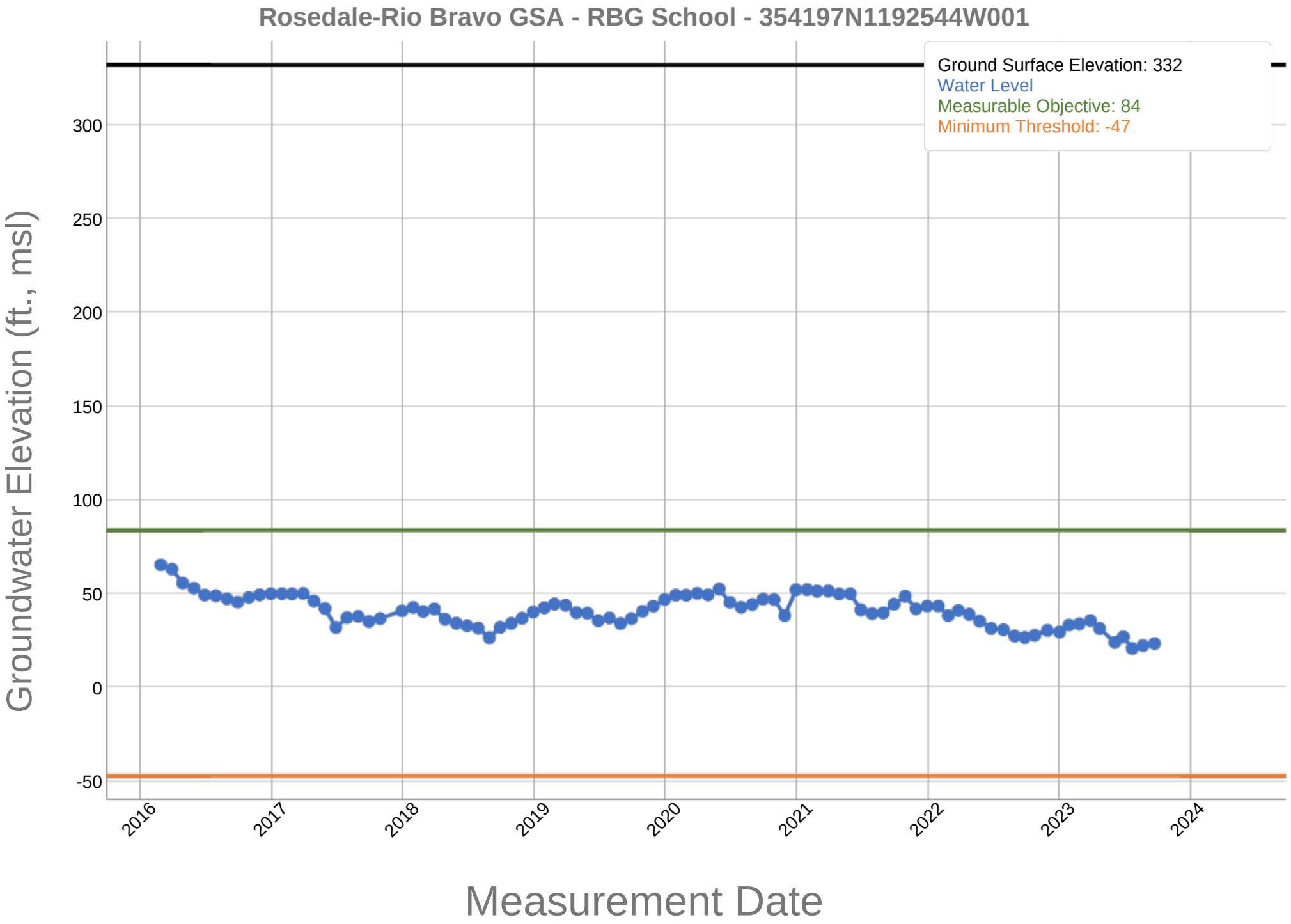
0 1.75 3.5 7

Miles

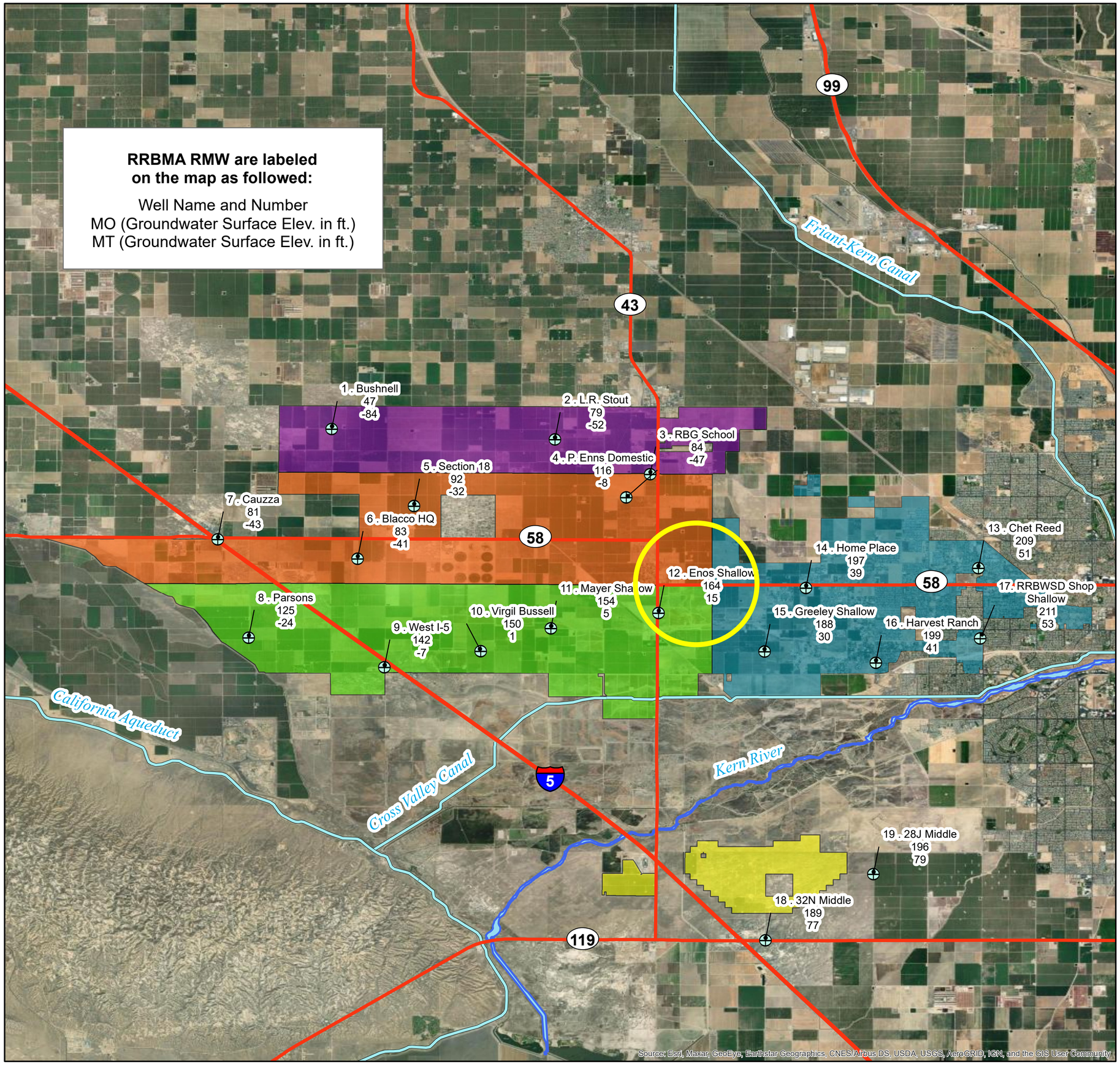


ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT

Z:\000-OldZDrive\jpa. JPA's\SGMA\RRBMA\RRBMA SGMA Docs\Maps\Figures (RE) 2022-06-22


Rosedale-Rio Bravo GSA - RBG School - 354197N1192544W001
Ground Surface Elevation: 332
Water Level
Measurable Objective: 84
Minimum Threshold: -47
Groundwater Elevation (ft., msl)
300
250
200
150
100
50
0
-50
2016
2017
2018
2019
2020
2021
2022
2023
2024
Measurement Date

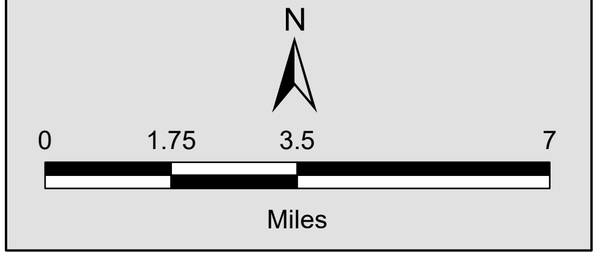
RRBMA Monitoring Areas - RMW Water Level MOs and MTs



Legend

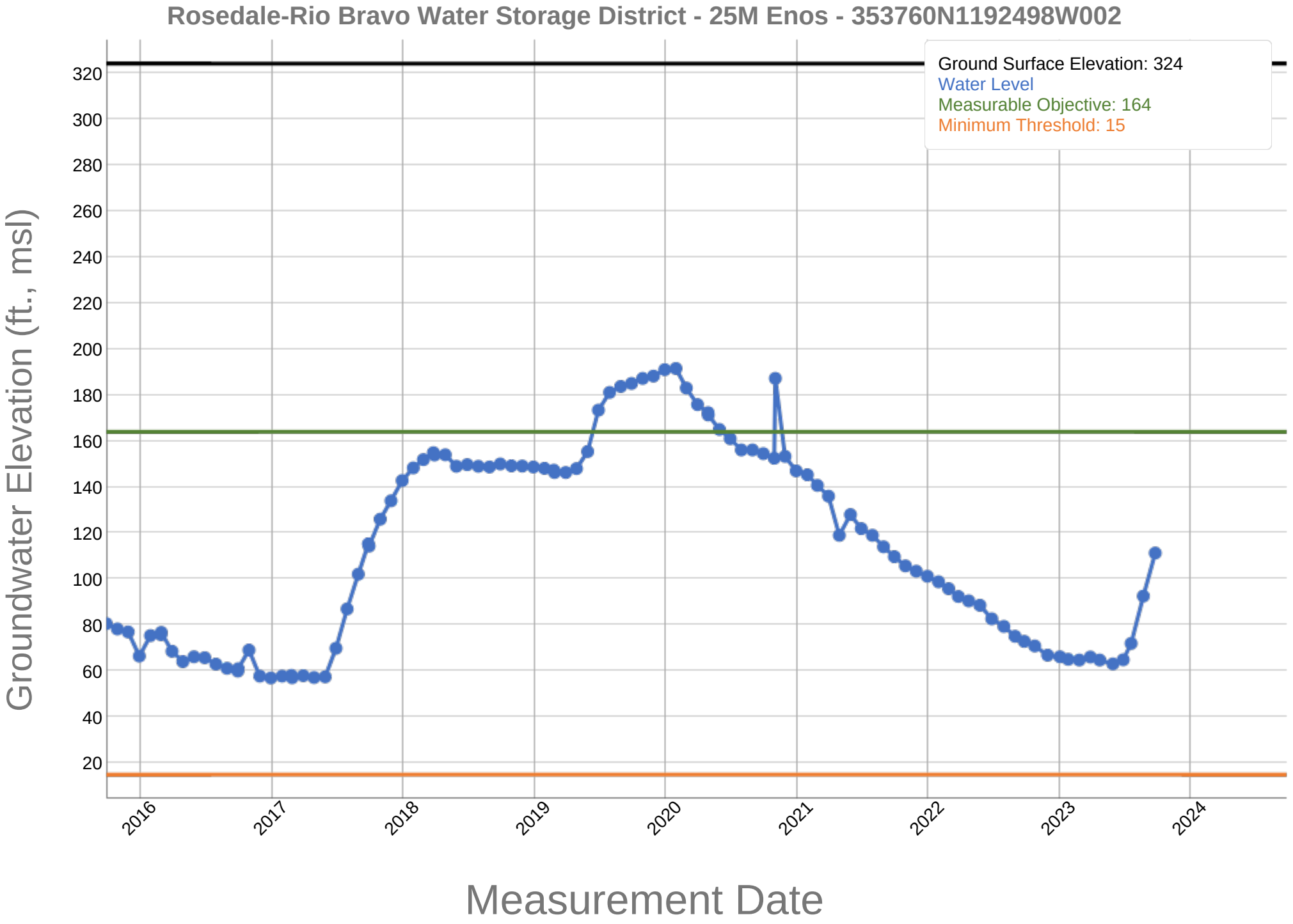
- RRBMA RMW (Water Level)
- Major Highways
- Major Conveyance Facilities
- KernRiver
- North Monitoring Area
- Central Monitoring Area
- South Monitoring Area
- East Monitoring Area
- South of the River Monitoring Area

RMW = Representative Monitoring Well
MO = Measurable Objective
MT = Minimum Threshold

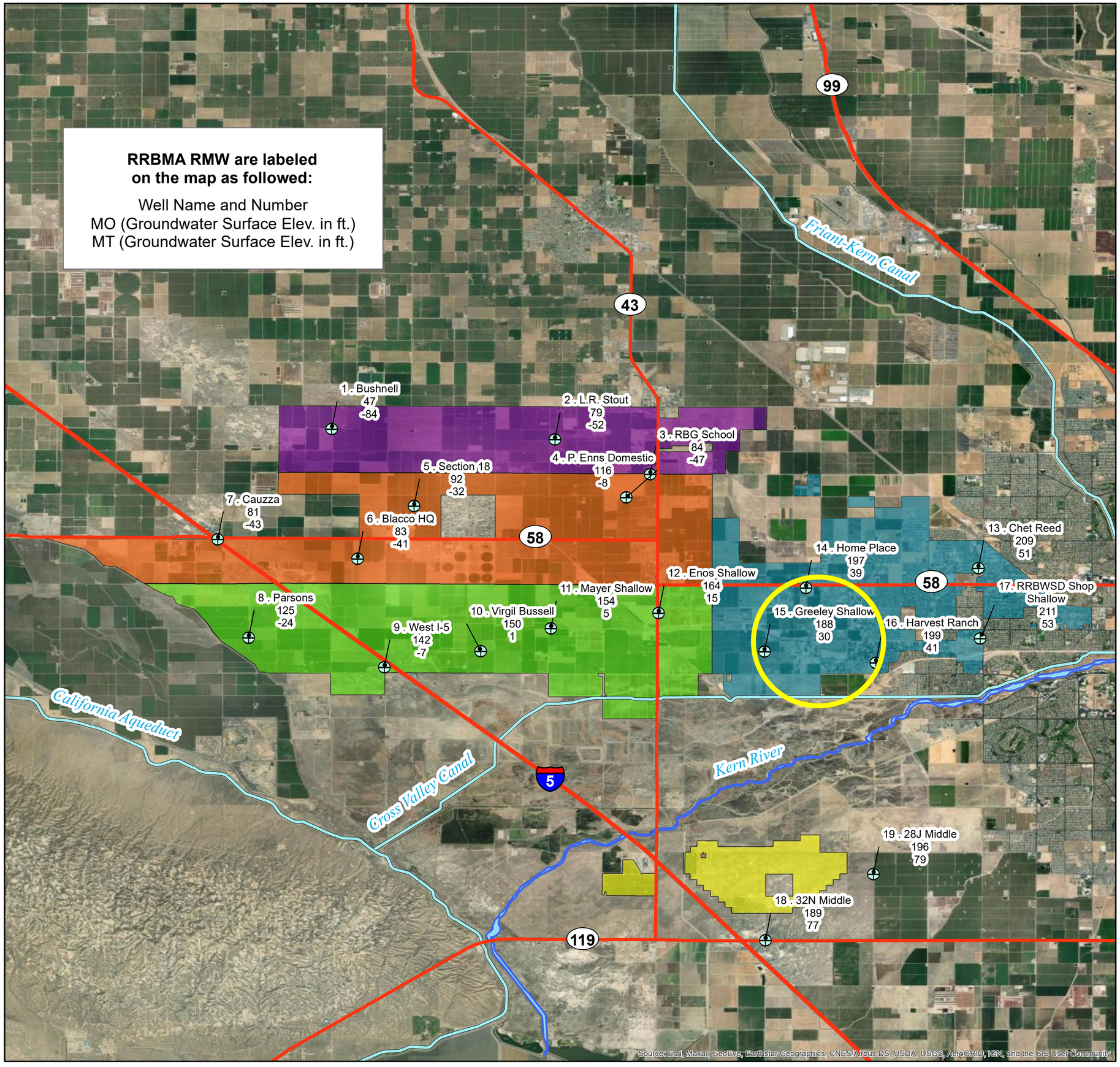


ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT

Z:\000-OldZDrive\jpa. JPA's\SGMA\RRBMA\RRBMA SGMA Docs\Maps\Figures (RE) 2022-06-22


Rosedale-Rio Bravo Water Storage District - 25M Enos - 353760N1192498W002
Ground Surface Elevation: 324
Water Level
Measurable Objective: 164
Minimum Threshold: 15
Groundwater Elevation (ft., msl)
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
2016
2017
2018
2019
2020
2021
2022
2023
2024
Measurement Date

RRBMA Monitoring Areas - RMW Water Level MOs and MTs



Legend

- RRBMA RMW (Water Level)
- Major Highways
- Major Conveyance Facilities
- KernRiver
- North Monitoring Area
- Central Monitoring Area
- South Monitoring Area
- East Monitoring Area
- South of the River Monitoring Area

RMW = Representative Monitoring Well
MO = Measurable Objective
MT = Minimum Threshold

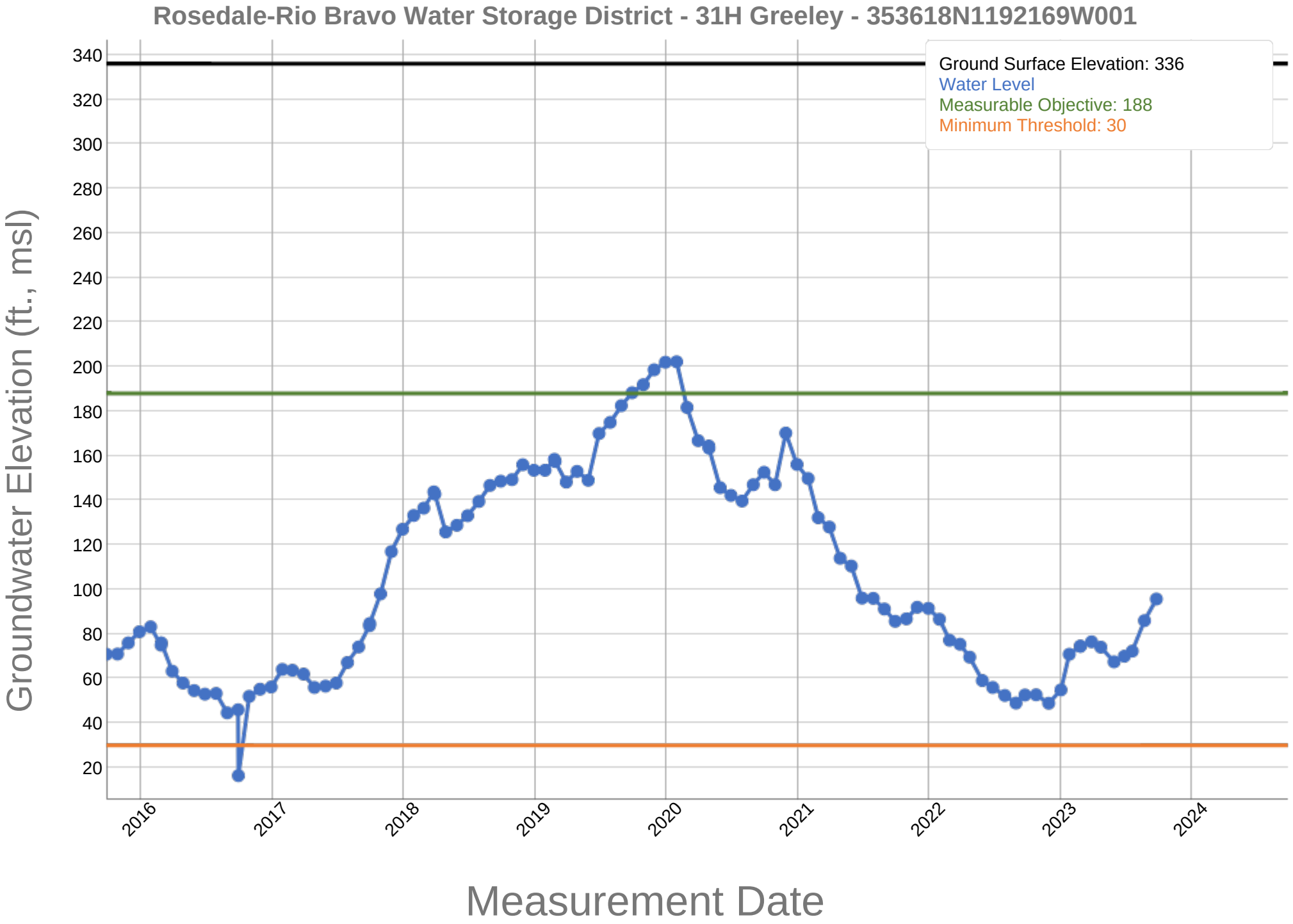
N

0 1.75 3.5 7

Miles

ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT

Z:\000-OldZDrive\jpa. JPA's\SGMA\RRBMA\RRBMA SGMA Docs\Maps\Figures (RE) 2022-06-22


Rosedale-Rio Bravo Water Storage District - 31H Greeley - 353618N1192169W001
Ground Surface Elevation: 336
Water Level
Measurable Objective: 188
Minimum Threshold: 30
Groundwater Elevation (ft., msl)
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
2016
2017
2018
2019
2020
2021
2022
2023
2024
Measurement Date

RRBMA Monitoring Areas - RMW Water Level MOs and MTs

RRBMA RMW are labeled on the map as followed:

Well Name and Number
MO (Groundwater Surface Elev. in ft.)
MT (Groundwater Surface Elev. in ft.)

1 . Bushnell
47
-84

2 . L.R. Stout
79
-52

3 . RBG School
84
-47

4 . P. Enns Domestic
116
-8

5 . Section 18
92
-32

6 . Blacco HQ
83
-41

7 . Cauzza
81
-43

8 . Parsons
125
-24

9 . West I-5
142
-7

10 . Virgil Bussell
150
1

11 . Mayer Shallow
154
5

12 . Enos Shallow
164
15

13 . Chet Reed
209
51

14 . Home Place
197
39

15 . Greeley Shallow
188
30

16 . Harvest Ranch
199
41

17 . RRBWSD Shop Shallow
211
53

18 . 32N Middle
189
77

19 . 28J Middle
196
79

99
43
58
58
5
119

Friant-Kern Canal
California Aqueduct
Cross Valley Canal
Kern River

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

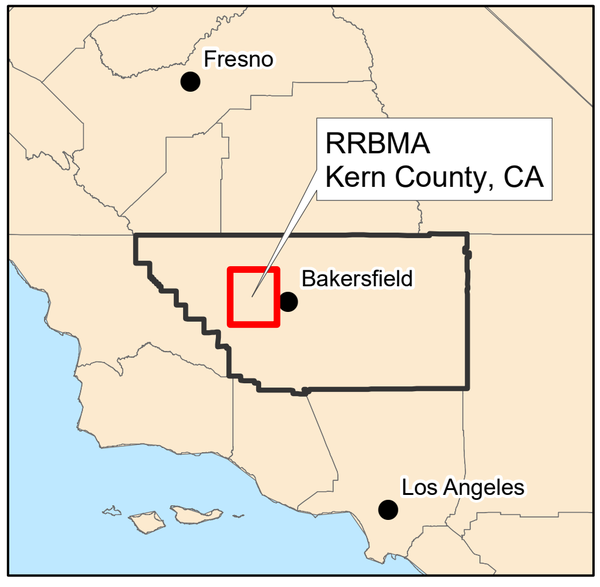
- RRBMA RMW (Water Level)
- Major Highways
- Major Conveyance Facilities
- KernRiver
- North Monitoring Area
- Central Monitoring Area
- South Monitoring Area
- East Monitoring Area
- South of the River Monitoring Area

RMW = Representative Monitoring Well
MO = Measurable Objective
MT = Minimum Threshold

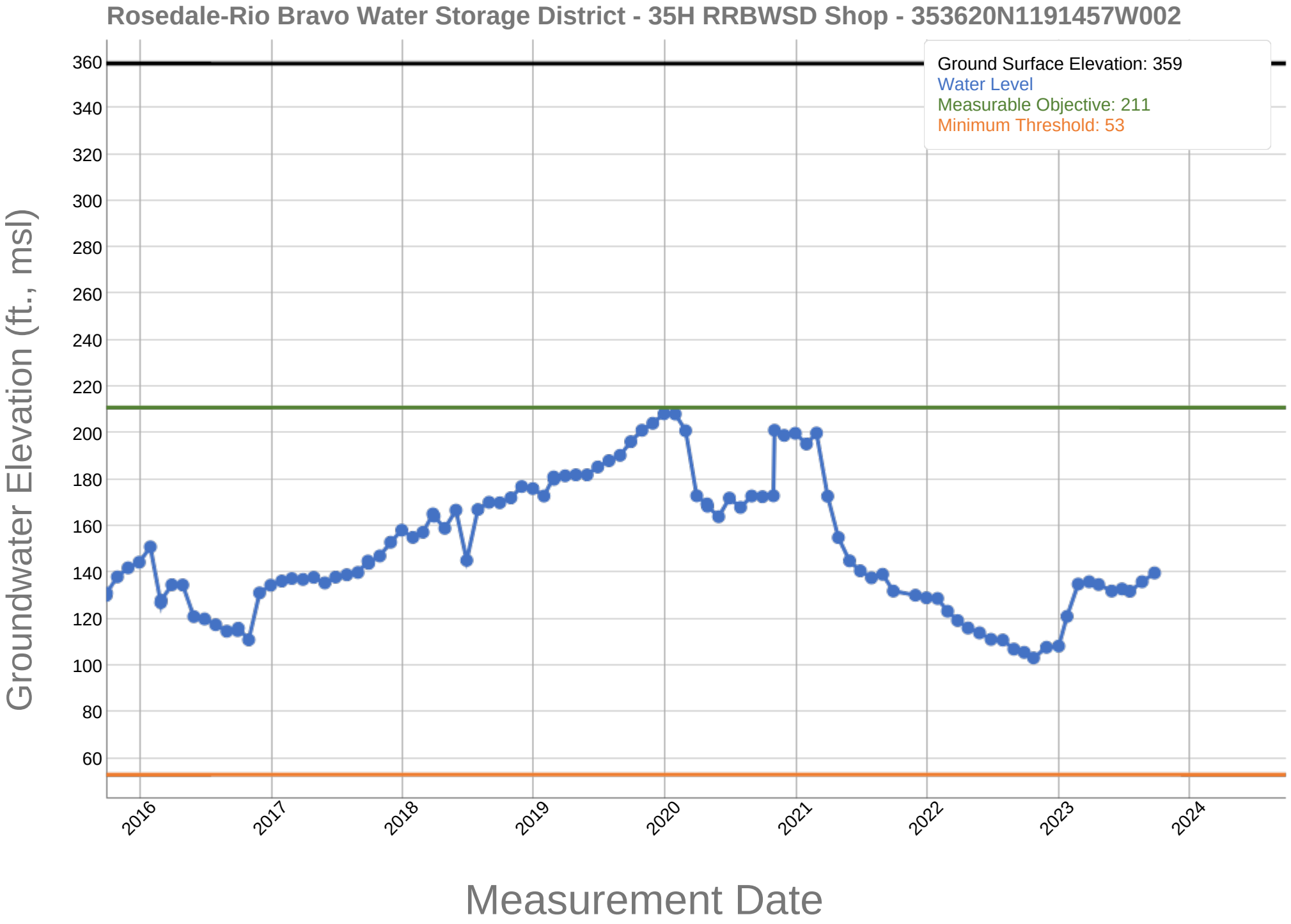
N

0 1.75 3.5 7

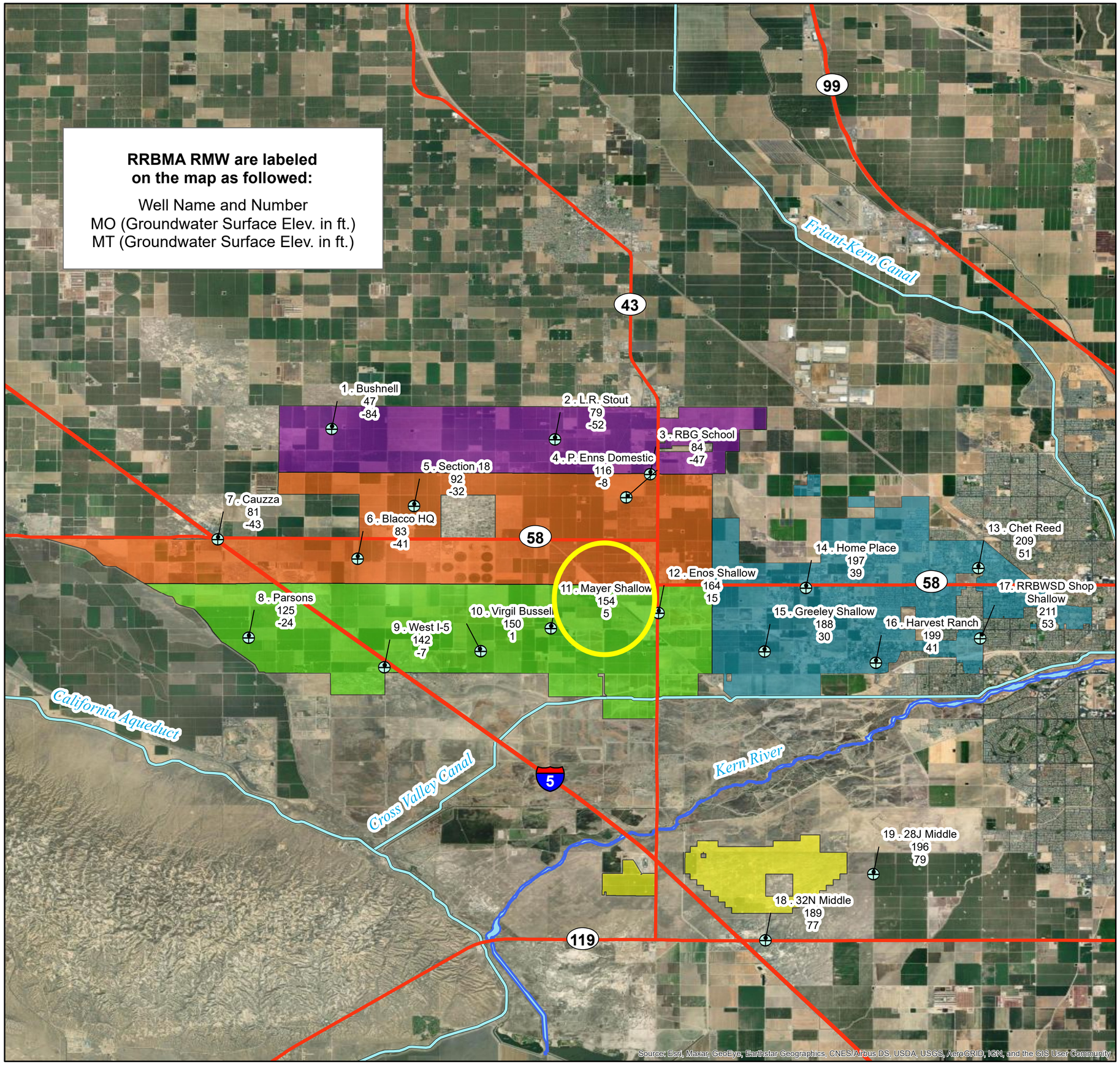
Miles



ROSEDALE-RIO BRAVO
WATER STORAGE DISTRICT


Rosedale-Rio Bravo Water Storage District - 35H RRBWSD Shop - 353620N1191457W002
Ground Surface Elevation: 359
Water Level
Measurable Objective: 211
Minimum Threshold: 53
Groundwater Elevation (ft., msl)
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
2016
2017
2018
2019
2020
2021
2022
2023
2024
Measurement Date

RRBMA Monitoring Areas - RMW Water Level MOs and MTs



Legend

- RRBMA RMW (Water Level)
- Major Highways
- Major Conveyance Facilities
- KernRiver
- North Monitoring Area
- Central Monitoring Area
- South Monitoring Area
- East Monitoring Area
- South of the River Monitoring Area

RMW = Representative Monitoring Well
MO = Measurable Objective
MT = Minimum Threshold

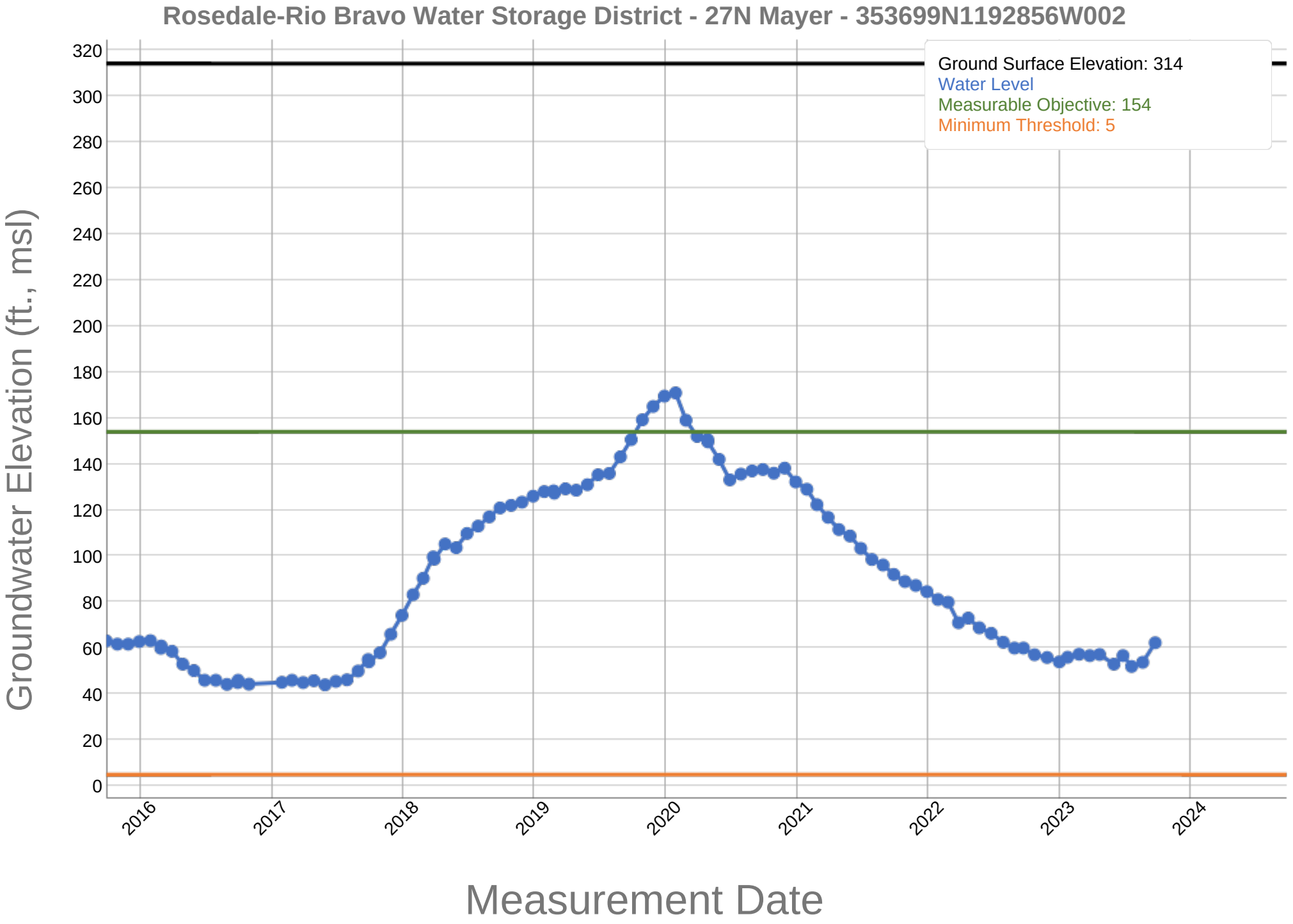
N

0 1.75 3.5 7

Miles

ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT

Z:\000-OldZDrive\jpa. JPA's\SGMA\RRBMA\RRBMA SGMA Docs\Maps\Figures (RE) 2022-06-22


Rosedale-Rio Bravo Water Storage District - 27N Mayer - 353699N1192856W002
Ground Surface Elevation: 314
Water Level
Measurable Objective: 154
Minimum Threshold: 5
Groundwater Elevation (ft., msl)
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
2016
2017
2018
2019
2020
2021
2022
2023
2024
Measurement Date

RRBMA Monitoring Areas - RMW Water Level MOs and MTs

RRBMA RMW are labeled on the map as followed:

Well Name and Number
MO (Groundwater Surface Elev. in ft.)
MT (Groundwater Surface Elev. in ft.)

1 . Bushnell
47
-84

2 . L.R. Stout
79
-52

3 . RBG School
84
-47

4 . P. Enns Domestic
116
-8

5 . Section 18
92
-32

6 . Blacco HQ
83
-41

7 . Cauzza
81
-43

8 . Parsons
125
-24

9 . West I-5
142
-7

10 . Virgil Bussell
150
1

11 . Mayer Shallow
154
5

12 . Enos Shallow
164
15

13 . Chet Reed
209
51

14 . Home Place
197
39

15 . Greeley Shallow
188
30

16 . Harvest Ranch
199
41

17 . RRBWSD Shop Shallow
211
53

18 . 32N Middle
189
77

19 . 28J Middle
196
79

99
43
58
58
5
119

Friant-Kern Canal
California Aqueduct
Cross Valley Canal
Kern River

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- RRBMA RMW (Water Level)
- Major Highways
- Major Conveyance Facilities
- KernRiver
- North Monitoring Area
- Central Monitoring Area
- South Monitoring Area
- East Monitoring Area
- South of the River Monitoring Area

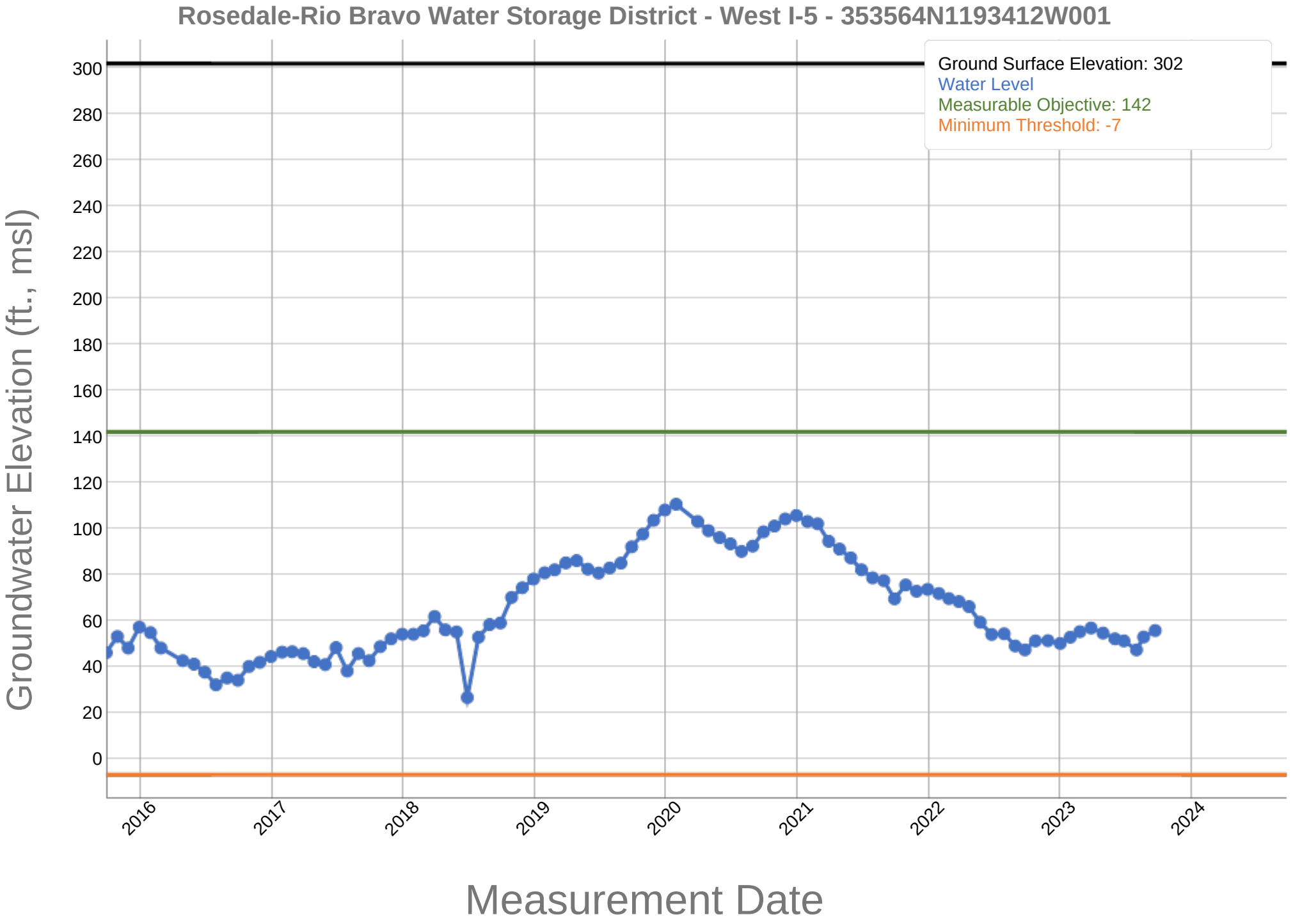
RMW = Representative Monitoring Well
MO = Measurable Objective
MT = Minimum Threshold

N

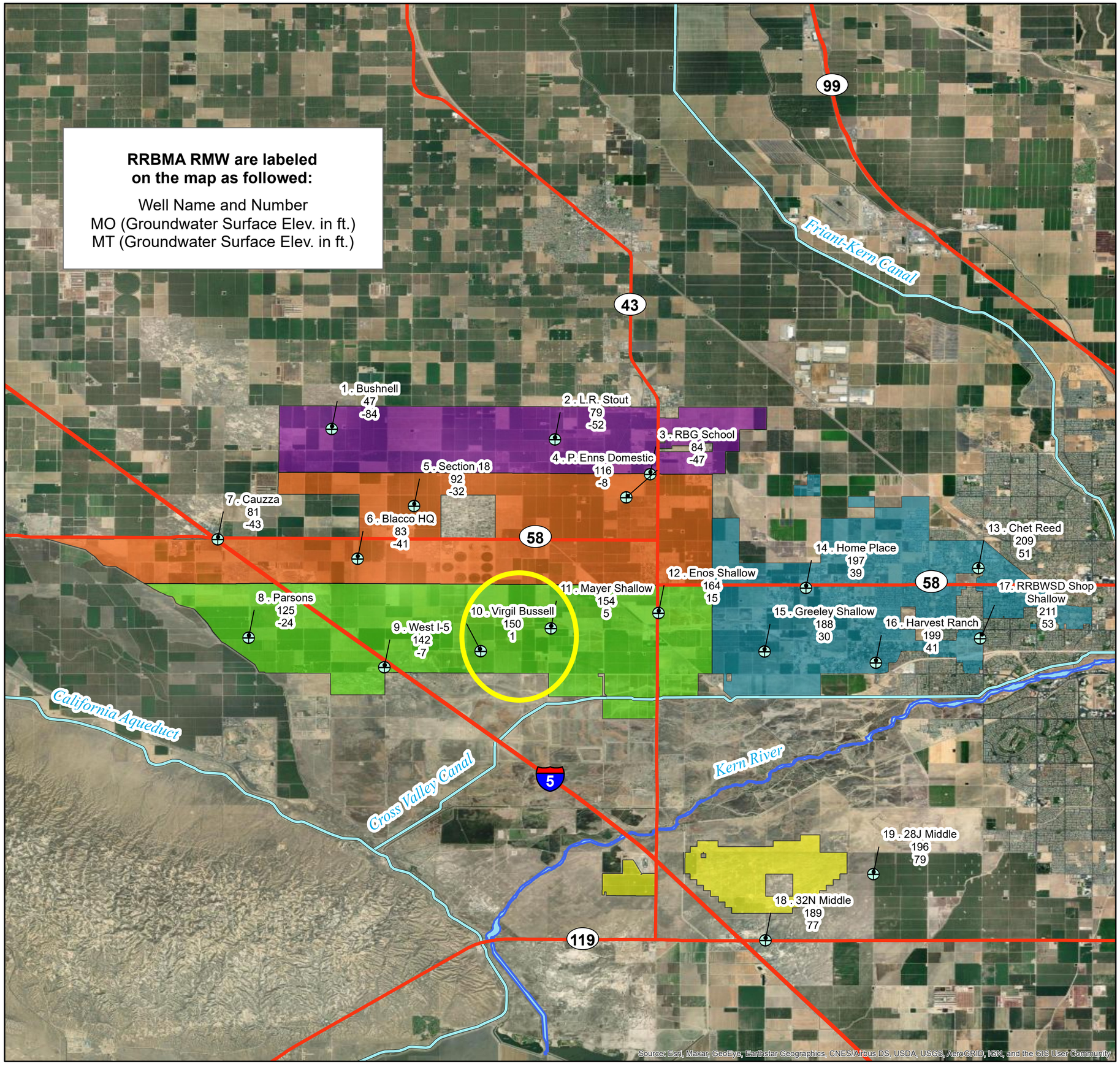
0 1.75 3.5 7

Miles

ROSEDALE-RIO BRAVO
WATER STORAGE DISTRICT


Rosedale-Rio Bravo Water Storage District - West I-5 - 353564N1193412W001
Ground Surface Elevation: 302
Water Level
Measurable Objective: 142
Minimum Threshold: -7
Groundwater Elevation (ft., msl)
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
2016
2017
2018
2019
2020
2021
2022
2023
2024
Measurement Date

RRBMA Monitoring Areas - RMW Water Level MOs and MTs



Legend

- RRBMA RMW (Water Level)
- Major Highways
- Major Conveyance Facilities
- KernRiver
- North Monitoring Area
- Central Monitoring Area
- South Monitoring Area
- East Monitoring Area
- South of the River Monitoring Area

RMW = Representative Monitoring Well
MO = Measurable Objective
MT = Minimum Threshold

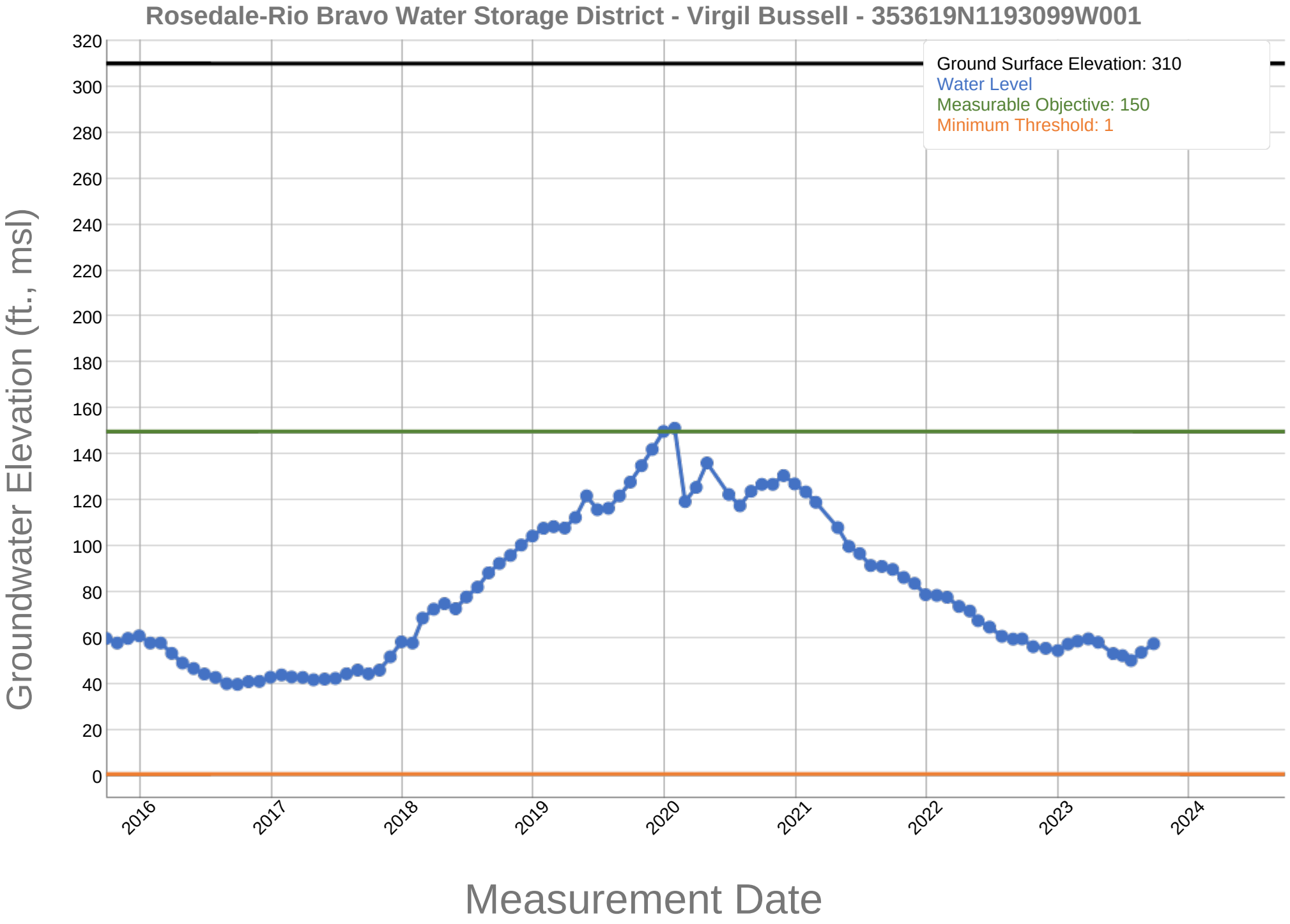
N

0 1.75 3.5 7

Miles

ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT

Z:\000-OldZDrive\jpa. JPA's\SGMA\RRBMA\RRBMA SGMA Docs\Maps\Figures (RE) 2022-06-22


Rosedale-Rio Bravo Water Storage District - Virgil Bussell - 353619N1193099W001
Ground Surface Elevation: 310
Water Level
Measurable Objective: 150
Minimum Threshold: 1
Groundwater Elevation (ft., msl)
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
2016
2017
2018
2019
2020
2021
2022
2023
2024
Measurement Date

RRBMA Monitoring Areas - RMW Water Level MOs and MTs

RRBMA RMW are labeled on the map as followed:

Well Name and Number
MO (Groundwater Surface Elev. in ft.)
MT (Groundwater Surface Elev. in ft.)

1 . Bushnell
47
-84

2 . L.R. Stout
79
-52

3 . RBG School
84
-47

4 . P. Enns Domestic
116
-8

5 . Section 18
92
-32

6 . Blacco HQ
83
-41

7 . Cauzza
81
-43

8 . Parsons
125
-24

9 . West I-5
142
-7

10 . Virgil Bussell
150
1

11 . Mayer Shallow
154
5

12 . Enos Shallow
164
15

13 . Chet Reed
209
51

14 . Home Place
197
39

15 . Greeley Shallow
188
30

16 . Harvest Ranch
199
41

17 . RRBWSD Shop Shallow
211
53

18 . 32N Middle
189
77

19 . 28J Middle
196
79

99
43
58
5
119

Friant-Kern Canal
California Aqueduct
Cross Valley Canal
Kern River

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- RRBMA RMW (Water Level)
- Major Highways
- Major Conveyance Facilities
- KernRiver
- North Monitoring Area
- Central Monitoring Area
- South Monitoring Area
- East Monitoring Area
- South of the River Monitoring Area

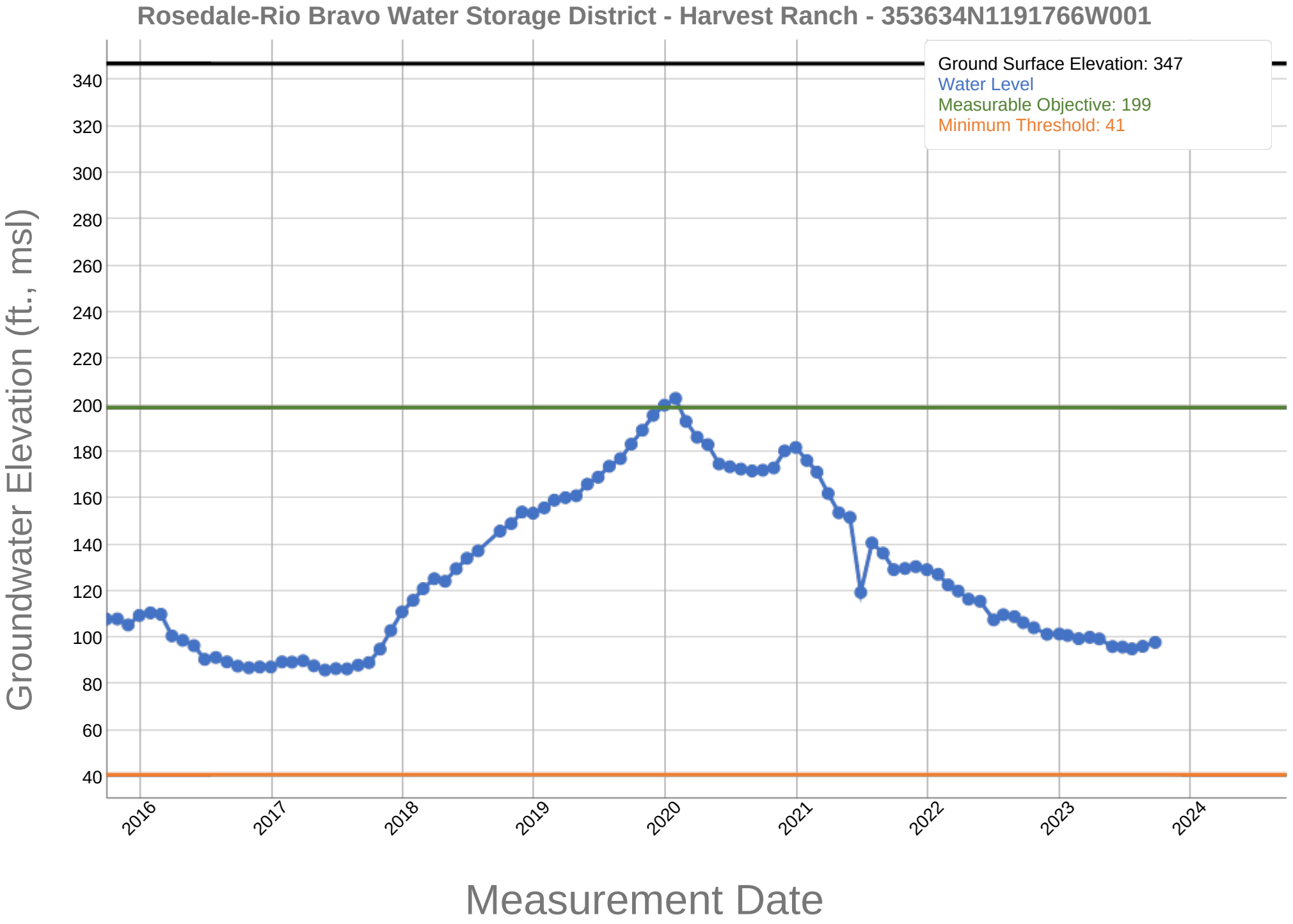
RMW = Representative Monitoring Well
MO = Measurable Objective
MT = Minimum Threshold

N

0 1.75 3.5 7

Miles

ROSEDALE-RIO BRAVO
WATER STORAGE DISTRICT


Rosedale-Rio Bravo Water Storage District - Harvest Ranch - 353634N1191766W001
Ground Surface Elevation: 347
Water Level
Measurable Objective: 199
Minimum Threshold: 41
Groundwater Elevation (ft., msl)
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
2016
2017
2018
2019
2020
2021
2022
2023
2024
Measurement Date

RRBMA Monitoring Areas - RMW Water Level MOs and MTs

RRBMA RMW are labeled on the map as followed:

Well Name and Number
MO (Groundwater Surface Elev. in ft.)
MT (Groundwater Surface Elev. in ft.)

1 . Bushnell
47
-84

2 . L.R. Stout
79
-52

3 . RBG School
84
-47

4 . P. Enns Domestic
116
-8

5 . Section 18
92
-32

6 . Blacco HQ
83
-41

7 . Cauzza
81
-43

8 . Parsons
125
-24

9 . West I-5
142
-7

10 . Virgil Bussell
150
1

11 . Mayer Shallow
154
5

12 . Enos Shallow
164
15

13 . Chet Reed
209
51

14 . Home Place
197
39

15 . Greele... Shallow
188
30

16 . Harvest Ranch
199
41

17 . RRBWSD Shop Shallow
211
53

18 . 32N Middle
189
77

19 . 28J Middle
196
79

99
43
58
58
5
119

Friant-Kern Canal
California Aqueduct
Cross Valley Canal
Kern River

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- RRBMA RMW (Water Level)
- Major Highways
- Major Conveyance Facilities
- KernRiver
- North Monitoring Area
- Central Monitoring Area
- South Monitoring Area
- East Monitoring Area
- South of the River Monitoring Area

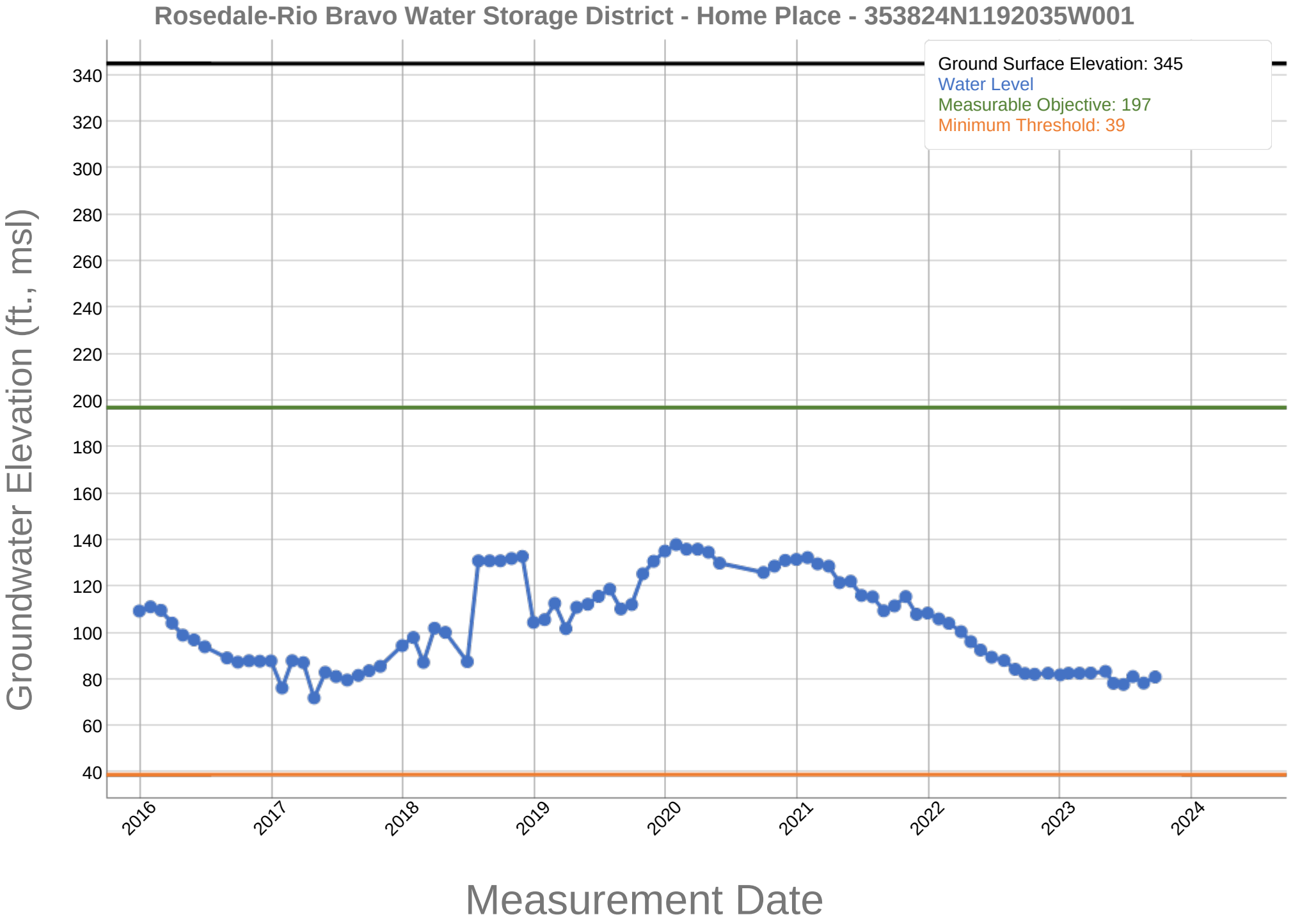
RMW = Representative Monitoring Well
MO = Measurable Objective
MT = Minimum Threshold

N

0 1.75 3.5 7

Miles

ROSEDALE-RIO BRAVO
WATER STORAGE DISTRICT


Rosedale-Rio Bravo Water Storage District - Home Place - 353824N1192035W001
Ground Surface Elevation: 345
Water Level
Measurable Objective: 197
Minimum Threshold: 39
Groundwater Elevation (ft., msl)
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
2016
2017
2018
2019
2020
2021
2022
2023
2024
Measurement Date

RRBMA Monitoring Areas - RMW Water Level MOs and MTs

RRBMA RMW are labeled on the map as followed:

Well Name and Number
MO (Groundwater Surface Elev. in ft.)
MT (Groundwater Surface Elev. in ft.)

1 . Bushnell
47
-84

2 . L.R. Stout
79
-52

3 . RBG School
84
-47

4 . P. Enns Domestic
116
-8

5 . Section 18
92
-32

6 . Blacco HQ
83
-41

7 . Cauzza
81
-43

8 . Parsons
125
-24

9 . West I-5
142
-7

10 . Virgil Bussell
150
1

11 . Mayer Shallow
154
5

12 . Enos Shallow
164
15

13 . Chet Reed
209
51

14 . Home Place
197
39

15 . Greeley Shallow
188
30

16 . Harvest Ranch
199
41

17 . RRBWSD Shop Shallow
211
53

18 . 32N Middle
189
77

19 . 28J Middle
196
79

99
43
58
58
5
119

Friant-Kern Canal
California Aqueduct
Cross Valley Canal
Kern River

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- RRBMA RMW (Water Level)
- Major Highways
- Major Conveyance Facilities
- KernRiver
- North Monitoring Area
- Central Monitoring Area
- South Monitoring Area
- East Monitoring Area
- South of the River Monitoring Area

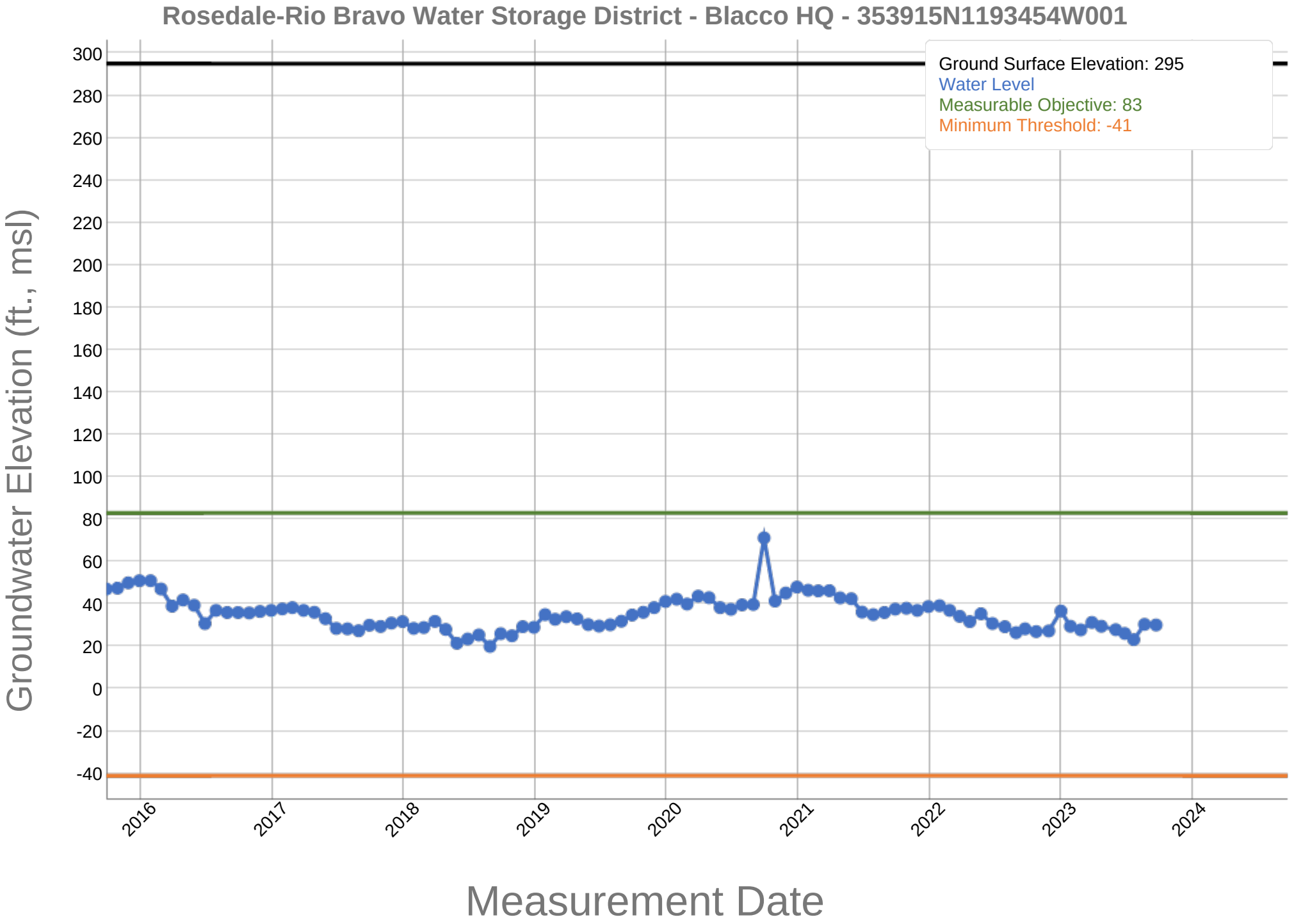
RMW = Representative Monitoring Well
MO = Measurable Objective
MT = Minimum Threshold

N

0 1.75 3.5 7

Miles

ROSEDALE-RIO BRAVO
WATER STORAGE DISTRICT


Rosedale-Rio Bravo Water Storage District - Blacco HQ - 353915N1193454W001
Ground Surface Elevation: 295
Water Level
Measurable Objective: 83
Minimum Threshold: -41
Groundwater Elevation (ft., msl)
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
-20
-40
2016
2017
2018
2019
2020
2021
2022
2023
2024
Measurement Date

RRBMA Monitoring Areas - RMW Water Level MOs and MTs

RRBMA RMW are labeled on the map as followed:

Well Name and Number
MO (Groundwater Surface Elev. in ft.)
MT (Groundwater Surface Elev. in ft.)

1 . Bushnell
47
-84

2 . L.R. Stout
79
-52

3 . RBG School
84
-47

4 . P. Enns Domestic
116
-8

5 . Section 18
92
-32

6 . Blacco HQ
83
-41

7 . Cauzza
81
-43

8 . Parsons
125
-24

9 . West I-5
142
-7

10 . Virgil Bussell
150
1

11 . Mayer Shallow
154
5

12 . Enos Shallow
164
15

13 . Chet Reed
209
51

14 . Home Place
197
39

15 . Greeley Shallow
188
30

16 . Harvest Ranch
199
41

17 . RRBWSD Shop Shallow
211
53

18 . 32N Middle
189
77

19 . 28J Middle
196
79

99
43
58
58
5
119

Friant-Kern Canal
California Aqueduct
Cross Valley Canal
Kern River

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

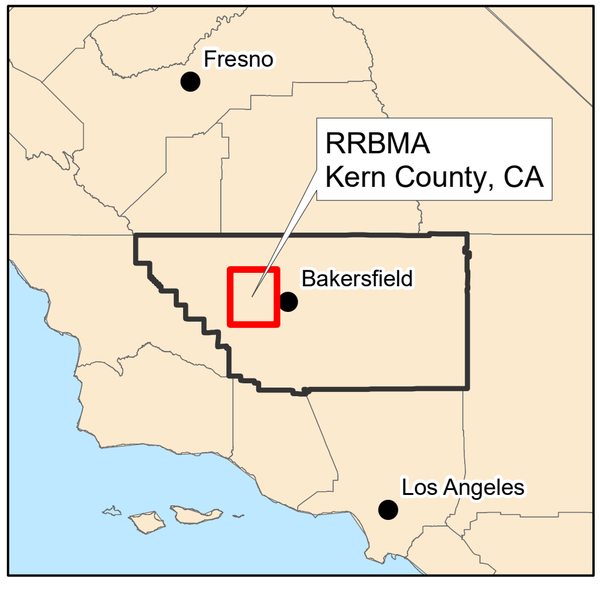
- RRBMA RMW (Water Level)
- Major Highways
- Major Conveyance Facilities
- KernRiver
- North Monitoring Area
- Central Monitoring Area
- South Monitoring Area
- East Monitoring Area
- South of the River Monitoring Area

RMW = Representative Monitoring Well
MO = Measurable Objective
MT = Minimum Threshold

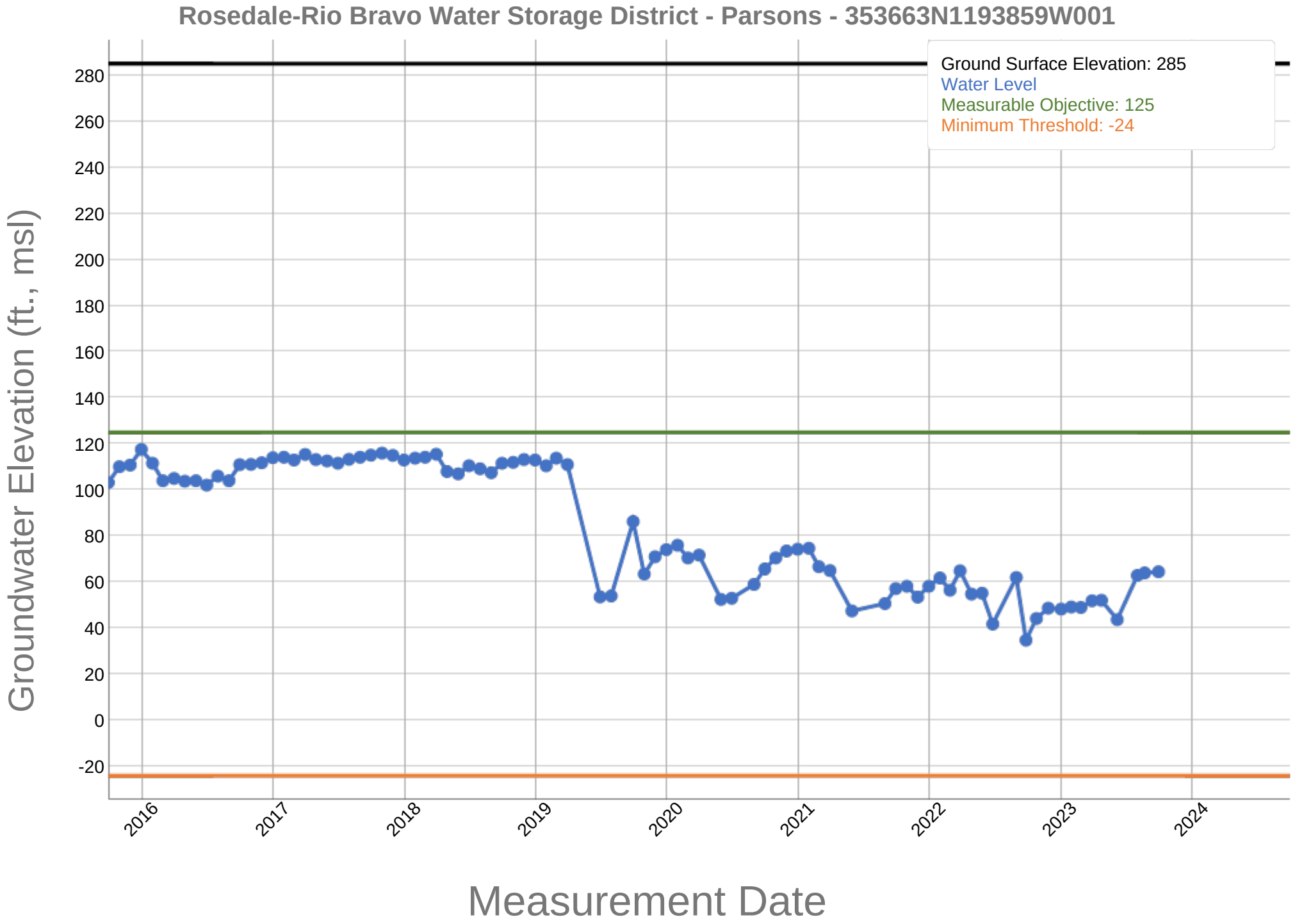
N

0 1.75 3.5 7

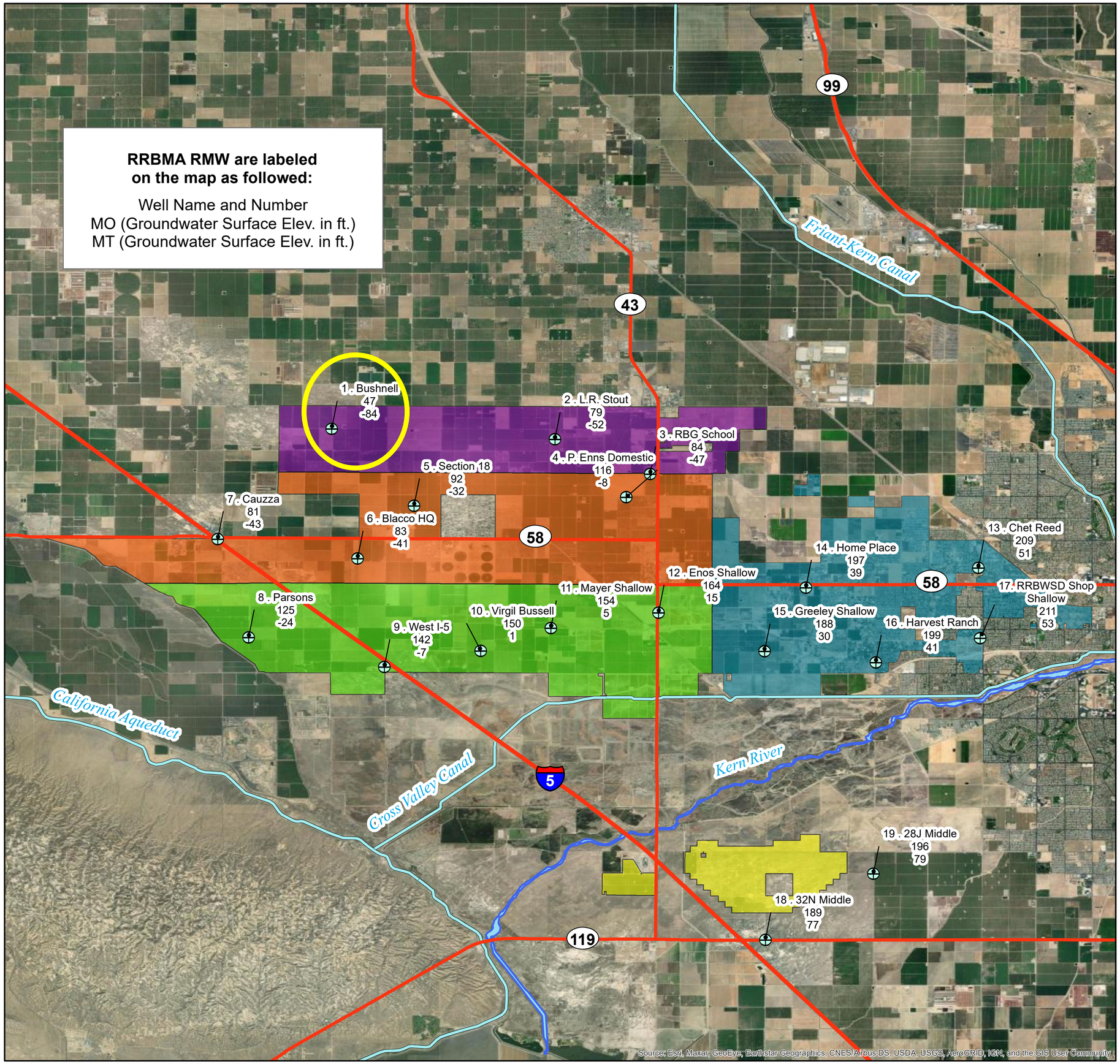
Miles



ROSEDALE-RIO BRAVO
WATER STORAGE DISTRICT


Rosedale-Rio Bravo Water Storage District - Parsons - 353663N1193859W001
Ground Surface Elevation: 285
Water Level
Measurable Objective: 125
Minimum Threshold: -24
Groundwater Elevation (ft., msl)
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
-20
2016
2017
2018
2019
2020
2021
2022
2023
2024
Measurement Date

RRBMA Monitoring Areas - RMW Water Level MOs and MTs



Legend

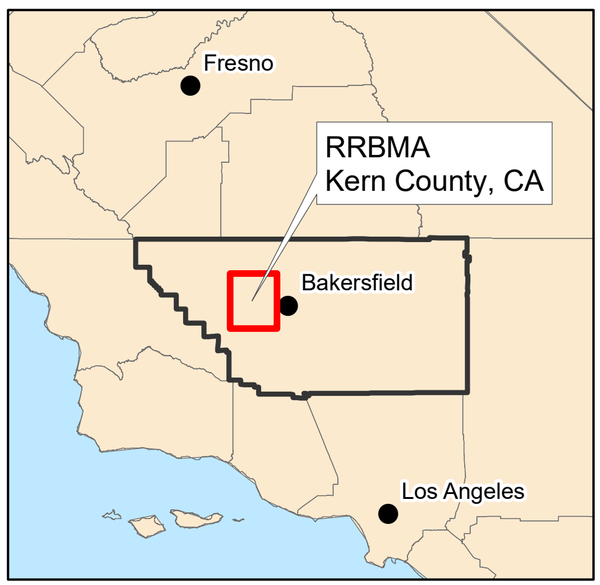
- RRBMA RMW (Water Level)
- Major Highways
- Major Conveyance Facilities
- KernRiver
- North Monitoring Area
- Central Monitoring Area
- South Monitoring Area
- East Monitoring Area
- South of the River Monitoring Area

RMW = Representative Monitoring Well
MO = Measurable Objective
MT = Minimum Threshold

N

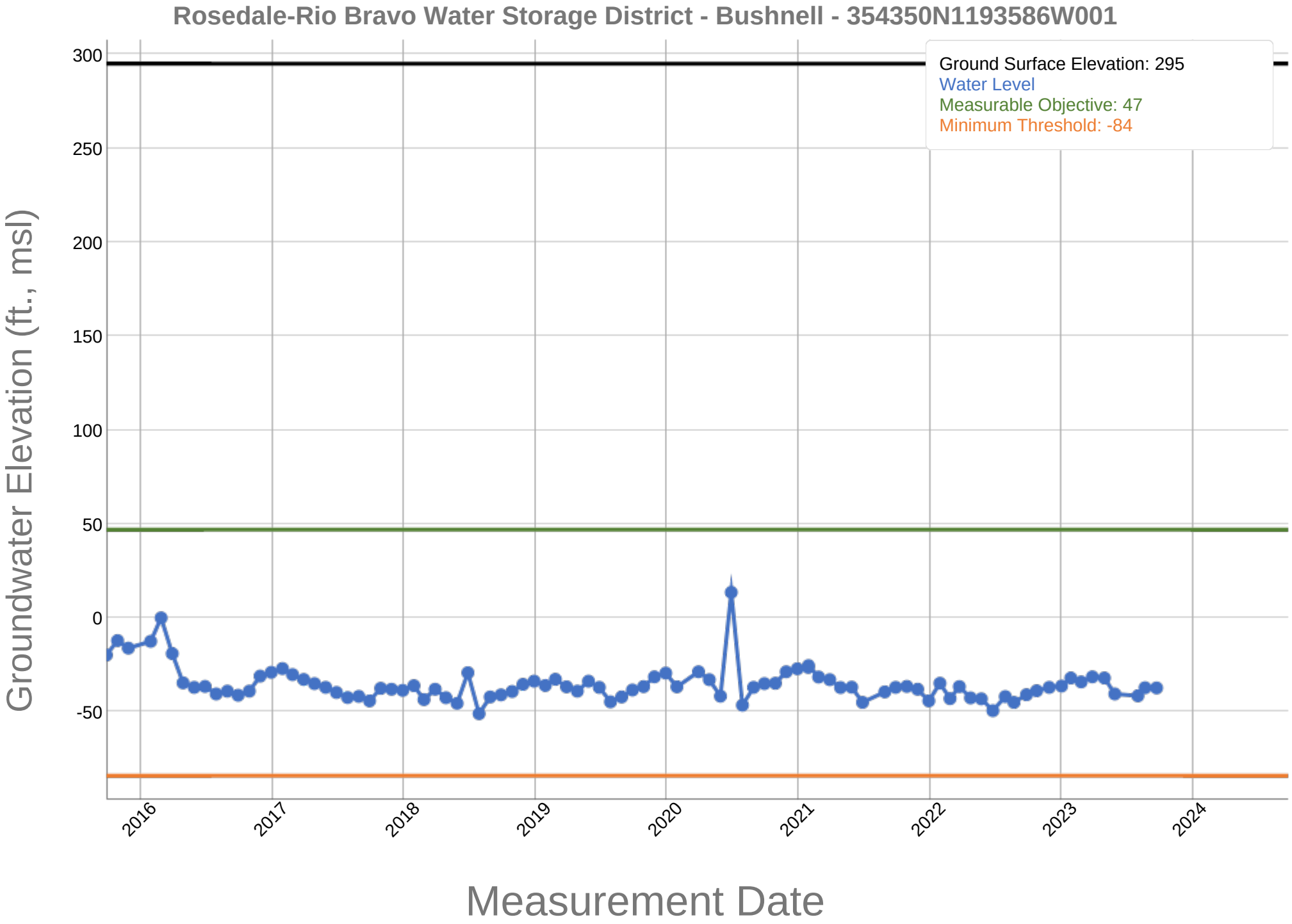
0 1.75 3.5 7

Miles



ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT

Z:\000-OldZDrive\jpa. JPA's\SGMA\RRBMA\RRBMA SGMA Docs\Maps\Figures (RE) 2022-06-22


Rosedale-Rio Bravo Water Storage District - Bushnell - 354350N1193586W001
Ground Surface Elevation: 295
Water Level
Measurable Objective: 47
Minimum Threshold: -84
Groundwater Elevation (ft., msl)
300
250
200
150
100
50
0
-50
2016
2017
2018
2019
2020
2021
2022
2023
2024
Measurement Date

RRBMA Monitoring Areas - RMW Water Level MOs and MTs

RRBMA RMW are labeled on the map as followed:

Well Name and Number
MO (Groundwater Surface Elev. in ft.)
MT (Groundwater Surface Elev. in ft.)

1 . Bushnell
47
-84

2 . L.R. Stout
79
-52

3 . RBG School
84
-47

4 . P. Ellis Domestic
116
-8

5 . Section 18
92
-32

6 . Blacco HQ
83
-41

7 . Cauzza
81
-43

8 . Parsons
125
-24

9 . West I-5
142
-7

10 . Virgil Bussell
150
1

11 . Mayer Shallow
154
5

12 . Enos Shallow
164
15

13 . Chet Reed
209
51

14 . Home Place
197
39

15 . Greeley Shallow
188
30

16 . Harvest Ranch
199
41

17 . RRBWSD Shop Shallow
211
53

18 . 32N Middle
189
77

19 . 28J Middle
196
79

99
43
58
58
5
119

Friant-Kern Canal
California Aqueduct
Cross Valley Canal
Kern River

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

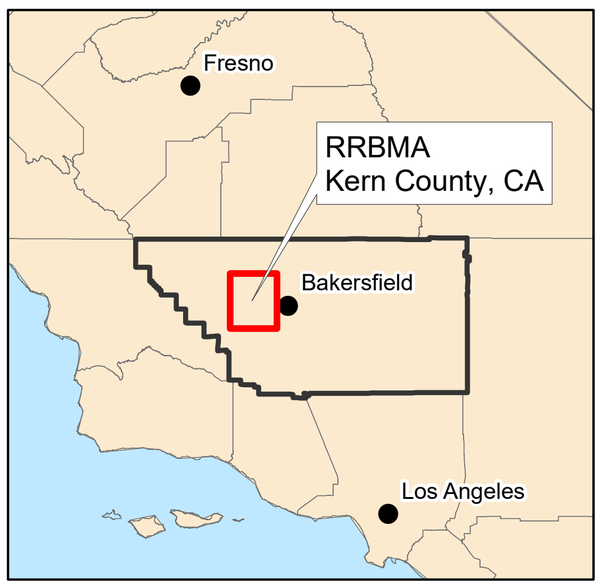
- RRBMA RMW (Water Level)
- Major Highways
- Major Conveyance Facilities
- KernRiver
- North Monitoring Area
- Central Monitoring Area
- South Monitoring Area
- East Monitoring Area
- South of the River Monitoring Area

RMW = Representative Monitoring Well
MO = Measurable Objective
MT = Minimum Threshold

N

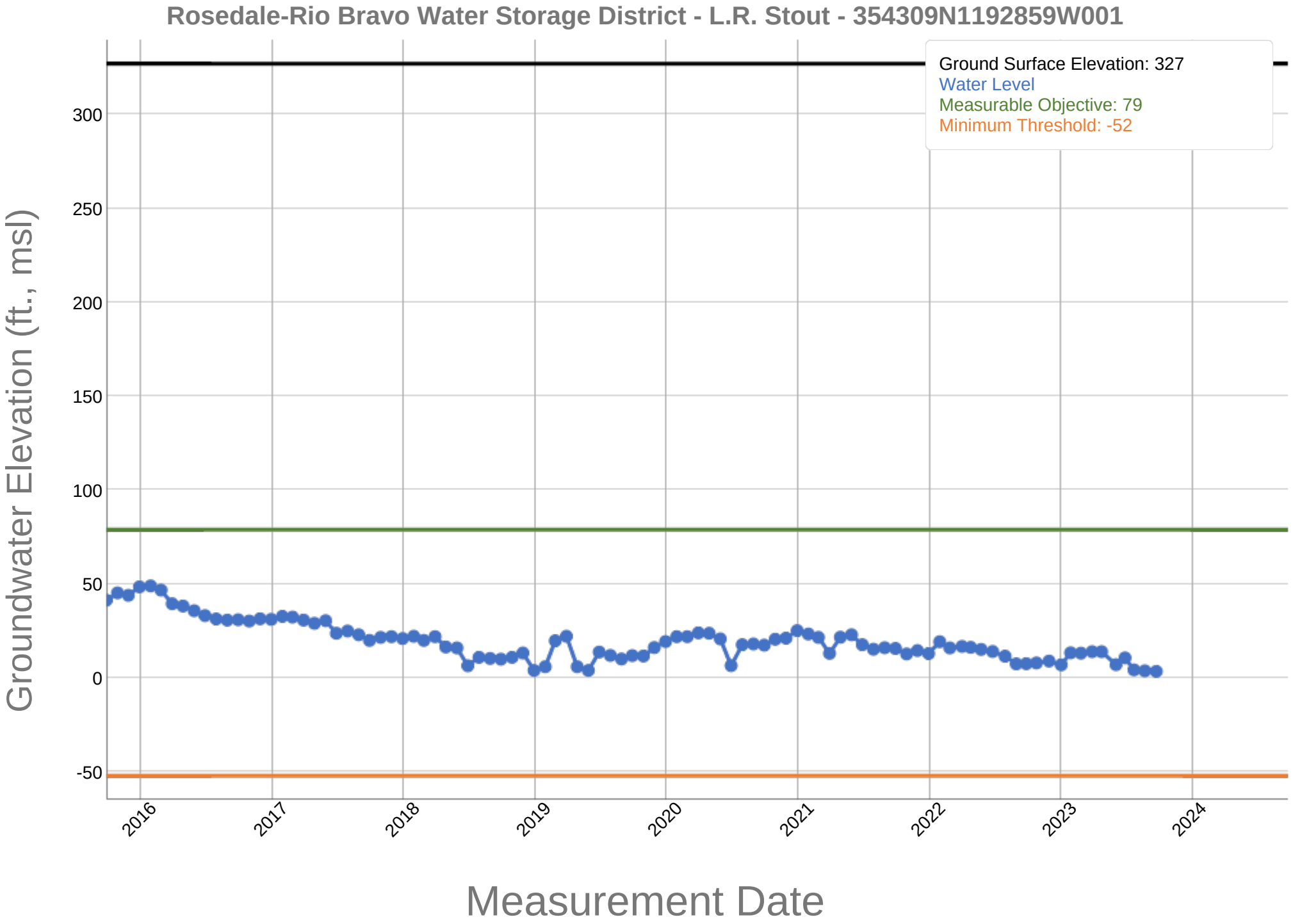
0 1.75 3.5 7

Miles

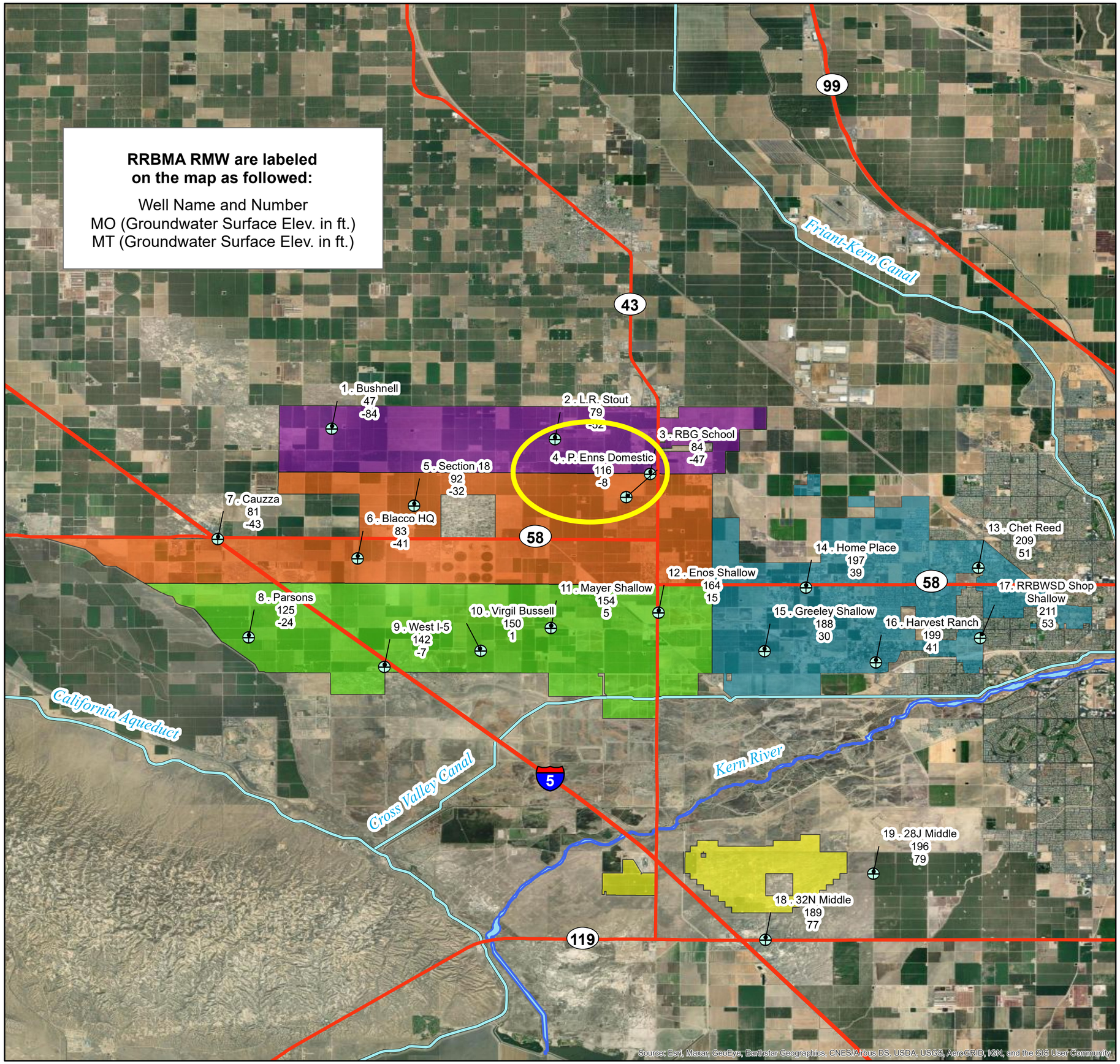


ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT

Z:\000-OldZDrive\jpa. JPA's\SGMA\RRBMA\RRBMA SGMA Docs\Maps\Figures (RE) 2022-06-22


Rosedale-Rio Bravo Water Storage District - L.R. Stout - 354309N1192859W001
Ground Surface Elevation: 327
Water Level
Measurable Objective: 79
Minimum Threshold: -52
Groundwater Elevation (ft., msl)
300
250
200
150
100
50
0
-50
2016
2017
2018
2019
2020
2021
2022
2023
2024
Measurement Date

RRBMA Monitoring Areas - RMW Water Level MOs and MTs



Legend

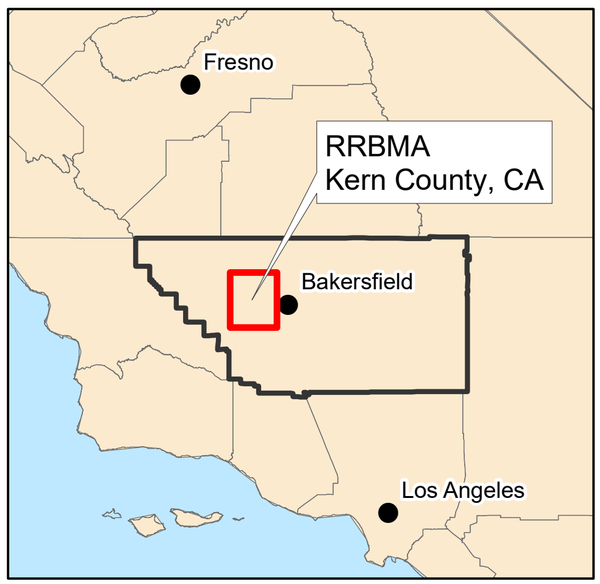
- RRBMA RMW (Water Level)
- Major Highways
- Major Conveyance Facilities
- KernRiver
- North Monitoring Area
- Central Monitoring Area
- South Monitoring Area
- East Monitoring Area
- South of the River Monitoring Area

RMW = Representative Monitoring Well
MO = Measurable Objective
MT = Minimum Threshold

N

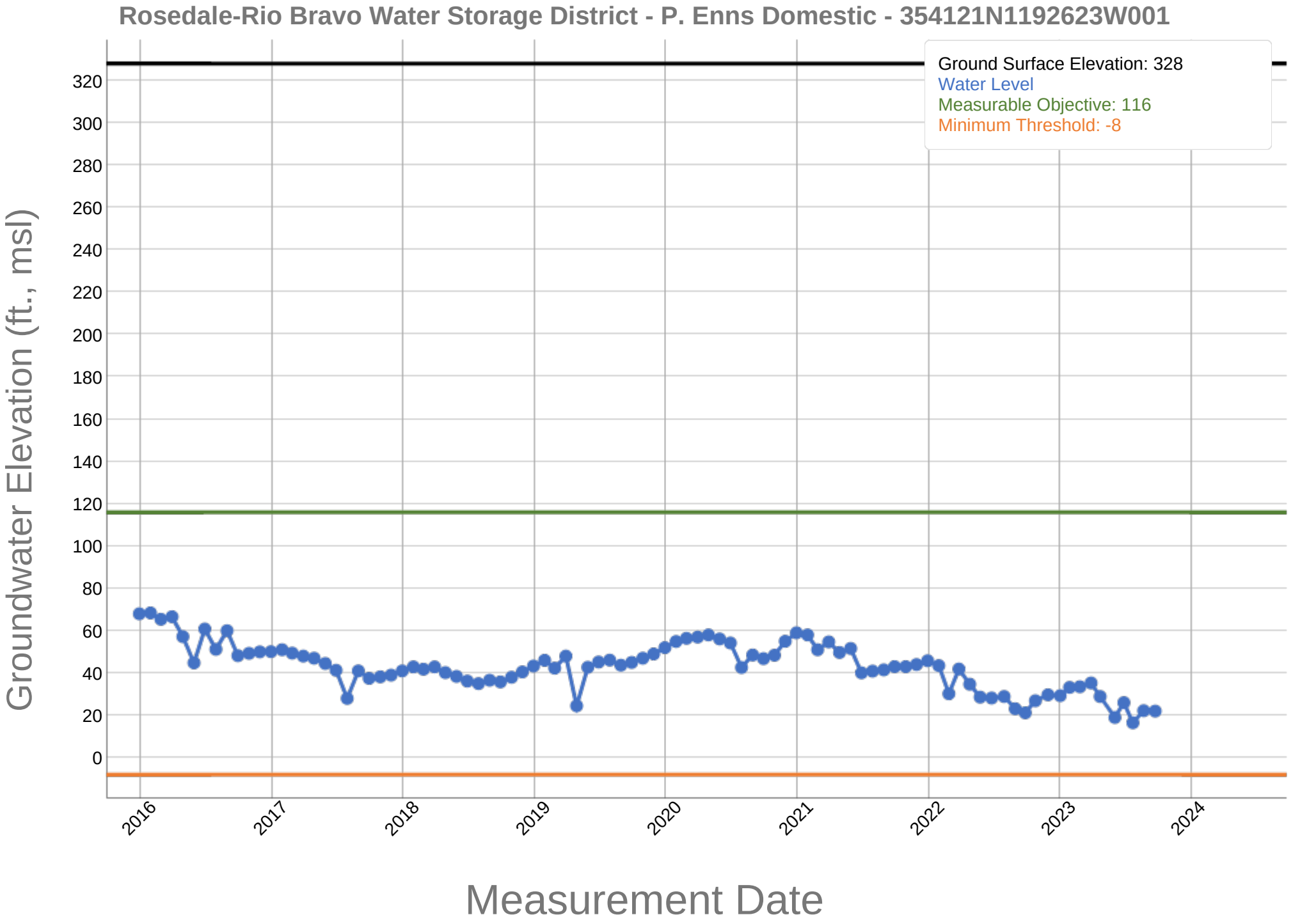
0 1.75 3.5 7

Miles



ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT

Z:\000-OldZDrive\jpa. JPA's\SGMA\RRBMA\RRBMA SGMA Docs\Maps\Figures (RE) 2022-06-22


Rosedale-Rio Bravo Water Storage District - P. Enns Domestic - 354121N1192623W001
Ground Surface Elevation: 328
Water Level
Measurable Objective: 116
Minimum Threshold: -8
Groundwater Elevation (ft., msl)
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
2016
2017
2018
2019
2020
2021
2022
2023
2024
Measurement Date

RRBMA Monitoring Areas - RMW Water Level MOs and MTs

RRBMA RMW are labeled on the map as followed:

Well Name and Number
MO (Groundwater Surface Elev. in ft.)
MT (Groundwater Surface Elev. in ft.)

1 . Bushnell
47
-84

2 . L.R. Stout
79
-52

3 . RBG School
84
-47

4 . P. Enns Domestic
116
-8

5 . Section 18
92
-32

6 . Blacco HQ
83
-41

7 . Cauzza
81
-43

8 . Parsons
125
-24

9 . West I-5
142
-7

10 . Virgil Bussell
150
1

11 . Mayer Shallow
154
5

12 . Enos Shallow
164
15

13 . Chet Ree
209
51

14 . Home Place
197
39

15 . Greeley Shallow
188
30

16 . Harvest Ranch
199
41

17 . RRBWSD Shop Shallow
211
53

18 . 32N Middle
189
77

19 . 28J Middle
196
79

99
43
58
58
5
119

Friant-Kern Canal
California Aqueduct
Cross Valley Canal
Kern River

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

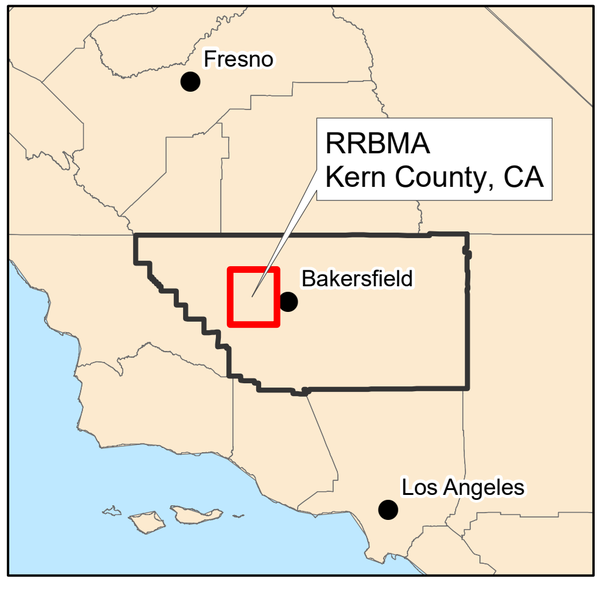
- RRBMA RMW (Water Level)
- Major Highways
- Major Conveyance Facilities
- KernRiver
- North Monitoring Area
- Central Monitoring Area
- South Monitoring Area
- East Monitoring Area
- South of the River Monitoring Area

RMW = Representative Monitoring Well
MO = Measurable Objective
MT = Minimum Threshold

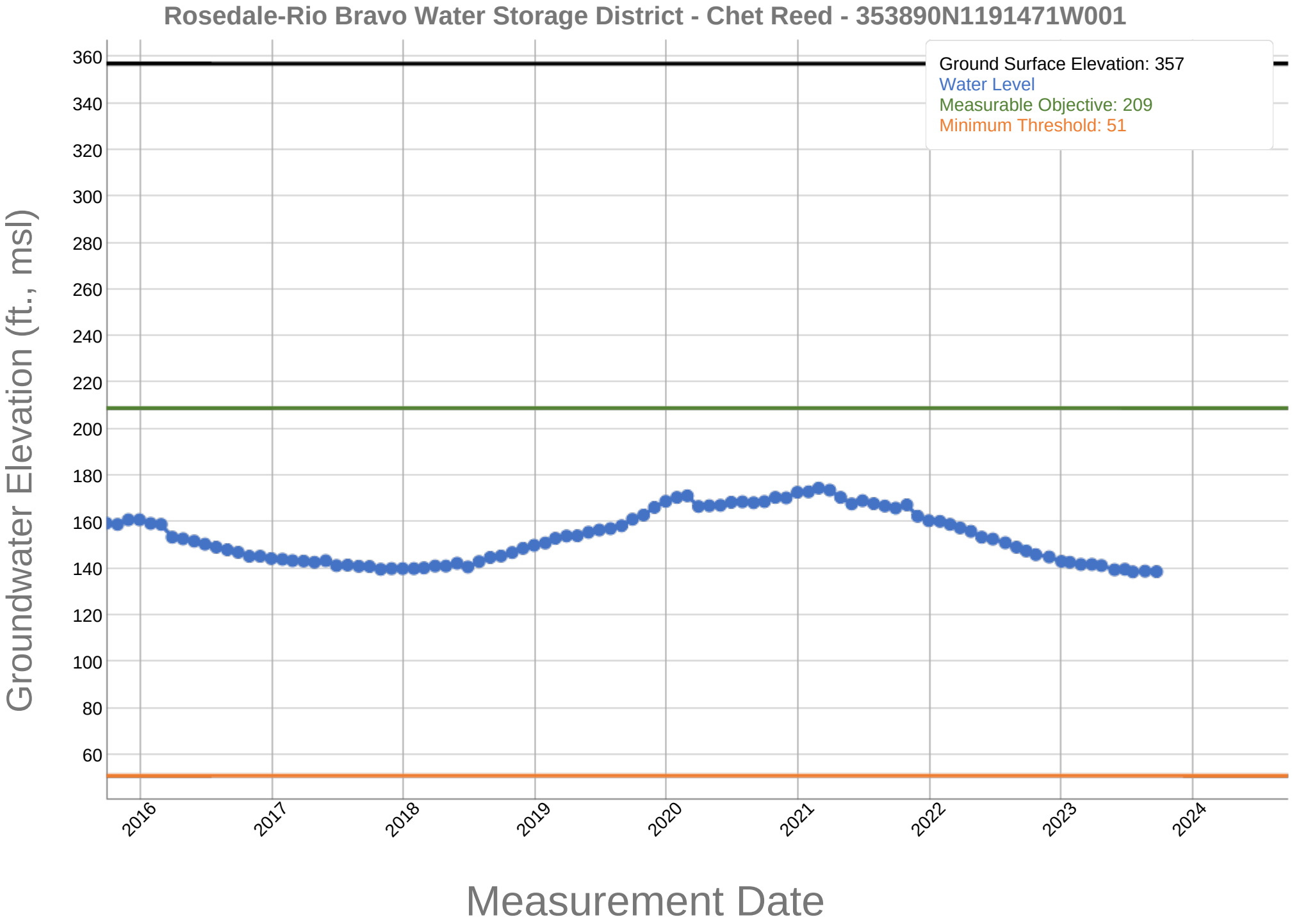
N

0 1.75 3.5 7

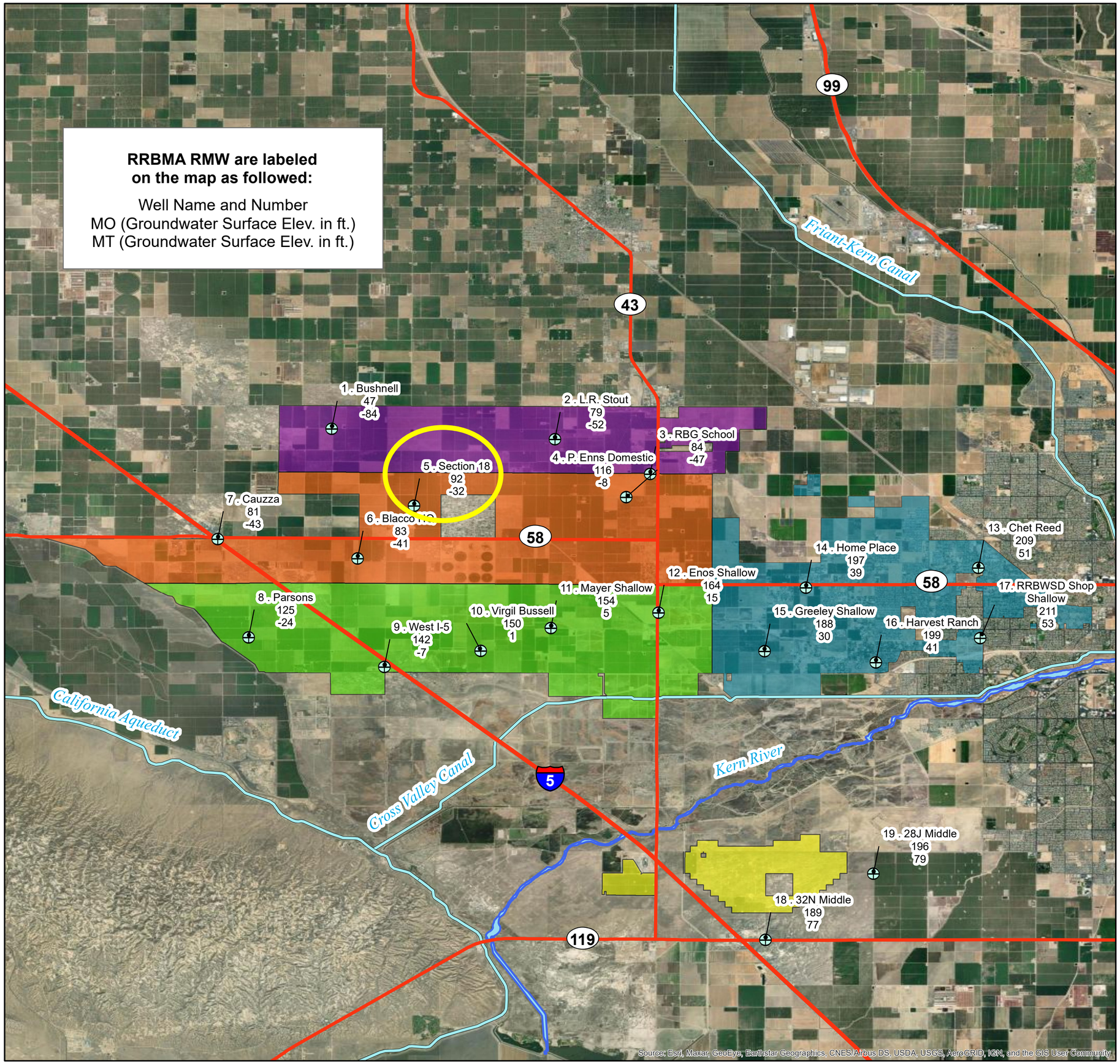
Miles



ROSEDALE-RIO BRAVO
WATER STORAGE DISTRICT


Rosedale-Rio Bravo Water Storage District - Chet Reed - 353890N1191471W001
Ground Surface Elevation: 357
Water Level
Measurable Objective: 209
Minimum Threshold: 51
Groundwater Elevation (ft., msl)
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
2016
2017
2018
2019
2020
2021
2022
2023
2024
Measurement Date

RRBMA Monitoring Areas - RMW Water Level MOs and MTs



Legend

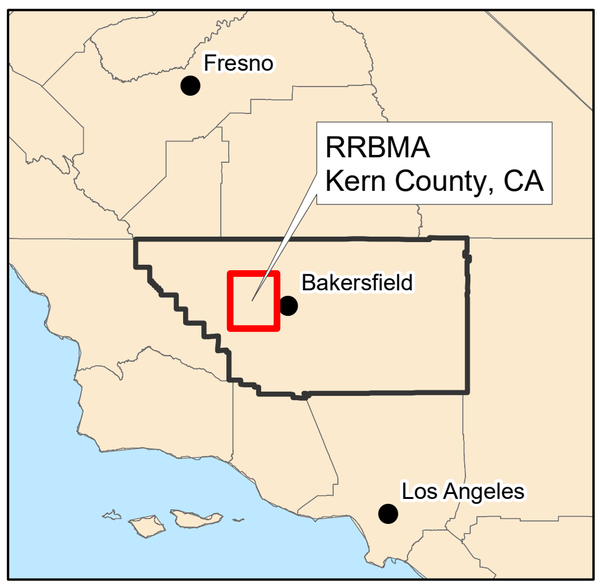
- RRBMA RMW (Water Level)
- Major Highways
- Major Conveyance Facilities
- KernRiver
- North Monitoring Area
- Central Monitoring Area
- South Monitoring Area
- East Monitoring Area
- South of the River Monitoring Area

RMW = Representative Monitoring Well
MO = Measurable Objective
MT = Minimum Threshold

N

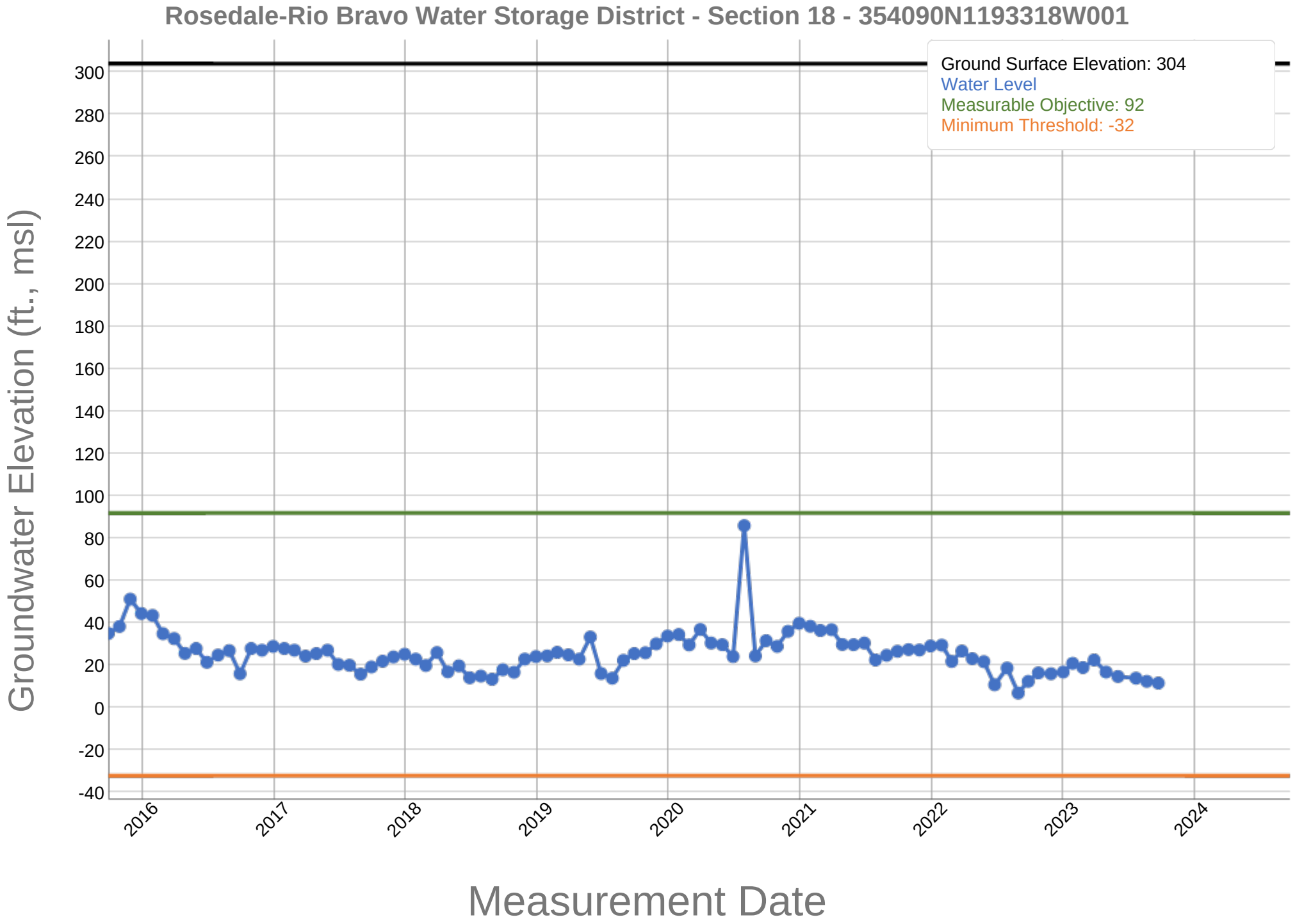
0 1.75 3.5 7

Miles



ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT

Z:\000-OldZDrive\jpa. JPA's\SGMA\RRBMA\RRBMA SGMA Docs\Maps\Figures (RE) 2022-06-22


Rosedale-Rio Bravo Water Storage District - Section 18 - 354090N1193318W001
Ground Surface Elevation: 304
Water Level
Measurable Objective: 92
Minimum Threshold: -32
Groundwater Elevation (ft., msl)
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
-20
-40
2016
2017
2018
2019
2020
2021
2022
2023
2024
Measurement Date

RRBMA Monitoring Areas - RMW Water Level MOs and MTs

RRBMA RMW are labeled on the map as followed:

Well Name and Number
MO (Groundwater Surface Elev. in ft.)
MT (Groundwater Surface Elev. in ft.)

1 . Bushnell
47
-84

2 . L.R. Stout
79
-52

3 . RBG School
84
-47

4 . P. Enns Domestic
116
-8

5 . Section 18
92
-32

6 . Blacco HQ
83
-41

7 . Cauzza
81
-43

8 . Parsons
125
-24

9 . West I-5
142
-7

10 . Virgil Bussell
150
1

11 . Mayer Shallow
154
5

12 . Enos Shallow
164
15

13 . Chet Reed
209
51

14 . Home Place
197
39

15 . Greeley Shallow
188
30

16 . Harvest Ranch
199
41

17 . RRBWSD Shop Shallow
211
53

18 . 32N Middle
189
77

19 . 28J Middle
196
79

99
43
58
58
5
119

Friant-Kern Canal
California Aqueduct
Cross Valley Canal
Kern River

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- RRBMA RMW (Water Level)
- Major Highways
- Major Conveyance Facilities
- KernRiver
- North Monitoring Area
- Central Monitoring Area
- South Monitoring Area
- East Monitoring Area
- South of the River Monitoring Area

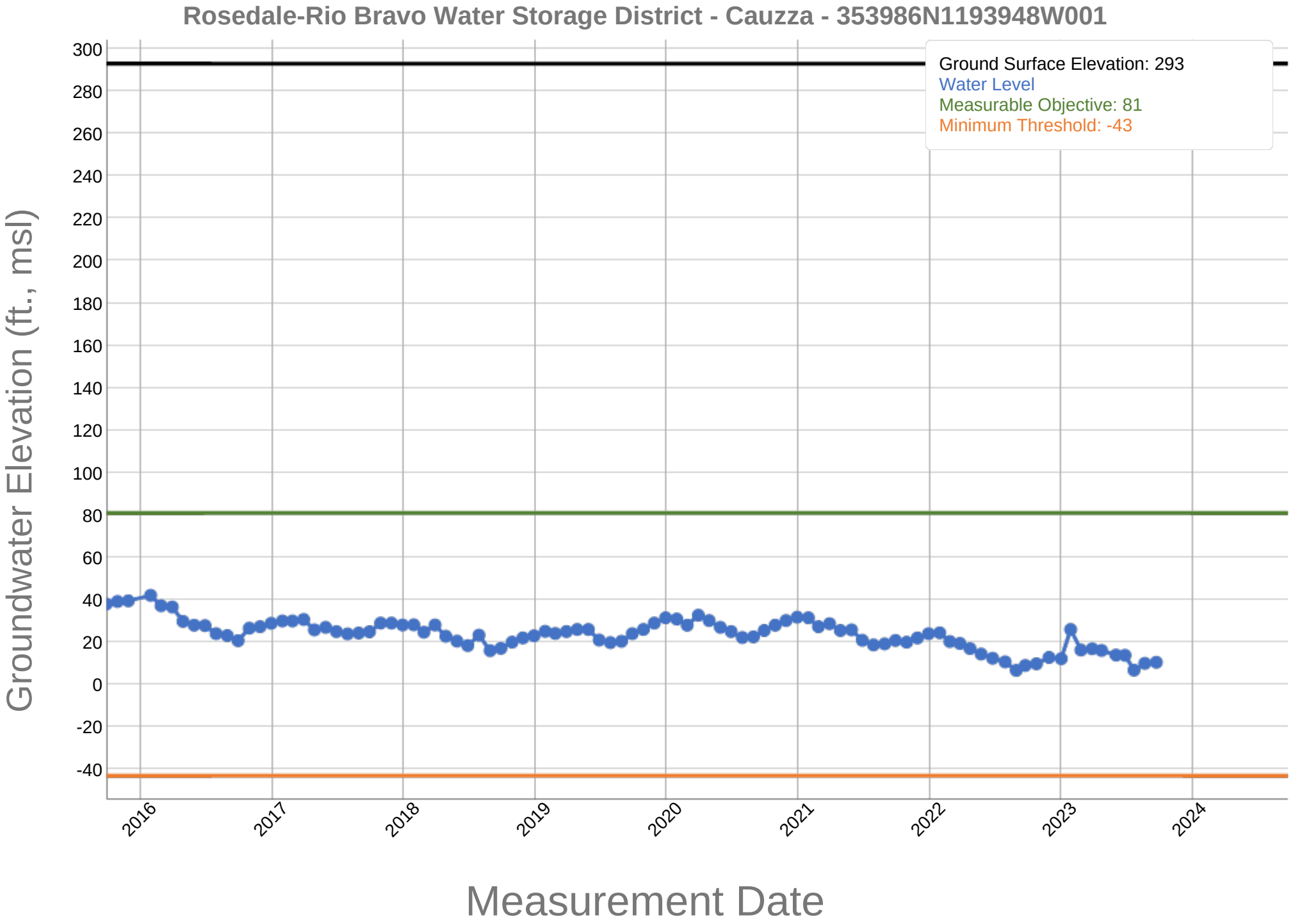
RMW = Representative Monitoring Well
MO = Measurable Objective
MT = Minimum Threshold

N

0 1.75 3.5 7

Miles

ROSEDALE-RIO BRAVO
WATER STORAGE DISTRICT


Rosedale-Rio Bravo Water Storage District - Cauzza - 353986N1193948W001
Ground Surface Elevation: 293
Water Level
Measurable Objective: 81
Minimum Threshold: -43
Groundwater Elevation (ft., msl)
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
-20
-40
2016
2017
2018
2019
2020
2021
2022
2023
2024
Measurement Date

RRBMA Monitoring Areas - RMW Water Level MOs and MTs

RRBMA RMW are labeled on the map as followed:

Well Name and Number
MO (Groundwater Surface Elev. in ft.)
MT (Groundwater Surface Elev. in ft.)

1 . Bushnell
47
-84

2 . L.R. Stout
79
-52

3 . RBG School
84
-47

4 . P. Enns Domestic
116
-8

5 . Section 18
92
-32

6 . Blacco HQ
83
-41

7 . Cauzza
81
-43

8 . Parsons
125
-24

9 . West I-5
142
-7

10 . Virgil Bussell
150
1

11 . Mayer Shallow
154
5

12 . Enos Shallow
164
15

13 . Chet Reed
209
51

14 . Home Place
197
39

15 . Greeley Shallow
188
30

16 . Harvest Ranch
199
41

17 . RRBWSD Shop Shallow
211
53

18 . 32N Middle
189
77

19 . 28J Middle
196
79

99
43
58
58
5
119

Friant-Kern Canal
California Aqueduct
Cross Valley Canal
Kern River

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- RRBMA RMW (Water Level)
- Major Highways
- Major Conveyance Facilities
- KernRiver
- North Monitoring Area
- Central Monitoring Area
- South Monitoring Area
- East Monitoring Area
- South of the River Monitoring Area

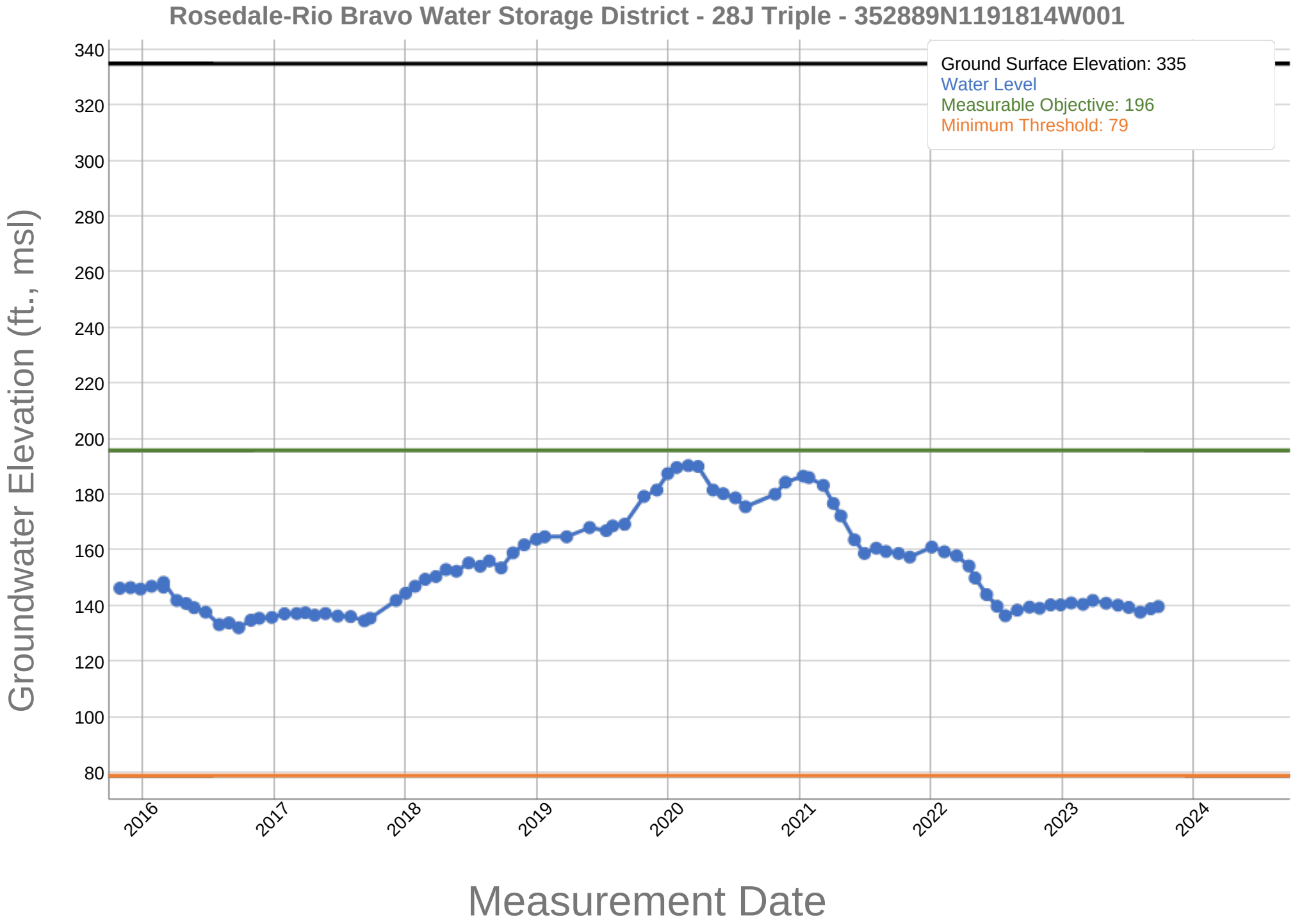
RMW = Representative Monitoring Well
MO = Measurable Objective
MT = Minimum Threshold

N

0 1.75 3.5 7

Miles

ROSEDALE-RIO BRAVO
WATER STORAGE DISTRICT


Rosedale-Rio Bravo Water Storage District - 28J Triple - 352889N1191814W001
Ground Surface Elevation: 335
Water Level
Measurable Objective: 196
Minimum Threshold: 79
Groundwater Elevation (ft., msl)
340
320
300
280
260
240
220
200
180
160
140
120
100
80
2016
2017
2018
2019
2020
2021
2022
2023
2024
Measurement Date

RRBMA Monitoring Areas - RMW Water Level MOs and MTs

RRBMA RMW are labeled on the map as followed:

Well Name and Number
MO (Groundwater Surface Elev. in ft.)
MT (Groundwater Surface Elev. in ft.)

1 . Bushnell
47
-84

2 . L.R. Stout
79
-52

3 . RBG School
84
-47

4 . P. Enns Domestic
116
-8

5 . Section 18
92
-32

6 . Blacco HQ
83
-41

7 . Cauzza
81
-43

8 . Parsons
125
-24

9 . West I-5
142
-7

10 . Virgil Bussell
150
1

11 . Mayer Shallow
154
5

12 . Enos Shallow
164
15

13 . Chet Reed
209
51

14 . Home Place
197
39

15 . Greeley Shallow
188
30

16 . Harvest Ranch
199
41

17 . RRBWSD Shop Shallow
211
53

18 . 32N Middle
189
77

19 . 28J Middle
196
79

99
43
58
58
5
119

Friant-Kern Canal
California Aqueduct
Cross Valley Canal
Kern River

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- RRBMA RMW (Water Level)
- Major Highways
- Major Conveyance Facilities
- KernRiver
- North Monitoring Area
- Central Monitoring Area
- South Monitoring Area
- East Monitoring Area
- South of the River Monitoring Area

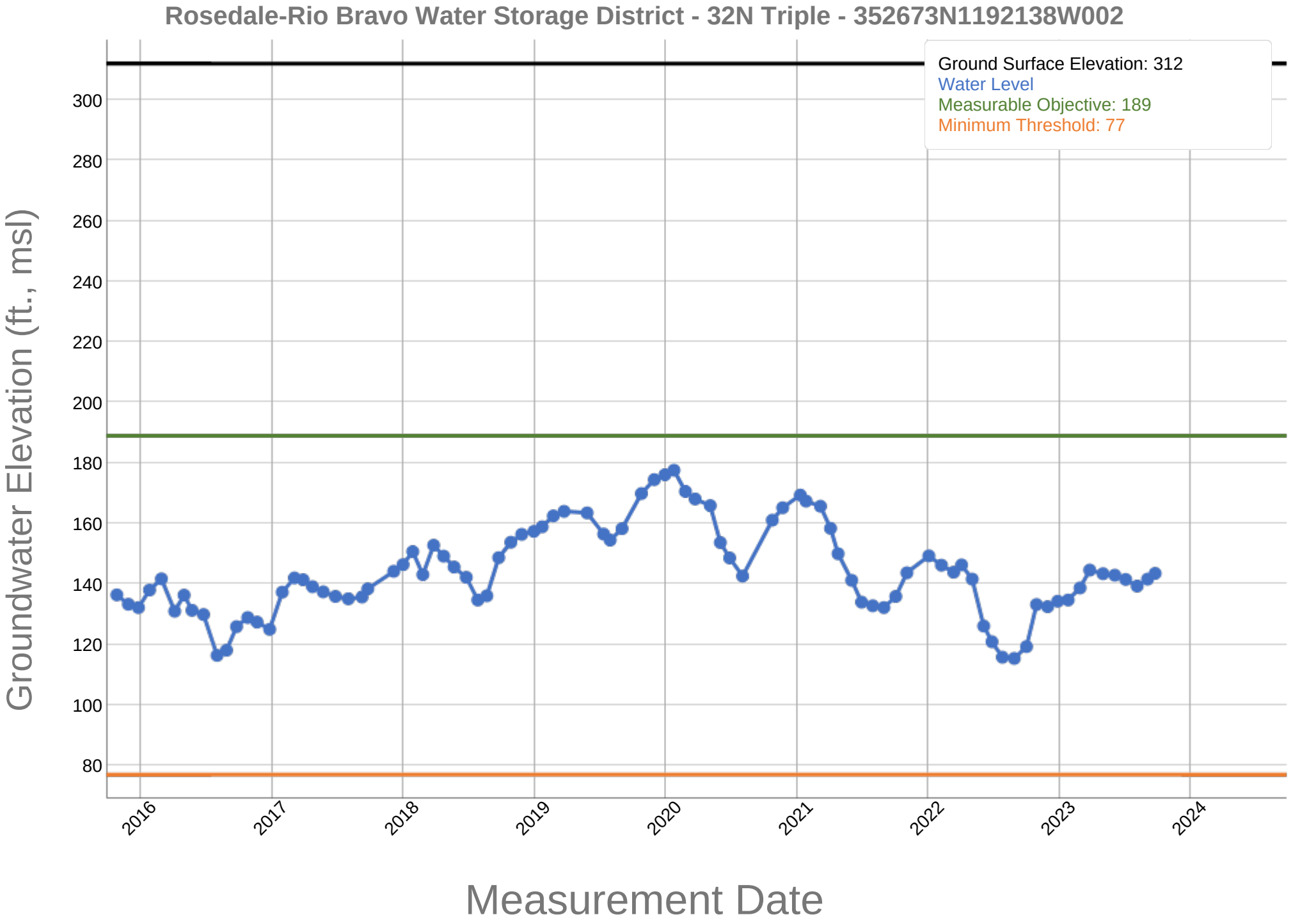
RMW = Representative Monitoring Well
MO = Measurable Objective
MT = Minimum Threshold

N

0 1.75 3.5 7

Miles

ROSEDALE-RIO BRAVO
WATER STORAGE DISTRICT


Rosedale-Rio Bravo Water Storage District - 32N Triple - 352673N1192138W002
Ground Surface Elevation: 312
Water Level
Measurable Objective: 189
Minimum Threshold: 77
Groundwater Elevation (ft., msl)
300
280
260
240
220
200
180
160
140
120
100
80
2016
2017
2018
2019
2020
2021
2022
2023
2024
Measurement Date

Appendix I – Thomas Harder & Co. Recharge and Recovery Suitability Reports

Technical Memorandum

To: Mr. Dan Bartel
Groundwater Banking Joint Powers Authority

From: Thomas Harder, P.G., CH.G.
Thomas Harder & Co.

Date: 23-Nov-21

Re: Recharge and Recovery Suitability Report for the Bolthouse Property

1. Introduction

This Technical Memorandum (TM) summarizes my review of soil lithology and groundwater quality data collected on and in the vicinity of approximately 201.5 acres of land known as the Bolthouse property (APN s 104-240-22, 104-240-30, and 104-240-31); the Site), located in the western portion of Rosedale-Rio Bravo Water Storage District's (RRBWSD's) service area west of Bakersfield, California (see Figure 1). The land making up the Site has historically been used for irrigated agriculture. It is my understanding that this parcel is a candidate for the construction of recharge basins and production wells for the Kern Fan Groundwater Storage Project. Thomas Harder & Co., (TH&Co) reviewed background documents, data, and reports associated with the parcel and surrounding area to evaluate whether managed recharge at the site is feasible and whether it poses a risk to groundwater quality resulting from proposed recharge activities.

I reviewed the following data and reports to inform my conclusions:

- BSK Associates Laboratory, 2021. Analytical Report for Groundwater Samples Collected from Site Well on October 15, 2021.
- TH&Co, 2015. Unpublished Lithologic Logs for RRBWSD Wells SUP-1, SUP-2, and SUP-4.
- TH&Co, 2011. Hydrogeological Impact Evaluation Related to Operation of the Kern Water Bank and Pioneer Projects. Prepared for RRBWSD. Dated September 9, 2011. Referenced Figure 16 Infiltration Rates.
- TH&Co, 2017. Strand Ranch Infiltration Rate Analysis. Technical Memorandum prepared for IRWD. Dated July 31, 2017.

- TH&Co, 2020a. Kern Fan Groundwater Storage Project - Hydrogeological Analysis. Technical Memorandum prepared for RRBWSD. Dated October 12, 2020.
- TH&Co, 2020b. Documentation of 1,2,3-Trichloropropane Concentrations in Rosedale-Rio Bravo Water Storage District Banking Project Wells. Technical Memorandum prepared for RRBWSD. Dated August 12, 2020.

2. Soil Lithologic Conditions

Lithologic logs from wells in the area describe subsurface soil conditions in the upper 40 ft bgs as poorly graded sand with minor silt. Silt content increases below 40 ft bgs, but lithology remains predominantly sand down to approximately 400 ft bgs, with clay content increasing beyond 400 ft bgs. These soil conditions are similar to those observed at other nearby banking operations. Based on infiltration tests conducted at nearby basins, infiltration rates at the Site are expected to be on the order of 0.3 to 0.76 feet per day (TH&Co, 2011; TH&Co, 2017).

3. Current Groundwater Conditions

The site has historically been used for irrigated agriculture. Constituents of potential concern in the groundwater beneath the site include:

- Total Dissolved Solids (TDS)
- Nitrate
- Chloride
- Arsenic
- Pesticides (1,2,3 Trichloropropane (1,2,3-TCP), EDB/DBCP)

Concentrations of these constituents in groundwater collected from area wells are summarized in the following table:

Table 1. Concentrations of Potential Constituents of Concern in Groundwater At and Near the Site

Well Name	TDS (mg/L)	Chloride (mg/L)	Nitrate (N) (mg/L)	Arsenic (µg/L)	1,2,3 TCP (µg/L)	EDB/DBCP (µg/L)
Site Well 1	150	20	1.8	3	0.0093	<0.02/<0.01
SUP-1	160	20	1.9	8.4	0.007	<0.0034/<0.0035
SUP-2	180	21	1.7	7.6	<0.00053	<0.0034/<0.0035
SUP-4	160	16	1.4	17	<0.00053	<0.0034/<0.0035
MCL/Regulatory Limit	**500**	**250**	**10**	**10**	**0.005**	**0.05/0.2**

*Yellow highlighted cells indicate concentrations that exceed regulatory limits for drinking water.

Total dissolved solids, chloride, nitrate, arsenic, and EDB/DBCP concentrations in groundwater from the existing well at the Site do not exceed regulatory limits. TDS concentrations were measured at 150 milligrams per liter (mg/L) (see Figure 1). Nitrate concentrations (as Nitrogen) were measured at 1.8 mg/L. Chloride concentrations are relatively low, at 20 mg/L. Arsenic concentrations are also relatively low, at 3 micrograms per liter (µg/L). Arsenic is a naturally occurring, regionally extensive metal that has been detected in groundwater samples from all of the wells in the Project area. Concentrations of arsenic typically increase with increasing depth in the aquifer (TH&Co, 2016). It is not known how deep the existing well on the Site are and wells constructed deeper may encounter higher arsenic concentrations with depth. EDB/DBCP concentrations were below the detectable limit (<0.02/<0.01).

The only constituent exceeding regulatory limits in groundwater from the well at the Site is 1,2,3-TCP. Concentrations of this chemical were measured at 0.0093 µg/L (MCL = 0.005 µg/L). 1,2,3-TCP is a manmade chlorinated hydrocarbon that is found in pesticides used on crops. Concentrations of this chemical are regionally extensive in the groundwater, having been detected in groundwater samples from wells located throughout the Project area (TH&Co, 2020b).

Arsenic and 1,2,3-TCP have been detected in groundwater from area wells that exceed regulatory limits (see concentrations for SUP-1 and SUP-4 in Table 1 and Figure 1). Arsenic and 1,2,3-TCP concentrations in the discharge of future recovery wells can be addressed through strategic well design and blending. Arsenic concentrations in recovery wells can be minimized by designing the wells with perforations that avoid aquifers that are known to have higher arsenic concentrations. The design of these wells can be informed through collection and

analysis of depth-specific groundwater quality data during pilot borehole drilling. 1,2,3-TCP concentrations in the discharge of recovery wells may be addressed through blending and may be reduced over time with the recharge of water that does not contain detectable 1,2,3-TCP.

4. Summary of Findings and Conclusions

The following summarizes my findings from review of soil and groundwater samples collected at and in the vicinity of the Site:

- The Site has historically been used for irrigated agriculture.
- Lithology at nearby wells has been logged primarily as sand and silty sand with clay content increasing below 400 ft bgs. These conditions are similar to subsurface conditions at nearby recharge basins and are expected to yield infiltration rates on the order of 0.3 to 0.76 feet per day.
- Constituents of expected concern in the groundwater beneath the Site include TDS, chloride, nitrate, arsenic, and pesticides (1,2,3-TCP and EDB/DBCP).
- TDS, chloride, nitrate, arsenic, and EDB/DBCP have not been detected above their respective MCLs in groundwater from the well at the Site.
- Naturally occurring arsenic has been detected in groundwater samples from nearby wells at concentrations that exceed the MCL. This constituent can be avoided in future project wells through site specific testing and designing the wells to avoid the aquifers that contain high arsenic concentrations.
- 1,2,3-TCP is a pesticide that has been detected in groundwater from wells throughout the Kern Fan area. Concentrations in the discharge of project recovery wells may be addressed through blending and may be reduced over time with the recharge of water that does not contain detectable 1,2,3-TCP.
- While no soil analytical data specific to this site were available for review, based on soil analytical data collected at nearby properties with similar historical land uses and assuming similar conditions, any residual constituents of potential concern in the soil beneath the Site resulting from historical land use pose a minimal risk to groundwater quality both beneath the Site and at potential future recovery wells.

5. References

BSK Associates Laboratory, 2021. Analytical Report for Groundwater Samples Collected from Site Wells on October 15, 2021.

TH&Co, 2011. Hydrogeological Impact Evaluation Related to Operation of the Kern Water Bank and Pioneer Projects. Prepare for RRBWSD. Dated September 9, 2011.

TH&Co, 2016. Hydrogeological Data Collection for Packer Testing of SUP-4 and SUP-6 Wells. Prepared for the Rosedale-Rio Bravo Water Storage District. Draft dated July 1, 2016.

TH&Co, 2017. Strand Ranch Infiltration Rate Analysis. Technical Memorandum prepared for IRWD. Dated July 31, 2017.

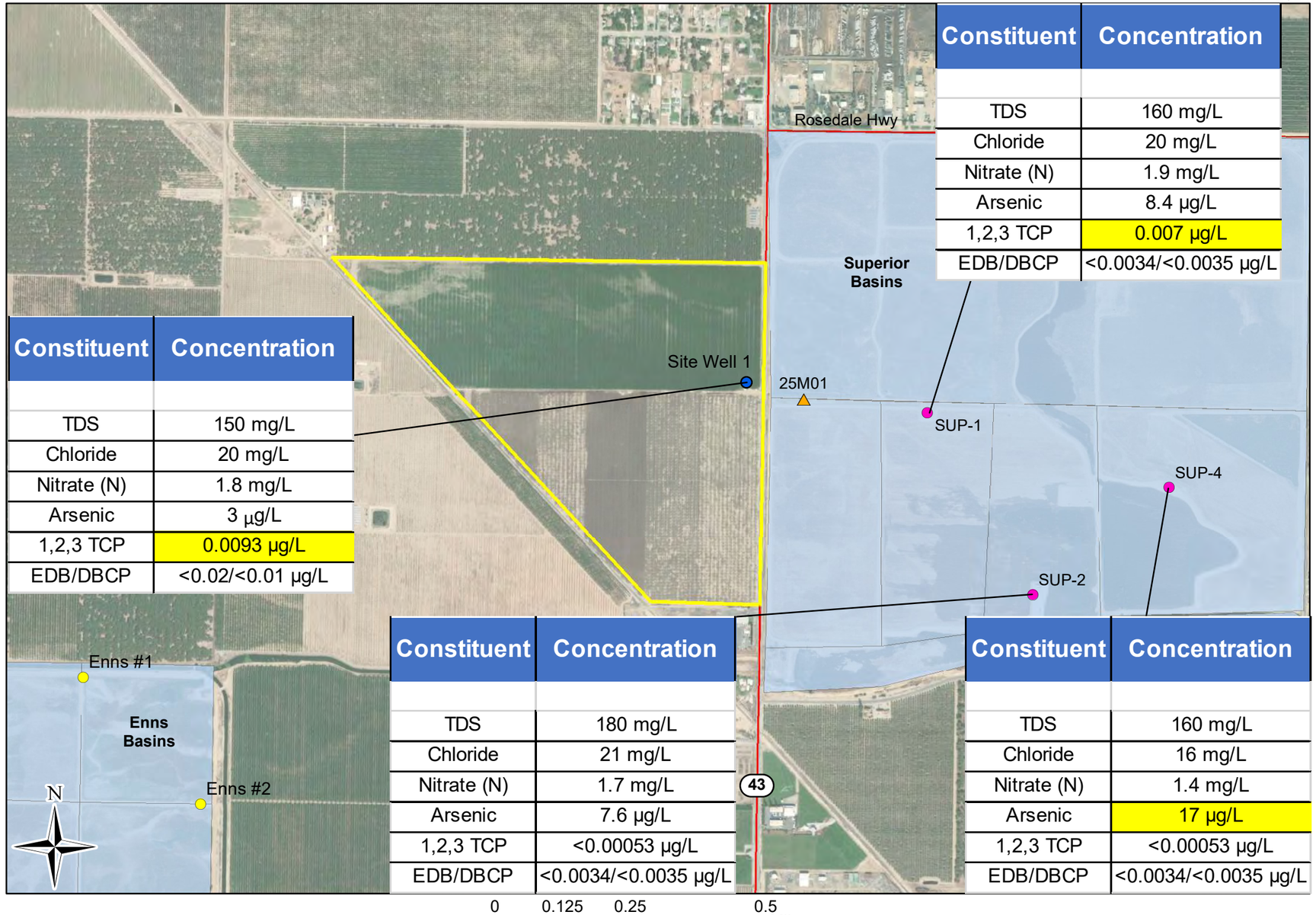
TH&Co, 20120a. Kern Fan Groundwater Storage Project - Hydrogeological Analysis. Technical Memorandum prepared for RRBWSD. Dated October 12, 2020.

TH&Co, 20120b. Documentation of 1,2,3-Trichloropropane Concentrations in Rosedale-Rio Bravo Water Storage District Banking Project Wells. Technical Memorandum prepared for RRBWSD. Dated August 12, 2020.

Groundwater Banking Joint Powers Authority

November 2021

Recharge and Recovery Suitability Report for the Bolthouse Property



Constituent	Concentration
TDS	150 mg/L
Chloride	20 mg/L
Nitrate (N)	1.8 mg/L
Arsenic	3 µg/L
1,2,3 TCP	0.0093 µg/L
EDB/DBCP	<0.02/<0.01 µg/L

Constituent	Concentration
TDS	160 mg/L
Chloride	20 mg/L
Nitrate (N)	1.9 mg/L
Arsenic	8.4 µg/L
1,2,3 TCP	0.007 µg/L
EDB/DBCP	<0.0034/<0.0035 µg/L

Constituent	Concentration
TDS	180 mg/L
Chloride	21 mg/L
Nitrate (N)	1.7 mg/L
Arsenic	7.6 µg/L
1,2,3 TCP	<0.00053 µg/L
EDB/DBCP	<0.0034/<0.0035 µg/L

Constituent	Concentration
TDS	160 mg/L
Chloride	16 mg/L
Nitrate (N)	1.4 mg/L
Arsenic	17 µg/L
1,2,3 TCP	<0.00053 µg/L
EDB/DBCP	<0.0034/<0.0035 µg/L

NAD 83 Stateplane Zone 5

Map Features

- Site Well 1
- Drought Relief Well
- Enns Ponds Production Well
- Monitoring Well
- Highway/Road
- Proposed Project Area
- RRBWSD Recharge Basin

Thomas Harder & Co.
Groundwater Consulting

DRAFT
Proposed Project Area
Figure 1

Technical Memorandum

DRAFT

To: Mr. Dan Bartel
Groundwater Banking Joint Powers Authority

From: Thomas Harder, P.G., CH.G.
Thomas Harder & Co.

Date: 23-Nov-21

Re: Recharge and Recovery Suitability Report for the Diamond Property

1. Introduction

This Technical Memorandum (TM) summarizes my review of soil lithology and groundwater quality data collected on and in the vicinity of approximately 147 acres of land known as the Diamond property (APN 104-291-07); the Site), located in the western portion of Rosedale-Rio Bravo Water Storage District's (RRBWSD's) service area west of Bakersfield, California (see Figure 1). The land making up the Site has historically been used for irrigated agriculture. It is my understanding that this parcel is a candidate for the construction of recharge basins and production wells for the Kern Fan Groundwater Storage Project. Thomas Harder & Co., (TH&Co) reviewed background documents, data, and reports associated with the parcel and surrounding area to evaluate whether managed recharge at the Site is feasible and whether it poses a risk to groundwater quality resulting from proposed recharge activities.

I reviewed the following data and reports to inform my conclusions:

- BSK Associates Laboratory, 2021. Analytical Report for Groundwater Samples Collected from Site Well on October 14, 2021.
- TH&Co, 2015. Unpublished Lithologic Logs for RRBWSD Wells SREX-1, SREX-2, and SREX-3.
- TH&Co, 2011. Hydrogeological Impact Evaluation Related to Operation of the Kern Water Bank and Pioneer Projects. Prepare for RRBWSD. Dated September 9, 2011. Referenced Figure 16 Infiltration Rates.
- TH&Co, 2017. Strand Ranch Infiltration Rate Analysis. Technical Memorandum prepared for IRWD. Dated July 31, 2017.

- TH&Co, 2020a. Kern Fan Groundwater Storage Project - Hydrogeological Analysis. Technical Memorandum prepared for RRBWSD. Dated October 12, 2020.
- TH&Co, 2020b. Documentation of 1,2,3-Trichloropropane Concentrations in Rosedale-Rio Bravo Water Storage District Banking Project Wells. Technical Memorandum prepared for RRBWSD. Dated August 12, 2020.

2. Soil Lithologic Conditions

Lithologic logs from wells in the area describe subsurface soil conditions in the upper 20 ft bgs primarily as silt. Below 20 ft bgs, the lithology is dominated by poorly graded fine- to medium-grained sand with occasional silt and clay. Clay content increases below 550 to 600 ft bgs. These soil conditions are similar to those observed at other nearby banking operations. Based on infiltration tests conducted at nearby basins, infiltration rates at the Site are expected to be on the order of 0.3 to 0.76 feet per day (TH&Co, 2011; TH&Co, 2017).

3. Current Groundwater Conditions

The site has historically been used for irrigated agriculture. Constituents of potential concern in the groundwater beneath the site include:

- Total Dissolved Solids (TDS)
- Nitrate
- Chloride
- Arsenic
- Pesticides (1,2,3 Trichloropropane (1,2,3-TCP), EDB/DBCP)

Concentrations of these constituents in groundwater collected from area wells are summarized in the following table:

Table 1. Concentrations of Potential Constituents of Concern in Groundwater At and Near the Site

Well Name	TDS (mg/L)	Chloride (mg/L)	Nitrate (N) (mg/L)	Arsenic (µg/L)	1,2,3 TCP (µg/L)	EDB/DBCP (µg/L)
Site Well 1	300	69	3.4	<2.0	0.0058	<0.02/<0.01
Enns Well 3 (Offsite)	510	120	7.3	<0.7	0.06	<0.0013/<0.0036
SREX-1 (Offsite)	190	67	3.8	6.0	0.024	<0.02/<0.01
SREX-2 (Offsite)	220	78	6.5	4.3	0.022	<0.02/<0.01
SREX-3 (Offsite)	220	89	2.2	5.8	<0.005	<0.02/<0.01
MCL/Regulatory Limit	**500**	**250**	**10**	**10**	**0.005**	**0.05/0.2**

*Yellow highlighted cells indicate concentrations that exceed regulatory limits for drinking water.

Total dissolved solids, chloride, nitrate, arsenic, and EDB/DBCP concentrations in groundwater from the existing well at the Site do not exceed regulatory limits. TDS concentrations were measured at 300 milligrams per liter (mg/L) (see Figure 1). Chloride concentrations were measured at 69 mg/L. Nitrate concentrations (as Nitrogen) were measured at 3.4 mg/L. Arsenic concentrations are low at less than 2.0 micrograms per liter (µg/L). Arsenic is a naturally occurring, regionally extensive metal that has been detected in groundwater samples from many of the wells in the Project area. Concentrations of arsenic typically increase with increasing depth in the aquifer (TH&Co, 2016). It is not known how deep the existing well on the Site is and wells constructed deeper may encounter higher arsenic concentrations with depth. EDB/DBCP concentrations were below the detectable limit (<0.02/<0.01).

The only constituent exceeding regulatory limits in groundwater from the well at the Site is 1,2,3-TCP. Concentrations of this chemical were measured at 0.0058 µg/L (MCL = 0.005 µg/L). 1,2,3-TCP is a manmade chlorinated hydrocarbon that is found in pesticides used on crops. Concentrations of this chemical are regionally extensive in the groundwater, having been detected in groundwater samples from wells located throughout the Project area (TH&Co, 2020b).

TDS and 1,2,3-TCP have been detected in groundwater from area wells that exceed regulatory limits (see concentrations for Enns Well 1, SREX-1, and SREX-2 in Table 1 and Figure 1). TDS and 1,2,3-TCP concentrations in the discharge of future recovery wells can be addressed through

blending and may be reduced over time with the recharge of water that does not contain elevated TDS or detectable 1,2,3-TCP.

4. Summary of Findings and Conclusions

The following summarizes my findings from review of soil and groundwater samples collected at and in the vicinity of the Site:

- The Site has historically been used for irrigated agriculture.
- Lithology at nearby wells has been logged primarily as silt in the upper 20 ft bgs. From 20 ft bgs, there is predominantly sand with silt and clay. Clay content increases beyond 550 to 600 ft bgs. These conditions are similar to subsurface conditions at nearby recharge basins and are expected to yield infiltration rates on the order of 0.3 to 0.76 feet per day.
- Constituents of expected concern in the groundwater beneath the Site include TDS, chloride, nitrate, arsenic, and pesticides (1,2,3-TCP and EDB/DBCP).
- TDS, chloride, nitrate, arsenic, and EDB/DBCP have not been detected above their respective MCLs in groundwater from the well at the Site.
- 1,2,3-TCP is a pesticide that has been detected in groundwater from wells throughout the Kern Fan area. Concentrations in the discharge of project recovery wells may be addressed through blending and may be reduced over time with the recharge of water that does not contain detectable 1,2,3-TCP.
- While no soil analytical data specific to this site were available for review, based on soil analytical data collected at nearby properties with similar historical land uses and assuming similar conditions, any residual constituents of potential concern in the soil beneath the Site resulting from historical land use should pose a minimal risk to groundwater quality both beneath the Site and at potential future recovery wells.

5. References

BSK Associates Laboratory, 2021. Analytical Report for Groundwater Samples Collected from Site Wells on October 14, 2021.

TH&Co, 2011. Hydrogeological Impact Evaluation Related to Operation of the Kern Water Bank and Pioneer Projects. Prepare for RRBWSD. Dated September 9, 2011.

TH&Co, 2016. Hydrogeological Data Collection for Packer Testing of SUP-4 and SUP-6 Wells. Prepared for the Rosedale-Rio Bravo Water Storage District. Draft dated July 1, 2016.

TH&Co, 2017. Strand Ranch Infiltration Rate Analysis. Technical Memorandum prepared for IRWD. Dated July 31, 2017.

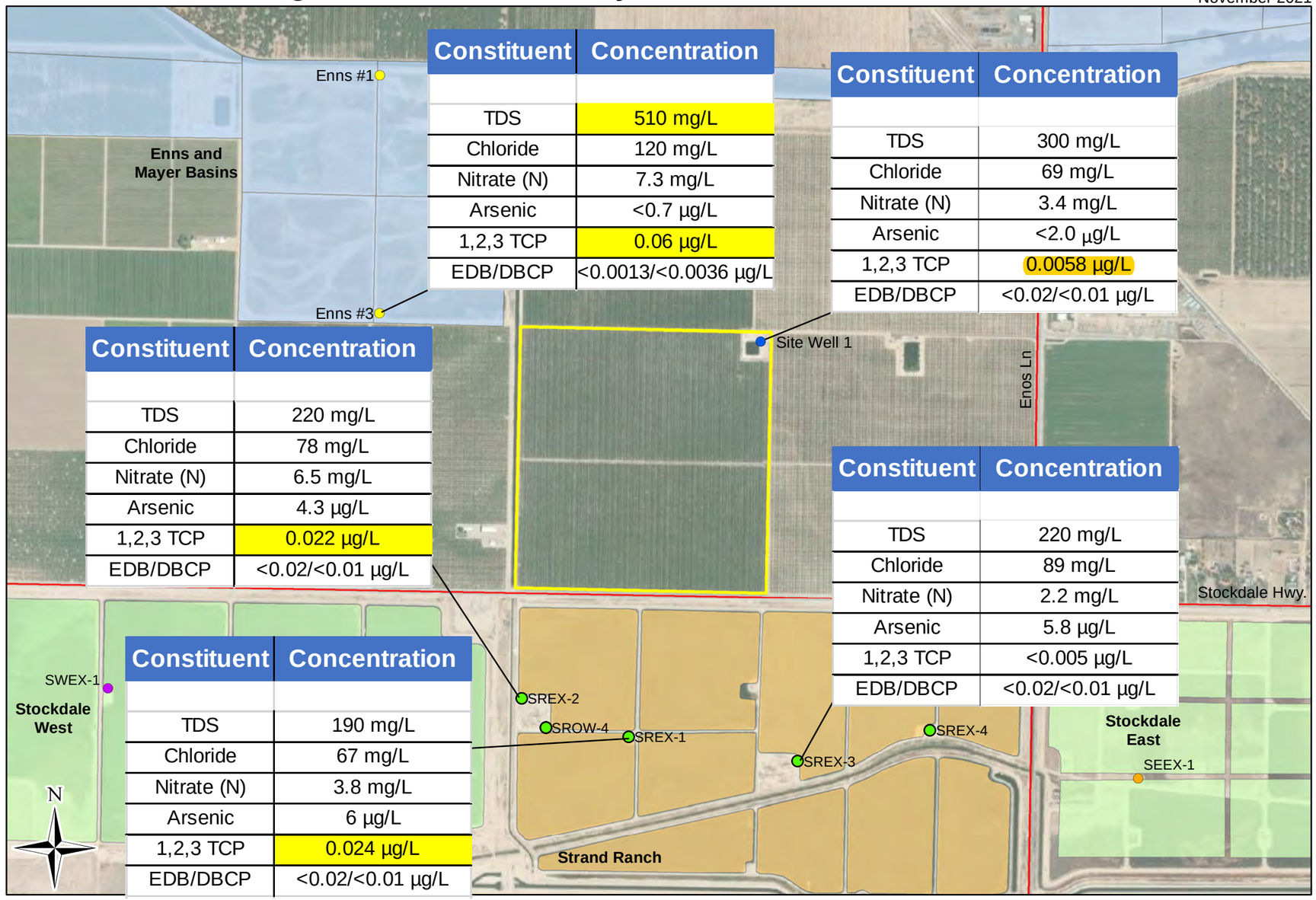
TH&Co, 20120a. Kern Fan Groundwater Storage Project - Hydrogeological Analysis. Technical Memorandum prepared for RRBWSD. Dated October 12, 2020.

TH&Co, 20120b. Documentation of 1,2,3-Trichloropropane Concentrations in Rosedale-Rio Bravo Water Storage District Banking Project Wells. Technical Memorandum prepared for RRBWSD. Dated August 12, 2020.

Groundwater Banking Joint Powers Authority

November 2021

Recharge and Recovery Suitability Report for the Diamond Property



Constituent	Concentration
TDS	510 mg/L
Chloride	120 mg/L
Nitrate (N)	7.3 mg/L
Arsenic	<0.7 µg/L
1,2,3 TCP	0.06 µg/L
EDB/DBCP	<0.0013/<0.0036 µg/L

Constituent	Concentration
TDS	300 mg/L
Chloride	69 mg/L
Nitrate (N)	3.4 mg/L
Arsenic	<2.0 µg/L
1,2,3 TCP	0.0058 µg/L
EDB/DBCP	<0.02/<0.01 µg/L

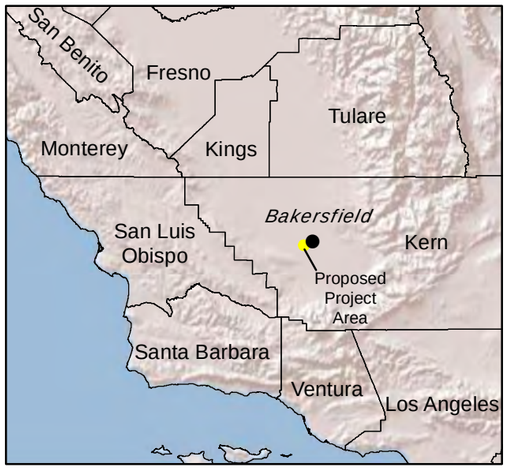
Constituent	Concentration
TDS	220 mg/L
Chloride	78 mg/L
Nitrate (N)	6.5 mg/L
Arsenic	4.3 µg/L
1,2,3 TCP	0.022 µg/L
EDB/DBCP	<0.02/<0.01 µg/L

Constituent	Concentration
TDS	220 mg/L
Chloride	89 mg/L
Nitrate (N)	2.2 mg/L
Arsenic	5.8 µg/L
1,2,3 TCP	<0.005 µg/L
EDB/DBCP	<0.02/<0.01 µg/L

Constituent	Concentration
TDS	190 mg/L
Chloride	67 mg/L
Nitrate (N)	3.8 mg/L
Arsenic	6 µg/L
1,2,3 TCP	0.024 µg/L
EDB/DBCP	<0.02/<0.01 µg/L

Map Features

- Site Well 1
- Enns Ponds Production Well
- Strand Ranch Well
- Stockdale East Well
- Stockdale West Well
- Highway/Road
- Proposed Project Area
- RRBWSD Recharge Basin
- Strand Ranch Recharge Basin
- Stockdale Recharge Basin



Thomas Harder & Co.
Groundwater Consulting

DRAFT
Proposed Project Area
Figure 1

Appendix J – Letters of Support

RIO BRAVO-GREELEY
UNION SCHOOL DISTRICT

District Superintendent, Jennifer Hedge
6521 Enos Lane, Bakersfield, CA 93314
*Phone (661) 589-2696 * Fax (661) 589-2218*

October 25, 2023

Bureau of Reclamation
Reclamation Law Administration Division
Attn: Austin Olah
Mail Code: 84-55000
PO Box 25007
Denver, Colorado 80225

Re: Letter of Support for the Kern Fan Groundwater Storage Project – Phase 1

Dear Austin Olah,

I am writing to express support for the Kern Fan Groundwater Storage Project – Phase 1, which received grant funding on April 6, 2023, under the U.S. Bureau of Reclamation's (USBR) Small Surface Water and Groundwater Storage Projects program (NOFO No. R23AS00019). Due to additional funding being made available within the same program, the Groundwater Banking Joint Powers Authority (GBJPA) is seeking further financial support for this Project.

The Kern Fan Groundwater Storage Project – Phase 1 is a collaborative effort between the Rosedale-Rio Bravo Water Storage District (RRBWSD) and the Irvine Ranch Water District (IRWD), operating jointly under the umbrella of the Groundwater Banking Joint Powers Authority (GBJPA). The GBJPA's primary objective is the implementation of the Kern Fan Groundwater Storage Project (Kern Fan Project). This initiative aims to establish a regional water bank in Kern County, California, capable of storing up to 100,000 acre-feet of surplus water during years of excess supply beyond the State Water Project contractors' entitlements. Given the scale of the Kern Fan Project, its execution has been divided into multiple phases, with Phase 1 representing the initial step. This phase includes the acquisition of approximately 350 acres of land in Kern County, designated for the construction and operation of recharge basins, recovery wells, well conveyance pipelines, and interconnections to existing conveyance facilities. Once implemented, the project has the potential to add approximately 28,000 acre-feet of new groundwater storage in California's Central Valley.

The Phase 1 Project is a win for Rosedale, Irvine, and Kern County in many ways. The Phase 1 Project facilities will facilitate the recharge and storage of available water for future use during dry periods, contribute to ecosystem benefits, enhance water supply for agricultural, municipal, and industrial users, assist in achieving groundwater sustainability objectives within the Kern Sub-basin, bolster water supply reliability for RRBWSD and IRWD customers and banking partners, and enhance water management and operational flexibility. Given the ever-increasing challenges posed by drought conditions, this project is pivotal in expanding water storage capacity, ensuring a dependable water supply for future generations, and aligning with the goals of the Sustainable Groundwater Management Act (SGMA).

The GBJPA prepared a feasibility study for this Project and will be submitting another federal funding application through USBR's Small Surface Water and Groundwater Storage Projects (NOFO No. R24S00010). This letter serves as an expression of support for potential funding for the Kern Fan Groundwater Storage Project – Phase 1.

Sincerely,

Jennifer Hedge
District Superintendent

Double H L.P.

1231 G Street, Wasco, CA 93280
Phone: 831.402.2023

October 24, 2023

Bureau of Reclamation
Reclamation Law Administration Division
Attn: Austin Olah
Mail Code: 84-55000
PO Box 25007
Denver, Colorado 80225

Re: Letter of Support for the Kern Fan Groundwater Storage Project – Phase 1

Dear Austin Olah,

I am writing to express support for the Kern Fan Groundwater Storage Project – Phase 1, which received grant funding on April 6, 2023, under the U.S. Bureau of Reclamation's (USBR) Small Surface Water and Groundwater Storage Projects program (NOFO No. R23AS00019). Due to additional funding being made available within the same program, the Groundwater Banking Joint Powers Authority (GBJPA) is seeking further financial support.

The Kern Fan Groundwater Storage Project – Phase 1 is a collaborative effort between the Rosedale-Rio Bravo Water Storage District (RRBWSD) and the Irvine Ranch Water District (IRWD), operating jointly under the umbrella of the Groundwater Banking Joint Powers Authority (GBJPA). The GBJPA's primary objective is the implementation of the Kern Fan Groundwater Storage Project (Kern Fan Project). This initiative aims to establish a regional water bank in Kern County, California, capable of storing up to 100,000 acre-feet of surplus water during years of excess supply beyond the State Water Project contractors' entitlements. Given the scale of the Kern Fan Project, its execution has been divided into multiple phases, with Phase 1 representing the initial step. This phase includes the acquisition of approximately 350 acres of land in Kern County, designated for the construction and operation of recharge basins, recovery wells, well conveyance pipelines, and interconnections to existing conveyance facilities. Once implemented, the project has the potential to add approximately 28,000 acre-feet of new groundwater storage in California's Central Valley.

The Phase 1 Project is a win for Rosedale, Irvine, and Kern County in many ways. Given the ever-increasing challenges posed by climate change, this project is pivotal in expanding water storage capacity, enhancing flood control during exceptionally wet years, ensuring a dependable water supply for future generations, and aligning with the goals of the Sustainable Groundwater Management Act (SGMA).

The GBJPA prepared a feasibility study for this Project and will be submitting another federal funding application through USBR's Small Surface Water and Groundwater Storage Projects (NOFO No. R24S00010). This letter serves as an expression of support for potential funding for the Kern Fan Groundwater Storage Project – Phase 1.

Sincerely,

Brent Hankins

Brent Hankins
Partner

West Coast Construction & Mechanical

October 23, 2023

Bureau of Reclamation
Reclamation Law Administration Division
Attn: Austin Olah
Mail Code: 84-55000
PO Box 25007
Denver, Colorado 80225

Re: Letter of Support for the Kern Fan Groundwater Storage Project – Phase 1

Dear Austin Olah,

I am writing to express support for the Kern Fan Groundwater Storage Project – Phase 1, which received grant funding on April 6, 2023, under the U.S. Bureau of Reclamation's (USBR) Small Surface Water and Groundwater Storage Projects program (NOFO No. R23AS00019). Due to additional funding being made available within the same program, the Groundwater Banking Joint Powers Authority (GBJPA) is seeking further financial support for this Project.

The Kern Fan Groundwater Storage Project – Phase 1 is a collaborative effort between the Rosedale-Rio Bravo Water Storage District (RRBWSD) and the Irvine Ranch Water District (IRWD), operating jointly under the umbrella of the Groundwater Banking Joint Powers Authority (GBJPA). The GBJPA's primary objective is the implementation of the Kern Fan Groundwater Storage Project (Kern Fan Project). This initiative aims to establish a regional water bank in Kern County, California, capable of storing up to 100,000 acre-feet of surplus water during years of excess supply beyond the State Water Project contractors' entitlements. Given the scale of the Kern Fan Project, its execution has been divided into multiple phases, with Phase 1 representing the initial step. This phase includes the acquisition of approximately 350 acres of land in Kern County, designated for the construction and operation of recharge basins, recovery wells, well conveyance pipelines, and interconnections to existing conveyance facilities. Once implemented, the project has the potential to add approximately 28,000 acre-feet of new groundwater storage in California's Central Valley.

The Phase 1 Project is a win for Rosedale, Irvine, and Kern County in many ways. The Phase 1 Project facilities will facilitate the recharge and storage of available water for future use during dry periods, contribute to ecosystem benefits, enhance water supply for agricultural, municipal, and industrial users, assist in achieving groundwater sustainability objectives within the Kern Sub-basin, bolster water supply reliability for RRBWSD and IRWD customers and banking partners, and enhance water management and operational flexibility. Given the ever-increasing challenges posed by drought conditions, this project is pivotal in expanding water storage capacity, ensuring a dependable water supply for future generations, and aligning with the goals of the Sustainable Groundwater Management Act (SGMA).

The GBJPA prepared a feasibility study for this Project and will be submitting another federal funding application through USBR's Small Surface Water and Groundwater Storage Projects (NOFO No. R24S00010). This letter serves as an expression of support for potential funding for the Kern Fan Groundwater Storage Project – Phase 1.

Sincerely,

Kal J Vaughn - President
West Coast Construction & Mechanical

P. O. Box 80965 * Bakersfield, CA 93380 * Phone 661.432.1300 * Fax 661.387.9850

DAVID G. VALADAO
22ND DISTRICT, CALIFORNIA

WWW.VALADAO.HOUSE.GOV

UNITED STATES
HOUSE OF REPRESENTATIVES

COMMITTEE ON APPROPRIATIONS

SUBCOMMITTEE ON AGRICULTURE, RURAL DEVELOPMENT, FOOD AND DRUG ADMINISTRATION

SUBCOMMITTEE ON MILITARY CONSTRUCTION, VETERANS' AFFAIRS AND RELATED AGENCIES

SUBCOMMITTEE ON TRANSPORTATION, HOUSING, AND URBAN DEVELOPMENT, AND RELATED AGENCIES

COMMITTEE ON BUDGET

November 2, 2023

Camille Calimlim Touton
Bureau of Reclamation
1849 C Street NW
Washington DC 20240-0001

Dear Commissioner Touton,

I strongly support Irvine Ranch Water District (IRWD) and Rosedale-Rio Bravo Water Storage District's (Rosedale) application for funding through the United States Bureau of Reclamation's (USBR) Small Storage Program Grant to fully fund Phase 1 of their "Kern Fan Groundwater Storage Project" (Kern Fan Project).

The Kern Fan Project is an innovative groundwater storage project that will provide water supply reliability for California through better capture, storage, and management of surplus Central Valley Project (CVP) and State Water Project (SWP) supplies. The overall project will create a new 100,000-acre-foot groundwater bank within the Kern Fan area of the Kern County Groundwater Basin and be operated jointly by IRWD and Rosedale to capture, recharge, and store water available during wet years. Stored groundwater recovered from the project will supply local demands in lieu of exporting water from the Delta, which would provide both ecological and agricultural benefits. Phase 1 will provide approximately 28,000 acre-feet of new storage in the Central Valley and will be used to store surplus SWP and CVP water during wet years for later use in dry years.

IRWD and Rosedale are well equipped to support this project's goal to provide regional and state benefits, such as improved local groundwater conditions, increased drought resiliency, enhanced agricultural water supply reliability, and preservation of productive agriculture acres. I respectfully ask for your full and fair consideration of IRWD and Rosedale's application for the Small Storage Program Grant through the USBR. Thank you for your time and attention to this matter.

Sincerely,

David G. Valadao
Member of Congress

107 SOUTH DOUTY STREET
HANFORD, CA 93230
(559) 460-6070

2465 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 225-4695

2700 M STREET, SUITE 250B
BAKERSFIELD, CA 93301
(661) 864-7736

Oct 23rd 2023

Bureau of Reclamation
Reclamation Law Administration Division
Attn: Austin Olah
Mail Code: 84-55000
PO Box 25007
Denver, Colorado 80225

Re: Letter of Support for the Kern Fan Groundwater Storage Project – Phase 1

Dear Austin Olah,

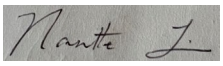
I am writing to express support for the Kern Fan Groundwater Storage Project – Phase 1, which received grant funding on April 6, 2023, under the U.S. Bureau of Reclamation's (USBR) Small Surface Water and Groundwater Storage Projects program (NOFO No. R23AS00019). Due to additional funding being made available within the same program, the Groundwater Banking Joint Powers Authority (GBJPA) is seeking further financial support for this Project.

The Kern Fan Groundwater Storage Project – Phase 1 is a collaborative effort between the Rosedale-Rio Bravo Water Storage District (RRBWSD) and the Irvine Ranch Water District (IRWD), operating jointly under the umbrella of the Groundwater Banking Joint Powers Authority (GBJPA). The GBJPA's primary objective is the implementation of the Kern Fan Groundwater Storage Project (Kern Fan Project). This initiative aims to establish a regional water bank in Kern County, California, capable of storing up to 100,000 acre-feet of surplus water during years of excess supply beyond the State Water Project contractors' entitlements. Given the scale of the Kern Fan Project, its execution has been divided into multiple phases, with Phase 1 representing the initial step. This phase includes the acquisition of approximately 350 acres of land in Kern County, designated for the construction and operation of recharge basins, recovery wells, well conveyance pipelines, and interconnections to existing conveyance facilities. Once implemented, the project has the potential to add approximately 28,000 acre-feet of new groundwater storage in California's Central Valley.

The Phase 1 Project is a win for Rosedale, Irvine, and Kern County in many ways. The Phase 1 Project facilities will facilitate the recharge and storage of available water for future use during dry periods, contribute to ecosystem benefits, enhance water supply for agricultural, municipal, and industrial users, assist in achieving groundwater sustainability objectives within the Kern Sub-basin, bolster water supply reliability for RRBWSD and IRWD customers and banking partners, and enhance water management and operational flexibility. Given the ever-increasing challenges posed by drought conditions, this project is pivotal in expanding water storage capacity, ensuring a dependable water supply for future generations, and aligning with the goals of the Sustainable Groundwater Management Act (SGMA).

The GBJPA prepared a feasibility study for this Project and will be submitting another federal funding application through USBR's Small Surface Water and Groundwater Storage Projects (NOFO No. R24S00010). This letter serves as an expression of support for potential funding for the Kern Fan Groundwater Storage Project – Phase 1.

Sincerely,



[Nanette Lin]

Driver Road Water Well Association
2331 Driver Road
Bakersfield, CA 93314

October 23, 2023

Bureau of Reclamation
Reclamation Law Administration Division
Attn: Austin Olah
Mail Code: 84-55000
PO Box 25007
Denver, Colorado 80225

Re: Letter of Support for the Kern Fan Groundwater Storage Project – Phase 1

Dear Austin Olah,

I am writing to express support for the Kern Fan Groundwater Storage Project – Phase 1, which received grant funding on April 6, 2023, under the U.S. Bureau of Reclamation's (USBR) Small Surface Water and Groundwater Storage Projects program (NOFO No. R23AS00019). Due to additional funding being made available within the same program, the Groundwater Banking Joint Powers Authority (GBJPA) is seeking further financial support for this Project.

The Kern Fan Groundwater Storage Project – Phase 1 is a collaborative effort between the Rosedale-Rio Bravo Water Storage District (RRBWSD) and the Irvine Ranch Water District (IRWD), operating jointly under the umbrella of the Groundwater Banking Joint Powers Authority (GBJPA). The GBJPA's primary objective is the implementation of the Kern Fan Groundwater Storage Project (Kern Fan Project). This initiative aims to establish a regional water bank in Kern County, California, capable of storing up to 100,000 acre-feet of surplus water during years of excess supply beyond the State Water Project contractors' entitlements. Given the scale of the Kern Fan Project, its execution has been divided into multiple phases, with Phase 1 representing the initial step. This phase includes the acquisition of approximately 350 acres of land in Kern County, designated for the construction and operation of recharge basins, recovery wells, well conveyance pipelines, and interconnections to existing conveyance facilities. Once implemented, the project has the potential to add approximately 28,000 acre-feet of new groundwater storage in California's Central Valley.

The Phase 1 Project is a win for Rosedale, Irvine, and Kern County in many ways. The Phase 1 Project facilities will facilitate the recharge and storage of available water for future use during dry periods, contribute to ecosystem benefits, enhance water supply for agricultural, municipal, and industrial users, assist in achieving groundwater sustainability objectives within the Kern Sub-basin, bolster water supply reliability for RRBWSD and IRWD customers and banking partners, and enhance water management and operational flexibility. Given the ever-increasing challenges posed by drought conditions, this project is pivotal in expanding water storage capacity, ensuring a dependable water supply for future generations, and aligning with the goals of the Sustainable Groundwater Management Act (SGMA).

The GBJPA prepared a feasibility study for this Project and will be submitting another federal funding application through USBR's Small Surface Water and Groundwater Storage Projects (NOFO No. R24S00010). This letter serves as an expression of support for potential funding for the Kern Fan Groundwater Storage Project – Phase 1.

Driver Road Water Well Association is a small group of households that obtain their water supply from the area immediately adjacent to Rosedale-Rio Bravo Water Storage District. As such, we have a vested interest in sustainability efforts for The Kern Fan Groundwater Storage Project.

Sincerely,

Kenneth Campbell
Manager
Driver Road Water Well Association

Bureau of Reclamation: Reclamation Law Administration Division
Attn: Jack Simes and Carrie Diroll
Mail Code: 84-55000
PO Box 25007 Denver, Colorado 80225

Belluomini Farms
444 E Front St.
Buttonwillow, CA 93206

Letter of Support for the Kern Fan Groundwater Storage Project – Phase 1

Dear Jack Simes and Carrie Diroll,

As a multigenerational farming family within the Rosedale Rio Bravo Water Storage District, I would like to extend my support for the Kern Fan Groundwater Storage Project – Phase 1, a joint effort between Rosedale-Rio Bravo Water Storage District and Irvine Ranch Water District via their Groundwater Banking Joint Powers Authority. The Kern Fan Project will develop new a regional water bank in Kern County to store up to 100,000 acre-feet of surplus water made available during years when the water supply exceeds the California State Water Project contractors' total entitlement. Owing to the eventual scale of the Kern Fan Project, implementation has been broken up into multiple phases, with Phase 1 being standalone and including the acquisition of 350 acres in Kern County for the construction and operation of recharge basins, recovery wells, and conveyance infrastructure and interconnections. Once implemented, this Project has the potential to provide approximately 28,000 acre-feet of new groundwater storage in the Central Valley, an extremely productive agricultural basin that provides food and livelihoods for countless people.

I share the applicant's belief that this Project is a win for Rosedale, Irvine, and Kern County. California is prone to boom or bust hydrologic cycles which makes the capture and storage of wet year flows essential for sustaining communities in dry years. Phase 1 Project facilities will: a) recharge and store available water for later use during dry periods, b) provide ecosystem benefits by increasing operational flexibility for managing stored water pools throughout the state, c) provide water supply benefits for agricultural, municipal, and industrial users, d) assist in achieving groundwater sustainability within the Kern Sub-basin, e) provide RRBWSD and IRWD customers and banking partners with increased water supply reliability, and f) increase water management and operating flexibility. With ever-increasing risks of aridification threatening the sustainability of the Central Valley, this Project is critical for enhancing water storage, creating a reliable water supply for future generations, and meeting Sustainable Groundwater Management Act (SGMA) goals.

The GBJPA has prepared a feasibility study for this Project and will be applying for federal funding through the Bureau of Reclamation's "Small Surface Water and Groundwater Storage Projects." As a longtime landowner in the District, I have witnessed how Rosedale-Rio Bravo and Irvine Ranch have diligently strived to leverage existing infrastructure and the most favorable soil profiles on the Kern Fan to maximize the benefit of this project for future generations. It is my sincere belief that this project is worthy of federal support, not only because there is an unmet need in our community but also because this is an extremely capable team of water resource managers.

Sincerely,

Pam Klassen

Pamela Jean Klassen
President, Belluomini Farms

Affentranger Ranches
18107 Kratzmeyer Rd
Bakersfield, CA 93314-9481

December 7, 2022

Bureau of Reclamation
Reclamation Law Administration Division
Attn: Jack Simes and Carrie Diroll
Mail Code: 84-55000
PO Box 25007
Denver, Colorado 80225

Re: Letter of Support for the Kern Fan Groundwater Storage Project – Phase 1

Dear Jack Simes and Carrie Diroll,

This is a letter of support for the Kern Fan Groundwater Storage Project – Phase 1 (Project). This Project is a joint effort between Rosedale-Rio Bravo Water Storage District (RRBWSD) and Irvine Ranch Water District (IRWD), working collectively under the Groundwater Banking Joint Powers Authority (GBJPA) for the purpose of implementing the Kern Fan Groundwater Storage Project (Kern Fan Project). The Kern Fan Project will develop a regional water bank in Kern County and store up to 100,000 acre-feet of surplus water made available during years when the water supply exceeds the State Water Project contractors' total entitlement. Due to the scale of the Kern Fan Project, implementation has been broken up into multiple phases, the first step being Phase 1. Phase 1 of the Kern Fan Project is a standalone element of what could be a larger project. Phase 1 includes the acquisition of approximately 350 acres of land in Kern County for the construction and operation of recharge basins, recovery wells, well conveyance pipelines, and interconnections to existing conveyance facilities. Once implemented, this Project has the potential to provide approximately 28,000 acre-feet of new groundwater storage in the Central Valley.

This Project is a win for Rosedale, Irvine, and Kern County in many ways. The Phase 1 Project facilities will recharge and store available water for later use during dry periods, provide ecosystem benefits, provide water supply benefits for agricultural, municipal, and industrial users, assist in achieving groundwater sustainability within the Kern Sub-basin, provide RRBWSD and IRWD customers and banking partners with increased water supply reliability, and increase water management and operating flexibility. With ever-increasing drought conditions, this Project is critical for enhancing water storage, creating a reliable water supply for future generations, and meeting Sustainable Groundwater Management Act (SGMA) goals.

The GBJPA has prepared a feasibility study for this Project and will be applying for federal funding through the Bureau of Reclamation's "Small Surface Water and Groundwater Storage Projects." This letter supports potential funding for the Kern Fan Groundwater Storage Project – Phase 1.

Sincerely,

Rosemarie Millan

Rosemarie Millan, Partner

KATIE PORTER
45TH DISTRICT, CALIFORNIA

NATURAL RESOURCES COMMITTEE
CHAIR, SUBCOMMITTEE ON OVERSIGHT AND INVESTIGATIONS

OVERSIGHT AND REFORM COMMITTEE
VICE CHAIR, SUBCOMMITTEE ON GOVERNMENT OPERATIONS

Congress of the United States
House of Representatives
Washington, DC 20515–0545

WASHINGTON OFFICE:
1117 LONGWORTH HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 225–5611

DISTRICT OFFICE:
2151 MICHELSON DRIVE
SUITE #195
IRVINE, CA 92612
(949) 668–6600

porter.house.gov

November 14, 2022

Ms. Camille Calimlim Touton
Commissioner
Bureau of Reclamation
1849 C Street NW
Washington DC 20240-0001

Dear Commissioner Touton:

I write to express my support for the Irvine Ranch Water District's (IRWD) application to the Bureau of Reclamation's Small Storage Program for Phase 1 of the Kern Fan Groundwater Storage Project (Kern Fan Project). The application was submitted by the Groundwater Banking Joint Powers Authority, a partnership formed by IRWD and the Rosedale-Rio Bravo Water Storage District, to build and operate the Kern Fan Project in California.

The Kern Fan Project is an innovative groundwater storage project that will improve water supply reliability for Kern County and provide an emergency water supply for Orange County, California. This project will allow for better water capture; increased water storage; and more efficient management of the Central Valley Project's water surplus, State Water Project water supplies, and flood flows. Once completed, the project will create a 100,000-acre-foot groundwater bank within the Kern Fan area of the Kern County Groundwater Basin. It will be operated jointly by IRWD and the Rosedale-Rio Bravo Water Storage District to capture, recharge, and store water during wet years. The stored groundwater recovered from the project will increase local water supplies and reduce reliance on costlier imported water from the San Francisco Bay/Sacramento-San Joaquin Delta Estuary and the Colorado River.

Phase 1 of the Kern Fan Project will provide approximately 28,000 acre-feet of new storage to store surplus Central Valley Project and State Water Project water during wet years for later use in dry years. This will provide regional and state benefits by improving local groundwater conditions, increasing drought resiliency, and strengthening water supply reliability for the agricultural industry.

The Kern Fan Project, including Phase 1, will also have important environmental benefits for endangered species in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary. Approximately 25 percent of the water stored within the project will be available to help protect endangered winter- and spring-run Chinook salmon by providing short-term ecosystem pulse flows from Lake Oroville. Furthermore, two phases of the Kern Fan Project, including Phase 1, will provide critical wetland habitat for migratory birds and other waterfowl along the Pacific Flyway.

All phases of the Kern Fan Project have strong support from the state of California. The California Water Commission has selected it as one of eight projects to receive Proposition 1 funding–a water bond approved by voters in 2014–and allocated $89.1 million to the project. With a federal feasibility study finding its potential economic benefits at over $400 million, the cost for Phase 1 is estimated to be $50.16 million, and the total cost of the Kern Fan Project is estimated to be $246 million.

I look forward to seeing the benefits that Phase 1 of the Kern Fan Project will provide for our water supply, the environment, and Orange County families. Should you have any questions, please feel free to contact my District Director, Cody Mendoza, at (949) 668-6600.

Very truly yours,

Katie Porter
Member of Congress

CALIFORNIA NATURAL RESOURCES AGENCY

GAVIN NEWSOM, *Governor*
WADE CROWFOOT, *Secretary for Natural Resources*

October 14, 2022

Secretary Deb Haaland
Department of the Interior
1849 C Street, N.W.
Washington, DC 20240

Dear Secretary Haaland,

I am writing to request federal support for the Kern Fan Groundwater Storage, which would develop a regional water bank in Kern County and store up to 100,000 acre-feet of surplus made available during years when water supply exceeds the State Water Project contractors' total entitlements. Additional storage like this would improve the ability of California to capture runoff, which would help stabilize water supplies for cities and farms in the face of the sharper peak flood flows and more intense drought we experience as average temperatures rise.

The Kern Fan project would be operated so that in wet years, the project partners, Irvine Ranch Water District (IRWD) and Rosedale-Rio Bravo Water Storage District (Rosedale), would divert unallocated, surplus State Water Project supplies into storage. IRWD and Rosedale would share first priority rights to 75 percent of the stored water for water supply purposes. The remaining 25 percent of the stored water would be available to support ecosystem benefits in the form of a pulse flow on the Feather River.

In 2014, California voters overwhelmingly approved a $7.5 billion water bond (Proposition 1) that provided $2.7 billion for water storage projects. The California Water Commission determined funding amounts for certain projects, including $89.1 million for the Kern Fan Groundwater Storage project. In total, the seven projects would add an additional 2.77 million acre-feet of capacity, above and below ground. Supporting local water districts to complete these projects is a priority of Gov. Gavin Newsom and highlighted in his August 2022 strategy for expanding water supplies to adapt to a hotter, drier California.

Proponents of the Kern Fan Groundwater Storage project have applied for federal funding through the U.S. Bureau of Reclamation's "Small Surface Water and Groundwater Storage Projects" grant opportunity. California appreciates the Department of the Interior's commitment to investing in new water storage. I respectfully ask for your support and partnership in funding all seven of these water storage projects, and in particular, at this moment, the Kern Fan Groundwater Storage project.

Sincerely,

Wade Crowfoot
California Secretary for Natural Resources

Congress of the United States
Washington, DC 20515

January 4, 2022

The Honorable Deb Haaland
Secretary
U.S. Department of the Interior
1849 C Street NW
Washington, D.C. 20240

The Honorable Camille Touton
Commissioner
U.S. Bureau of Reclamation
1849 C Street NW
Washington, D.C. 20240

Dear Secretary Haaland and Commissioner Touton:

Thank you for your partnership in working with Congress to pass the Infrastructure Investment and Jobs Act (IIJA) into law. This legislation makes significant new federal funding available to address long-overdue and much needed investments in our nation's aging infrastructure. Given the state of our nation's infrastructure, which the American Society of Civil Engineers recently rated a C-[1], it is essential that we allocate these new funds in a manner that will most effectively benefit the American public.

As you know, California recently experienced the second driest year in its historical record in 2021, following the fifth driest year in 2020. This two-year dry period continues the theme of aridity California has been experiencing in the 21st century, including the three-year drought of 2007-2009 and the five-year one of 2012-2016. In the San Joaquin Valley, which is responsible for producing over 40 percent of our nation's fruits, vegetables, and nuts, lack of water leads to fallowed fields, lost jobs, and reduced economic outcomes for those who raise and tend those crops, our farmworkers and farmers. However, it's important to be aware that drought impacts far more than just farms and fields. It means lost jobs, less revenue for local schools and first responders, decreased public health outcomes, and less financial support for the small businesses and local economies. It is the local businesses that depend on the dollars earned by farmworkers and their families. We have an imperative to implement those lessons learned from previous droughts and utilize all the water tools in our water toolbox.

The recent rains in California are much welcomed and give us hope of averting another extreme dry year. However, we must prepare for hydrological conditions over the next year that are yet to be determined. Notwithstanding this early precipitation, it is all the more reason that we take a multi-faceted, all-of-the-above approach to water infrastructure. California must be prepared for managing current and future hydrological conditions with more extreme droughts, a depleted Sierra snowpack, and wet years where more precipitation falls as rain.

As your agencies work to finalize a spending plan to implement the provisions of IIJA, we respectfully request that you to give full consideration to the following recommendations for prioritizing the funding provided by this historic infrastructure law:

[1] https://infrastructurereportcard.org/

- Building major storage projects in California such as B.F. Sisk Dam Raise and San Luis Reservoir Expansion, Sites Reservoir Project, Los Vaqueros Reservoir Expansion, Del Puerto Canyon Reservoir Project, Pacheco Reservoir Expansion, and Kern Fan Groundwater Storage Project, which enjoy broad regional support and have multiple benefits, including storing more water in wet years to use in dry years.
- Completing seismic retrofits at B.F. Sisk Dam in conjunction with expansion of San Luis Reservoir to create cost efficiency.
- Restoring the carrying capacity of canals in the San Joaquin Valley, including the Delta-Mendota Canal, Friant-Kern Canal, and the California Aqueduct.
- Projects that help ease the transition to compliance with California's Sustainable Groundwater Management Act.
- Multi-benefit projects in key regions, particularly groundwater recharge projects that will have positive impacts on groundwater sustainability while providing other benefits such as water supplies for disadvantaged communities or seasonal wetlands for waterfowl and other species.
- Expediting the delivery of aging infrastructure funding, particularly for major rehabilitation and replacement activities located in the San Joaquin Valley that are listed in the Bureau of Reclamation's April 2021 Asset Management Report.
- Recycling projects with the potential to increase the availability of Central Valley Project and State Water Project supplies for water transfers to other regions and reduce sole source reliance on the Delta.

Thank you for considering our recommendations. We are confident the work your agencies do to implement IIJA funding will provide direct and positive impacts for the people of the San Joaquin Valley, California, and the nation. We look forward to continuing to work with you to ensure this funding is spent where it will have the greatest benefit to our constituents, to our state, and the nation.

Sincerely,

JIM COSTA
Member of Congress

JOSH HARDER
Member of Congress

CAPITOL OFFICE
STATE CAPITOL, ROOM 3063
SACRAMENTO, CA 95814
TEL (916) 651-4036
FAX (916) 651-4936

DISTRICT OFFICES
24031 EL TORO ROAD
SUITE 201A
LAGUNA HILLS, CA 92653
TEL (949) 598-5850
FAX (949) 598-5855

169 SAXONY ROAD
SUITE 103
ENCINITAS, CA 92024
TEL (760) 642-0809
FAX (760) 642-0814

SENATOR.BATES@SENATE.CA.GOV
WWW.SENATE.CA.GOV/BATES

California State Senate

SENATOR
PATRICIA C. BATES
THIRTY-SIXTH SENATE DISTRICT

COMMITTEES
APPROPRIATIONS
VICE CHAIR
ENVIRONMENTAL QUALITY
VICE CHAIR
HOUSING
VICE CHAIR
RULES
VICE CHAIR
TRANSPORTATION
VICE CHAIR
BUSINESS, PROFESSIONS AND ECONOMIC DEVELOPMENT
INSURANCE

June 11, 2021

The Honorable Dianne Feinstein
United States Senate
331 Hart Senate Office Building
Washington, D.C. 20510

The Honorable Alex Padilla
United States Senate
112 Hart Senate Office Building
Washington, D.C. 20510

RE: Support for the Kern Fan Groundwater Storage Project

Dear Senators Feinstein and Padilla,

As the state senator for California's 36th Senate District, which includes most of South Orange County, I support the Irvine Ranch Water District (IRWD) and Rosedale-Rio Bravo Water Storage District's (Rosedale) Kern Fan Groundwater Storage Project (Kern Fan Project), and request that you prioritize the project for federal funding.

The Kern Fan Project is an innovative groundwater storage project that will improve water supply reliability for Kern County and provide an emergency water supply for Orange County through better capture, storage, and management of surplus State Water Project (SWP) supplies or flood flows. The project will create a new 140,000 acre-foot groundwater bank within the Kern Fan area of the Kern County Groundwater Basin, and be operated jointly by IRWD and Rosedale to capture, recharge, and store unallocated SWP Article 21 supplies available during wet years. Stored groundwater recovered from the project will supply local demands in lieu of exporting water from the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Delta).

Unlike other groundwater storage projects, the Kern Fan Project will also provide significant environmental benefits to endangered species in the Delta. Approximately a quarter of the water stored within the project will be available to benefit endangered winter- and spring-run Chinook salmon. 25 percent of the water would be used to provide short-term ecosystem pulse flows from Lake Oroville in exchange of the same amount of water extracted from the project.

California has recognized the value of this project. The California Water Commission has selected the Kern Fan Project as one of eight projects in the state to receive Proposition 1 (2014) funding. The Commission has allocated $87.8 million to the project.

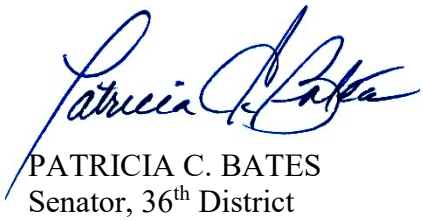
The total cost for the project is $246 million, but a federal feasibility study for the Kern Fan Project quantified the net present value of the Kern Fan Project's benefits at more than $400 million. The study showed that the Kern Fan Groundwater Storage Project will not only provide regional and state benefits, such as improved local groundwater conditions, enhanced agricultural water supply reliability and preservation of productive

agriculture acres, but will also provide significant federal environmental benefits and direct benefits to federal water operations.

The Kern Fan Groundwater Storage Project meets water supply security needs while, at the same time, producing important ecological and agricultural benefits. For these reasons, it should receive federal funding.

Thank you in advance for your consideration.

Sincerely,



PATRICIA C. BATES
Senator, 36th District

LISA A. BARTLETT
ORANGE COUNTY BOARD OF SUPERVISORS
SUPERVISOR, FIFTH DISTRICT

ORANGE COUNTY HALL OF ADMINISTRATION
333 W. SANTA ANA BLVD.
10 CIVIC CENTER, SANTA ANA, CALIFORNIA 92701
PHONE (714) 834-3550 FAX (714) 834-2670
http://bos.ocgov.com/fifth/

June 11, 2021

The Honorable Dianne Feinstein
United States Senate
331 Hart Senate Office Building
Washington, D.C. 20510

The Honorable Alex Padilla
United States Senate
112 Hart Senate Office Building
Washington, D.C. 20510

RE: Support for the Kern Fan Groundwater Storage Project

Dear Senator Feinstein and Senator Padilla:

I write in support of the Irvine Ranch Water District (IRWD) and Rosedale-Rio Bravo Water Storage District's (Rosedale) Kern Fan Groundwater Storage Project (Kern Fan Project), and respectfully request that you consider the project a priority for federal funding.

The Kern Fan Project is an innovative groundwater storage project that will provide water supply reliability for Kern County, and an emergency supply of water for Orange County, California through better capture, storage, and management of surplus State Water Project (SWP) supplies- or flood flows. The project will create a new 140,000 acre-foot groundwater bank within the Kern Fan area of the Kern County Groundwater Basin, and will be operated jointly by IRWD and Rosedale to capture, recharge, and store unallocated SWP Article 21 supplies available during wet years.

Unlike other groundwater storage projects, the Kern Fan Project will also provide significant environmental benefits to endangered species in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Delta). Approximately a quarter of the water stored within the project will be available to benefit endangered winter- and spring-run Chinook salmon. This 25 percent of the water would be used to provide short-term ecosystem pulse flows from Lake Oroville in exchange of the same amount of water extracted from the project.

This project provides significant value and as such the California Water Commission has selected the Kern Fan Project as one of eight projects in the state to receive Proposition 1 water storage funds. The Commission has allocated $87.8 million to the project.

The total cost for the project is $246 million, but a federal feasibility study for the Kern Fan Project quantified the net present value of the Kern Fan Project's benefits at more than more than $400 million. The study showed that the Kern Fan Groundwater Storage Project will not only provide regional and state benefits, such as improved local groundwater conditions, enhanced agricultural water supply reliability, and preservation of productive agriculture acres, but will also provide significant federal environmental benefits and direct benefits to federal water operations. The Kern Fan Groundwater Storage Project meets water supply security needs while, at the same time, producing important ecological and agricultural benefits. For this reason, it should be a strong candidate for federal funding.

Thank you for consideration of the Kern Fan Groundwater Storage Project.

Sincerely,

Lisa A. Bartlett
Supervisor, Fifth District
Orange County Board of Supervisors

DUDLEY RIDGE WATER DISTRICT

455 W. FIR AVENUE
CLOVIS, CALIFORNIA 93611

PHONE (559) 449-2700
FAX (559) 449-2715

June 11, 2021

The Honorable Dianne Feinstein
United States Senate
331 Hart Senate Office Building
Washington, D.C. 20510

The Honorable Alex Padilla
United States Senate
112 Hart Senate Office Building
Washington, D.C. 20510

RE: Support for the Kern Fan Groundwater Storage Project

Dear Senator Feinstein and Senator Padilla:

On behalf of Dudley Ridge Water District ("District"), I write in strong support of the Irvine Ranch Water District ("IRWD") and Rosedale-Rio Bravo Water Storage District's ("Rosedale") Kern Fan Groundwater Storage Project ("Kern Fan Project"), and respectfully request that you consider the project a priority for federal funding.

The Kern Fan Project is an innovative groundwater storage project that will provide water supply reliability for Kern County, Dudley Ridge Water District, and an emergency supply of water for Orange County through better capture, storage, and management of surplus State Water Project ("SWP") supplies and flood flows. The Kern Fan Project will create a new 140,000 acre-foot groundwater bank within the Kern Fan area of the Ken County Groundwater Basin; the Kern Fan Project will be operated jointly by IRWD and Rosedale to capture, recharge, and store unallocated SWP Article 21 supplies available during wet years. Stored groundwater recovered from the Kern Fan Project will supply local demands in-lieu of exporting water from the Delta, and the Kern Fan Project would provide both public and non-public benefits.

Unlike other groundwater storage projects, the Kern Fan Project will also provide significant environmental benefits to endangered species in the San Francisco Bay/Sacramento-San Joaquin Delta ("Delta"). Approximately a quarter of the water stored within the Kern Fan Project will be available to benefit endangered winter- and spring-run Chinook salmon. This 25 percent of the water would be used to provide short-term ecosystem pulse flows from Lake Oroville in exchange of the same amount of water extracted from the Kern Fan Project.

California has recognized the value of the Kern Fan Project. The California Water Commission has selected the Kern Fan Project as one of eight projects in the State to receive Proposition 1

funding, a water bond approved by voters in November 2014. The Water Commission has allocated $87.8 million to the Kern Fan Project.

The total cost for the Kern Fan Project is $246 million, but a federal feasibility study for the Kern Fan Project quantified the net present value of the Kern Fan Project's benefits at more than $400 million. The study showed that the Kern Fan Groundwater Storage Project will not only provide regional and State benefits, such as improved local groundwater conditions, enhanced agricultural water supply reliability, and preservation of productive agriculture acres, but it will also provide significant federal environmental benefits and direct benefits to federal water operations.

The Kern Fan Groundwater Storage Project meets water supply security needs while, at the same time, producing important ecological and agricultural benefits. For this reason, it should be a strong candidate for federal funding.

Thank you for carefully considering federal funding for the Kern Fan Groundwater Storage Project.

Respectfully,

Kimberly M. Brown
President

Buena Vista Water Storage District
P.O. Box 756 • 525 N. Main Street
Buttonwillow, California 93206
Phone: (661) 324-1101 • (661) 764-5510
Fax: (661) 764-5053

June 11, 2021

The Honorable Dianne Feinstein
United States Senate
331 Hart Senate Office Building
Washington, D.C. 20510

The Honorable Alex Padilla
United States Senate
112 Hart Senate Office Building
Washington, D.C. 20510

RE: Support for the Kern Fan Groundwater Storage Project

Dear Senator Feinstein and Senator Padilla:

I write in support of the Irvine Ranch Water District (IRWD) and Rosedale-Rio Bravo Water Storage District's (Rosedale) Kern Fan Groundwater Storage Project (Kern Fan Project), and respectfully request that you consider the project a priority for federal funding.

The Kern Fan Project is a groundwater storage project that will provide water supply reliability for Kern County, and an emergency supply of water for Orange County, California through better capture, storage and management of surplus State Water Project (SWP) supplies- or flood flows. The project will create a new 140,000 acre-foot groundwater bank within the Kern Fan area of the Ken County Groundwater Basin and be operated jointly by IRWD and Rosedale to capture, recharge and storage unallocated SWP Article 21 supplies available during wet years. Stored groundwater recovered from the project will supply local demands in lieu of exporting water from the Delta, and the project would provide both public and non-public benefits.

Unlike other groundwater storage projects, the Kern Fan Project will also provide significant environmental benefits to endangered species in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Delta). Approximately a quarter of the water stored within the project will be available to benefit endangered winter- and spring-run Chinook salmon. This 25 percent of the water would be used to provide short-term ecosystem pulse flows from Lake Oroville in exchange of the same amount of water extracted from the project.

California has recognized the value of this project. The California Water Commission has selected the Kern Fan Project as one of eight projects in the state to receive Proposition 1, a water bond approved by voters in November 2014, water storage funds. The Commission has allocated $87.8 million to the project.

The total cost for the project is $246 million, but a federal feasibility study for the Kern Fan Project quantified the net present value of the Kern Fan Project's benefits at more than more than $400 million. The study showed that the Kern Fan Groundwater Storage Project will not only provide regional and state benefits, such as improved local groundwater conditions, enhanced agricultural water supply reliability and preservation of productive agriculture acres, but will also provide significant federal environmental benefits and direct benefits to federal water operations.

The Kern Fan Groundwater Storage Project meets water supply security needs while, at the same time, producing important ecological and agricultural benefits. For this reason, it should be a strong candidate for federal funding.

Thank you for carefully considering the Kern Fan Groundwater Storage Project

Sincerely,

Tim Ashlock
Engineer – Manager
Buena Vista Water Storage District

STATE CAPITOL
P.O. BOX 942849
SACRAMENTO, CA 94249-0068
(916) 319-2068
FAX (916) 319-2168

Assembly
California Legislature

STEVEN S. CHOI, PH.D.
ASSEMBLYMEMBER, SIXTY-EIGHTH DISTRICT

June 10, 2021

The Honorable Dianne Feinstein
United States Senate
331 Hart Senate Office Building
Washington, D.C. 20510

The Honorable Alex Padilla
United States Senate
112 Hart Senate Office Building
Washington, D.C. 20510

RE: Support for the Kern Fan Groundwater Storage Project

Dear Senator Feinstein and Senator Padilla:

I write in strong support of the Irvine Ranch Water District (IRWD) and Rosedale-Rio Bravo Water Storage District's (Rosedale) Kern Fan Groundwater Storage Project (Kern Fan Project), and respectfully request that you consider the project a priority for federal funding.

The Kern Fan Project is an innovative groundwater storage project that will provide water supply reliability for Kern County, and an emergency supply of water for Orange County, California through better capture, storage and management of surplus State Water Project (SWP) supplies- or flood flows. The project will create a new 140,000 acre-foot groundwater bank within the Kern Fan area of the Ken County Groundwater Basin, and be operated jointly by IRWD and Rosedale to capture, recharge and storage unallocated SWP Article 21 supplies available during wet years. Stored groundwater recovered from the project will supply local demands in lieu of exporting water from the Delta, and the project would provide both public and non-public benefits.

Unlike other groundwater storage projects, the Kern Fan Project will also provide significant environmental benefits to endangered species in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Delta). Approximately a quarter of the water stored within the project will be available to benefit endangered winter- and spring-run Chinook salmon. This 25 percent of the water would be used to provide short-term ecosystem pulse flows from Lake Oroville in exchange of the same amount of water extracted from the project.

California has recognized the value of this project. The California Water Commission has selected the Kern Fan Project as one of eight projects in the state to receive Proposition 1, a water bond approved by voters in November 2014, water storage funds. The Commission has allocated $87.8 million to the project.

The total cost for the project is $246 million, but a federal feasibility study for the Kern Fan Project quantified the net present value of the Kern Fan Project's benefits at more than more than $400 million. The study showed that the Kern Fan Groundwater Storage Project will not only provide regional and state benefits, such as improved local groundwater conditions, enhanced agricultural water supply

STATE CAPITOL
P.O. BOX 942849
SACRAMENTO, CA 94249-0068
(916) 319-2068
FAX (916) 319-2168

Assembly
California Legislature
STEVEN S. CHOI, PH.D.
ASSEMBLYMEMBER, SIXTY-EIGHTH DISTRICT

reliability and preservation of productive agriculture acres, but will also provide significant federal environmental benefits and direct benefits to federal water operations.
The Kern Fan Groundwater Storage Project meets water supply security needs while, at the same time, producing important ecological and agricultural benefits. For this reason, it should be a strong candidate for federal funding.

Thank you for carefully considering the Kern Fan Groundwater Storage Project

Sincerely,

Steven S. Choi

Steven Choi, Ph.D.
Assemblymember, 68th District

STATE CAPITOL
P.O. BOX 942849
SACRAMENTO, CA 94249-0034
(916) 319-2034
FAX (916) 319-2134

E-MAIL
Assemblymember.Fong@assembly.ca.gov

Assembly
California Legislature

VINCE FONG
ASSEMBLYMEMBER, THIRTY-FOURTH DISTRICT

DISTRICT OFFICE
4550 CALIFORNIA AVENUE, SUITE 740
BAKERSFIELD, CA 93309
(661) 395-2995
FAX (661) 395-3883

June 11, 2021

The Honorable Dianne Feinstein
United States Senate
331 Hart Senate Office Building
Washington, D.C. 20510

The Honorable Alex Padilla
United States Senate
112 Hart Senate Office Building
Washington, D.C. 20510

RE: Support for the Kern Fan Groundwater Storage Project

Dear Senator Feinstein and Senator Padilla:

I write in strong support of the Rosedale-Rio Bravo Water Storage District's (Rosedale) and Irvine Ranch Water District (IRWD) Kern Fan Groundwater Storage Project (Kern Fan Project), and respectfully request that you consider the project a priority for federal funding.

The Kern Fan Project is an innovative groundwater storage project that will provide water supply reliability for Kern County, and an emergency supply of water for Orange County, California through better capture, storage and management of surplus State Water Project (SWP) supplies- or flood flows. The project will create a new 140,000 acre-foot groundwater bank within the Kern Fan area of the Kern County Groundwater Basin, and be operated jointly by IRWD and Rosedale to capture, recharge and store unallocated SWP Article 21 supplies available during wet years. Stored groundwater recovered from the project will supply local demands in lieu of exporting water from the Delta, and the project would provide both public and non-public benefits.

Unlike other groundwater storage projects, the Kern Fan Project will also provide significant environmental benefits to endangered species in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Delta). Approximately a quarter of the water stored within the project will be available to benefit endangered winter- and spring-run Chinook salmon. This 25 percent of the water would be used to provide short-term ecosystem pulse flows from Lake Oroville in exchange of the same amount of water extracted from the project.

California has recognized the value of this project. The California Water Commission has selected the Kern Fan Project as one of eight projects in the state to receive funding from Proposition 1, a water bond approved by voters in November 2014. The Commission has allocated $87.8 million to this project.

The total cost for the project is $246 million, but a federal feasibility study for the Kern Fan Project quantified the net present value of the Kern Fan Project's benefits at more than $400

million. The study showed that the Kern Fan Groundwater Storage Project will not only provide regional and state benefits, such as improved local groundwater conditions, enhanced agricultural water supply reliability and preservation of productive agriculture acres, but will also provide significant federal environmental benefits and direct benefits to federal water operations. The Kern Fan Groundwater Storage Project meets water supply security needs while, at the same time, producing important ecological and agricultural benefits. For these reasons, it should be a strong candidate for federal funding.

Thank you for carefully considering the Kern Fan Groundwater Storage Project.

Sincerely,

Vince Fong
Assemblymember, 34th District

cityofirvine.org

City of Irvine, 1 Civic Center Plaza, P.O. Box 19575, Irvine, California 92623-9575 949-724-6000

June 10, 2021

The Honorable Dianne Feinstein
United States Senate
331 Hart Senate Office Building
Washington, D.C. 20510

The Honorable Alex Padilla
United States Senate
112 Hart Senate Office Building
Washington, D.C. 20510

RE: Support for the Kern Fan Groundwater Storage Project

Dear Senator Feinstein and Senator Padilla:

We write in strong support of the Irvine Ranch Water District (IRWD) and Rosedale-Rio Bravo Water Storage District's (Rosedale) Kern Fan Groundwater Storage Project (Kern Fan Project), and respectfully request that you consider the project a priority for federal funding.

The Kern Fan Project is an innovative groundwater storage project that will provide water supply reliability for Kern County, and an emergency supply of water for Orange County, California through better capture, storage and management of surplus State Water Project (SWP) supplies- or flood flows. The project will create a new 140,000 acre-foot groundwater bank within the Kern Fan area of the Ken County Groundwater Basin, and be operated jointly by IRWD and Rosedale to capture, recharge and storage unallocated SWP Article 21 supplies available during wet years. Stored groundwater recovered from the project will supply local demands in lieu of exporting water from the Delta, and the project would provide both public and non-public benefits.

Unlike other groundwater storage projects, the Kern Fan Project will also provide significant environmental benefits to endangered species in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Delta). Approximately a quarter of the water stored within the project will be available to benefit endangered winter- and spring-run Chinook salmon. This 25 percent of the water would be used to provide short-term ecosystem pulse flows from Lake Oroville in exchange of the same amount of water extracted from the project.

California has recognized the value of this project. The California Water Commission has selected the Kern Fan Project as one of eight projects in the state to receive Proposition 1, a water bond approved by voters in November 2014, water storage funds. The Commission has allocated $87.8 million to the project.

The total cost for the project is $246 million, but a federal feasibility study for the Kern Fan Project quantified the net present value of the Kern Fan Project's benefits at more than more than $400 million. The study showed that the Kern Fan Groundwater Storage

Project will not only provide regional and state benefits, such as improved local groundwater conditions, enhanced agricultural water supply reliability and preservation of productive agriculture acres, but will also provide significant federal environmental benefits and direct benefits to federal water operations.

The Kern Fan Groundwater Storage Project meets water supply security needs while, at the same time, producing important ecological and agricultural benefits. For this reason, it should be a strong candidate for federal funding.

Thank you for carefully considering the Kern Fan Groundwater Storage Project.

Sincerely,

Farrah N. Khan
Mayor

Anthony Kuo
Councilmember

DONALD P. WAGNER
ORANGE COUNTY BOARD OF SUPERVISORS
THIRD DISTRICT

ORANGE COUNTY HALL OF ADMINISTRATION
333 W. SANTA ANA BLVD.
SANTA ANA, CALIFORNIA 92701
PHONE (714) 834-3330 FAX (714) 834-6190
https://donwagnerca.com/

June 10, 2021

The Honorable Dianne Feinstein
United States Senate
331 Hart Senate Office Building
Washington, D.C. 20510

The Honorable Alex Padilla
United States Senate
112 Hart Senate Office Building
Washington, D.C. 20510

Subject: Support for the Kern Fan Groundwater Storage Project

Dear Senator Feinstein and Senator Padilla:

I am writing in support of the Irvine Ranch Water District (IRWD) and Rosedale-Rio Bravo Water Storage District's (Rosedale) Kern Fan Groundwater Storage Project (Kern Fan Project), and respectfully request that you consider the project a priority for federal funding.

The Kern Fan Project is an innovative groundwater storage project that will provide water supply reliability for Kern County, and an emergency supply of water for Orange County, California through better capture, storage and management of surplus State Water Project (SWP) supplies- or flood flows. The project will create a new 140,000 acre-foot groundwater bank within the Kern Fan area of the Ken County Groundwater Basin, and be operated jointly by IRWD and Rosedale to capture, recharge and storage unallocated SWP Article 21 supplies available during wet years. Stored groundwater recovered from the project will supply local demands in lieu of exporting water from the Delta, and the project would provide both public and non-public benefits.

Unlike other groundwater storage projects, the Kern Fan Project will also provide significant environmental benefits to endangered species in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Delta). Approximately a quarter of the water stored within the project will be available to benefit endangered winter- and spring-run Chinook salmon. This 25 percent of the water would be used to provide short-term ecosystem pulse flows from Lake Oroville in exchange of the same amount of water extracted from the project.

California has recognized the value of this project. The California Water Commission has selected the Kern Fan Project as one of eight projects in the state to receive

Proposition 1, a water bond approved by voters in November 2014, water storage funds. The Commission has allocated $87.8 million to the project.

The total cost for the project is $246 million, but a federal feasibility study for the Kern Fan Project quantified the net present value of the Kern Fan Project's benefits at more than more than $400 million. The study showed that the Kern Fan Groundwater Storage Project will not only provide regional and state benefits, such as improved local groundwater conditions, enhanced agricultural water supply reliability and preservation of productive agriculture acres, but will also provide significant federal environmental benefits and direct benefits to federal water operations.

The Kern Fan Groundwater Storage Project meets water supply security needs while, at the same time, producing important ecological and agricultural benefits. For this reason, it should be a strong candidate for federal funding.

Thank you for carefully considering the Kern Fan Groundwater Storage Project

Sincerely,

Donald P. Wagner
Orange County Supervisor, Third District

Appendix K – Multi-benefit Recharge Diagram

Key features of multibenefit recharge

Berms planted with perennial grasses and shrubs from local seed can prevent bank erosion and provide additional habitat for birds and pollinators.

Earthen berms can be used to create separate basins. Interbasin water control structures are needed to control movement, flow rate, and water levels in and between basins.

Grazing is the recommended method for vegetation management due to its low cost and effectiveness. There is a risk of soil compaction if herds are too dense or if grazers are applied for an extended duration. Grazing should only be used when soil conditions are dry to avoid soil compaction.

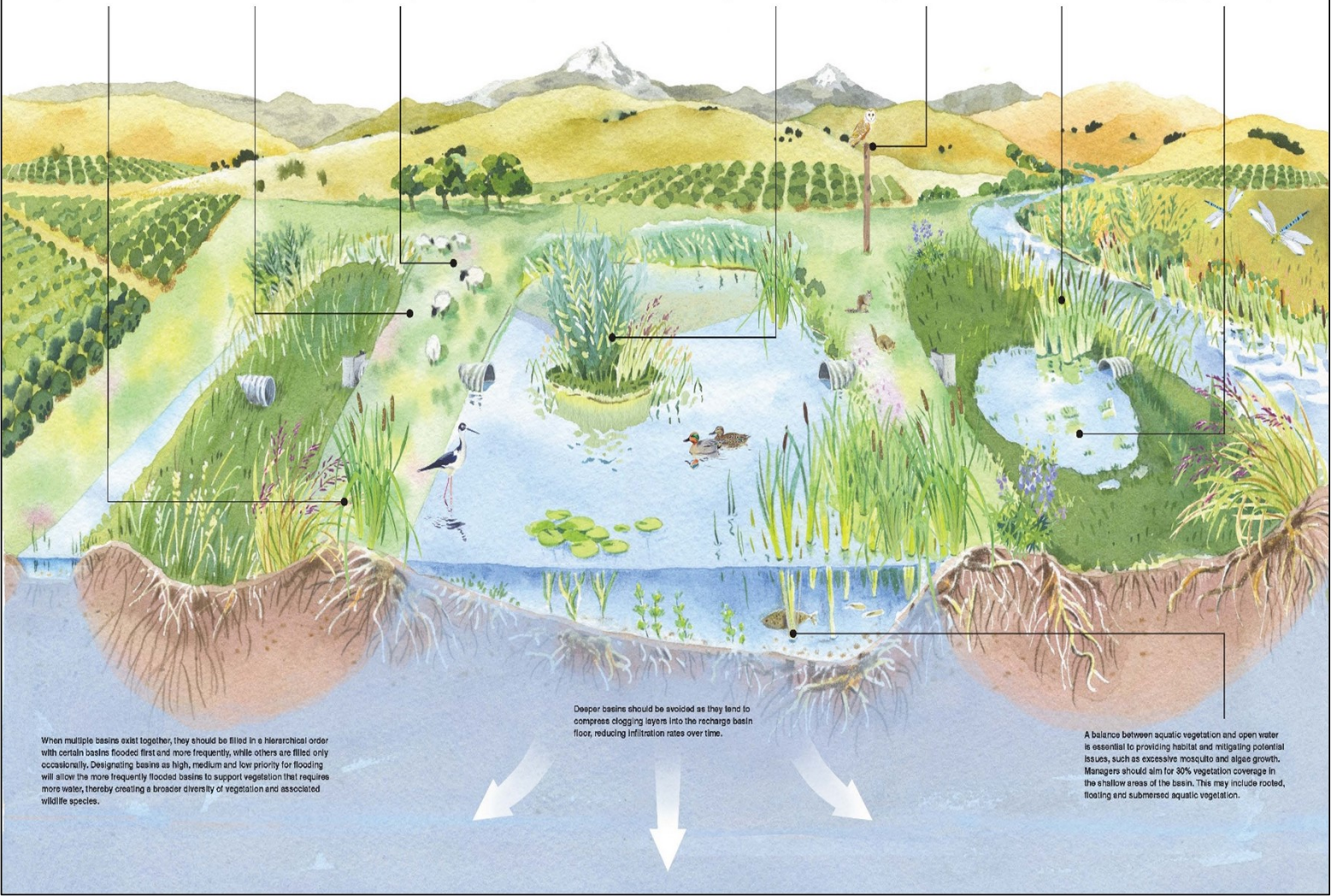
Frequent heavy disking and mowing is not recommended for vegetation removal as heavy equipment can result in soil compaction and reduced infiltration rates. However, these methods may be needed periodically to control overgrowth of cattails or tule.

Over time, sediment can build up, resulting in clogged soil pores and decreased infiltration rates. Excess sediment can be removed using a grader and then added to islands within the recharge basins, providing resting habitat for waterbirds.

Burrowing rodents can cause structural damage to earthen berms. Because rodenticides can be harmful to wildlife, we suggest alternative methods for rodent control, including trapping and/or installing owl boxes and perching structures for hawks to encourage predation.

When possible, use surface water from natural waterways to supply recharge basins. This will expedite the introduction of vegetation and invertebrates, which can act to jump-start habit creation.

Establishing a vegetated forebay at the basin inflow can help filter water and reduce sediment transport and clogging throughout the basin system.



When multiple basins exist together, they should be filled in a hierarchical order with certain basins flooded first and more frequently, while others are filled only occasionally. Designating basins as high, medium and low priority for flooding will allow the more frequently flooded basins to support vegetation that requires more water, thereby creating a broader diversity of vegetation and associated wildlife species.

Deeper basins should be avoided as they tend to compress clogging layers into the recharge basin floor, reducing infiltration rates over time.

A balance between aquatic vegetation and open water is essential to providing habitat and mitigating potential issues, such as excessive mosquito and algae growth. Managers should aim for 30% vegetation coverage in the shallow areas of the basin. This may include rooted, floating and submersed aquatic vegetation.

Appendix L – US Drought Monitor Data Kern County (2018-2022)

Data Tables | U.S. Drought Monitor

Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4	DSCI
2022-11-22	0.00	100.00	100.00	100.00	95.78	78.01	474
2022-11-15	0.00	100.00	100.00	100.00	95.78	78.01	474
2022-11-08	0.00	100.00	100.00	100.00	95.78	82.47	478
2022-11-01	0.00	100.00	100.00	100.00	95.78	82.47	478
2022-10-25	0.00	100.00	100.00	100.00	95.78	82.47	478
2022-10-18	0.00	100.00	100.00	100.00	95.78	82.47	478
2022-10-11	0.00	100.00	100.00	100.00	95.78	82.47	478
2022-10-04	0.00	100.00	100.00	100.00	95.78	82.47	478
2022-09-27	0.00	100.00	100.00	100.00	95.78	82.47	478
2022-09-20	0.00	100.00	100.00	100.00	95.78	82.47	478
2022-09-13	0.00	100.00	100.00	100.00	95.78	82.47	478
2022-09-06	0.00	100.00	100.00	100.00	95.78	82.47	478
2022-08-30	0.00	100.00	100.00	100.00	95.78	82.47	478
2022-08-23	0.00	100.00	100.00	100.00	95.78	82.47	478
2022-08-16	0.00	100.00	100.00	100.00	95.78	82.47	478
2022-08-09	0.00	100.00	100.00	100.00	95.78	82.47	478
2022-08-02	0.00	100.00	100.00	100.00	100.00	69.57	470
2022-07-26	0.00	100.00	100.00	100.00	100.00	69.57	470
2022-07-19	0.00	100.00	100.00	100.00	100.00	69.57	470
2022-07-12	0.00	100.00	100.00	100.00	100.00	69.57	470
2022-07-05	0.00	100.00	100.00	100.00	100.00	68.74	469
2022-06-28	0.00	100.00	100.00	100.00	100.00	68.74	469
2022-06-21	0.00	100.00	100.00	100.00	100.00	68.74	469
2022-06-14	0.00	100.00	100.00	100.00	100.00	68.74	469
2022-06-07	0.00	100.00	100.00	100.00	100.00	68.74	469
2022-05-31	0.00	100.00	100.00	100.00	100.00	68.74	469
2022-05-24	0.00	100.00	100.00	100.00	100.00	68.74	469
2022-05-17	0.00	100.00	100.00	100.00	100.00	0.00	400
2022-05-10	0.00	100.00	100.00	100.00	100.00	0.00	400
2022-05-03	0.00	100.00	100.00	100.00	89.21	0.00	389
2022-04-26	0.00	100.00	100.00	100.00	89.21	0.00	389
2022-04-19	0.00	100.00	100.00	100.00	89.21	0.00	389
2022-04-12	0.00	100.00	100.00	100.00	89.21	0.00	389
2022-04-05	0.00	100.00	100.00	100.00	89.21	0.00	389
2022-03-29	0.00	100.00	100.00	100.00	89.21	0.00	389
2022-03-22	0.00	100.00	100.00	100.00	89.21	0.00	389
2022-03-15	0.00	100.00	100.00	100.00	89.21	0.00	389
2022-03-08	0.00	100.00	100.00	100.00	0.00	0.00	300
2022-03-01	0.00	100.00	100.00	100.00	0.00	0.00	300
2022-02-22	0.00	100.00	100.00	89.31	0.00	0.00	289
2022-02-15	0.00	100.00	100.00	89.31	0.00	0.00	289
2022-02-08	0.00	100.00	100.00	89.12	0.00	0.00	289
2022-02-01	0.00	100.00	100.00	89.31	0.00	0.00	289
2022-01-25	0.00	100.00	100.00	89.31	0.00	0.00	289

Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4	DSCI
2022-01-18	0.00	100.00	100.00	89.31	0.00	0.00	289
2022-01-11	0.00	100.00	100.00	89.31	0.00	0.00	289
2022-01-04	0.00	100.00	100.00	89.34	0.00	0.00	289
2021-12-28	0.00	100.00	100.00	100.00	89.34	0.00	389
2021-12-21	0.00	100.00	100.00	100.00	100.00	89.41	489
2021-12-14	0.00	100.00	100.00	100.00	100.00	89.41	489
2021-12-07	0.00	100.00	100.00	100.00	100.00	89.41	489
2021-11-30	0.00	100.00	100.00	100.00	100.00	89.41	489
2021-11-23	0.00	100.00	100.00	100.00	100.00	89.41	489
2021-11-16	0.00	100.00	100.00	100.00	100.00	89.41	489
2021-11-09	0.00	100.00	100.00	100.00	100.00	89.41	489
2021-11-02	0.00	100.00	100.00	100.00	100.00	89.41	489
2021-10-26	0.00	100.00	100.00	100.00	100.00	89.41	489
2021-10-19	0.00	100.00	100.00	100.00	100.00	89.41	489
2021-10-12	0.00	100.00	100.00	100.00	100.00	89.41	489
2021-10-05	0.00	100.00	100.00	100.00	100.00	89.41	489
2021-09-28	0.00	100.00	100.00	100.00	100.00	89.41	489
2021-09-21	0.00	100.00	100.00	100.00	100.00	89.41	489
2021-09-14	0.00	100.00	100.00	100.00	100.00	89.41	489
2021-09-07	0.00	100.00	100.00	100.00	100.00	89.41	489
2021-08-31	0.00	100.00	100.00	100.00	100.00	89.41	489
2021-08-24	0.00	100.00	100.00	100.00	100.00	89.41	489
2021-08-17	0.00	100.00	100.00	100.00	100.00	89.41	489
2021-08-10	0.00	100.00	100.00	100.00	100.00	89.41	489
2021-08-03	0.00	100.00	100.00	100.00	100.00	89.41	489
2021-07-27	0.00	100.00	100.00	100.00	100.00	89.41	489
2021-07-20	0.00	100.00	100.00	100.00	100.00	89.54	490
2021-07-13	0.00	100.00	100.00	100.00	100.00	89.54	490
2021-07-06	0.00	100.00	100.00	100.00	100.00	89.54	490
2021-06-29	0.00	100.00	100.00	100.00	100.00	89.54	490
2021-06-22	0.00	100.00	100.00	100.00	100.00	89.54	490
2021-06-15	0.00	100.00	100.00	100.00	100.00	89.54	490
2021-06-08	0.00	100.00	100.00	100.00	100.00	89.54	490
2021-06-01	0.00	100.00	100.00	100.00	100.00	30.09	430
2021-05-25	0.00	100.00	100.00	100.00	100.00	30.09	430
2021-05-18	0.00	100.00	100.00	100.00	100.00	30.09	430
2021-05-11	0.00	100.00	100.00	100.00	100.00	30.09	430
2021-05-04	0.00	100.00	100.00	100.00	100.00	0.00	400
2021-04-27	0.00	100.00	100.00	100.00	75.22	0.00	375
2021-04-20	0.00	100.00	100.00	100.00	75.22	0.00	375
2021-04-13	0.00	100.00	100.00	91.00	40.94	0.00	332
2021-04-06	0.00	100.00	99.69	91.00	40.94	0.00	332
2021-03-30	0.00	100.00	99.69	83.59	16.94	0.00	300
2021-03-23	0.00	100.00	99.69	83.59	16.94	0.00	300
2021-03-16	0.00	100.00	99.73	47.30	6.12	0.00	253
2021-03-09	0.00	100.00	99.85	47.30	6.12	0.00	253
2021-03-02	0.00	100.00	99.85	47.30	6.12	0.00	253

Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4	DSCI
2021-02-23	0.00	100.00	99.25	47.30	6.12	0.00	253
2021-02-16	0.00	100.00	99.25	47.30	5.91	0.00	252
2021-02-09	0.00	100.00	99.25	47.30	5.91	0.00	252
2021-02-02	0.00	100.00	99.25	47.30	5.91	0.00	252
2021-01-26	0.00	100.00	100.00	62.98	6.44	0.00	269
2021-01-19	0.00	100.00	100.00	62.98	6.44	0.00	269
2021-01-12	0.00	100.00	100.00	63.30	6.44	0.00	270
2021-01-05	0.00	100.00	100.00	20.59	0.01	0.00	221
2020-12-29	0.00	100.00	100.00	20.59	0.01	0.00	221
2020-12-22	0.00	100.00	100.00	20.59	0.01	0.00	221
2020-12-15	0.00	100.00	100.00	20.59	0.01	0.00	221
2020-12-08	0.00	100.00	100.00	0.59	0.00	0.00	201
2020-12-01	0.00	100.00	5.06	0.00	0.00	0.00	105
2020-11-24	0.00	100.00	5.06	0.00	0.00	0.00	105
2020-11-17	59.16	40.84	0.35	0.00	0.00	0.00	41
2020-11-10	58.64	41.36	0.35	0.00	0.00	0.00	42
2020-11-03	58.64	41.36	0.00	0.00	0.00	0.00	41
2020-10-27	58.46	41.54	0.00	0.00	0.00	0.00	42
2020-10-20	58.46	41.54	0.00	0.00	0.00	0.00	42
2020-10-13	58.46	41.54	0.00	0.00	0.00	0.00	42
2020-10-06	58.46	41.54	0.00	0.00	0.00	0.00	42
2020-09-29	58.27	41.73	0.00	0.00	0.00	0.00	42
2020-09-22	59.53	40.47	0.00	0.00	0.00	0.00	40
2020-09-15	59.53	40.47	0.00	0.00	0.00	0.00	40
2020-09-08	99.83	0.17	0.00	0.00	0.00	0.00	0
2020-09-01	99.79	0.21	0.00	0.00	0.00	0.00	0
2020-08-25	99.84	0.16	0.00	0.00	0.00	0.00	0
2020-08-18	99.84	0.16	0.00	0.00	0.00	0.00	0
2020-08-11	100.00	0.00	0.00	0.00	0.00	0.00	0
2020-08-04	100.00	0.00	0.00	0.00	0.00	0.00	0
2020-07-28	100.00	0.00	0.00	0.00	0.00	0.00	0
2020-07-21	100.00	0.00	0.00	0.00	0.00	0.00	0
2020-07-14	100.00	0.00	0.00	0.00	0.00	0.00	0
2020-07-07	100.00	0.00	0.00	0.00	0.00	0.00	0
2020-06-30	100.00	0.00	0.00	0.00	0.00	0.00	0
2020-06-23	100.00	0.00	0.00	0.00	0.00	0.00	0
2020-06-16	100.00	0.00	0.00	0.00	0.00	0.00	0
2020-06-09	100.00	0.00	0.00	0.00	0.00	0.00	0
2020-06-02	100.00	0.00	0.00	0.00	0.00	0.00	0
2020-05-26	100.00	0.00	0.00	0.00	0.00	0.00	0
2020-05-19	100.00	0.00	0.00	0.00	0.00	0.00	0
2020-05-12	100.00	0.00	0.00	0.00	0.00	0.00	0
2020-05-05	100.00	0.00	0.00	0.00	0.00	0.00	0
2020-04-28	100.00	0.00	0.00	0.00	0.00	0.00	0
2020-04-21	100.00	0.00	0.00	0.00	0.00	0.00	0
2020-04-14	100.00	0.00	0.00	0.00	0.00	0.00	0
2020-04-07	13.49	86.51	63.96	0.00	0.00	0.00	150

Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4	DSCI
2020-03-31	10.63	89.37	63.96	0.00	0.00	0.00	153
2020-03-24	10.63	89.37	63.96	0.00	0.00	0.00	153
2020-03-17	10.63	89.37	72.92	0.00	0.00	0.00	162
2020-03-10	6.14	93.86	72.92	0.00	0.00	0.00	167
2020-03-03	20.13	79.87	57.63	0.00	0.00	0.00	138
2020-02-25	20.13	79.87	15.28	0.00	0.00	0.00	95
2020-02-18	20.13	79.87	15.28	0.00	0.00	0.00	95
2020-02-11	20.13	79.87	15.28	0.00	0.00	0.00	95
2020-02-04	38.72	61.28	0.00	0.00	0.00	0.00	61
2020-01-28	38.72	61.28	0.00	0.00	0.00	0.00	61
2020-01-21	100.00	0.00	0.00	0.00	0.00	0.00	0
2020-01-14	100.00	0.00	0.00	0.00	0.00	0.00	0
2020-01-07	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-12-31	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-12-24	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-12-17	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-12-10	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-12-03	0.00	100.00	0.00	0.00	0.00	0.00	100
2019-11-26	0.00	100.00	0.00	0.00	0.00	0.00	100
2019-11-19	0.00	100.00	0.00	0.00	0.00	0.00	100
2019-11-12	0.00	100.00	0.00	0.00	0.00	0.00	100
2019-11-05	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-10-29	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-10-22	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-10-15	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-10-08	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-10-01	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-09-24	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-09-17	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-09-10	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-09-03	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-08-27	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-08-20	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-08-13	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-08-06	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-07-30	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-07-23	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-07-16	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-07-09	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-07-02	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-06-25	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-06-18	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-06-11	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-06-04	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-05-28	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-05-21	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-05-14	100.00	0.00	0.00	0.00	0.00	0.00	0

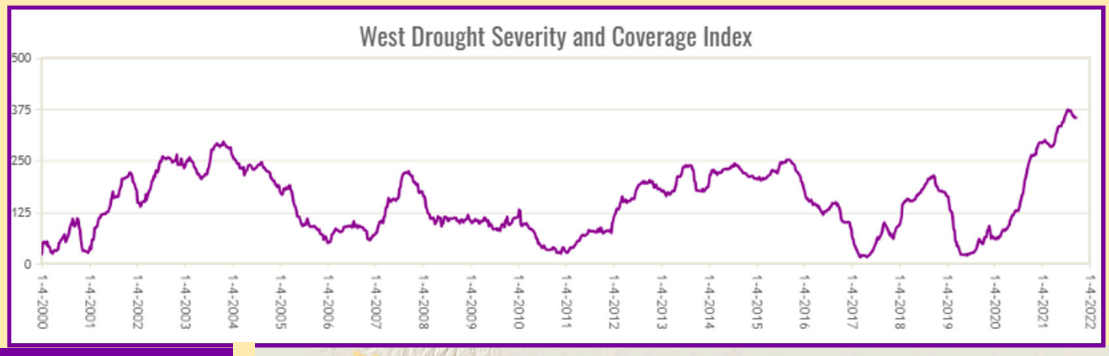
Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4	DSCI
2019-05-07	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-04-30	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-04-23	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-04-16	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-04-09	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-04-02	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-03-26	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-03-19	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-03-12	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-03-05	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-02-26	100.00	0.00	0.00	0.00	0.00	0.00	0
2019-02-19	38.99	61.01	0.00	0.00	0.00	0.00	61
2019-02-12	15.61	84.39	0.00	0.00	0.00	0.00	84
2019-02-05	15.61	84.39	0.00	0.00	0.00	0.00	84
2019-01-29	15.61	84.39	2.37	0.00	0.00	0.00	87
2019-01-22	0.00	100.00	84.21	0.00	0.00	0.00	184
2019-01-15	0.00	100.00	84.21	0.00	0.00	0.00	184
2019-01-08	0.00	100.00	84.21	0.00	0.00	0.00	184
2019-01-01	0.00	100.00	84.21	0.00	0.00	0.00	184
2018-12-25	0.00	100.00	84.21	0.00	0.00	0.00	184
2018-12-18	0.00	100.00	84.21	0.00	0.00	0.00	184
2018-12-11	0.00	100.00	84.21	0.00	0.00	0.00	184
2018-12-04	0.00	100.00	84.21	0.00	0.00	0.00	184
2018-11-27	0.00	100.00	84.21	0.00	0.00	0.00	184
2018-11-20	0.00	100.00	84.12	0.00	0.00	0.00	184
2018-11-13	0.00	100.00	84.12	0.00	0.00	0.00	184
2018-11-06	0.00	100.00	84.12	0.00	0.00	0.00	184
2018-10-30	0.00	100.00	84.12	0.00	0.00	0.00	184
2018-10-23	0.00	100.00	84.12	0.00	0.00	0.00	184
2018-10-16	0.00	100.00	84.12	0.00	0.00	0.00	184
2018-10-09	0.00	100.00	84.12	0.00	0.00	0.00	184
2018-10-02	0.00	100.00	84.12	0.00	0.00	0.00	184
2018-09-25	0.00	100.00	84.12	0.00	0.00	0.00	184
2018-09-18	0.00	100.00	84.12	0.00	0.00	0.00	184
2018-09-11	0.00	100.00	84.12	0.00	0.00	0.00	184
2018-09-04	0.00	100.00	84.12	0.00	0.00	0.00	184
2018-08-28	0.00	100.00	84.12	0.00	0.00	0.00	184
2018-08-21	0.00	100.00	84.12	0.00	0.00	0.00	184
2018-08-14	0.00	100.00	84.12	0.00	0.00	0.00	184
2018-08-07	0.00	100.00	84.12	0.00	0.00	0.00	184
2018-07-31	0.00	100.00	84.12	0.00	0.00	0.00	184
2018-07-24	0.00	100.00	84.09	0.00	0.00	0.00	184
2018-07-17	0.00	100.00	83.95	0.00	0.00	0.00	184
2018-07-10	0.00	100.00	83.83	0.00	0.00	0.00	184
2018-07-03	0.00	100.00	84.05	0.00	0.00	0.00	184
2018-06-26	0.00	100.00	84.05	0.00	0.00	0.00	184
2018-06-19	0.00	100.00	84.05	0.00	0.00	0.00	184

Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4	DSCI
2018-06-12	0.00	100.00	84.05	0.00	0.00	0.00	184
2018-06-05	0.00	100.00	84.17	0.00	0.00	0.00	184
2018-05-29	0.00	100.00	84.17	0.00	0.00	0.00	184
2018-05-22	0.00	100.00	84.17	0.00	0.00	0.00	184
2018-05-15	0.00	100.00	84.53	0.00	0.00	0.00	185
2018-05-08	0.00	100.00	84.27	0.00	0.00	0.00	184
2018-05-01	0.00	100.00	84.27	0.00	0.00	0.00	184
2018-04-24	0.00	100.00	84.27	0.00	0.00	0.00	184
2018-04-17	0.00	100.00	84.27	0.00	0.00	0.00	184
2018-04-10	0.00	100.00	84.27	0.00	0.00	0.00	184
2018-04-03	0.00	100.00	91.54	0.00	0.00	0.00	192
2018-03-27	0.00	100.00	91.19	0.00	0.00	0.00	191
2018-03-20	0.00	100.00	99.99	83.59	0.00	0.00	284
2018-03-13	0.00	100.00	99.99	83.59	0.00	0.00	284
2018-03-06	0.00	100.00	99.99	83.59	0.00	0.00	284
2018-02-27	0.00	100.00	99.99	83.59	0.00	0.00	284
2018-02-20	0.00	100.00	99.99	83.59	0.00	0.00	284
2018-02-13	0.00	100.00	99.99	83.59	0.00	0.00	284
2018-02-06	0.00	100.00	99.97	2.30	0.00	0.00	202
2018-01-30	0.00	100.00	99.86	1.00	0.00	0.00	201
2018-01-23	0.00	100.00	3.50	0.00	0.00	0.00	104
2018-01-16	21.74	78.26	3.50	0.00	0.00	0.00	82
2018-01-09	21.81	78.19	3.50	0.00	0.00	0.00	82
2018-01-02	21.81	78.19	3.50	0.00	0.00	0.00	82
2017-12-26	21.81	78.19	3.50	0.00	0.00	0.00	82
2017-12-19	21.81	78.19	3.50	0.00	0.00	0.00	82
2017-12-12	21.81	78.19	3.50	0.00	0.00	0.00	82
2017-12-05	27.40	72.60	3.50	0.00	0.00	0.00	76
2017-11-28	36.85	63.15	3.50	0.00	0.00	0.00	67
2017-11-21	59.45	40.55	3.50	0.00	0.00	0.00	44
2017-11-14	59.45	40.55	3.50	0.00	0.00	0.00	44
2017-11-07	61.44	38.56	3.50	0.00	0.00	0.00	42
2017-10-31	61.44	38.56	3.50	0.00	0.00	0.00	42
2017-10-24	61.44	38.56	3.50	0.00	0.00	0.00	42
2017-10-17	61.27	38.73	3.50	0.00	0.00	0.00	42
2017-10-10	61.27	38.73	3.50	0.00	0.00	0.00	42
2017-10-03	61.27	38.73	3.50	0.00	0.00	0.00	42
2017-09-26	61.27	38.73	3.50	0.00	0.00	0.00	42
2017-09-19	61.27	38.73	3.50	0.00	0.00	0.00	42
2017-09-12	61.27	38.73	3.50	0.00	0.00	0.00	42
2017-09-05	61.27	38.73	3.50	0.00	0.00	0.00	42
2017-08-29	61.27	38.73	3.50	0.00	0.00	0.00	42
2017-08-22	61.27	38.73	3.50	0.00	0.00	0.00	42
2017-08-15	61.27	38.73	3.50	0.00	0.00	0.00	42
2017-08-08	61.27	38.73	3.50	0.00	0.00	0.00	42
2017-08-01	61.27	38.73	3.50	0.00	0.00	0.00	42
2017-07-25	61.27	38.73	3.50	0.00	0.00	0.00	42

Q How can I summarize the U.S. Drought Monitor over time, with one number?

A Use the Drought Severity and Coverage Index

The U.S. Drought Monitor (USDM) is a snapshot of where drought is occurring across the country in a given week. Meaningfully condensing many weekly maps into one map showing drought over time results in interesting, complex maps such as the one below. Likewise, a statistical summary retains as much nuance as possible. We don't just average a single level of drought. Instead, to simplify the USDM for an area like a state or a county to one number, we use a weighted sum to condense five area statistics into one, and then add or average them over time. The Drought Severity and Coverage Index (DSCI) summarizes U.S. Drought Monitor status each week on a scale from zero to 500, and can be computed for any area.

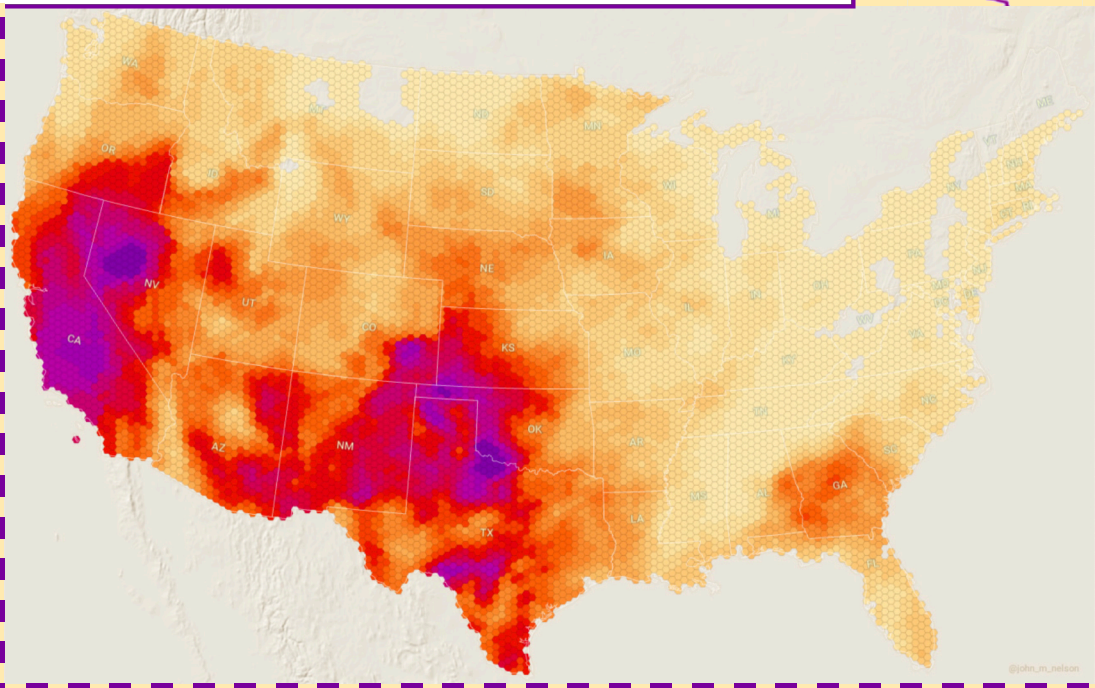


Five+ Years of Drought:

An extended look at drought intensity and duration in the contiguous United States

Based on U.S. Drought Monitor data for 2011–2016

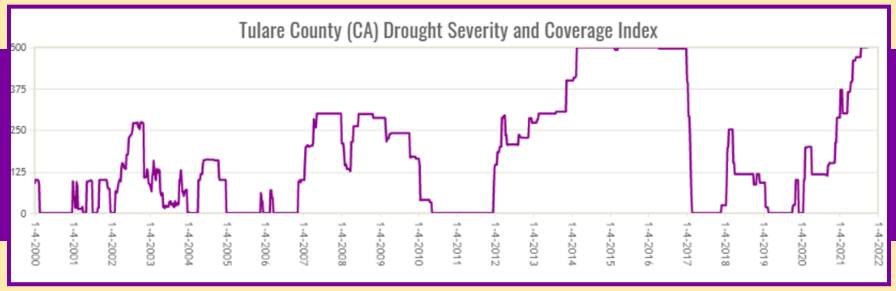
Courtesy of John M. Nelson



The U.S. Drought Monitor is jointly produced by the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration.

1/2022

USDM statistics: The way the USDM works, each week, each part of the country is classified as being in one of six levels of drought: none, abnormally dry (D0), moderate (D1), severe (D2), extreme (D3), and exceptional (D4). Statistics computed each week alongside the map describe what proportion of an area is in what level of dryness or drought, so there are six percentages to describe an area in a single week. We use the five levels from D0 to D4 to compute the DSCI. These stats are computed for the entire area of the United States, with and without non-contiguous states and islands, and for individual states, counties, tribal areas, river basins and other geopolitical and natural boundaries (droughtmonitor.unl.edu/DmData/DataTables.aspx > Area type).



Computing DSCI: The Drought Severity and Coverage Index (DSCI) is a weighted sum of the proportion of each area in each level of drought, summarizing the extent and severity of drought with a single number each week on a scale from 0 (no drought) to 500 (all of the area in the worst category of drought). You can compute it two different ways:

Using cumulative Drought Monitor data, add the percentages for D0 through D4 for a given week to get the Drought Severity and Coverage Index for that week.

$$D0 + D1 + D2 + D3 + D4 = DSCI$$

Or, use categorical (not cumulative) Drought Monitor data, and compute a weighted sum of the percentages for D0 through D4:

$$1(D0) + 2(D1) + 3(D2) + 4(D3) + 5(D4) = DSCI$$

Caution: Note that because drought has a large footprint, smaller areas have more all (500) and none (0) DSCI values. It doesn't necessarily mean that drought is more extreme there. It actually means that a more locally specific description is possible when computing statistics for a smaller area. For example, the Western U.S. is a very large region, and as of 2021, the lowest DSCI for the West in more than 20 years of USDM data was 16, in 2017, when just under 3% of the area was in moderate drought or worse. Its highest DSCI was 374, in July 2021, when 95% of the region was in some degree of drought and 28% was in exceptional drought. In contrast, Tulare County, California, which is part of the western region, has had many weeks with DSCI of zero, and many weeks with DSCI of 500.

DSCI over time: Best practices for using DSCI over time are still evolving and depend on the intended use. The most obvious choices are to average or sum it.

Averaging DSCI: The advantage of averaging the DSCI is that the same 0–500 scale applies, so users would not have to learn a new scale, and less qualifying detail is needed for context. For example, a state climatologist might find it useful to compare the average DSCI for their state from month to month as part of a regular report.

Summing DSCI: Summing the DSCI may be more useful for comparing different droughts. If for example two areas experienced droughts of comparable duration, but one had a higher total DSCI than the other, we could conclude that the one with the higher DSCI experienced a more intense or more widespread drought. Summing the DSCI could also be part of a comparison of two droughts from the same area.

For more information on DSCI:

droughtmonitor.unl.edu/About/AbouttheData/DSCI.aspx

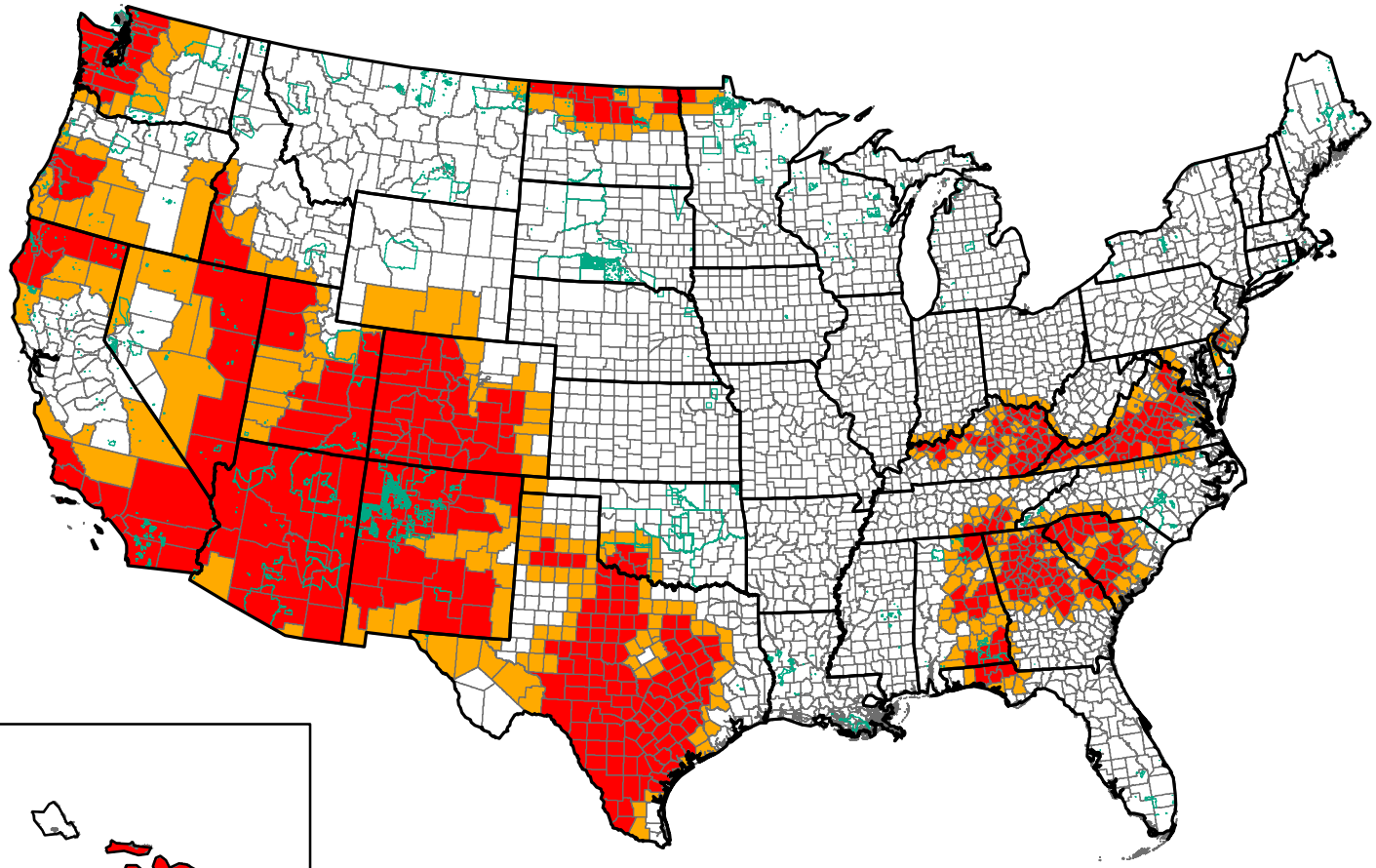
Credit

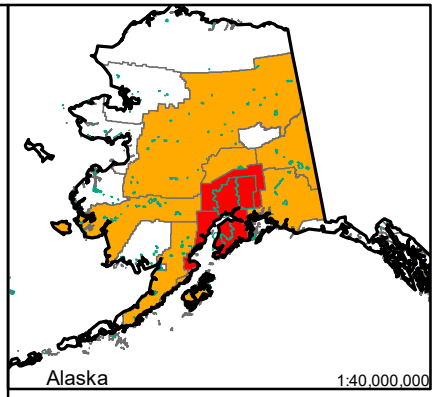
The idea for the Drought Severity and Coverage Index is courtesy of Adnan Akyuz, North Dakota State University. Suggested citation:

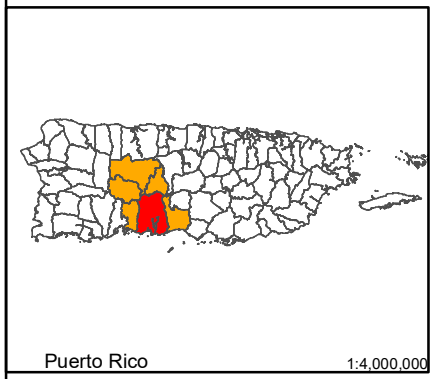
Akyuz, F. A. 2017. Drought Severity and Coverage Index. United States Drought Monitor. droughtmonitor.unl.edu/About/AbouttheData/DSCI.aspx

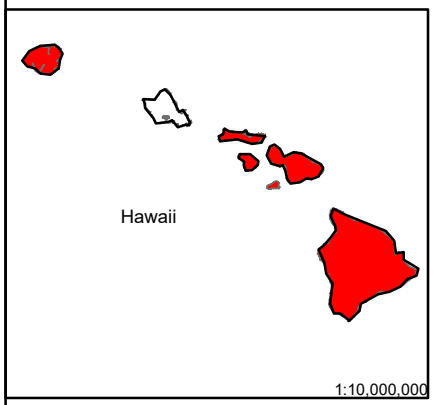
Appendix M – USDA Secretarial Drought Designation Maps (2019-2023)

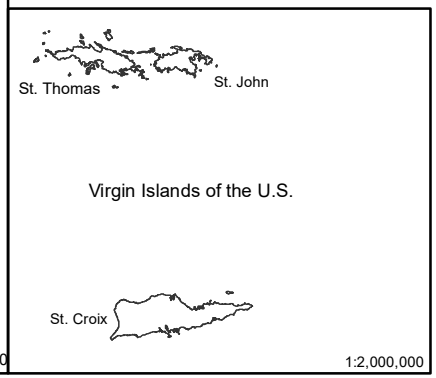
2019 Secretarial Drought Designations - All Drought











Secretarial Drought Designations for 2019

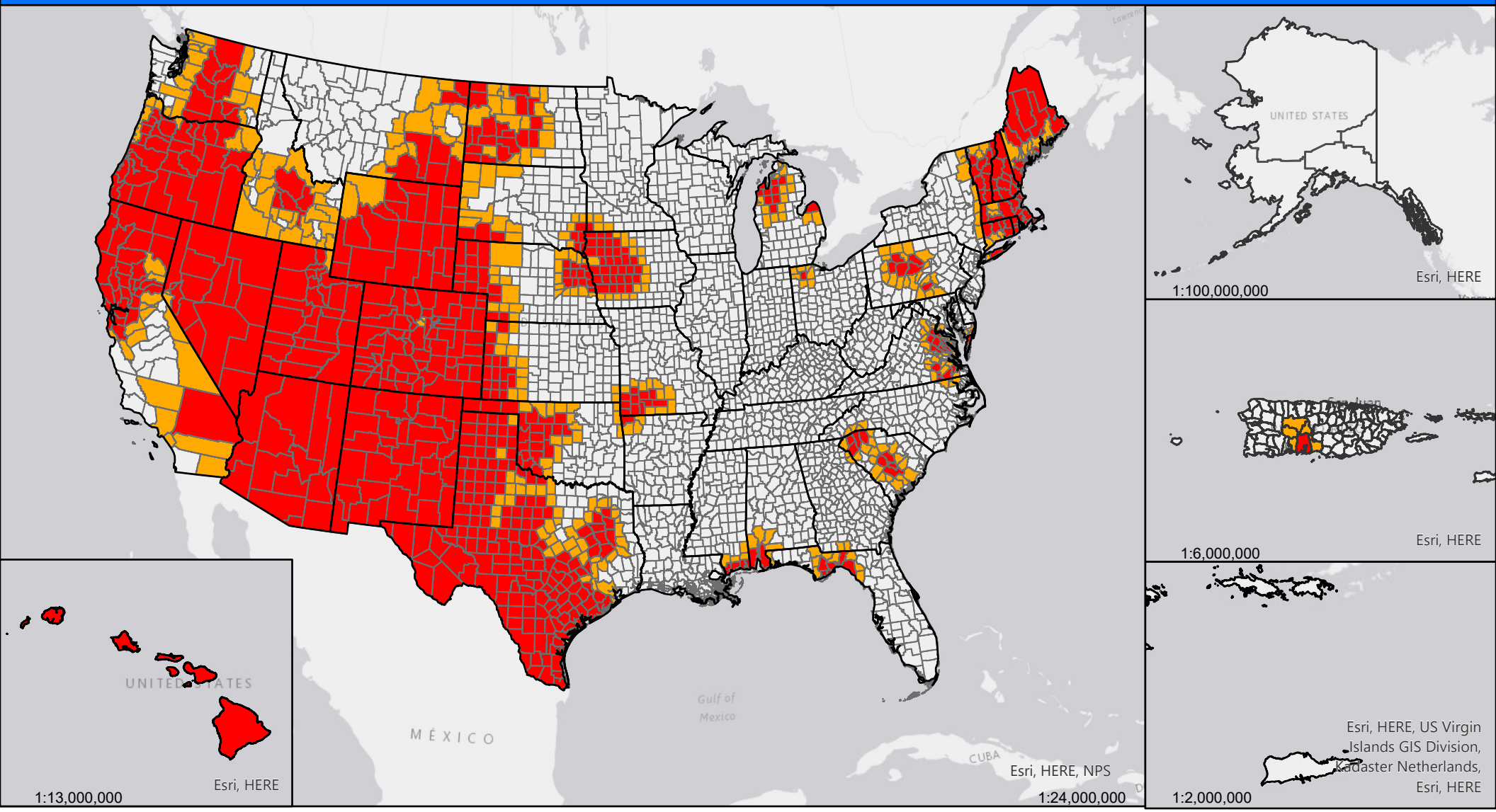
Disaster Incidents as of July 22, 2020

- State Boundary
- County Boundary
- Tribal Lands
- Primary Counties: 472
- Contiguous Counties: 428

1:25,000,000

United States Department of Agriculture
Farm Service Agency
Production, Emergencies and Compliance Division
Washington, D.C.
July 22, 2020

2020 Secretarial Drought Designations - All Drought



Secretarial Drought Designations for 2020

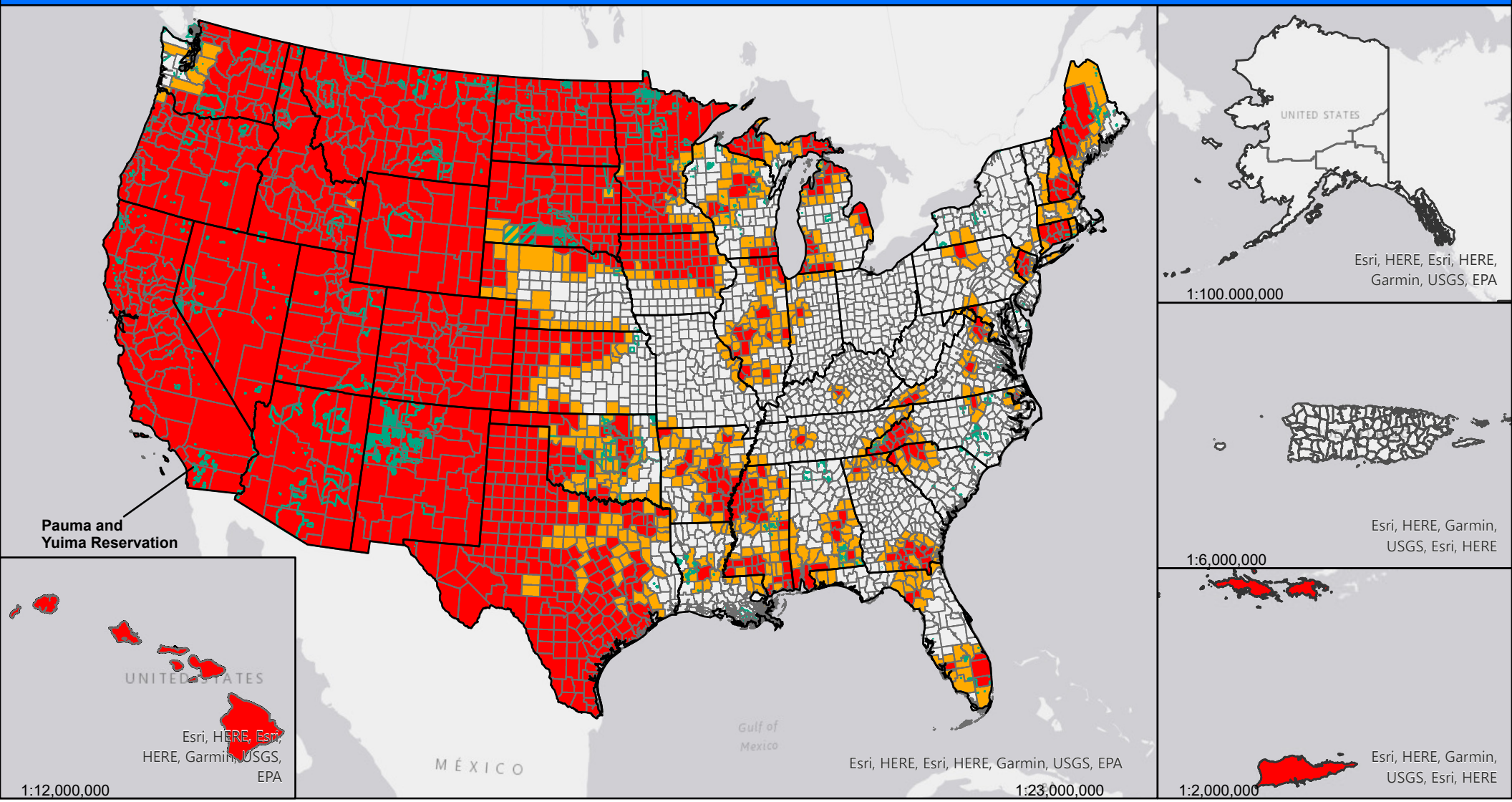
Disaster Incidences as of April 28, 2021

Primary Counties: 669
Contiguous Counties: 381

United States Department of Agriculture
Farm Service Agency
Program Delivery/Safety Net Division
April 28, 2021

Secretarial Disaster Designations - CY 2021

Primary and Contiguous Counties Designated for Crop Disaster Losses



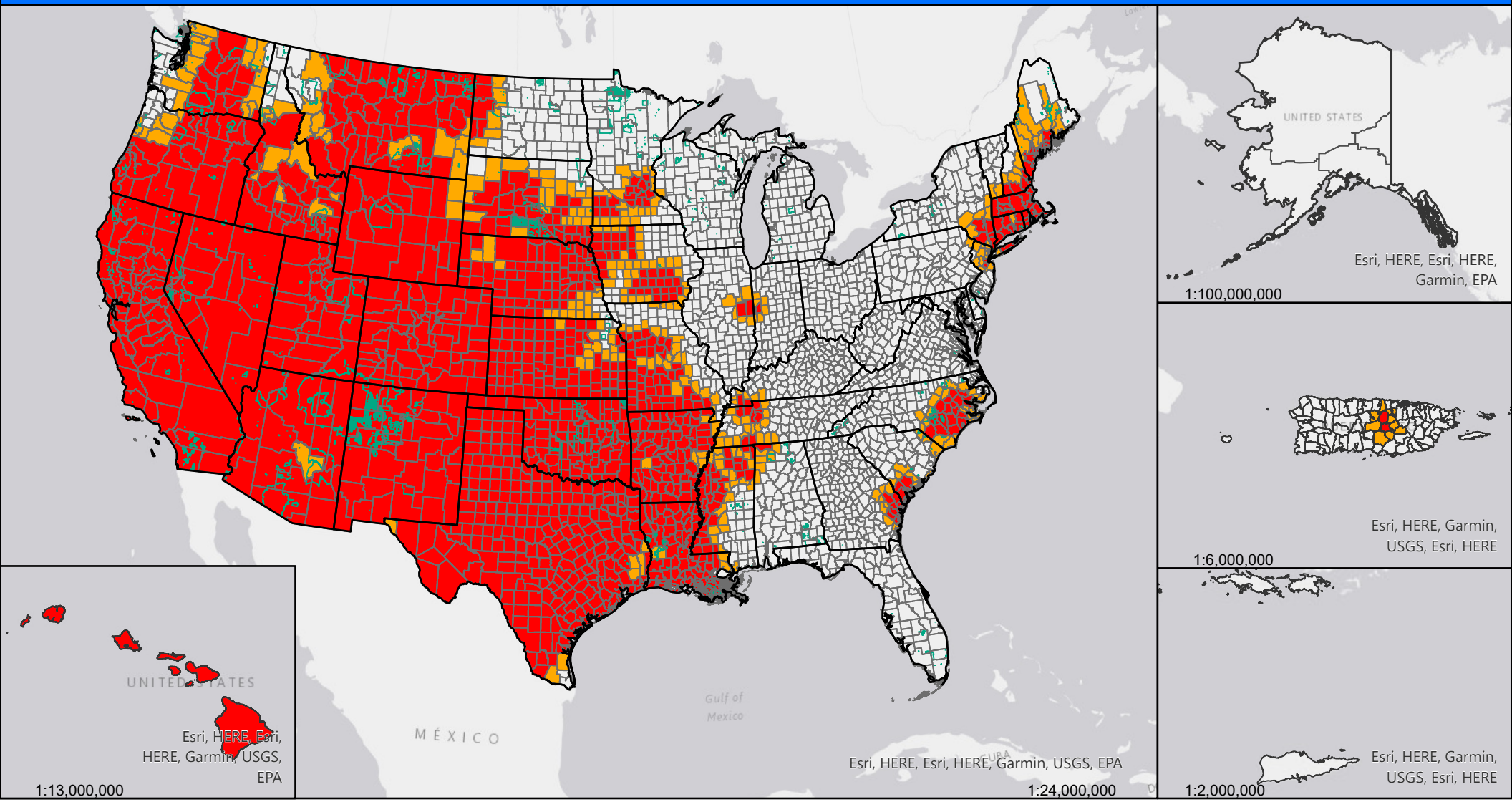
All Secretarial Designations as of May 25, 2022

Total All Crop Approval Designations

- State Boundary
- County Boundary
- Tribal Lands
- Secretarial_Tribal_Areas: 2
- Primary Counties: 1,095
- Contiguous Counties: 588

United States Department of Agriculture
Farm Service Agency
Program Delivery/Safety Net Division
May 25, 2022

2022 Secretarial Drought Designations - All Drought



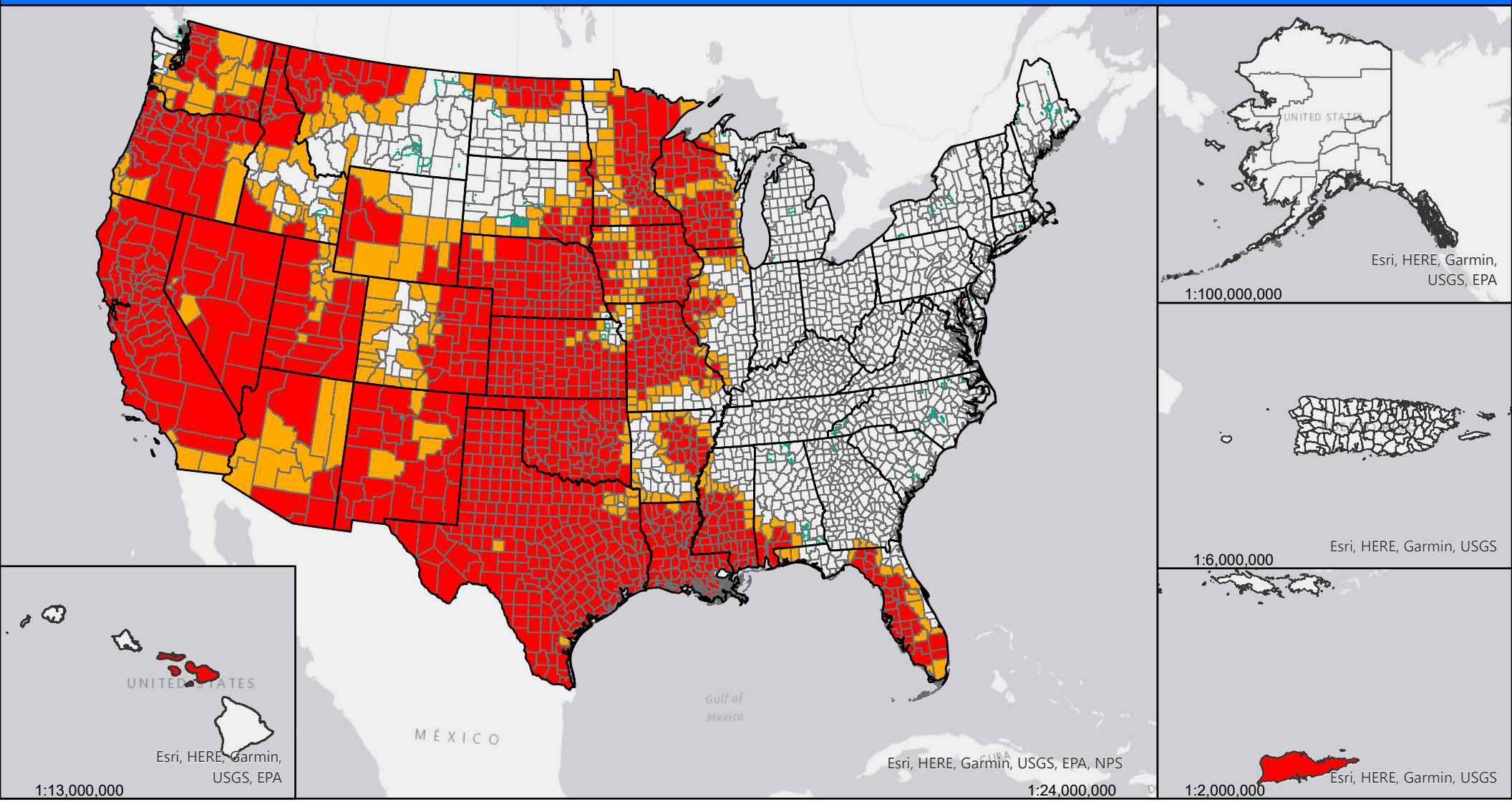
Secretarial Drought Designations for 2022

Disaster Incidences as of October 26, 2022

- State Boundary
- County Boundary
- Tribal Lands
- Primary Counties: 1,216
- Contiguous Counties: 338

United States Department of Agriculture
Farm Service Agency
Program Delivery/Safety Net Division
October 26, 2022

2023 Secretarial Drought Designations - All Drought



Secretarial Drought Designations for 2023

Disaster Incidences as of October 4, 2023

- State Boundary
- County Boundary
- Tribal Lands
- Primary Counties: 1,156
- Contiguous Counties: 373

United States Department of Agriculture
Farm Service Agency
Program Delivery/Safety Net Division
October 4, 2023

DISASTER ASSISTANCE

Emergency Disaster Designation and Declaration Process

Overview

Agriculture-related disasters and disaster designations are quite common. Many counties in the United States have been designated as disaster areas in the past several years, even in years of record crop production.

The Secretary of Agriculture is authorized to designate counties as disaster areas to make emergency (EM) loans available to producers suffering losses in those counties and in counties that are contiguous to a designated county. In addition to EM loan eligibility, other emergency assistance programs, such as Farm Service Agency (FSA) disaster assistance programs, have historically used disaster designations as an eligibility trigger.

Types of Disaster Designations

FSA administers four types of disaster designations:

- U.S. Department of Agriculture (USDA) Secretarial disaster designation;
- Presidential major disaster and Presidential emergency declaration;
- FSA Administrator's Physical Loss Notification (APLN); and
- Quarantine designation by the Secretary under the Plant Protection Act or animal quarantine laws.

USDA Secretarial disaster designations must be requested of the Secretary of Agriculture by a governor or the governor's authorized representative, by an Indian Tribal Council leader or by an FSA State Executive Director (SED). The Secretarial disaster designation is the most widely used. There is an expedited process for drought. The general process and the expedited process are described in further detail under "Secretarial Disaster Designation Process."

Presidential major disaster declarations, which must be requested of the President by a governor, are administered through the Federal Emergency Management Agency (FEMA). A Presidential major disaster declaration can be made within days or hours of the initial request. FEMA immediately notifies FSA of the primary counties named in a Presidential declaration.

An FSA APLN is for physical losses only, such as a building destroyed by a tornado. Livestock-related losses are considered physical losses. An APLN is requested of FSA's Administrator by an FSA SED. A quarantine designation is requested of the Secretary of Agriculture by an FSA SED. A quarantine designation authorizes EM loans for production and physical losses resulting from quarantine.

What Does a Disaster Designation Specify?

A disaster designation specifies:

- The disaster that resulted in the designation;
- The incident period (dates) of that disaster; and
- The specific counties included in the designation.

Secretarial Disaster Designation Process

USDA's Secretarial disaster declaration process is streamlined to reduce paperwork and documentation requirements at the local FSA level, making the process more efficient and timely for agricultural producers. The process includes Fast Track Secretarial disaster designations for severe drought, which provide for a nearly automatic designation when, during the growing season, any portion of a county meets the D2 (Severe Drought) drought intensity value for eight consecutive weeks or a higher drought intensity value for any length of time as reported in the U.S. Drought Monitor (**http://droughtmonitor.unl.edu**.)

For all other natural disaster occurrences, including drought conditions that do not trigger a Fast Track designation, the county must have a 30 percent production loss of at least one crop or a determination must be made by surveying producers that other lending institutions will not be able to provide emergency financing. The process for those Secretarial disaster designations is described below.

Process

STEP 1
The governor, Indian Tribal Council leader or FSA SED makes a request in writing to the Secretary of Agriculture within three months of the ending date of the disaster.

STEP 2
FSA county offices assemble required agricultural loss information for the Loss Assessment Report.

STEP 3
The County Emergency Board reviews the Loss Assessment Report to determine if a 30 percent production loss of at least one crop occurred, and makes a recommendation to approve, defer or reject the request.

STEP 4
The State Emergency Board reviews the request and the County Emergency Board's recommendation. The State Emergency Board's recommendation is submitted to FSA's national headquarters.

STEP 5
FSA national headquarters reviews the loss information on the Loss Assessment Report, determines eligibility and prepares a package, including the letter of approval or disapproval, to be signed by the Secretary.

Eligible Natural Disasters

Eligible natural disasters are disasters in which damaging weather conditions or other adverse natural occurrence phenomena have substantially affected farmers causing severe production losses. Eligible natural disaster conditions include, but are not limited to, drought, flooding, excessive rain and humidity, severe storms, lightning, hail, mudslides and landslides, snow, ice, blizzards, frost, freeze, below-normal temperatures, wind, tornadoes, hurricanes, typhoons, tropical storms, fire, excessive heat, volcanoes, pests and disease.

FSA Programs Initiated by Designations and/or Declarations

All types of designation or declaration (Secretarial disaster designations, Presidential disaster declarations, APLNs and quarantine designations) immediately trigger the availability of low-interest FSA EM loans to eligible producers in all primary and contiguous counties. More information about EM loans is available at **www.fsa.usda.gov/programs-and-services/farm-loan-programs/emergency-farm-loans/index**.
FSA borrowers located in designated disaster areas or contiguous counties, who are unable to make their scheduled payments on any debt, may be authorized to have certain set asides. Under Section 331A of the Consolidated Farm and Rural Development Act, FSA is authorized to consider setting aside certain payments owed by FSA borrowers to allow the operation to continue.

Various other programs may reference designations or declarations as is determined appropriate in program development.

Regulation Governing Disaster Designation Process

The regulation governing disaster designations is at 7 CFR Part 759.

For More Information

This fact sheet is for informational purposes only; other restrictions may apply. For more information about FSA disaster programs, visit **http://disaster.fsa.usda.gov** or contact your local FSA office. To find your local FSA office, visit **http://offices.usda.gov**.

Appendix N – Kern Fan Project Phase 1 Proposed and Capital Budget

Groundwater Banking Joint Power Authority

R24AS00010 Phase 1 - Kern Fan Groundwater Storage Project

			GBJPA Project Costs			Budget				
Item		**Budget Item Description**	**$/Unit**	**Unit**	**QTY**	**GBJPA Funding**	**USBR Agreement No. R23AP00368**	**Reclamation Funding (NOFO R23AS00010)**	**Total**	**Explanation of Estimate**
1		***Contractual / Construction***							**31,687,412**	
	a	Land Acquisition	8,995,398	LS	1	8,995,398			8,995,398	engineers est.
	b	Well Drilling	1,173,973	LS	4	2,817,534	1,878,356		4,695,890	engineers est.
	c	Well Equipping	1,411,968	LS	4	3,388,724	2,259,149		5,647,873	engineers est.
	d	Conveyance	7,323,113	LS	1	3,863,444	530,424	2,929,245	7,323,113	engineers est.
	e	Recharge Ponds	12,706	Ac.	360	3,524,459		1,049,679	4,574,138	engineers est.
	f	SCADA and PLC Programming	451,000	LS	1	451,000			451,000	engineers est.
2		***Environmental and Regulatory Compliance***							**205,000**	
	a	Reclamation NEPA Review (Agreement No.	75,000	LS	1		75,000		75,000	Per Agreement No. R23AP00368
	b	Environmental studies, surveys, groundwater impact analysis, and biological education	130,000	LS	1	130,000			130,000	prior project
		E&R percent of total cost								
3		***Engineering and Administration***							**2,995,000**	
	a	Engineering Design	1,245,000	LS	1	1,245,000			1,245,000	past project
	b	Construction Management & Inspection	1,500,000	LS	1	1,500,000			1,500,000	past project
	c	Communication Design & Equipment	250,000	LS	1	250,000			250,000	past project
4		***Total***							**$ 34,887,412**	
	a	GBJPA Contribution				**$ 26,165,559**				
	b	USBR Agreement No. R23AP00368					**$ 4,742,929.00**			
	c	Reclamation Contribution						**$ 3,978,924**		
	d	Percent Funded by GBJPA							**75%**	

Groundwater Banking Joint Powers Authority

Proposed Capital Budget

Task No.	Task Description	Project Capital Cost	FY2022-23	FY2023-24	FY2024-25	FY2025-26
1	Land Acquistion	$8,995,398.00	$8,995,398.00			
2	Engineering Design and Project Management	$1,245,000.00	$500,000.00	$250,000.00	$250,000.00	$245,000.00
3	Environmental Work	$130,000.00	$30,000.00	$50,000.00	$30,000.00	$20,000.00
4	Construction Management and Inspection	$1,500,000.00		$250,000.00	$1,000,000.00	$250,000.00
5	SCADA Communication Design & Equipment	$250,000.00		$150,000.00	$100,000.00	
6	Bolthouse Property 200 acre Recharge Earthwork	$2,628,050.29		$100,000.00	$2,528,050.29	
7	Bolthouse Property 200 acre Conveyance Facilities	$3,376,862.50		$1,688,431.25	$1,688,431.25	
8	Bolthouse Property 200 acre Well Drilling (Two Wells)	$2,384,814.49		$1,192,407.24	$1,192,407.24	
9	Bolthouse Property 200 acre Well Equipping (Two Wells)	$2,823,936.50			$1,411,968.25	$1,411,968.25
10	Diamond Property 160 acre Recharge Earthwork	$1,946,087.55			$1,946,087.55	
11	Diamond Property 160 acre Conveyance Facilities	$3,946,250.00			$1,973,125.00	$1,973,125.00
12	Diamond Property 160 acre Well Drilling (Two Wells)	$2,311,075.99			$1,155,537.99	$1,155,537.99
13	Diamond Property 160 acre Well Equipping (Two Wells)	$2,823,936.50			$1,411,968.25	$1,411,968.25
14	SCADA System Communication Installation	$451,000.00			$242,000.00	$209,000.00
	Total Budget:	$34,812,411.81	$9,525,398.00	$3,680,838.49	$14,929,575.82	$6,676,599.49

Date: May 2022
Price Level: March 2022

Groundwater Banking Joint Powers Authority

Task 1 - West Enos Property (Bolthouse 200 Acre Property)

Engineer's Estimate

Item No.	Item Description	Unit	Quantity	Unit Cost	Extended Cost	Section Subtotal
	Recharge Facility					
1	Mobilization, Demobilization, and Clean-Up	EA	1	$ 166,500.00	$ 166,500.00	
2	Clearing & Grubbing	AC	200	$ 1,080.00	$ 216,000.00	
3	Levee Over-Excavation and Re-Compaction	CY	120000	$ 4.14	$ 496,800.00	
4	Levee Keyway	CY	32000	$ 4.23	$ 135,360.00	
5	Levee Embankment Fill	CY	175000	$ 3.78	$ 661,500.00	
6	Structure Headwalls	EA	6	$ 27,000.00	$ 162,000.00	
7	Structure Miscellaneous Steel & Weir Boards	EA	6	$ 9,000.00	$ 54,000.00	
8	Interbasin Structure Piping	LF	360	$ 153.00	$ 55,080.00	
9	Interbasin Structure Rip-Rap	EA	6	$ 49,500.00	$ 297,000.00	
10	Interbasin Structure Cutoff Walls	EA	12	$ 13,500.00	$ 162,000.00	
11	Site Fencing and Gates	LF	13500	$ 6.75	$ 91,125.00	$ 2,330,865.00
12	Conveyance Turnout from Slough	LS	1	$ 520,000.00	$ 520,000.00	
13	Conveyance Turnout Earthwork and Rip-Rap	LS	1	$ 200,000.00	$ 200,000.00	
14	Conveyance Turnout to West Enos Property	LS	1	$ 975,000.00	$ 975,000.00	$ 1,695,000.00
	Well Drilling, Construction, & Development	EA	2	$ 1,057,567.40		$ 2,115,134.80
1	Mobilization	EA	1	$ 9,000.00	$ 9,000.00	
2	Demobilization	EA	1	$ 9,000.00	$ 9,000.00	
3	Final Cleanup	EA	1	$ 4,500.00	$ 4,500.00	
4	Transport and dispose of drill cuttings offsite	EA	1	$ 9,000.00	$ 9,000.00	
5	Three 20,000-gallon temporary water storage tanks and discharge piping	EA	1	$ 9,000.00	$ 9,000.00	
6	Drill 54-inch minimum diameter surface casing/sanitary seal borehole	LF	50	$ 558.00	$ 27,900.00	
7	Drill 17.5-inch minimum diameter pilot borehole from 50 ft to 970 ft bgs	LF	920	$ 120.00	$ 110,400.00	
8	Drill 17.5-inch minimum diameter pilot borehole from 970 ft to 1,400 ft bgs	LF	430	$ 120.00	$ 51,600.00	
9	Conduct downhole geophysical surveys and alignment/deviation survey	EA	1	$ 13,500.00	$ 13,500.00	
10	Conduct isolated aquifer zone test	EA	3	$ 22,500.00	$ 67,500.00	
11	Conduct deep isolated aquifer zone test below 800 ft bgs	EA	3	$ 31,500.00	$ 94,500.00	
12	Enlarge pilot borehole to 36-inch diameter from 50 ft to 330 ft bgs	LF	280	$ 110.00	$ 30,800.00	
13	Enlarge pilot borehole to 32-inch diameter from 330 ft to 970 ft bgs	LF	660	$ 110.00	$ 72,600.00	
14	Conduct alignment/deviation tests in enlarged borehole	EA	1	$ 4,950.00	$ 4,950.00	
15	Conduct a caliper survey of enlarged borehole	EA	1	$ 4,950.00	$ 4,950.00	
16	Furnish and install 20-inch I.D. by 5/16-inch wall HSLA steel blank well casing	LF	424	$ 220.00	$ 93,280.00	
17	Furnish and install HSLA steel blank well casing with reinforced "Bull Nose"	EA	1	$ 4,500.00	$ 4,500.00	
18	Furnish and install 20-inch by 5/16-inch wall Ful Flo louvered, HSLA steel well screen	LF	510	$ 320.00	$ 163,200.00	
19	Furnish and install 3-inch I.D. schedule 40 mild steel sounding/camera access tube	LF	329	$ 41.40	$ 13,620.60	
20	Furnish and install 3-inch I.D. schedule 40 mild steel gravel feed tube	LF	319	$ 34.20	$ 10,909.80	
21	Furnish and install gravel pack in borehole annulus	LF	665	$ 150.00	$ 99,750.00	
22	Furnish and install 10.3-sack sand-cement grout upper annular seal	LF	305	$ 100.00	$ 30,500.00	
23	Perform initial well development	HRS	108	$ 247.50	$ 26,730.00	
24	Provide chlorine solution for chemical development of the well	GAL	255	$ 23.40	$ 5,967.00	
25	Provide polymer dispersant for chemical development of the well	GAL	40	$ 99.00	$ 3,960.00	
26	Mobilize, install, and demobilize test pumping equipment in newly completed wells	EA	1	$ 22,500.00	$ 22,500.00	
27	Conduct final development by pumping and surging	HRS	60	$ 450.00	$ 27,000.00	
28	Conduct step-drawdown pumping test in newly completed wells	HRS	8	$ 450.00	$ 3,600.00	
29	Conduct constant-rate pumping test in newly completed wells	HRS	28	$ 450.00	$ 12,600.00	
30	Conduct a dynamic flow meter survey	EA	1	$ 9,000.00	$ 9,000.00	
31	Conduct a color video camera survey	EA	1	$ 2,250.00	$ 2,250.00	
32	Conduct well alignment/deviation test in newly completed wells	EA	1	$ 4,500.00	$ 4,500.00	
33	Conduct final well disinfection in newly completed wells	EA	1	$ 4,500.00	$ 4,500.00	
	Well Equipping and Site Development	EA	2	$ 1,252,300.00		$ 2,504,600.00
1	Mobilization	EA	1	$ 22,500.00	$ 22,500.00	
2	Demobilization	EA	1	$ 22,500.00	$ 22,500.00	
3	Final Cleanup	EA	1	$ 9,000.00	$ 9,000.00	
4	Water Supply	EA	1	$ 13,500.00	$ 13,500.00	
5	Environmental Mitigation	EA	1	$ 18,000.00	$ 18,000.00	
6	Construct well site earthwork	CY	2400	$ 9.00	$ 21,600.00	
7	Furnish and install well concrete foundation	CY	20	$ 1,080.00	$ 21,600.00	
8	Furnish and install electrical concrete foundation	CY	15	$ 1,080.00	$ 16,200.00	
9	Furnish and install discharge pipe concrete pad	CY	5	$ 1,080.00	$ 5,400.00	
10	Furnish and install transformer pad	EA	1	$ 9,000.00	$ 9,000.00	
11	Furnish and install 12" FBE Steel Well Discharge Piping	LF	45	$ 600.00	$ 27,000.00	
12	Furnish and install Deep Well Air Release Valve	EA	1	$ 3,500.00	$ 3,500.00	
13	Furnish and install 12" Dresser Coupling	EA	1	$ 2,500.00	$ 2,500.00	
14	Furnish and install 12" Check Valve	EA	1	$ 4,500.00	$ 4,500.00	
15	Furnish and install 12" Flow Meter	EA	1	$ 8,000.00	$ 8,000.00	
16	Furnish and install 12" FBE Steel Tee	EA	1	$ 2,500.00	$ 2,500.00	
17	Furnish and install 12" Butterfly Valve	EA	1	$ 5,500.00	$ 5,500.00	
18	Furnish and install 2" Air Release Valve	EA	1	$ 2,500.00	$ 2,500.00	
19	Furnish and install Pressure Gauges	EA	2	$ 500.00	$ 1,000.00	
20	Furnish and install Pipe Supports	EA	3	$ 1,000.00	$ 3,000.00	
21	Furnish and install vertical turbine well pump assembly	EA	1	$ 162,000.00	$ 162,000.00	
22	Furnish and install vertical turbine well motor	EA	1	$ 67,500.00	$ 67,500.00	
23	Furnish and install well enclosures and appurtenances	EA	1	$ 18,000.00	$ 18,000.00	
24	Furnish and install electrical Main Switchboard	EA	1	$ 45,000.00	$ 45,000.00	
25	Furnish and install electrical Motor Control Center	EA	1	$ 180,000.00	$ 180,000.00	
26	Furnish and install Electrical Service and Transformer	EA	1	$ 22,500.00	$ 22,500.00	
27	Furnish and install Site Lighting	EA	2	$ 15,000.00	$ 30,000.00	
28	Furnish and install Multi-Lin	EA	1	$ 9,000.00	$ 9,000.00	
29	Furnish and install RTU and HMI	EA	1	$ 15,000.00	$ 15,000.00	
30	Furnish and install Electrical Instrumentation	EA	1	$ 30,000.00	$ 30,000.00	
31	Furnish and install Electrical Conduit, Wires, and Grounding	EA	1	$ 135,000.00	$ 135,000.00	
32	Furnish and install pre-fabricated metal canopy	EA	1	$ 63,000.00	$ 63,000.00	
33	Furnish and install site ground cover	CY	200	$ 45.00	$ 9,000.00	
34	Furnish and install site fencing	LF	400	$ 45.00	$ 18,000.00	
35	Furnish and install site painting	EA	1	$ 9,000.00	$ 9,000.00	
36	Furnish and install VFD's	EA	1	$ 220,000.00	$ 220,000.00	
37	Phase I 200 Acres Well Recovery Pipeline - 15" PVC	LF	2550	$ 150.00	$ 382,500.00	
38	Phase I 200 Acres Well Recovery Pipeline - 18" PVC	LF	3500	$ 200.00	$ 700,000.00	
39	Enos Lane Cased Crossing	LS	1	$ 150,000.00	$ 150,000.00	
40	Intertie Connection	LS	1	$ 67,500.00	$ 67,500.00	$ 1,300,000.00
41	SCADA System Communication	LS	1	$ 200,000.00	$ 200,000.00	$ 200,000.00
	Subtotal with Mobilization:				**$ 10,145,599.80**	
	Contract Cost Allowances (Sum of):			2.5%	$ 253,640.00	
	Design Contingencies, 2% (+/-)					
	APS (+/-). Type of Procurement: Request for Proposal, Competitive Bid					
	Contract Cost:				**$ 10,399,239.80**	
	Construction Contingencies:			10.0%	$ 1,039,923.98	
	Field Cost:				**$ 11,439,163.77**	
	Project Management				$ 95,000.00	
	Engineering & Design				$ 475,000.00	
	Environmental				$ 25,000.00	
	NEPA				$ 40,000.00	
	Labor Compliance				$ 50,000.00	
	PG&E Electrical Service				$ 50,000.00	
	Bid Advertisement & Legal				$ 20,000.00	
	Construction Staking				$ 75,000.00	
	Construction Management & Inspection				$ 650,000.00	
	Subtotal Non-Contract Cost:				**$ 1,480,000.00**	
	Construction Cost (Unit Price Level Mar 2022) excluding Land Acquisition and Rights of Way:				**$ 12,919,163.77**	

QUANTITIES		PRICES	
BY Curtis Skaggs	CHECKED	BY Curtis Skaggs	CHECKED
DATE PREPARED September 29, 2022	PEER REVIEW / DATE	DATE PREPARED September 29, 2022	PEER REVIEW / DATE

Date: May 2022
Price Level: March 2022

Groundwater Banking Joint Powers Authority

Task 1 - Stockdale North Property (Diamond 160 Acre Property)

Engineer's Estimate

Item No.	Item Description	Unit	Quantity	Unit Cost	Extended Cost	Section Subtotal
	Recharge Facility					
1	Mobilization, Demobilization, and Clean-Up	EA	1	$ 166,500.00	$ 166,500.00	
2	Clearing & Grubbing	AC	160	$ 1,080.00	$ 172,800.00	
3	Levee Over-Excavation and Re-Compaction	CY	92500	$ 4.14	$ 382,950.00	
4	Levee Keyway	CY	25000	$ 4.23	$ 105,750.00	
5	Levee Embankment Fill	CY	135000	$ 3.78	$ 510,300.00	
6	Structure Headwalls	EA	4	$ 27,000.00	$ 108,000.00	
7	Structure Miscellaneous Steel & Weir Boards	EA	4	$ 9,000.00	$ 36,000.00	
8	Interbasin Structure Piping	LF	240	$ 153.00	$ 36,720.00	
9	Interbasin Structure Rip-Rap	EA	4	$ 49,500.00	$ 198,000.00	
10	Interbasin Structure Cutoff Walls	EA	8	$ 13,500.00	$ 108,000.00	
11	Site Fencing and Gates	LF	10000	$ 6.75	$ 67,500.00	$ 1,726,020.00
12	Conveyance Turnout	LS	1	$ 500,000.00	$ 500,000.00	
13	Conveyance Turnout Earthwork and Rip-Rap	LS	1	$ 250,000.00	$ 250,000.00	
14	Conveyance Turnout to Stockdale North Property	LS	1	$ 1,100,000.00	$ 1,100,000.00	$ 1,850,000.00
	Well Drilling, Construction, & Development	EA	2	$ 1,024,867.40		$ 2,049,734.80
1	Mobilization	EA	1	$ 9,000.00	$ 9,000.00	
2	Demobilization	EA	1	$ 9,000.00	$ 9,000.00	
3	Final Cleanup	EA	1	$ 4,500.00	$ 4,500.00	
4	Transport and dispose of drill cuttings offsite	EA	1	$ 9,000.00	$ 9,000.00	
5	Three 20,000-gallon temporary water storage tanks and discharge piping	EA	1	$ 9,000.00	$ 9,000.00	
6	Drill 54-inch minimum diameter surface casing/sanitary seal borehole	LF	50	$ 558.00	$ 27,900.00	
7	Drill 17.5-inch minimum diameter pilot borehole from 50 ft to 970 ft bgs	LF	920	$ 99.00	$ 91,080.00	
8	Drill 17.5-inch minimum diameter pilot borehole from 970 ft to 1,400 ft bgs	LF	430	$ 120.00	$ 51,600.00	
9	Conduct downhole geophysical surveys and alignment/deviation survey	EA	1	$ 120.00	$ 120.00	
10	Conduct isolated aquifer zone test	EA	3	$ 22,500.00	$ 67,500.00	
11	Conduct deep isolated aquifer zone test below 800 ft bgs	EA	3	$ 31,500.00	$ 94,500.00	
12	Enlarge pilot borehole to 36-inch diameter from 50 ft to 330 ft bgs	LF	280	$ 110.00	$ 30,800.00	
13	Enlarge pilot borehole to 32-inch diameter from 330 ft to 970 ft bgs	LF	660	$ 110.00	$ 72,600.00	
14	Conduct alignment/deviation tests in enlarged borehole	EA	1	$ 4,950.00	$ 4,950.00	
15	Conduct a caliper survey of enlarged borehole	EA	1	$ 4,950.00	$ 4,950.00	
16	Furnish and install 20-inch I.D. by 5/16-inch wall HSLA steel blank well casing	LF	424	$ 220.00	$ 93,280.00	
17	Furnish and install HSLA steel blank well casing with reinforced "Bull Nose"	EA	1	$ 4,500.00	$ 4,500.00	
18	Furnish and install 20-inch by 5/16-inch wall Ful Flo louvered, HSLA steel well screen	LF	510	$ 320.00	$ 163,200.00	
19	Furnish and install 3-inch I.D. schedule 40 mild steel sounding/camera access tube	LF	329	$ 41.40	$ 13,620.60	
20	Furnish and install 3-inch I.D. schedule 40 mild steel gravel feed tube	LF	319	$ 34.20	$ 10,909.80	
21	Furnish and install gravel pack in borehole annulus	LF	665	$ 150.00	$ 99,750.00	
22	Furnish and install 10.3-sack sand-cement grout upper annular seal	LF	305	$ 100.00	$ 30,500.00	
23	Perform initial well development	HRS	108	$ 247.50	$ 26,730.00	
24	Provide chlorine solution for chemical development of the well	GAL	255	$ 23.40	$ 5,967.00	
25	Provide polymer dispersant for chemical development of the well	GAL	40	$ 99.00	$ 3,960.00	
26	Mobilize, install, and demobilize test pumping equipment in newly completed wells	EA	1	$ 22,500.00	$ 22,500.00	
27	Conduct final development by pumping and surging	HRS	60	$ 450.00	$ 27,000.00	
28	Conduct step-drawdown pumping test in newly completed wells	HRS	8	$ 450.00	$ 3,600.00	
29	Conduct constant-rate pumping test in newly completed wells	HRS	28	$ 450.00	$ 12,600.00	
30	Conduct a dynamic flow meter survey	EA	1	$ 9,000.00	$ 9,000.00	
31	Conduct a color video camera survey	EA	1	$ 2,250.00	$ 2,250.00	
32	Conduct well alignment/deviation test in newly completed wells	EA	1	$ 4,500.00	$ 4,500.00	
33	Conduct final well disinfection in newly completed wells	EA	1	$ 4,500.00	$ 4,500.00	
	Well Equipping and Site Development	EA	2	$ 1,252,300.00		$ 2,504,600.00
1	Mobilization	EA	1	$ 22,500.00	$ 22,500.00	
2	Demobilization	EA	1	$ 22,500.00	$ 22,500.00	
3	Final Cleanup	EA	1	$ 9,000.00	$ 9,000.00	
4	Water Supply	EA	1	$ 13,500.00	$ 13,500.00	
5	Environmental Mitigation	EA	1	$ 18,000.00	$ 18,000.00	
6	Construct well site earthwork	CY	2400	$ 9.00	$ 21,600.00	
7	Furnish and install well concrete foundation	CY	20	$ 1,080.00	$ 21,600.00	
8	Furnish and install electrical concrete foundation	CY	15	$ 1,080.00	$ 16,200.00	
9	Furnish and install discharge pipe concrete pad	CY	5	$ 1,080.00	$ 5,400.00	
10	Furnish and install transformer pad	EA	1	$ 9,000.00	$ 9,000.00	
11	Furnish and install 12" FBE Steel Well Discharge Piping	LF	45	$ 600.00	$ 27,000.00	
12	Furnish and install Deep Well Air Release Valve	EA	1	$ 3,500.00	$ 3,500.00	
13	Furnish and install 12" Dresser Coupling	EA	1	$ 2,500.00	$ 2,500.00	
14	Furnish and install 12" Check Valve	EA	1	$ 4,500.00	$ 4,500.00	
15	Furnish and install 12" Flow Meter	EA	1	$ 8,000.00	$ 8,000.00	
16	Furnish and install 12" FBE Steel Tee	EA	1	$ 2,500.00	$ 2,500.00	
17	Furnish and install 12" Butterfly Valve	EA	1	$ 5,500.00	$ 5,500.00	
18	Furnish and install 2" Air Release Valve	EA	1	$ 2,500.00	$ 2,500.00	
19	Furnish and install Pressure Gauges	EA	2	$ 500.00	$ 1,000.00	
20	Furnish and install Pipe Supports	EA	3	$ 1,000.00	$ 3,000.00	
21	Furnish and install vertical turbine well pump assembly	EA	1	$ 162,000.00	$ 162,000.00	
22	Furnish and install vertical turbine well motor	EA	1	$ 67,500.00	$ 67,500.00	
23	Furnish and install well enclosures and appurtenances	EA	1	$ 18,000.00	$ 18,000.00	
24	Furnish and install electrical Main Switchboard	EA	1	$ 45,000.00	$ 45,000.00	
25	Furnish and install electrical Motor Control Center	EA	1	$ 180,000.00	$ 180,000.00	
26	Furnish and install Electrical Service and Transformer	EA	1	$ 22,500.00	$ 22,500.00	
27	Furnish and install Site Lighting	EA	2	$ 15,000.00	$ 30,000.00	
28	Furnish and install Multi-Lin	EA	1	$ 9,000.00	$ 9,000.00	
29	Furnish and install RTU and HMI	EA	1	$ 15,000.00	$ 15,000.00	
30	Furnish and install Electrical Instrumentation	EA	1	$ 30,000.00	$ 30,000.00	
31	Furnish and install Electrical Conduit, Wires, and Grounding	EA	1	$ 135,000.00	$ 135,000.00	
32	Furnish and install pre-fabricated metal canopy	EA	1	$ 63,000.00	$ 63,000.00	
33	Furnish and install site ground cover	CY	200	$ 45.00	$ 9,000.00	
34	Furnish and install site fencing	LF	400	$ 45.00	$ 18,000.00	
35	Furnish and install site painting	EA	1	$ 9,000.00	$ 9,000.00	
36	Furnish and install VFD's	EA	1	$ 220,000.00	$ 220,000.00	
37	Phase I 160 Acres Well Recovery Pipeline - 15" PVC	LF	4000	$ 150.00	$ 600,000.00	
38	Phase I 160 Acres Well Recovery Pipeline - 18" PVC	LF	3500	$ 200.00	$ 700,000.00	
39	Stockdale Hwy Cased Crossing	LS	1	$ 200,000.00	$ 200,000.00	
40	CVC Turn-In	LS	1	$ 150,000.00	$ 150,000.00	$ 1,650,000.00
41	SCADA System Communication	LS	1	$ 200,000.00	$ 200,000.00	$ 200,000.00
	Subtotal with Mobilization:				**$ 9,980,354.80**	
	Contract Cost Allowances (Sum of):			2.5%	$ 249,508.87	
	Design Contingencies, 2% (+/-)					
	APS (+/-). Type of Procurement: Request for Proposal, Competitive Bid					
	Contract Cost:				**$ 10,229,863.67**	
	Construction Contingencies:			10.0%	$ 1,022,986.37	
	Field Cost:				**$ 11,252,850.04**	
	Project Management				$ 85,000.00	
	Engineering & Design				$ 450,000.00	
	Environmental				$ 25,000.00	
	NEPA				$ 40,000.00	
	Labor Compliance				$ 50,000.00	
	PG&E Electrical Service				$ 50,000.00	
	Bid Advertisement & Legal				$ 20,000.00	
	Construction Staking				$ 75,000.00	
	Construction Management & Inspection				$ 600,000.00	
	Subtotal Non-Contract Cost:				**$ 1,395,000.00**	
	Construction Cost (Unit Price Level Mar 2022) excluding Land Acquisition and Rights of Way:				**$ 12,647,850.04**	

QUANTITIES		PRICES	
BY Curtis Skaggs	CHECKED	BY Curtis Skaggs	CHECKED
DATE PREPARED September 29, 2022	PEER REVIEW / DATE	DATE PREPARED September 29, 2022	PEER REVIEW / DATE

Appendix O – Kern Fan Project DEIR and FEIR

Kern Fan Groundwater Storage Project Environmental Impact Report

The Kern Fan Groundwater Project Final Environmental Impact Report can be found online at:

https://www.rrbwsd.com/wp-content/uploads/2021/10/KernFanGroundwater-StorageProject_FEIR_Dec2020.pdf

Chapters 1 through 7 and Appendices A through H are part of the Draft Environmental Impact report (under separate cover) and can be found online at:

https://www.rrbwsd.com/wp-content/uploads/2021/09/01_KernFanGroundwaterStorage_DraftEIR.pdf

Appendix P – GBJPA Official Resolution No. 2023-04

RESOLUTION NO. 2022-05

RESOLUTION OF THE BOARD OF DIRECTORS OF THE GROUNDWATER BANKING JOINT POWERS AUTHORITY SMALL SURFACE STORAGE AND GROUNDWATER STORAGE PROJECTS GRANT APPLICATION

WHERAS, the Groundwater Banking Joint Powers Authority has prepared an application to apply for federal funding from the United States Department of the Interior, Bureau of Reclamation (Reclamation) to assist in the funding of Groundwater Storage Projects; and

WHERAS, the funding opportunity provided by Reclamation through their Grant Program entitled "Small Surface Water and Groundwater Storage Projects" Funding Opportunity Announcement No. is R23AS00019; and

WHERAS, the West Enos and Stockdale North Recharge and Recovery Project involves the drilling and equipping of 4 wells, construction of approximately 300 acres of recharge ponds, and construction of recovery well conveyance, pipelines, and turnout facilities to improve overall drought resiliency by increasing groundwater recharge during wet years and recovery in drought years.

THEREFORE, BE IT RESOLVED, the Groundwater Banking Joint Powers Authority Board of Directors have reviewed the application and support its submittal for Reclamation assisted funding. The Board of Directors approve Dan Bartel, General Manager, as the official with legal authority to enter into a cooperative agreement with Reclamation and confirm that the Groundwater Banking Joint Powers Authority is capable of providing the amount of funding specified in the application. The Groundwater Banking Joint Powers Authority will work with Reclamation to meet established deadlines for entering into a cooperative agreement.

PASSED APPROVED AND ADOPTED on this 19th day of September, 2022 by the following roll-call vote:

AYES: Directors Pierucci, Selvidge, Reinhart and Swan
NOES:
ABSENT:
ABSTAINED:

GROUNDWATER BANKING JOINT POWERS AUTHORITY

President/Board of Directors

ATTEST:

Secretary/Board of Directors

Appendix Q – GBJPA
Auditor's Report

EXHIBIT "A"

Groundwater Banking Joint Powers Authority

Financial Statements

Fiscal Year Ended June 30, 2022

Groundwater Banking Joint Powers Authority

Financial Statements

Fiscal Year Ended June 30, 2022

Table of Contents

DavisFarr
CERTIFIED PUBLIC ACCOUNTANTS

Davis Farr LLP
18201 Von Karman Avenue | Suite 1100 | Irvine, CA 92612
Main: 949.474.2020 | Fax: 949.263.5520

Independent Auditor's Report

Board of Directors
Groundwater Banking Joint Powers Authority
Irvine, California

Report on the Audit of the Financial Statements

Opinion

We have audited the financial statements of the Groundwater Banking Joint Powers Authority (the "GBJPA") as of and for the year June 30, 2022, and the related notes to the financial statements, which collectively comprise the GBJPA's basic financial statements as listed in the table of contents.

In our opinion, the accompanying financial statements present fairly, in all material respects, the respective financial position of the GBJPA, as of June 30, 2022, and the respective changes in financial position and cash flows thereof for the year then ended in accordance with accounting principles generally accepted in the United States of America.

Basis for Opinion

We conducted our audit in accordance with auditing standards generally accepted in the United States of America (GAAS) and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States. Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We are required to be independent of the GBJPA and to meet our other ethical responsibilities, in accordance with the relevant ethical requirements relating to our audit. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Responsibilities of Management for the Financial Statements

The GBJPA's management is responsible for the preparation and fair presentation of the financial statements in accordance with accounting principles generally accepted in the United States of America, and for the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is required to evaluate whether there are conditions or events, considered in the aggregate, that raise substantial doubt about the GBJPA's ability to continue as a going concern for one year after the date that the financial statements are issued.

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinions. Reasonable assurance is a high level of assurance but is not absolute assurance and therefore is not a guarantee that an audit conducted in accordance with GAAS will always detect a material misstatement when it exists. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control. Misstatements are considered material if there is a substantial likelihood that, individually or in the aggregate, they would influence the judgment made by a reasonable user based on the financial statements.

In performing an audit in accordance with GAAS, we:

- Exercise professional judgment and maintain professional skepticism throughout the audit.
- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, and design and perform audit procedures responsive to those risks. Such procedures include examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the GBJPA's internal control. Accordingly, no such opinion is expressed.
- Evaluate the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluate the overall presentation of the financial statements.
- Conclude whether, in our judgment, there are conditions or events, considered in the aggregate, that raise substantial doubt about the GBJPA's ability to continue as a going concern for a reasonable period of time.

We are required to communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit, significant audit findings, and certain internal control–related matters that we identified during the audit.

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that the *management's discussion and analysis* be presented to supplement the basic financial statements. Such information is the responsibility of management and, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

Report on Summarized Comparative Information

We have previously audited the GBJPA's 2021 financial statements, and we expressed an unmodified audit opinion on those audited financial statements in our report dated October 21, 2021. In our opinion, the summarized comparative information presented herein as of and for the year ended June 30, 2021 is consistent, in all material respects, with the audited financial statements from which it has been derived.

Other Reporting Required by *Government Auditing Standards*

In accordance with *Government Auditing Standards*, we have also issued our report dated October 28, 2022 on our consideration of the GBJPA's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements and other matters. The purpose of that report is solely to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on the effectiveness of internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the GBJPA's internal control over financial reporting and compliance.

Irvine, California
October 28, 2022

MANAGEMENT'S DISCUSSION AND ANALYSIS

The following discussion and analysis of the financial performance of the Groundwater Banking Joint Powers Authority (GBJPA) provides an overview of GBJPA's financial activities for the fiscal year ended June 30, 2022. This section should be read in conjunction with the basic financial statements and notes to the basic financial statements, which follow this analysis.

Financial Highlights:

- Total assets exceeded total liabilities by $12.1 million (net position), consisting of $11.2 million in investment in capital assets and $0.9 million unrestricted net position. This is an increase of $10.4 million over the prior fiscal year's net position.
- Total assets are $12.2 million, an increase of $10.4 million over the prior fiscal year. This is due primarily to $9.0 million for land acquisitions, a $1.0 million increase in cash, and $0.4 million in additional pre-construction related capital expenditures for the Kern Fan Groundwater capital project.
- Total liabilities are $56,988, a decrease of $21,895 over the prior fiscal year. This is due primarily to the deferral of various capital and operating activities, resulting in lower billings from the Irvine Ranch Water District and the Rosedale-Rio Bravo Water Storage District for shared services.
- Total revenues are $49,844, an increase of $1,277 over the prior fiscal year. The increase in total operating revenues is primarily due to $33,248 in agriculture lease revenues received. This was offset by a $31,971 decrease in member agencies contributions for funding the current fiscal year's operating expenses.
- Total expenses are $49,844, an increase of $1,277 over the prior fiscal year. The increase is due primarily to $5,000 for the first-year audit and $1,150 for website maintenance, partially offset by a $5,130 decrease in administration costs.
- Capital contributions are $10.4 million, an increase of $8.7 million over the prior fiscal year. This is primarily due to cash contributions from the member agencies for two land acquisitions and pre-construction related capital expenditures for the Kern Fan Groundwater capital project.

More detailed analysis about the overall GBJPA's financial position and operations is provided in the following sections.

Overview of the Financial Statements:

The basic financial statements of the GBJPA consist of the financial statements (Statement of Net Position, Statement of Revenues, Expenses and Changes in Net Position, and Statement of Cash Flows) and notes to the basic financial statements. The basic financial statements are prepared using the accrual basis of accounting.

Statement of Net Position depicts GBJPA's financial position as of June 30, the end of GBJPA's fiscal year. The statement of net position shows all financial assets and liabilities of the GBJPA. Net position represents GBJPA's residual interest after liabilities are deducted from assets. Net position is displayed in two components: net investment in capital assets and unrestricted net position.

Statement of Revenues, Expenses and Changes in Net Position provides information on GBJPA's operations and can be used to determine whether the GBJPA has recovered all of its costs through operating and non-operating revenues.

Statement of Cash Flows provides information on GBJPA's cash receipts, cash payments and changes in cash resulting from operations and investments activities.

Notes to the Basic Financial Statements provide additional information essential to a full understanding of the data provided in the basic financial statements.

Financial Analysis of the GBJPA:

The following condensed schedules contain summary financial information extracted from the basic financial statements to assist general readers in evaluating GBJPA's overall financial position and results of operations as described in this Management's Discussion and Analysis (MD&A).

Table 1 – Summary of Net Position

			Increase/(Decrease)	
	2022	2021	Amount	Percentage
Assets				
Current assets	$ 961,129	$ 7,557	$ 953,572	12618.4%
Noncurrent assets	11,204,572	1,762,587	9,441,985	535.7%
Total assets	12,165,701	1,770,144	10,395,557	587.3%
Liabilities				
Current liabilities	56,988	78,883	(21,895)	-27.8%
Total liabilities	56,988	78,883	(21,895)	-27.8%
Net position				
Investment in capital assets	11,204,572	1,762,587	9,441,985	535.7%
Unrestricted	904,141	(71,326)	975,467	-1367.6%
Total net position	$12,108,713	$ 1,691,261	$10,417,452	616.0%

As shown in Table 1, GBJPA's total assets increased $10.4 million during the current fiscal year. Current assets were $1.0 million, an increase of $1.0 million compared to the prior fiscal year. This is primarily due to contributions from the member agencies to fund various capital and operating activities which were subsequently deferred.

Noncurrent assets, which include land and construction in progress, were $11.2 million, an increase of $9.4 million from the prior fiscal year. The increase was due primarily to $9.0 million for two land acquisitions: $4.9 million from Diamond M Properties, LLC and $4.0 million from Bolthouse Land Company, LLC. In addition, there were $0.4 million of pre-construction related capital expenditures for the Kern Fan Groundwater capital project.

GBJPA's total liabilities were $56,988, a decrease of $21,895 from the prior fiscal year. The decrease is due primarily to the deferral of various capital and operating activities resulting in lower billings from the Irvine Ranch Water District and the Rosedale-Rio Bravo Water Storage District for shared services.

Net position at the end of the current fiscal year is $12.1 million representing the excess of total assets over total liabilities. Net position increased $10.4 million from the prior fiscal year. Net position consists

of investment in capital assets of $11.2 million and an unrestricted net position for water services of $1.0 million. The increase in net position is primarily due to $9.4 million in capital asset additions.

Activities and Changes in Net Position:

The Statement of Revenues, Expenses and Changes in Net Position summarizes GBJPA's operations during the current fiscal year. A summary of GBJPA's changes in net position for the fiscal year ended June 30, 2022, is included in Table 2 below:

Table 2 – Revenues, Expenses and Changes in Net Position

			Increase/(Decrease)	
	2022	2021	Amount	Percentage
Operating revenues				
Member agency fees:				
Irvine Ranch Water District	$ 8,298	$ 24,284	$ (15,986)	-65.8%
Rosedale-Rio Bravo Water Storage District	8,298	24,283	(15,985)	-65.8%
Lease Revenue	33,248	-	33,248	100.0%
Total operating revenues	49,844	48,567	1,277	2.6%
Operating expenses				
General and administrative:				
Administration	38,820	43,950	(5,130)	-11.7%
Audit	5,000	-	5,000	100.0%
Bank charges	1,582	678	904	133.3%
Insurance	2,781	3,249	(468)	-14.4%
Website Maintenance	1,150	-	1,150	100.0%
Other	511	690	(179)	-25.9%
Total operating expenses	49,844	48,567	1,277	2.6%
Income (Loss) before capital contibutions	-	-	-	0.0%
Capital contributions				
Irvine Ranch Water District	5,208,726	845,630	4,363,096	516.0%
Rosedale-Rio Bravo Water Storage District	5,208,726	845,631	4,363,095	516.0%
Total capital contributions	10,417,452	1,691,261	8,726,191	516.0%
Changes in net position	10,417,452	1,691,261	8,726,191	516.0%
Beginning net position	1,691,261	-	1,691,261	100.0%
Ending net position	$12,108,713	$ 1,691,261	$10,417,452	616.0%

Revenues:

As shown in Table 2, GBJPA's total operating revenues were $49,844, an increase of $1,277 from the prior fiscal year. Lease revenue contributed $33,248 or 66.7 percent to total operating revenues. Member agency fees contributed $16,596 or 33.3 percent to total operating revenues. The increase in total operating revenues is primarily due to $33,248 in agriculture lease revenues received from Bolthouse Land Company, LLC where Bolthouse leased back property from the GBJPA post acquisition. The increase was offset by a $31,971 decrease in member agencies contributions to fund operating expenses.

Expenses:

As shown in Table 2, $49,844 operating expenses consisted of 77.9 percent administration charges, 10.0 percent audit fees, 5.6 percent insurance, 3.2 percent bank charges, 2.3 percent website maintenance,

and 1.0 percent other operating expenses. Operating expenses increased $1,277 from the prior fiscal year. The increase in the current year is due to:

- $5,000 in audit fees for the first fiscal year ended June 30, 2021, as work was completed after the prior fiscal year end;
- First year expenses of $1,150 for website hosting and maintenance;
- An increase of $904 in bank charges due to a full year of charges in the current fiscal year compared to three months the prior fiscal year;
- A decrease of $5,130 in administration expenses due to the lower shared service billings from the previous year due to the deferral of various capital and operating activities;
- A decrease of $468 in insurance expenses; and
- A decrease of $179 in other operating expenses.

Capital Contributions:

Capital contributions total $10.4 million consisting of $5.2 million in contributions from the Irvine Ranch Water District and $5.2 million in contributions from the Rosedale-Rio Water Storage District for capital expenditures of the Kern Fan Groundwater capital project.

Capital Assets:

GBJPA's investment in capital assets consists of the following as of June 30, 2022:

Table 3 – Capital Assets

			Increase/(Decrease)	
	2022	2021	Amount	Percentage
Land	$ 8,996,494	$ -	$ 8,996,494	100.0%
Construction in progress	2,208,078	1,762,587	445,491	25.3%
Total	$ 11,204,572	$ 1,762,587	$ 9,441,985	535.7%

As shown in Table 3, capital assets increased $9.4 million in the current fiscal year. Construction in progress added $0.4 million during the current fiscal year. The $9.0 million of land acquisitions consisted of $4.9 million from Diamond M Properties, LLC and $4.0 million from Bolthouse Land Company, LLC. There were $0.4 million in additional pre-construction related capital expenditures for the Kern Fan Groundwater capital project. Additional information on GBJPA's capital assets can be found in Note 3 of the Notes to the Basic Financial Statements.

Contacting the District's Financial Management:

This financial report is designed to provide a general review of the GBJPA's finances to show accountability for the money it receives. If you have questions about this report or need additional financial information, contact the Treasurer at the Groundwater Banking Joint Powers Authority, 849 Allen Road, Bakersfield, California 93314.

Groundwater Banking Joint Powers Authority

Statement of Net Position

June 30, 2022

(with comparative data as of June 30, 2021)

	2022	2021
ASSETS		
Current assets:		
Cash	$ 957,962	$ 7,557
Prepaid items	3,167	-
Total current assets	961,129	7,557
Noncurrent assets:		
Capital assets, non-depreciable	11,204,572	1,762,587
Total noncurrent assets	11,204,572	1,762,587
TOTAL ASSETS	12,165,701	1,770,144
LIABILITIES		
Current liabilities:		
Accounts payable	56,988	78,883
TOTAL LIABILITIES	56,988	78,883
NET POSITION		
Investment in capital assets	11,204,572	1,762,587
Unrestricted	904,141	(71,326)
TOTAL NET POSITION	$ 12,108,713	$ 1,691,261

See accompanying notes to the basic financial statements.

Groundwater Banking Joint Powers Authority

Statement of Revenues, Expenses and Changes in Net Position
For the Fiscal Year Ended June 30, 2022
(with comparative data for the Fiscal Year Ended June 30, 2021)

	2022	2021
OPERATING REVENUES		
Member agency fees:		
Irvine Ranch Water District	$ 8,298	$ 24,284
Rosedale-Rio Bravo Water Storage District	8,298	24,283
Lease revenue	33,248	-
Total operating revenues	49,844	48,567
OPERATING EXPENSES		
General and administrative:		
Administration	38,820	43,950
Audit	5,000	-
Bank charges	1,582	678
Insurance	2,781	3,249
Website Maintenance	1,150	-
Other	511	690
Total operating expenses	49,844	48,567
Income (loss) before capital contributions	-	-
CAPITAL CONTRIBUTIONS FROM MEMBER AGENCIES		
Irvine Ranch Water District	5,208,726	845,630
Rosedale-Rio Bravo Water Storage District	5,208,726	845,631
Total capital contributions	10,417,452	1,691,261
Increase (decrease) in net position	10,417,452	1,691,261
NET POSITION AT BEGINNING OF YEAR	1,691,261	-
NET POSITION AT END OF YEAR	$ 12,108,713	$ 1,691,261

See accompanying notes to the basic financial statements.

Groundwater Banking Joint Powers Authority

Statement of Cash Flows

For the Fiscal Year Ended June 30, 2022

(with comparative data for the Fiscal Year Ended June 30, 2021)

	2022	2021
CASH FLOWS FROM OPERATING ACTIVITIES		
Cash received from member agencies and others	$ 49,844	$ 48,567
Cash paid to suppliers of goods and services	(124,647)	(28,338)
Net cash provided by (used for) operating activities	(74,803)	20,229
CASH FLOWS FROM CAPITAL AND RELATED FINANCING ACTIVITIES		
Acquisition and construction of capital assets	(9,392,244)	(276,628)
Capital contributions	10,417,452	263,956
Net cash provided by (used for) capital and related financing activities	1,025,208	(12,672)
Net increase (decrease) in cash and cash equivalents	950,405	7,557
Cash and cash equivalents at beginning of year	7,557	-
Cash and cash equivalents at end of year	$ 957,962	$ 7,557
RECONCILIATION OF OPERATING INCOME (LOSS) TO NET CASH PROVIDED BY (USED FOR) OPERATING ACTIVITIES		
Operating income (loss)	$ -	$ -
Adjustments to reconcile operating income to net cash provided by (used for) operating activities:		
(Increase) decrease in prepaid items	(3,167)	-
Increase (decrease) in accounts payable	(71,636)	78,883
Net cash provided by (used for) operating activities	$ (74,803)	$ 78,883
NONCASH INVESTING, CAPITAL AND FINANCING ACTIVITIES		
Capital contributions	$ -	$ 1,427,305

See accompanying notes to the basic financial statements.

(1) Summary of Significant Accounting Policies

A. Reporting Entity

The Groundwater Banking Joint Powers Authority (GBJPA) was formed in July 2020 as a joint owners authority under the California Government Code section 6500. The GBJPA was formed to finance, construct and operate the Kern Fan Groundwater Storage Project which will recharge and store up to 100,000 acre-feet (AF) of water, primarily during wet periods, in the Kern County Groundwater Sub-basin of the San Joaquin Valley Groundwater Basin for subsequent recovery and use for public and non-public benefit. GBJPA's member agencies are the Irvine Ranch Water District and the Rosedale-Rio Bravo Water Storage District with each agency having a 50% share in the GBJPA.

B. Basic Financial Statements

The basic financial statements are comprised of the Statement of Net Position, the Statement of Revenues, Expenses and Changes in Net Position, the Statement of Cash Flows, and the Notes to the Basic Financial Statements.

C. Basis of Accounting and Measurement Focus

GBJPA's financial activities are accounted as an enterprise fund (proprietary fund type). A fund is an accounting entity with a self-balancing set of accounts established to record the financial position and results of operations of a specific governmental activity. The activities of enterprise funds closely resemble those of ongoing businesses in which the purpose is to conserve and add to basic resources while meeting operating expenses from current revenues. Enterprise funds account for operations that provide services on a continuous basis and are substantially financed by revenues derived from water sales and member charges. The enterprise fund utilizes the accrual basis of accounting. Revenues are recognized in the accounting period in which they are earned and expenses are recognized in the period incurred, regardless of when the related cash flow takes place.

The GBJPA distinguishes operating revenues and expenses from non-operating items. Until completion of the construction, the operating revenues and expenses of the project represent contributions by the member agencies to fund operating expenses. All revenues and expenses not meeting this definition will be reported as non-operating revenues and expenses. Capital contributions will consist of contributions from member agencies and any grant funding for the capital assets. When both restricted and unrestricted resources are available for use, the GBJPA uses restricted resources and then unrestricted resources**.**

D. Cash

GBJPA's cash is considered to be demand deposits with a bank.

E. Prepaid Items

Certain payments to vendors reflect costs applicable to future accounting periods and are recorded as prepaid items.

F. Capital Assets

Capital assets, which include construction in progress and land, are valued at cost. The cost of normal maintenance and repairs that do not add to the value of the assets or materially extend asset lives are not capitalized. Donated assets are valued at their estimated acquisition value on the date received.

(1) Summary of Significant Accounting Policies (Continued)

G. Net Position

Net position is categorized as follows:

- **Net Investment in Capital Assets** – This component of net position consists of capital assets, net of accumulated depreciation reduced by any debt outstanding against the acquisition, construction or improvement of those assets.
- **Restricted Net Position** – This component of net position consists of constraints placed on net position use through external constraints imposed by creditors, grantors, contributors, or laws or regulations of other governments or constraints imposed by law through constitutional provisions or enabling legislation.
- **Unrestricted Net Position** – This component of net position consists of net position that does not meet the definition of restricted or net investment in capital assets.

H. Use of Estimates

The preparation of the basic financial statements in conformity with generally accepted accounting principles requires management to make estimates and assumptions that affect certain reported amounts and disclosures. Accordingly, actual results could differ from those estimates.

I. Comparative Financial Statements and Reclassifications

The information included in the accompanying financial statements for the prior year has been presented for comparison purposes only and does not represent a complete presentation in accordance with generally accepted accounting principles. Certain amounts presented in the prior year financial statements have been reclassified in order to be consistent with the current year's presentation.

(2) Cash and Investments

Cash as of June 30, 2022 consists of $957,962 demand deposits with a bank.

Investments Authorized by the California Government Code

The following table identifies the investment types that are authorized for the GBJPA by the California Government Code, although as of June 30, 2022, the GJBPA does not have any of these types of investments. The table also identifies certain provisions of the California Government Code that address interest rate risk and concentration of credit risk.

Authorized Investment type	Maximum Maturity	Maximum Percentage Allowed	Maximum Investment In One Issuer
Local Agency Bonds	5 years	None	None
U.S. Treasury Obligations	5 years	None	None
U.S. Agency Securities	5 years	None	None
Commercial Paper	270 days	25%	10%
Negotiable Certificates of Deposit	5 years	30%	None
Medium-Term Notes	5 years	30%	None
Local Agency Investment Fund (LAIF)	N/A	None	None

(2) Cash and Investments (Continued)

Custodial Credit Risk

The custodial credit risk for *investments* is the risk that, in the event of the failure of the counterparty (e.g., broker-dealer) to a transaction, a government will not be able to recover the value of its investment or collateral securities that are in the possession of another party. The California Government Code requires that a financial institution secure deposits made by state or local governmental units by pledging securities in an undivided collateral pool held by a depository regulated under state law (unless so waived by the governmental unit). The market value of the pledged securities in the collateral pool must equal at least 110% of the total amount deposited by the public agencies. California law also allows financial institutions to secure public agency deposits by pledging first trust deed mortgage notes having a value of 150% of the secured public deposits.

Disclosure Relating to Credit Risk

Generally, credit risk is the risk that an issuer of an investment will not fulfill its obligation to the holder of the investment. This is measured by assignment of a rating by a nationally recognized statistical rating organization.

Disclosures Relating to Interest Rate Risk

Interest rate risk is the risk that changes in market interest rates will adversely affect the fair value of an investment. Generally, the longer the maturity of an investment, the greater the sensitivity of its fair value is to changes in market interest rates.

(3) Capital Assets

Capital assets activity for the fiscal year ended June 30, 2022 is as follows:

	Balance at June 30, 2021	Additions	Deletions	Balance at June 30, 2022
Capital assets, non-depreciable:				
Land	$ -	$ 8,996,494	$ -	$ 8,996,494
Construction in progress	1,762,587	9,441,985	(8,996,494)	2,208,078
Total	$ 1,762,587	$18,438,479	$(8,996,494)	$11,204,572

(4) Commitments and Contingencies – Legal Actions

The GBJPA is a defendant in various legal actions arising out of the conduct of the GBJPA's operations. Management believes that, based on current knowledge, the outcome of these matters will not have a material adverse effect on the GBJPA's financial position.

Appendix R – Replacement Costs Backup

	A	B	C	D	E	F	G
1	**Backup for Constructions Costs by Year and Replacement Costs**						
2							
3	1a.		Calendar Year	Construction Costs			
4			1. 2022	$ 8,995,398	(property acquisition costs)		
5			2. 2023	$ 100,000			
6			3. 2024	$ 5,408,889			
7			4. 2025	$ 9,609,557			
8			5. 2026	$ 7,573,568			
9							
10			2022	2023	2024	2025	2026
11		Property Acquisition	$ 8,995,398.00				
12		West Enos Recharge Basin		$ 100,000.00	$ 2,528,050.29		
13		West Enos Conveyance Facilities			$ 1,688,431.25	$ 1,688,431.25	
14		West Enos Well Drilling			$ 1,192,407.24	$ 1,192,407.24	
15		West Enos Well Equipping				$ 1,411,968.25	$ 1,411,968.25
16		Stockdale North Recharge Basin				$ 1,946,087.55	
17		Stockdale North Conveyance Facilities				$ 1,973,125.00	$ 1,973,125.00
18		Stockdale North Well Drilling				$ 1,155,537.99	$ 1,155,537.99
19		Stockdale North Well Equipping					$ 2,823,936.50
20		SCADA Construction				$ 242,000.00	$ 209,000.00
21							
22							
23							
24							
25	1b.	The total estimated or actual costs to plan and design the project					
26							
27		Environmental Planning	$ 130,000.00				
28		NEPA Review (USBR)	$ 75,000.00				
29		Engineering and Admin Services	$ 1,495,000.00				
30		Total	$ 1,700,000.00				
31							
32		Description of Replacement Requirement	Year	Replacement Cost	Lifespan		Present Costs
33		Interbasin Recharge Basin Structures (West Enos)	2074	$ 436,037	50	years	$ 162,000
34		Interbasin Recharge Basin Structures (Stockdale North)	2075	$ 290,692	50	years	$ 108,000
35		Conveyance (West Enos)	2100	$ 14,911,669	75	years	$ 3,376,863
36		Conveyance (Stockdale North)	2101	$ 17,425,991	75	years	$ 3,946,250
37		(2) Wells (West Enos)	2075	$ 6,418,938	50	years	$ 2,384,814
38		(2) Wells (Stockdale North)	2076	$ 6,220,464	50	years	$ 2,311,076
39		(2) Pump, Motor, Well Appurtenances (West Enos)	2036	$ 3,442,363	10	years	$ 2,823,937
40		(2) Pump,Motor, Well Appurtenances (Stockdale North)	2036	$ 3,442,363	10	years	$ 2,823,937

Future Value
Definition Formula

$$FV = PV\,(1 + i)^n$$

FV = Future Value
PV = Present Value
i = Interest (discount) rate
n = Period number

Appendix S – Operation and Maintenance Costs

ANNUALIZED REPLACEMENT COST ESTIMATES FROM DJA CONSTRUCTION COST ESTIMATE

Description	*Cost*
West Enos- Structure Headwalls	$162,000.00
West Enos- Furnish and install Deep Well Air Release Valve	$3,500.00
West Enos- Furnish and install 12" check valve	$4,500.00
West Enos- Furnish and install 12" Flow Meter	$8,000.00
West Enos- Furnish and install 12" Butterfly valve	$5,500.00
West Enos- Furnish and install 2" air release valve	$2,500.00
West Enos- Furnish and install Pressure gauges	$1,000.00
West Enos- Furnish and install vertical turbine well pump asse	$162,000.00
West Enos- Furnish and install vertical turbine well motor	$67,500.00
West Enos- Furnish and install electrical Motor Control Center	$180,000.00
West Enos- Furnish and install electrical Service and Transforn	$22,500.00
West Enos- Furnish and install RTU and HMI	$15,000.00
West Enos- Furnish and install Electrical Instrumentation	$30,000.00
West Enos- Furnish and install site fencing	$18,000.00
West Enos- Furnish and install dite painting	$9,000.00
West Enos- Furnish and install VFD's	$222,000.00
Stockdale North- Structure Headwalls	$108,000.00
Stockdale North- Furnish and install Deep Well Air Release Va	$3,500.00
Stockdale North- Furnish and install 12" check valve	$4,500.00
Stockdale North- Furnish and install 12" Flow Meter	$8,000.00
Stockdale North- Furnish and install 12" Butterfly valve	$5,500.00
Stockdale North- Furnish and install 2" air release valve	$2,500.00
Stockdale North- Furnish and install Pressure gauges	$1,000.00
Stockdale North- Furnish and install vertical turbine well pump	$162,000.00
Stockdale North- Furnish and install vertical turbine well motc	$67,500.00
Stockdale North- Furnish and install electrical Motor Control C	$180,000.00
Stockdale North- Furnish and install electrical Service and Trar	$22,500.00
Stockdale North- Furnish and install RTU and HMI	$15,000.00
Stockdale North - Furnish and install Electrical Instrumentatio	$30,000.00
Stockdale North- Furnish and install site fencing	$18,000.00
Stockdale North- Furnish and install dite painting	$9,000.00
Stockdale North- Furnish and install VFD's	$220,000.00
Total Estimated Replacement	$1,770,000.00
Total Estimated Annual Replacement->	$35,400.00

RECPLACEMENT COSTS PV CALCULATION

Operations Year	*Calendar Year*	*Replacement Cost*
1	2026	$35,400.00
2	2027	$35,400.00
3	2028	$35,400.00
4	2029	$35,400.00
5	2030	$35,400.00
6	2031	$35,400.00
7	2032	$35,400.00
8	2033	$35,400.00
9	2034	$35,400.00
10	2035	$35,400.00
11	2036	$35,400.00
12	2037	$35,400.00
13	2038	$35,400.00
14	2039	$35,400.00
15	2040	$35,400.00
16	2041	$35,400.00
17	2042	$35,400.00
18	2043	$35,400.00
19	2044	$35,400.00
20	2045	$35,400.00
21	2046	$35,400.00
22	2047	$35,400.00
23	2048	$35,400.00
24	2049	$35,400.00
25	2050	$35,400.00
26	2051	$35,400.00
27	2052	$35,400.00
28	2053	$35,400.00
29	2054	$35,400.00
30	2055	$35,400.00
31	2056	$35,400.00
32	2057	$35,400.00
33	2058	$35,400.00
34	2059	$35,400.00
35	2060	$35,400.00
36	2061	$35,400.00
37	2062	$35,400.00
38	2063	$35,400.00
39	2064	$35,400.00
40	2065	$35,400.00
41	2066	$35,400.00
42	2067	$35,400.00
43	2068	$35,400.00
44	2069	$35,400.00
45	2070	$35,400.00
46	2071	$35,400.00
47	2072	$35,400.00
48	2073	$35,400.00
49	2074	$35,400.00
50	2075	$35,400.00
	NPV of Replacement->	**$1,056,137.63**

PHASE I O&M COSTS

Year Type	*Monthly Cost*	*Annual Cost*
Dry Year (Pumping Wells)	$102,144.44	$1,225,733.33
Wet Year (Recharging Water)	$53,336.11	$640,033.33
Idle Year	$5,311.11	$63,733.33

DURATION OF OPERATIONS

Year Type	*Based on MBK results using*
Dry Year (Pumping Wells)	13.83
Wet Year (Recharging Water)	8.08
Idle Year	60.08

*The values utilized for duration of operations for the 2035 operating condition was adjusted to reflect full years of operation. The data was adjusted from partial-year operations data provided by MBK Engineers. Since the modeled operations from MBK were over a 82 year hydrology, the proportions of idle, dry, and wet years were used to calculate a a weighted average annual O&M cost. This annual value was applied to the 50 years of expected operations to determine an appropriate present value of O&M costs.

WEIGHTED AVERAGE OF O&M COSTS

Year Type	*Total Cost*	*Project Life Years*
Dry Year (Pumping Wells)	$1,298,051.60	13.83
Wet Year (Recharging Water)	$677,795.30	8.08
Idle Year	$67,493.60	60.08
Weighted Average Annual O&M:		$335,242.11

O&M COSTS ESCALATED

Operations Year	*Calendar Year*	*Annual O&M Cost (@2035 Conditions)*
1	2026	$335,242.11
2	2027	$335,242.11
3	2028	$335,242.11
4	2029	$335,242.11
5	2030	$335,242.11
6	2031	$335,242.11
7	2032	$335,242.11
8	2033	$335,242.11
9	2034	$335,242.11
10	2035	$335,242.11
11	2036	$335,242.11
12	2037	$335,242.11
13	2038	$335,242.11
14	2039	$335,242.11
15	2040	$335,242.11
16	2041	$335,242.11
17	2042	$335,242.11
18	2043	$335,242.11
19	2044	$335,242.11
20	2045	$335,242.11
21	2046	$335,242.11
22	2047	$335,242.11
23	2048	$335,242.11
24	2049	$335,242.11
25	2050	$335,242.11
26	2051	$335,242.11
27	2052	$335,242.11
28	2053	$335,242.11
29	2054	$335,242.11
30	2055	$335,242.11
31	2056	$335,242.11
32	2057	$335,242.11
33	2058	$335,242.11
34	2059	$335,242.11
35	2060	$335,242.11
36	2061	$335,242.11
37	2062	$335,242.11
38	2063	$335,242.11
39	2064	$335,242.11
40	2065	$335,242.11
41	2066	$335,242.11
42	2067	$335,242.11
43	2068	$335,242.11
44	2069	$335,242.11
45	2070	$335,242.11
46	2071	$335,242.11
47	2072	$335,242.11
48	2073	$335,242.11
49	2074	$335,242.11
50	2075	$335,242.11
		$10,001,745.82

$10.00

$16,762,105.28