

Small Surface Water and Groundwater Storage Projects

NOFO No. R23AS00019

December 2022



Groundwater Banking Joint Powers Authority (GBJPA)

Phase 1 - Kern Fan Groundwater Storage Project

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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 of the work for which funding is being requested, including how funds will be used to accomplish specific project activities.*

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. Once implemented, the Project has the potential to provide approximately 28,000 acre-feet of new groundwater storage and 14,480 acre-feet of drought year supply in the Central Valley to provide long-term water supply for agriculture, municipal users, and disadvantaged communities alike. 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 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
- Increase water management and operational flexibility

A third consecutive dry year in California has limited water supplies and threatened the groundwater sustainability of the Central Valley. 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 | Friday, December 9, 2022 |
| Project Name | Phase 1 - Kern Fan Groundwater Storage Project |
| Applicant Name | Groundwater Banking Joint Powers Authority (GBJPA) |
| City, County, State | Bakersfield, Kern County, California |

Figure 1. RRBWSD and IRWD Boundaries and Location



1.2 Technical Project Description

The technical project description should describe the project in its entirety. This description shall have sufficient detail to permit a comprehensive evaluation of the proposal.

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 adjacent to existing Rosedale and IRWD’s groundwater recharge basins and conveyance facilities, which provide advantageous locations for the development of water banking and recovery. 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)

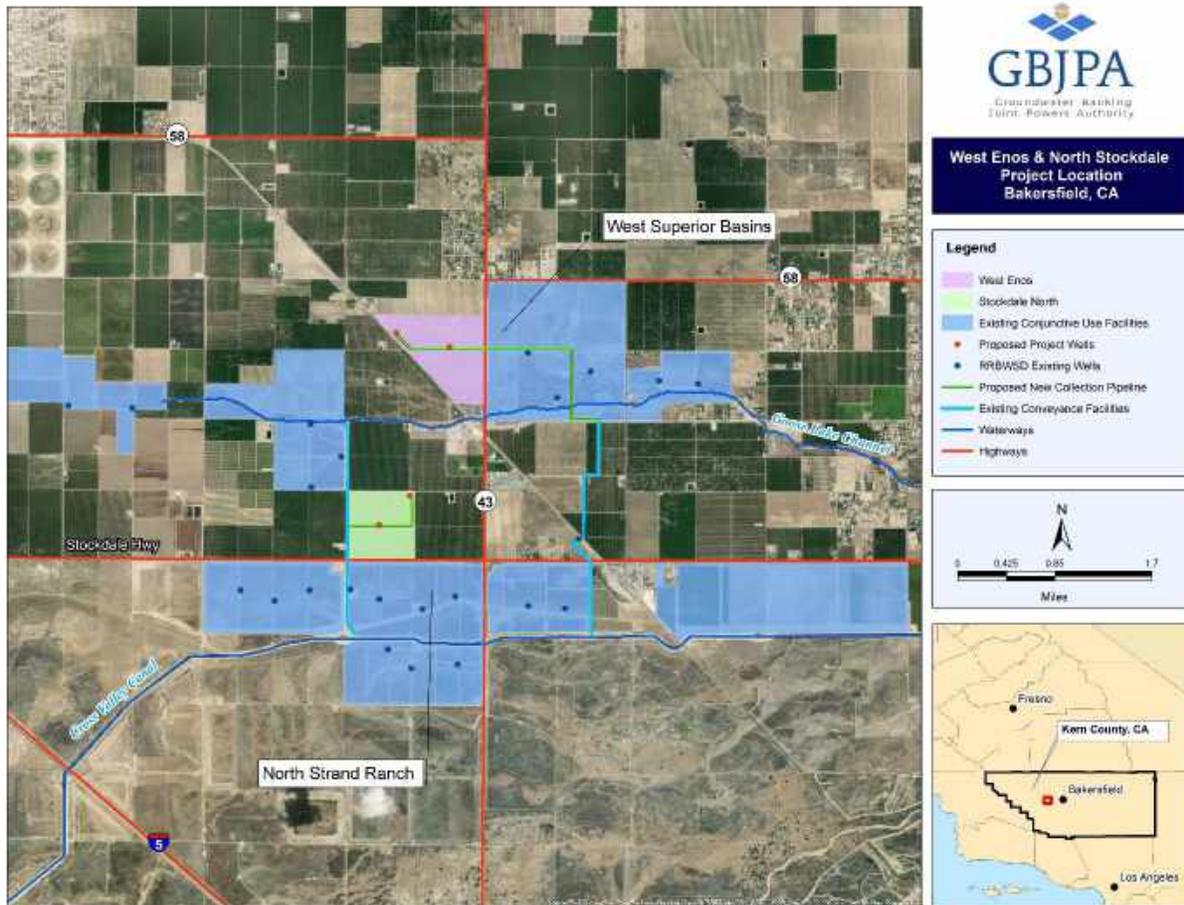


Figure 2 shows the location of the proposed West Enos and Stockdale North recharge basins as well as a preliminary estimate of the locations of the wells and conveyance facilities that will deliver water to and from the Stockdale North and West Enos Phase 1 project site.

Phase 1 is designed to improve the GBJPA’s water storage opportunities for future generations by increasing groundwater storage in wet years and recovering groundwater during periods of drought and limited water supply. This will be accomplished in four major steps. 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 3 to 5 separate recharge basins on each property. Precast concrete structures and 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. The second step will be the drilling and equipping of four (4) production wells, two on each of the sites for recharge.

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 and local experience. Equipping will be done after the drilling is finished, see **Appendix A** for a layout of the well equipping facilities. 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 additional capacity to cater to recovery flows off 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 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 flood 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 two separate 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 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 demands, or east to the Friant Kern Canal to satisfy Federal Water 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 the same crossing as the delivery box 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 aspects, or details 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 the environmental review, will be completed in approximately 39 months. Please see **Appendix C** for a preliminary Project Schedule.

With extreme restrictions in California regarding the development and construction of more above-ground water storage, the Phase 1 Project provides an achievable way to increase water storage opportunities in the State via groundwater banking. Some of the major benefits of this project are listed below:

- Support the GBJPA’s water users (agricultural, municipal, and industrial).
- Provide enhanced protection against prolonged drought and climatic changes.
- 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
- Support the GBJPA’s obligations and exchanges (agricultural, municipal, and industrial)

1.3 Evaluation Criteria

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

E.1.1.1. Subcriterion No. 1a—Enhanced Water Supplies (20 points)

How many additional acre-feet of water are expected to be made available on average each year upon completion of the project? 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 will be accessible for storage within the aquifer. In a single year, 14,940 AF can be recharged, and approximately 14,480 AF can be recovered. 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 P**), 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)

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:

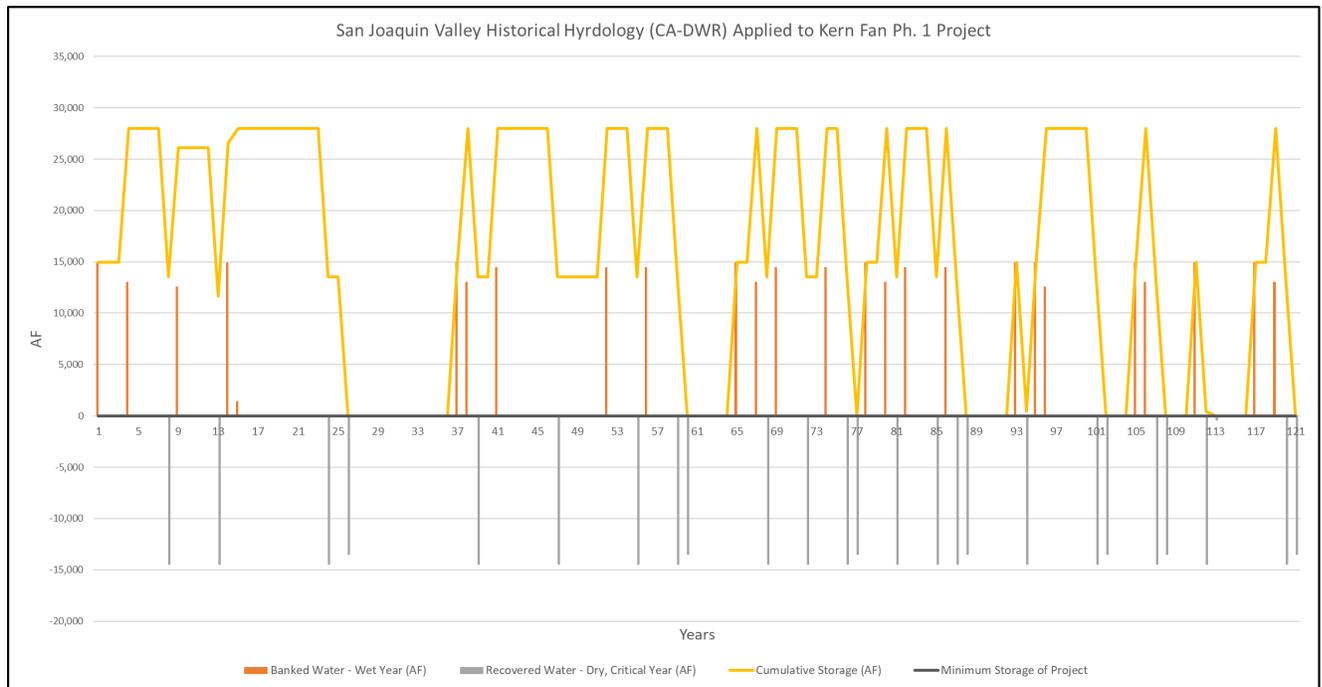
5 cfs (flow rate) x 1 cfs/1.983 AFD (acre-feet/day) x 365 days/year x 2 wells
= 7,240 AF / year

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 used two different methods to calculate the annual water supply benefit. In the feasibility study modeling results provided by consultants at MBK Engineers performed a hydrologic analysis using the CalSim II baseline Benchmark model with 20135 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 has been 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, most of IRWD’s demand is mainly 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 % |

During an average year, the supplies of the project aren’t physically collected, because water is either being banked or the facilities are in a standby operation (not banking, not recovering). For the average annual 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 of average annual yield is due to an additional amount of loss percentage of recharge water that is required for IRWD as this water is ultimately used outside of Kern County requiring additional losses.

RRBWS 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 surface water supplies.

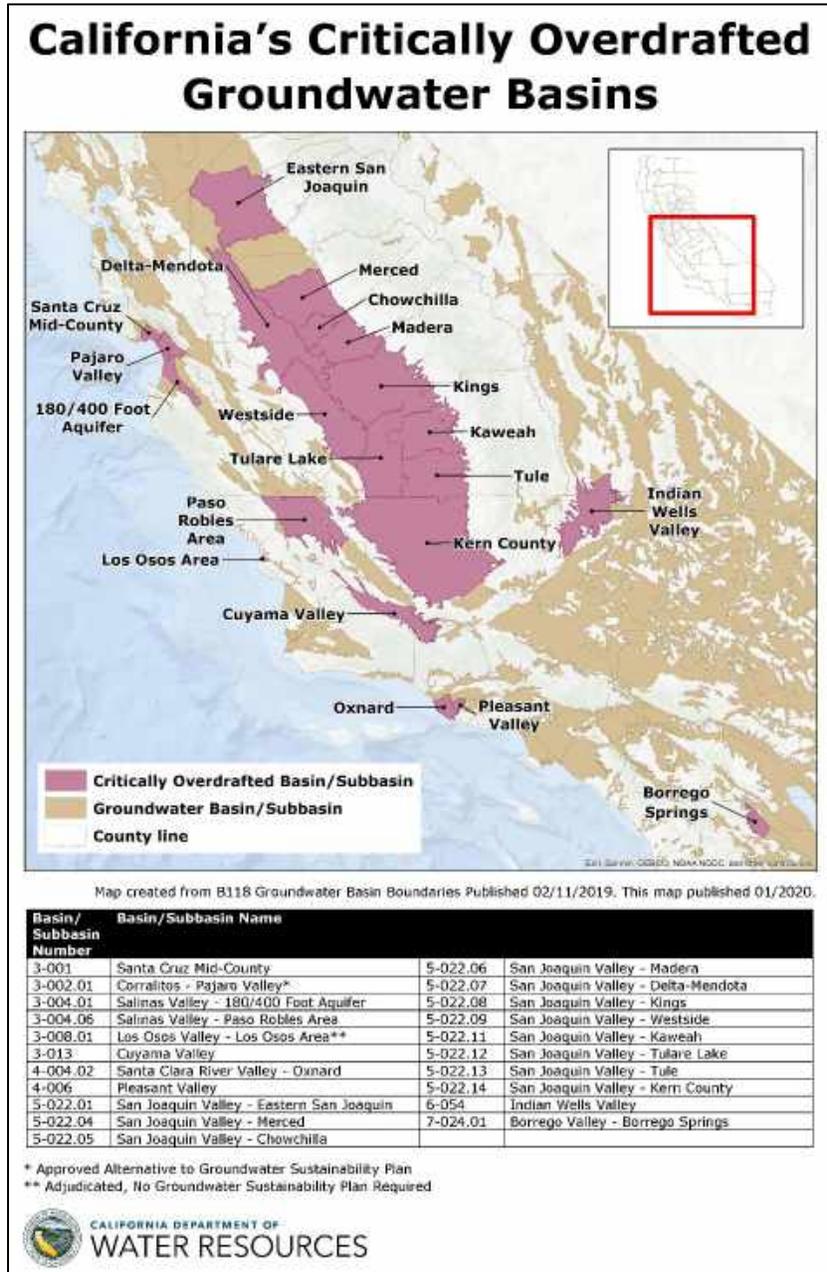
Will the project reduce groundwater overdraft and positively contribute to the sustainable yield of a groundwater basin or local aquifer? Explain.

The Project will reduce groundwater overdraft and positively contribute to the sustainable yield of the Kern Sub-basin. SGMA requires governments and water agencies of high and medium-priority basins to halt overdrafting 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 ($100,000 \text{ AF} / 1,280 \text{ acres} = 78.125 \text{ AF/acre}$). 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 ($78.125 \text{ AF/acre} \times 350 \text{ acres} = 27,344 \text{ AF}$). 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



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 2** for District well locations 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.

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 be impacted by the project, including quantifications where applicable.

By storing excess wet year water supplies, the Project will alleviate drought-year water supply demands from the SWP and CVP. A description of each source of water supply and how each water supply will be impacted by the Project is included below:

State Water Project (SWP):

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 is 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. Particularly 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. Article 21 water stored by the Project can be used in dry years when the SWP supplies are short which will help to reduce pressure on the SWP system.

Central Valley Project (CVP):

The United States Bureau of Reclamation (Reclamation) delivers Central Valley Project (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.

CVP and SWP Supplies Impacted by Project:

Due to the nature of California’s hydrology, there are often wet-year 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 reliability and operational flexibility of the SWP and CVP systems. By integrating the operation of SWP and CVP surface reservoirs with groundwater storage in the Kern River Fan Project, water supplies that would have been lost to the ocean can be made available for use in dry years.

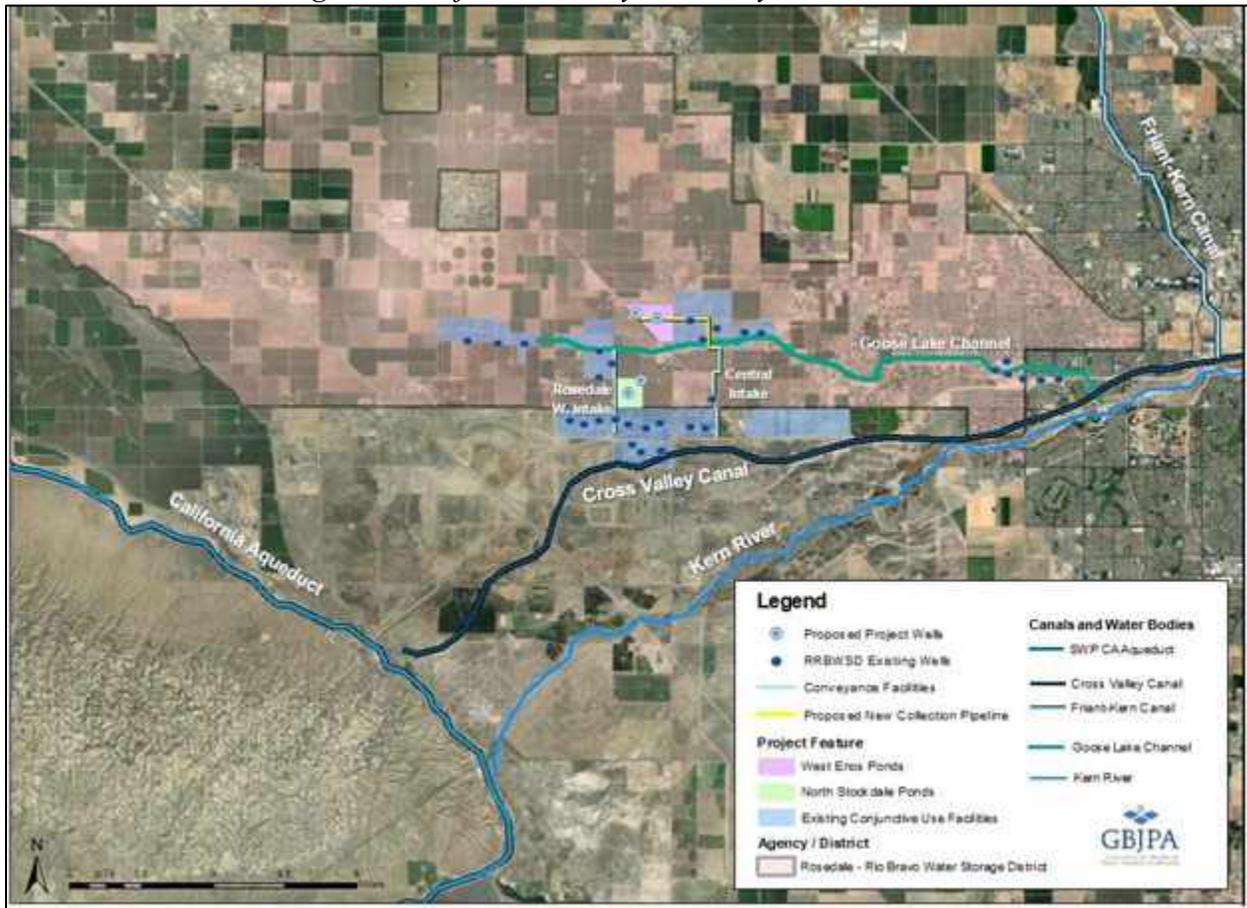
The GBJPA utilized modeling results provided by consultants at MBK Engineers to estimate the anticipated water supply that could be available for the Project. MBK Engineers performed a hydrologic analysis using the CalSim II baseline Benchmark model with 2035 Central Tendency Climate data, published 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 on an average annual basis for the Phase 1 Project are presented in **Table 2** 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 2: Projected Water Supply for Phase 1

| <i>Water Supply Type</i> | <i>Amount (AF per year)</i> |
|--------------------------|-----------------------------|
| 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)

Will the project make water available to address a specific concern? Consider the number of acre-feet of water to be made available and the severity of the concern. Explain the role of the project in addressing that concern and the extent to which the project will address it. 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 concerns 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 (see section E.1.1.1. and **Appendix E** for further Project storage analysis).

b) Water Supply Reliability

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 over-pumping 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 overdrafts 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 Project will provide an improved groundwater level benefit in Kern County as a result of the Project's leave behind water which will help the Kern County Sub-basin comply with SGMA goals. 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 purposes will meet applicable requirements for water quality. The proposed recharge water would not have elevated concentrations of 1,2,3-TCP (Kern Fan Project DEIR, 2020). For more information regarding water quality and mitigation, please see **Appendix P** to access the Kern Fan Project DEIR.

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. This 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 which will alleviate the stress of increased competition for water supplies from the Delta and climate change impacts.

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. On the converse side, dry years supplies can be extremely inadequate, but recovered water from the Project can provide 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 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 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 more intense periods of available excess supplies and longer periods of supply shortages. The Project will provide increased water supply reliability benefits for multiple local 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 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 include other natural hazard risk reductions for hazards such as wildfires or floods? Explain.

Uncertainties related to the effects of climate change increase the need for water supply reliability that comes from new storage capacity. Climate change is expected to result in California becoming hotter and drier, with more periods of extended drought, wildfires, and a shift from less snowfall to more rainfall with significant potential for flooding. Due to these climatic uncertainties, there is a need for more storage to capture water supplies during wet periods and facilities to recover water supplies during dry periods. Storage capacity south of the Delta will be especially valuable as the effects of climate change continue, making dry year surface supplies increasingly less reliable to users south of the Delta. Therefore, the proposed Project has the potential to reduce these natural hazard risks by storing available flood water during wet years reducing potential flooding to agricultural areas and increasing water supplies throughout the state during dry years, which could also provide beneficial uses for fighting fires.

d) 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.

Severity of actual or potential drought impacts to be addressed by the project. Describe recent, existing, or potential drought conditions in the project area.

The State of California suffers from recurrent water supply shortages due to drought and the associated impacts of climate change, further exacerbated by increased competition for limited surface and groundwater supplies. This year, California is once again faced with dry conditions, with most of the state facing severe or extreme drought conditions. The Sierra snowpack, where much of the state's water is stored as snowmelt, occurred well below normal conditions. This year, April measurements of the Sierra snowpack, when the snowpack is typically near its deepest, were only 38% of the average (Sierra Nevada Updates, 2022). As a result, deliveries from the State Water Project have been reduced to five percent allocations with the expectation that next year will be dry as well. In addition, water supplies in major reservoirs throughout the state are at low levels and legal and environmental restrictions have impaired the SWP's ability to move water through the Delta, making dry year surface supplies increasingly less reliable to users South of the Delta (RRBWSD and IRWD). Additionally, January-October of 2022 has been the driest on record in California, see **Figure 6** below from the National Oceanic and Atmospheric Administration ("NOAA"), and Kern County continues to remain in exceptional drought conditions, see **Figure 7** from the U.S. Drought Monitor.

Figure 6. January-October 2022 Statewide Precipitation Ranks

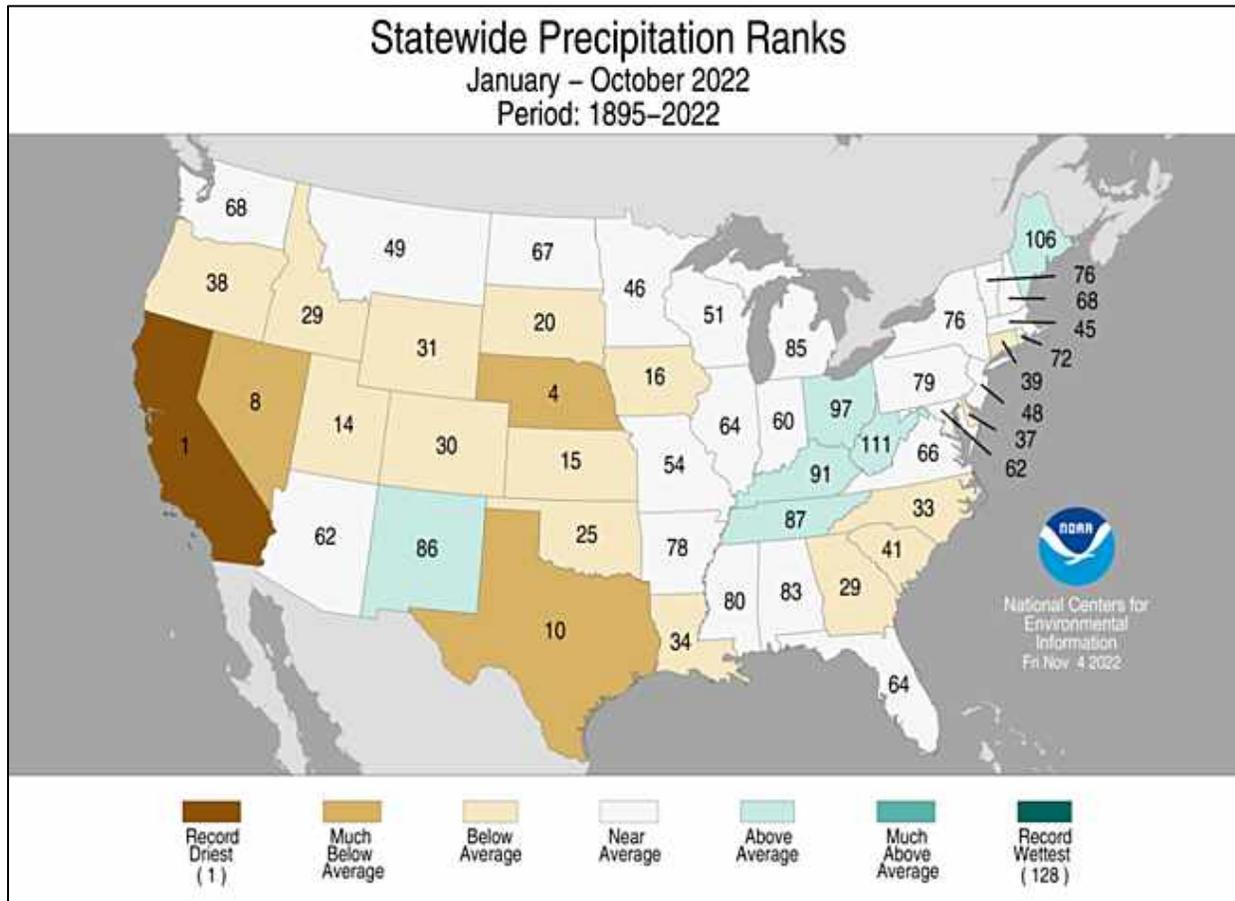
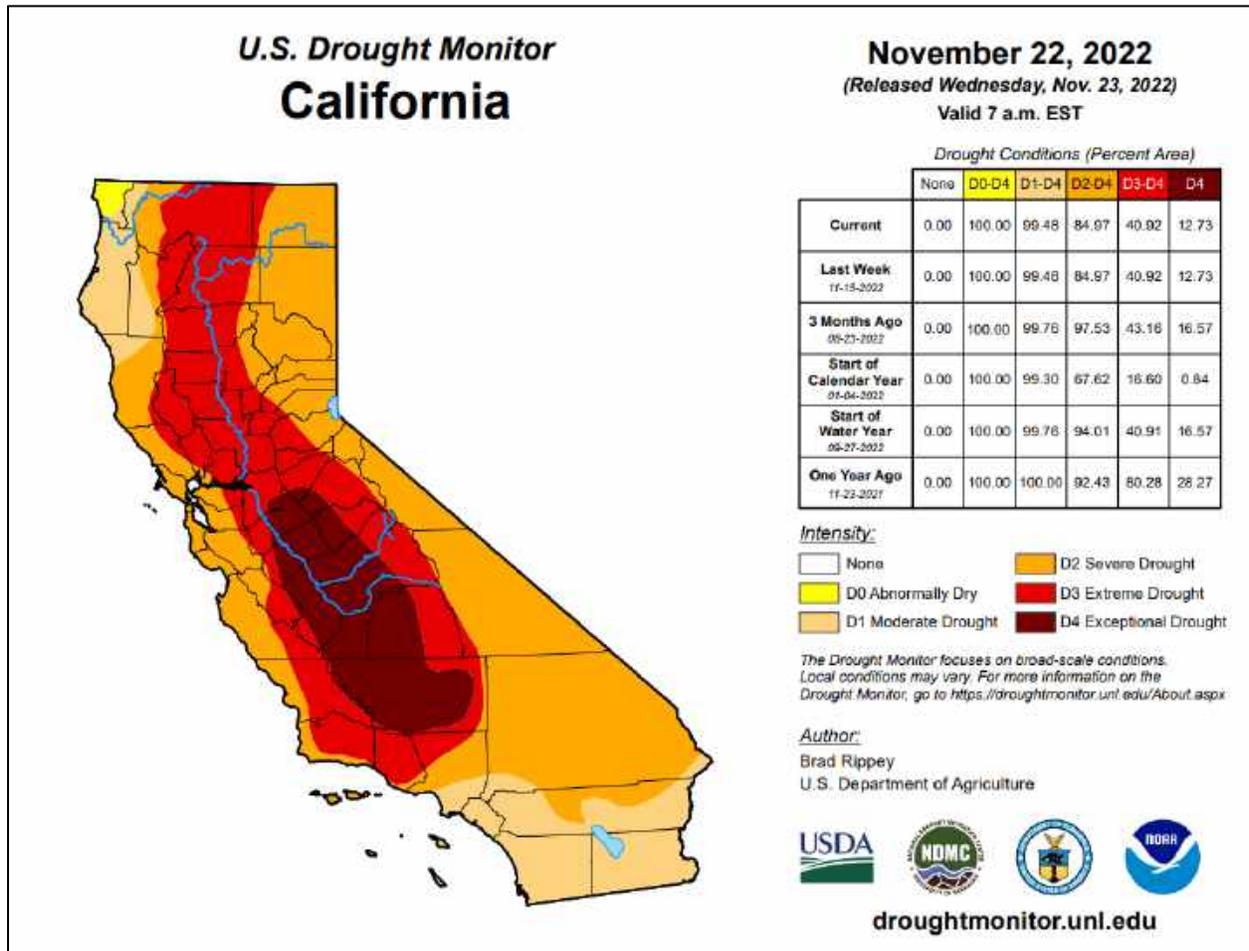


Figure 7. California Drought Monitor as of November 2022



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 I will help create additional flexibility to address drought. In response to the decreased reliability of water supplies due to 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.

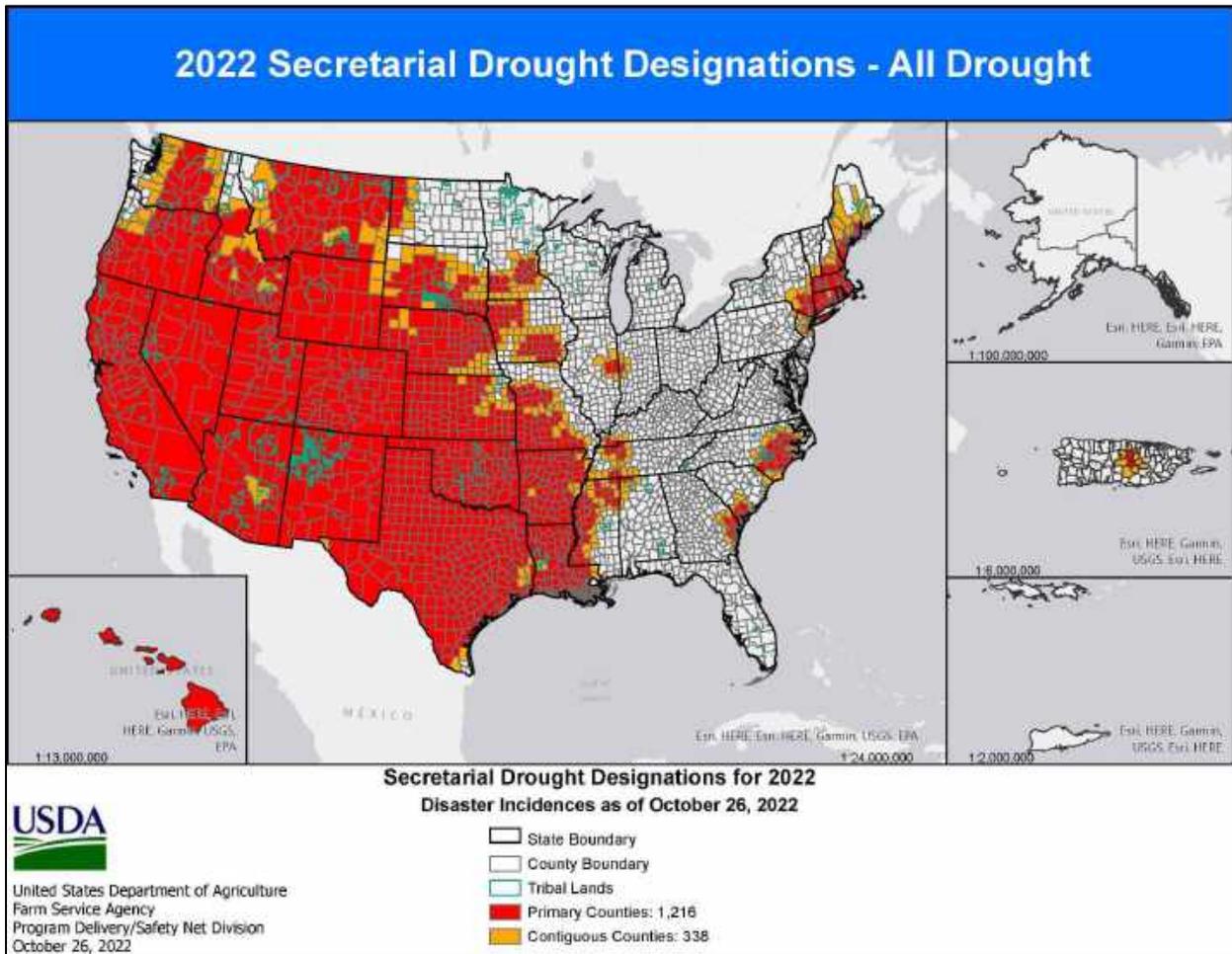
b) Has the area served by the project been identified by the United States Drought Monitor as experiencing extreme or exceptional drought for at least one consecutive year in the last four years? Explain.

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. The area served by the Project, Kern County, has been designated by the United States Department of Agriculture (“USDA”) as a Secretarial Drought Designated area for multiple years. 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. The Secretarial Disaster Designation 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. **Figure 8** below shows Secretarial Drought Designations for 2022, where Kern County is listed as a primary county. See **Appendix M** for the last four years of Secretarial Drought Designation maps, where Kern County has been listed as either a primary or contiguous county. **Appendix M** also includes the USDA’s Disaster Assistance fact sheet for more information regarding the disaster designation and declaration processes.

Figure 8. 2022 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 flood 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.

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

The proposed Project is a milestone in Rosedale's Groundwater Sustainability Plan to obtain a sustainable water supply by 2040. The path and the milestones to meet by 2030 can be seen in **Appendix N**. The project is critical to meeting RRBMA's goals and successfully implementing the water plan through the Kern County Sub-Basin. This project will also contribute to the Joint Operating Committee and the Kern Fan Monitoring Committee, protecting groundwater for both agricultural and domestic users alike. To view Rosedale's Groundwater Sustainability Plan, use the following for more information: <https://www.rrbwsd.com/wp-content/uploads/2022/07/2022-07-15-jpa.-RRBMA-Revised-GSP-Chapter-clean-FINAL.pdf>.

The Project will also help implement *California's Water Supply Strategy – Adapting to a Hotter, Drier Future* released in August 2022. This focused plan is designed to ensure California's water can meet future needs and adapt to climate change and prioritizes the key strategies, including the need to expand average annual groundwater recharge by at least 500,000 AF. It specifically identifies the overall Kern Fan Groundwater Storage Project, which this Project is an initial phase of, as a key component in meeting California's expanded water storage objectives. <https://resources.ca.gov/-/media/CNRA-Website/Files/Initiatives/Water-Resilience/CA-Water-Supply-Strategy.pdf>

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, fewer 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.

Will the additional storage in the local area provided by the project reduce reliance on imported water supplies that have an impact on Federally listed threatened or endangered species? If so, how?

Yes. The Project is a regional project that will provide increased water supplies for its stakeholders (Rosedale and IRWD) by storing excess water supplies when available, reducing reliance on the Delta and Friant water systems during periods of drought. The Delta is an important ecosystem for several threatened and endangered species such as the delta smelt and other listed salmonid species which are impacted during dry, critical years. Project operations during dry years will provide benefit to the Delta, as the GBJPA would be recovering water stored by the Project, subsequently reducing exports from the Delta.

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? 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— Rural and Economically Disadvantaged Communities (10 points)

Does the project provide benefits to at least one rural community? If so, explain and discuss to what extent the project serves rural communities. For the purposes of this funding opportunity, a rural community is defined as an incorporated or unincorporated census designated place with fewer than 50,000 people.

Yes, the project provides benefits to multiple rural communities. Many landowners living in the Rosedale-Rio Bravo WSD boundary are not connected to public water lines and are reliant on groundwater and a private or community well 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 would be considered rural communities by these standards.

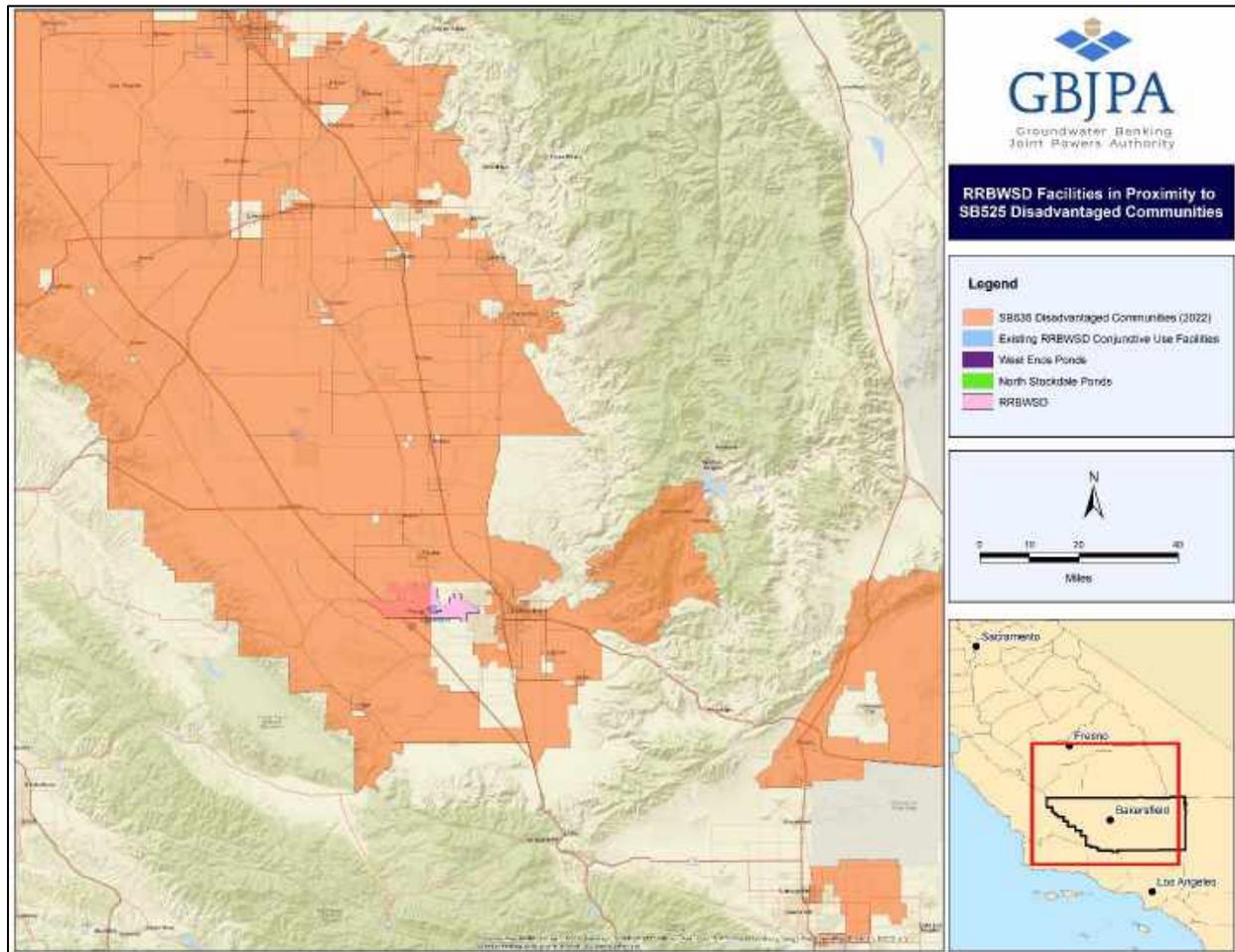
EO 14008 and EO 13985 affirm the advancement of environmental justice and equity for all through the development and funding of programs to invest in disadvantaged or underserved communities.

Does the project provide benefits to at least one economically disadvantaged community? If so, explain and discuss to what extent the project serves economically disadvantaged communities. This may include neighborhoods, census tracts, census designated places, or incorporated areas within a larger service area that are economically disadvantaged. A community may be considered disadvantaged based on a combination of variables that may include:

- a. low income, high and/or persistent poverty,*
- b. high unemployment and/or underemployment,*
- c. racial and/or ethnic segregation, particularly where the segregation stems from discrimination by Federal or non-Federal government entities,*
- d. linguistic isolation,*
- e. high housing cost burden relative to available income and substandard housing,*
- f. high transportation cost burden and/or limited access to public transportation,*
- g. high energy cost burden,*
- h. disproportionate environmental stressor burden and high cumulative impacts,*
- i. limited water and sanitation access and affordability,*
- j. disproportionate impacts from climate change,*
- k. jobs lost due to energy transition (e.g., fossil fuels to renewables),*
- l. jobs lost due to environmental regulations on resource intensive industries, and/or*
- m. lack of access to affordable healthcare.*

The GBJPA has groundwater banking projects with agencies that serve areas that include disadvantaged communities such as Rosedale, Lamont, Arvin, Delano, Firebaugh, Dos Palos, Los Banos, Gustine, and Newman. These facilities would provide drought water supplies to these areas. All of the previously mentioned communities lie within the orange areas of the map, see **Figure 9**, which represents SB 535 Disadvantaged Communities designation. These areas are below 80% of the statewide median income.

Figure 9. SB 535 Disadvantaged Communities Designation (in orange)



E.1.4. Evaluation Criterion 4—Stakeholder Support (9 points)

Does the project promote collaborative partnerships to address water and related issues? Explain.

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. The Project will also promote regional partnerships that will provide a reduced reliance on the Delta and Friant water systems during periods of drought. 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 include outreach and opportunities for the public to learn about the project either during planning, design, construction, and/or completion? Explain.

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 of both of these project sites are adjacent to state highways and will be in the public eye 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. In addition, the proposed overall Kern Fan Groundwater Storage Project is a planned supplemental water supply project included in the Rosedale Management Area (“RRBMA”) Groundwater Sustainability Plan. To maintain groundwater sustainability within the Rosedale management area, the RRBMA plans to implement a combination of water banking projects and water management actions. 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 RRBMA: Agricultural, Urban, areas outside of the Rosedale service area boundary, and Groundwater Banking entities. These meetings provide stakeholders within the RRBMA 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 recently had 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.

Does the project provide a more reliable water supply for States, Indian Tribes, and/or local governments (including subdivisions of those entities)? If so, identify the specific beneficiaries and explain how reliability is improved for each by partnership in the project.

The Project does not specifically benefit one State or local government entity, but by increasing dry year water supplies many state and local government entities stand to benefit. As shown in **Appendix J**, which includes support letters for the Project, there are numerous entities and governmental districts that would benefit from water supply reliability improvements provided by the proposed Project.

E.1.5. Evaluation Criterion 5—Economic Benefits (30 points)

E.1.5.1. Subcriterion No. 5a—Cost Effectiveness (10 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 3.***

The estimated construction costs by year can be found in **Table 3** below and are backed up in **Appendix O with additional backup in Appendix S** .

Table 3. Estimated Construction Costs by Year

| <i>Calendar Year</i> | <i>Construction Cost</i> |
|----------------------|--------------------------|
| <i>1. 2022</i> | <i>\$8,995,398.00**</i> |
| <i>2. 2023</i> | <i>\$6,532,958.74</i> |
| <i>3. 2024</i> | <i>\$12,853,448.84</i> |
| <i>4. 2025</i> | <i>\$7,590,727.79</i> |

*** Please note the costs associated with 2022 are 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 \$35,000 for NEPA review. Total planning/design = \$1,660,000. Please note construction management and inspection services were not included in this. See **Appendix O** and the Budget Proposal (**Table 11**) 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 Jaspas & Associates for the full Kern Fan Project, which includes Phase 1 facilities (**Appendix T**). 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

(f) all estimated replacement costs by year as shown in Table 4. 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 4. Replacement Costs by Year

| Description of Replacement Requirement | Year | Cost |
|---|-------------|---------------------|
| Interbasin Recharge Basin Structures (West Enos) | 2073 | \$436,037 |
| Interbasin Recharge Basin Structures (Stockdale North) | 2074 | \$290,692 |
| Conveyance Pipeline and Crossings (West Enos) | 2099 | \$16,267,275 |
| Conveyance Pipeline and Crossings (Stockdale North) | 2100 | \$19,010,172 |
| (2) Well Replacement (West Enos) | 2073 | \$7,002,479 |
| (2) Well Replacement (Stockdale North) | 2074 | \$6,785,964 |
| (2) Pump, Motor, Well Appurtenances (West Enos) | 2034 | \$3,755,305 |
| (2) Pump, Motor, Well Appurtenances (Stockdale North) | 2035 | \$3,755,305 |

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 S** 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 20135 Central Tendency Climate data, published by Reclamation in March 2022. For purposes of this feasibility study, 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 (**Appendix G**). The other 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. In extremely wet years, the Project sponsor could potentially use the recharge basins year-round to store water in 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) a description of the conditions that exist in the area and projections of the future with, and without, the project.***

The GBJPA has evaluated the conditions and future projections with, and without the Phase 1 Project. As mentioned, water supplies in California are stressed due to increased competition, reoccurring drought, environmental restrictions, and the effects of climate change. The Phase 1

Project will provide an essential supplemental supply for IRWD during periods of extended drought and major water supply interruptions and in meeting Rosedale's supplemental water supply needs to help avoid a potential long-term water supply deficiency. In addition, IRWD and Rosedale need to plan for supply shortages due to long-term climate change impacts that affect the timing and frequency 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. This dry year supply would provide Rosedale and IRWD customers with increased water supply reliability. Water supplies from the Project can also be utilized during other water supply shortages such as a Delta levee failure event. In addition, during wet years Rosedale and IRWD can procure water at a low cost in comparison to purchasing water during dry years when water supplies are extremely high cost. During periods of drought, many farmers are forced to fallow their lands due to the inability to purchase costly water supplies. The Phase 1 Project will provide Rosedale and DRWD agricultural customers with an affordable water supply during periods of drought.

During recharge events, the Project will provide intermittent wetland habitat along the Pacific Flyway that supports migratory birds and other waterfowl. Project operations during dry years will also provide an indirect benefit to the Delta, as the GBJPA would reduce its imports from the Delta by recovering water from the Project in Kern County instead.

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.

Without Project Future Projections

Without the Project, Rosedale and IRWD would not be able to fully meet demands during droughts and other water supply interruptions. Additional stored water supplies would not be available to Rosedale and IRWD during periods of drought or supply interruption, decreasing water supply reliability for their customers. Rosedale and IRWD would be forced to procure costly dry year supplies, and likely would need to pass these costs on to their customers. This would create negative impacts on Rosedale and DRWD and even potentially other federal contractors that could benefit from dry year supplies provided by Phase 1. To procure dry year supplies, Rosedale and IRWD would likely rely on what little water supplies are available from the Delta. During wet-years, intermittent wetland habitat along the Project recharge basins would not exist along the Pacific Flyway for waterfowl and other shorebirds, raptors, and migrating birds. Rosedale would also be in danger of triggering minimum thresholds and exceedances, and by doing so would fail to comply with their GSP under SGMA. Finally, without the Project's additional groundwater storage, during wet years excess water supplies would be lost to the

ocean or otherwise left uncaptured for future use due to a lack of storage options available. A No Project Alternative does not meet any of the Planning Objectives or Small Storage Program priorities described above.

(b) 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 Project sponsor 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 5**.

Table 5: 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 | \$50.15 million | - |
| Cost per AF (50 years, net present value basis) | \$404.15 | \$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 \$404.15 per AF, a savings of \$304 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.

(c) 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 6 shows feasibility-level cost estimates for the Existing Water Bank Alternative Plan in 2022 dollars.

Table 6: 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

(d) 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. As shown in Table 8 below, the net present value unit cost for the Project is \$404.15 per AF, a savings of \$304 per AF (See **Table 5**).

Without the Project, the GBJPA’s estimated costs would be \$87.9 million (\$53.4 million + \$34.5 million) as shown in Table 5 over the 50-year operating period. With the implementation of the Project, GBJPA’s estimated costs would be approximately \$50.15 million (see **Table 8**). The Phase 1 Project represents a net present value savings in excess of \$37.7 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 (20 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.

**Please note that information must be included in the proposal to be considered. Scores will not be based on information provided in the project's feasibility study if the information is not included in the proposal.*

- 2. Some project benefits may be difficult to quantify and/or monetize. 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. Does the project provide multiple benefits, or is it a single purpose facility? If the project provides multiple benefits, please describe. The purpose of this question is to identify projects with multiple benefit categories (i.e., projects will be evaluated based on how the proposed project will provide multiple benefits, including water supply reliability, ecosystem benefits, groundwater management and enhancement, and water quality improvements.*

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 \$36.6 million.

Interest during construction is calculated separately from the project's capital costs. Costs are in 2022 dollars, expressed in present value terms at the expected start of project operations using the Federal water resources planning discount rate of 2.25 percent interest during construction, which is the interest on capital expenditures between the time of expenditure and the start of operations. The Phase 1 Project is expected to incur Interest During Construction costs from the

period May 2023 through September 2025. The estimated interest during construction for the Phase 1 Project is \$2.47 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 \$50.16 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. For purposes of this Feasibility Study, 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 feel that this approach is 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. Further detail on the methods and assumptions used for calculating the economic benefits is provided in the Feasibility Study. The benefits can be further broken down in **Appendix D** and 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 values¹ 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

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>

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 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 Rosedale-Rio Bravo Management Area 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 7**.

Table 7: 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 multi-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 8. 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 \$404.15 per AF. The total sum of benefits is approximately \$1,375.28 per AF demonstrating that the project is highly cost-effective.

Table 8: Monetized Project Costs and Benefits Per AF

| COSTS | | |
|--|-----------|-----------------|
| Project Capital Costs: | \$ | 36,625,324 |
| Interest During Construction: | \$ | 2,472,209 |
| NPV of O&M Costs: | \$ | 10,001,746 |
| NPV of Replacement Costs: | \$ | 1,056,138 |
| Total Costs: | \$ | 50,155,417 |
| Total AF Water Supplied: | | 124,100 |
| Cost/AF: | \$ | 404.15 |
| 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 | | 3.4 |

1. Some Project benefits may be difficult to quantify and/or monetize. 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.).

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 runoff². 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. 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.

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

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.

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.

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 \$29,358,150. See **Table 9** below for the breakdown of the funding amount.

Table 9. Funding Sources

| Funding Source | Funding Amount |
|--|-------------------------------|
| Non-Federal Entities | |
| Groundwater Banking Joint Powers Authority | \$29,358,150.00 |
| Groundwater Banking Joint Powers Authority (in-kind) | \$ 0 |
| Non-Federal Subtotal | \$29,323,150.00 |
| | |
| Requested Reclamation Funding | \$ 9,774,383.00 |
| <i>Total Project Funding</i> | <i>\$39,132,533.00</i> |

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. The scope of the project was too large to be applicable for the WaterSMART drought resiliency grant, and at this time there are no other pending funding requests.

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 costs, which between both properties totaled \$8,995,398.00. 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 beneficial in location to 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 costs for analyzing the location of the recovery wells, environmental obstacles, and the effectiveness of the recharge ground.

Please refer to **Table 10** (below) for a summary of all funding sources.

Table 10. Summary of Funding Sources

| Funding Sources | Percent of Total Project Cost | Total Cost by Source |
|------------------------|--------------------------------------|-----------------------------|
| Recipient Funding | 75% | \$ 29,358,150 |
| Reclamation Funding | 25% | \$ 9,774,383 |
| Other Federal Funding | 0% | \$ 0 |
| Total | 100% | \$ 39,132,533 |

2.2 Budget Proposal

Submission of a budget proposal is mandatory. Applications that fail to fully disclose this information will be considered ineligible and will not pass initial screening. The total project cost is the sum of all allowable items of costs, including all required cost sharing and voluntary committed cost sharing (including third-party contributions) that are necessary to complete the project. The budget proposal should include detailed information on the categories listed below and must clearly identify all project costs, including those that will be contributed as non-Federal cost share by the applicant (required and voluntary), third-party in-kind contributions, and those that will be covered using the funding requested from Reclamation, and any requested pre-award costs. Unit costs must be provided for all budget items, including the cost of services or other work to be provided by consultants and contractors. Applicants are strongly encouraged to review the procurement standards for Federal awards found at 2 CFR §200.317 through §200.326 before developing their budget proposal.

It is also strongly advised that applicants use the budget proposal format shown in Table 2 or a similar format that provides this information. If selected for award, successful applicants must submit detailed supporting documentation for all budgeted costs.

The estimated cost of the project including feasibility study, environmental assessments, all associated construction costs, CEQA documents, and permits is **\$39,132,533**. Please refer to **Table 11**. A detailed and itemized breakdown of each facility and component of the project in **Table 11** can be found on pages 7-8 of **Appendix O**. The GBJPA is requesting approximately

\$9,774,383 (or just less than 25% of total project costs) in federal funding from USBR 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.

Table 11. Budget Proposal

| Groundwater Banking Joint Power Authority | | | | | | | | |
|---|---|---------------------|------|-----|-------------------|---------------------|----------------------|-------------------------|
| R23AS00019 Phase 1 - Kern Fan Groundwater Storage Project | | | | | | | | |
| Item | Budget Item Description | GBJPA Project Costs | | | Budget | | | Explanation of Estimate |
| | | \$/Unit | Unit | QTY | GBJPA Funding | Reclamation Funding | Total | |
| 1 | Contractual / Construction | | | | | | 33,500,324 | |
| a | Land Acquisition | 8,995,398 | LS | 1 | 8,995,398 | | 8,995,398 | engineers est. |
| b | Well Drilling | 1,280,698 | LS | 4 | 3,073,675 | 2,049,116 | 5,122,791 | engineers est. |
| c | Well Equipping | 1,540,329 | LS | 4 | 3,696,790 | 2,464,526 | 6,161,316 | engineers est. |
| d | Conveyance | 7,988,850 | LS | 1 | 4,793,310 | 3,195,540 | 7,988,850 | engineers est. |
| e | Recharge Ponds | 13,861 | Ac. | 360 | 3,093,781 | 1,896,188 | 4,989,969 | engineers est. |
| f | SCADA and PLC Programming | 242,000 | LS | 1 | 107,988 | 134,012 | 242,000 | engineers est. |
| 2 | Environmental and Regulatory Compliance | | | | | | 165,000 | |
| a | Reclamation NEPA Review | 30,000 | LS | 1 | 0 | 35,000 | 35,000 | USBR estimate |
| 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 | | | | | | 0% | |
| 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 | 250,000 | LS | 1 | 250,000 | | 250,000 | past project |
| 4 | Variable Costs | | | | | | 2,472,209 | |
| a | Interest During Construction (over 3 years of construction) | 824,069.79 | LS | 3 | 2,472,209 | | 2,472,209 | |
| 5 | Total | | | | | | \$ 39,132,533 | 0 |
| a | GBJPA Contribution | | | | 29,358,150 | | | |
| b | Reclamation Contribution | | | | | 9,774,383 | | |
| c | Percent Funded by GBJPA | | | | | | 75% | |

2.3 Budget Narrative

Submission of a budget narrative is mandatory. Applications that fail to fully disclose this information will be considered ineligible and will not pass initial screening. The budget narrative provides a discussion of, or explanation for, items included in the budget proposal. The types of information to describe in the narrative include, but are not limited to, those listed in the following subsections. The information in the narrative should include, but is not limited to, that identified in the Budget Narrative Guidance attached to this NOFO. Applicants may elect to use the Budget Detail and Narrative spreadsheet for their budget narrative. Costs, including the valuation of third-party in-kind contributions, must comply with the applicable cost principles contained in 2 CFR Part §200, available at the eCFR (www.ecfr.gov).

Table 12. Budget Narrative Form

| Summary | | | |
|------------------------------|---------------------|--------------------------|------------------------------|
| 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 | \$30,137,135 | | |
| h. Other Direct Costs | \$0 | | |
| i. Total Direct Costs | \$39,132,533 | | |
| i. Indirect Charges | \$0 | | |
| Total Costs | \$39,132,533 | \$9,774,383 | \$29,358,150 |
| Cost Share Percentage | | 24.98% | 75.02% |

The following is a description of the line items in **Table 11** in the budget proposal and the required Budget Narrative Form in **Table 12**.

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 O**.

Environmental and Regulatory Compliance - The GBJPA intends to work 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. Based on the inspection of the NOFO, it is understood that Reclamation will determine who will perform the work under this category (i.e. Reclamation, the Applicant, or a consultant). For purposes of this grant proposal, based on previous projects performed by the GBJPA, and feedback from Reclamation, it was assumed that the work would be performed at an estimated cost of \$35,000. The GBJPA will provide all funding related to environmental and regulatory compliance for the Project regarding CEQA requirements.

- a) This is the estimated cost to conduct project biological and cultural surveys by qualified consultants as required for CEQA and NEPA compliance.
- b) This is the estimated cost to prepare all necessary studies, reports, and other documents for the project. This includes the cost for environmental consultants.

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 10, 11, and 12** 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 basin land cover. 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 but would mainly happen 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. RRBWSD or the

contractor would utilize a water truck or portable pumps for necessary dust suppression. Dust impacts on the environment will be minimal but will be evaluated according to CEQA and NEPA requirements.

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. There will be no impacts on water but the potential impacts have been evaluated according to CEQA and NEPA requirements.

All project activities will occur on routinely disturbed ground and therefore will have minimal or no impact on animal habitats. 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 on habitat will be evaluated according to CEQA and NEPA requirements. Any necessary preconstruction biological or cultural surveys will be conducted by qualified personnel as required for CEQA and NEPA compliance.

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 CNDDDB detections and observed suitable habitat. 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. The CEQA-Plus document employs several mitigation measures to reduce the impact to less than significant with adopted mitigated. Please see **Appendix Q** for access to the Kern Fan Project DEIR and FEIR.

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. If Reclamation deems it necessary, the GBJPA will retain a private cultural resources management consultant or arrange for Reclamation staff to carry out a consultation to evaluate if any buildings or structures are eligible under the National Register of Historic Places. The expectation is that no historical landmarks will be identified, as the Project will be constructed near actively disturbed agricultural lands.

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 will be conducted. There has been over a century of ongoing farming operations on the Project sites and it is very unlikely that archaeological sites would be currently located or discovered. Nevertheless, the GBJPA is prepared to implement any necessary mitigation measures should cultural resources be identified for any component of the Project.

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 and should only have positive impacts on low income or minority persons living in the region.

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. It is the GBJPA's full intention to satisfy all CEQA and NEPA compliance requirements by October 2023. Another requirement of all projects in California with ground-disturbing activities is routine submissions of the Stormwater Pollution Prevention Plan (SWPPP), which is filed through the Stormwater Multiple Application and Report Tracking System (SMARTS) at the CA State Water Resources Control Board. For the crossing underneath Stockdale Highway and State Highway 43, a Caltrans permit will be required. Well drilling permits are also mandatory as requested by the County of Kern Environmental Health Department required for any drilling or construction of new wells in the county. In compliance with Executive Order N-7-22, coordination between the applicable Groundwater Sustainability Agency will also be required. Due to the nature and location of selected project sites, we expect that no third-party approval or permits will be required from the state to break ground for the Project.

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 were encouraged to submit a similar proposal under the USBR's Small Surface Water and Groundwater Storage Project funding opportunity.

Additionally, the GBJPA has requested funding under 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, funding from the State will not be used to construct the proposed Phase 1. It is expected that once a final funding agreement is executed, the 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

Please see **Appendix Q** for the GBJPA's official resolution.

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 R** for the GBJPA's Auditor's Report.

10. References

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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*

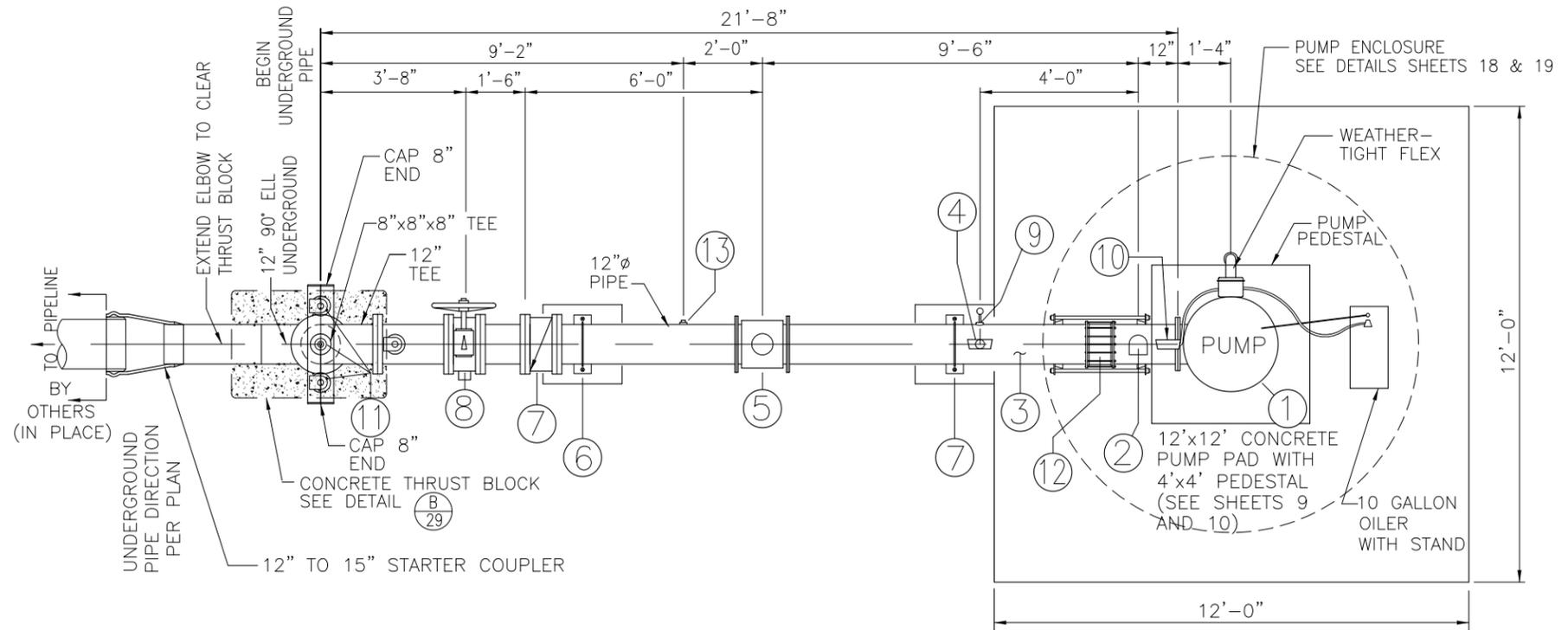
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Retrieved from U.S. Drought Monitor:
<https://droughtmonitor.unl.edu/DmData/DataTables.aspx?county%2C06029>.

Appendix A – Well-Equipping Layout

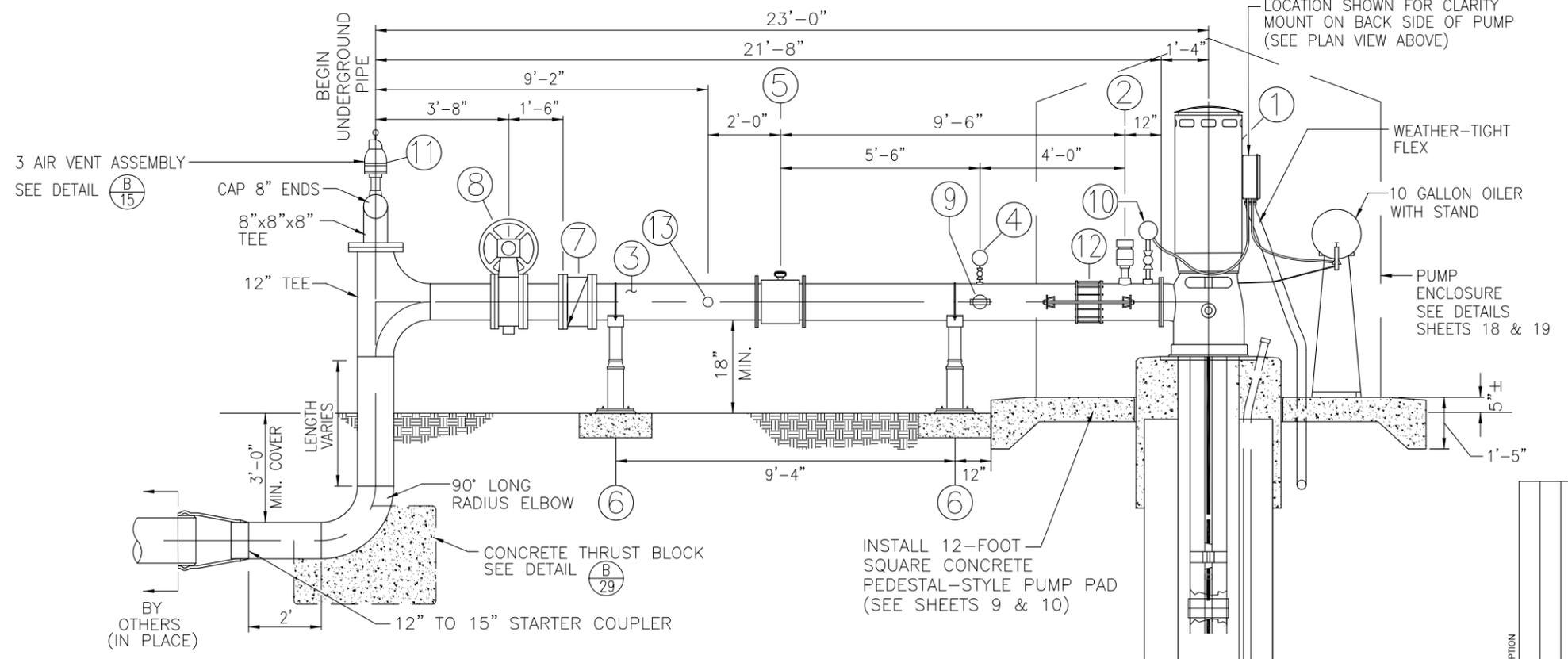
SCOPE OF WORK

- ① PUMPHHEAD 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) TYPICAL WELL DISCHARGE PLAN
14 WELLS SE-1 & SE-2 SCALE: 1" = 2'



(B) TYPICAL WELL DISCHARGE PROFILE
14 WELLS SE-1 & SE-2 SCALE: 1" = 2'



| REV. | DATE | DESCRIPTION |
|------|------|-------------|
| | | |
| | | |

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

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



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

ZEIDERS CONSULTING
1655 GREELEY ROAD
BAKERSFIELD, CA. 93314
(661) 589-8366

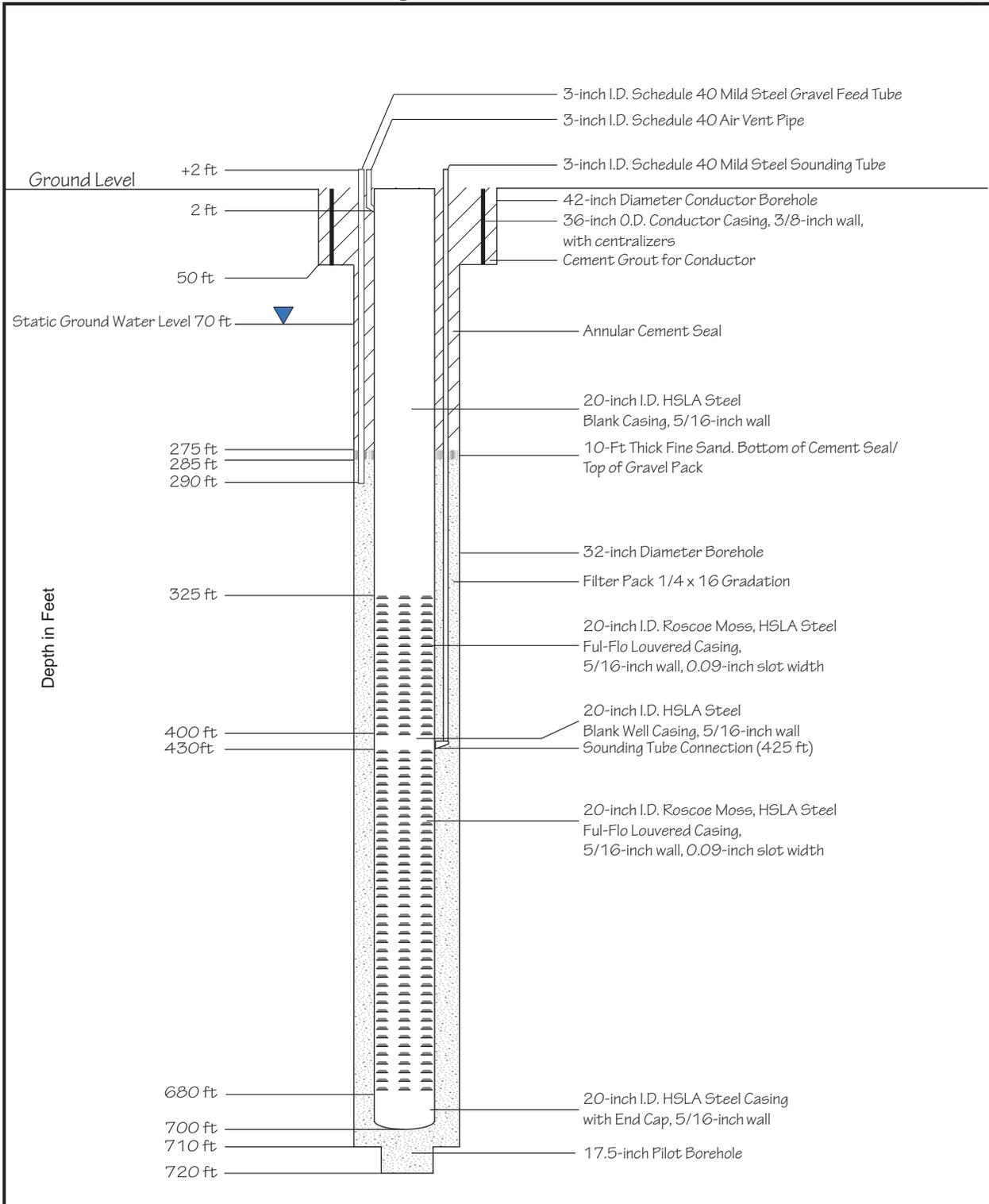
Appendix B – Well Design

DRAFT

Recommended Casing, Screen
and Filter Pack Design

Rosedale-Rio Bravo Water Storage District

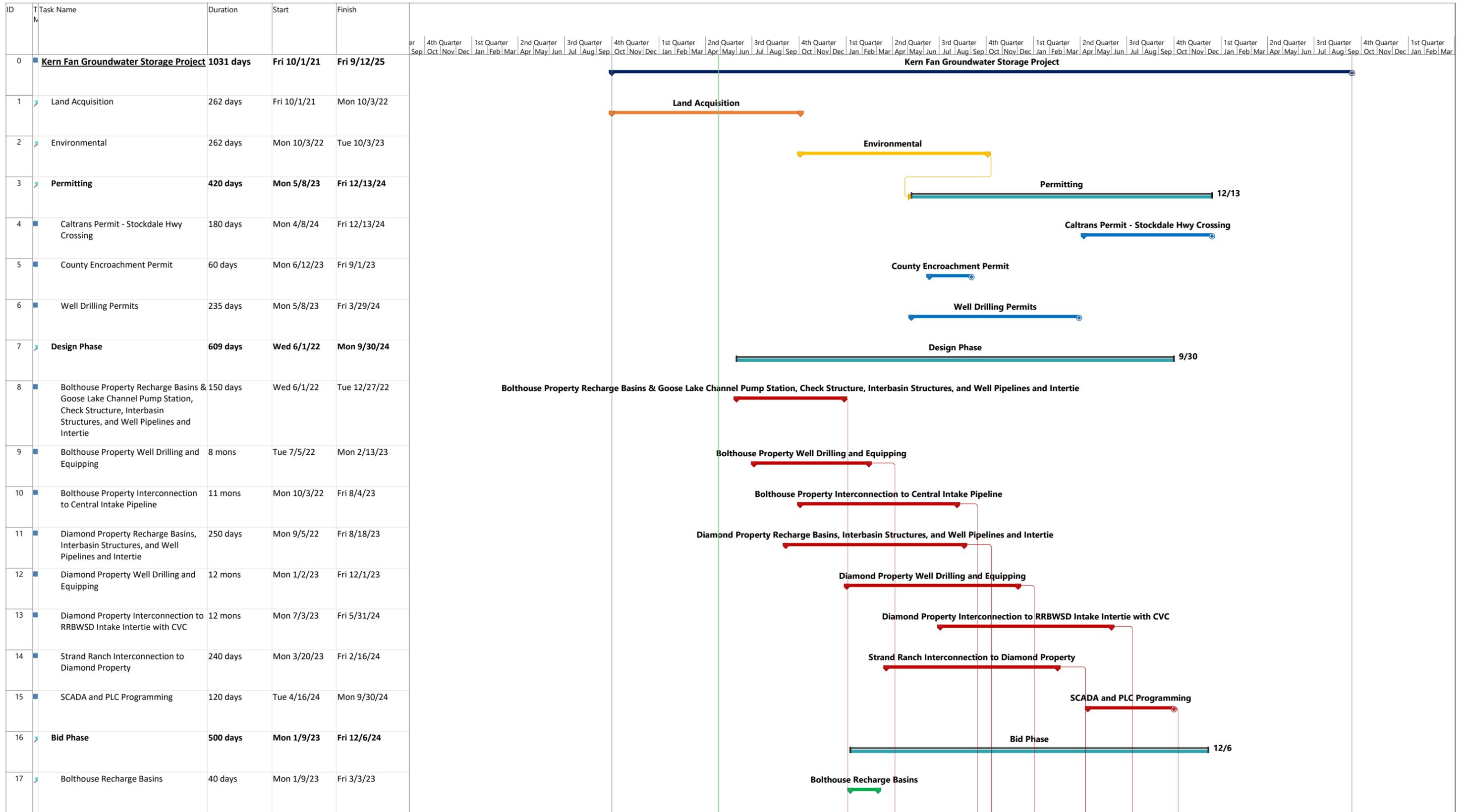
Well SE-1
19-Feb-20



Notes:

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

Appendix C – Project Schedule



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



| ID | Task Name | Duration | Start | Finish | Timeline | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|--|----------|--------------|--------------|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | | | | | 4th Quarter | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter | 1st Quarter | 2nd Quarter | 3rd Quarter |
| 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 | Bolthouse Goose Lake Channel Pump Station, Check Structure, Interbasin Structures, and Well Pipelines and Intertie | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19 | Bolthouse Well Drilling and Equipping | 40 days | Tue 4/11/23 | Mon 6/5/23 | Bolthouse Well Drilling and Equipping | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | Bolthouse Interconnection Pipeline with Central Intake | 40 days | Tue 9/19/23 | Mon 11/13/23 | Bolthouse Interconnection Pipeline with Central Intake | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21 | Diamond Recharge Basins, Interbasin Structures, and Well Pipelines | 40 days | Mon 10/16/23 | Fri 12/8/23 | Diamond Recharge Basins, Interbasin Structures, and Well Pipelines | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22 | Diamond Well Drilling and Equipping | 40 days | Mon 1/8/24 | Fri 3/1/24 | Diamond Well Drilling and Equipping | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 23 | Diamond Interconnection to RRBWSD-CVC Intertie Pipeline | 40 days | Wed 7/17/24 | Tue 9/10/24 | Diamond Interconnection to RRBWSD-CVC Intertie Pipeline | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24 | Strand Ranch Interconnection to Diamond Property | 40 days | Wed 4/17/24 | Tue 6/11/24 | Strand Ranch Interconnection to Diamond Property | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25 | SCADA and PLC Programming | 40 days | Mon 10/14/24 | Fri 12/6/24 | SCADA and PLC Programming | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 26 | Construction Phase | 618 days | Wed 5/3/23 | Fri 9/12/25 | Construction Phase 618 days 9/12 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 27 | Bolthouse Recharge Basins | 180 days | Wed 5/3/23 | Tue 1/9/24 | Bolthouse Recharge Basins | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | Bolthouse Goose Lake Channel Pump Station, Check Structure, Interbasin Structures, and Well Pipelines and Intertie | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 29 | Bolthouse Well Drilling and Equipping | 365 days | Mon 9/4/23 | Fri 1/24/25 | Bolthouse Well Drilling and Equipping | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30 | Bolthouse Interconnection Pipeline with Central Intake | 270 days | Mon 1/15/24 | Fri 1/24/25 | Bolthouse Interconnection Pipeline with Central Intake | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 31 | Diamond Recharge Basins | 180 days | Mon 3/4/24 | Fri 11/8/24 | Diamond Recharge Basins | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 32 | Diamond Well Drilling and Equipping | 330 days | Mon 6/3/24 | Fri 9/5/25 | Diamond Well Drilling and Equipping | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 33 | Diamond Interconnection to RRBWSD-CVC Intertie Pipeline | 180 days | Mon 12/30/24 | Fri 9/5/25 | Diamond Interconnection to RRBWSD-CVC Intertie Pipeline | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 34 | Strand Ranch Interconnection to Diamond Property | 250 days | Mon 9/23/24 | Fri 9/5/25 | Strand Ranch Interconnection to Diamond Property | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35 | SCADA and PLC Programming | 180 days | Mon 12/30/24 | Fri 9/5/25 | SCADA and PLC Programming | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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

Appendix D – M. Cubed Tech Memo



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 Index⁶ 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**

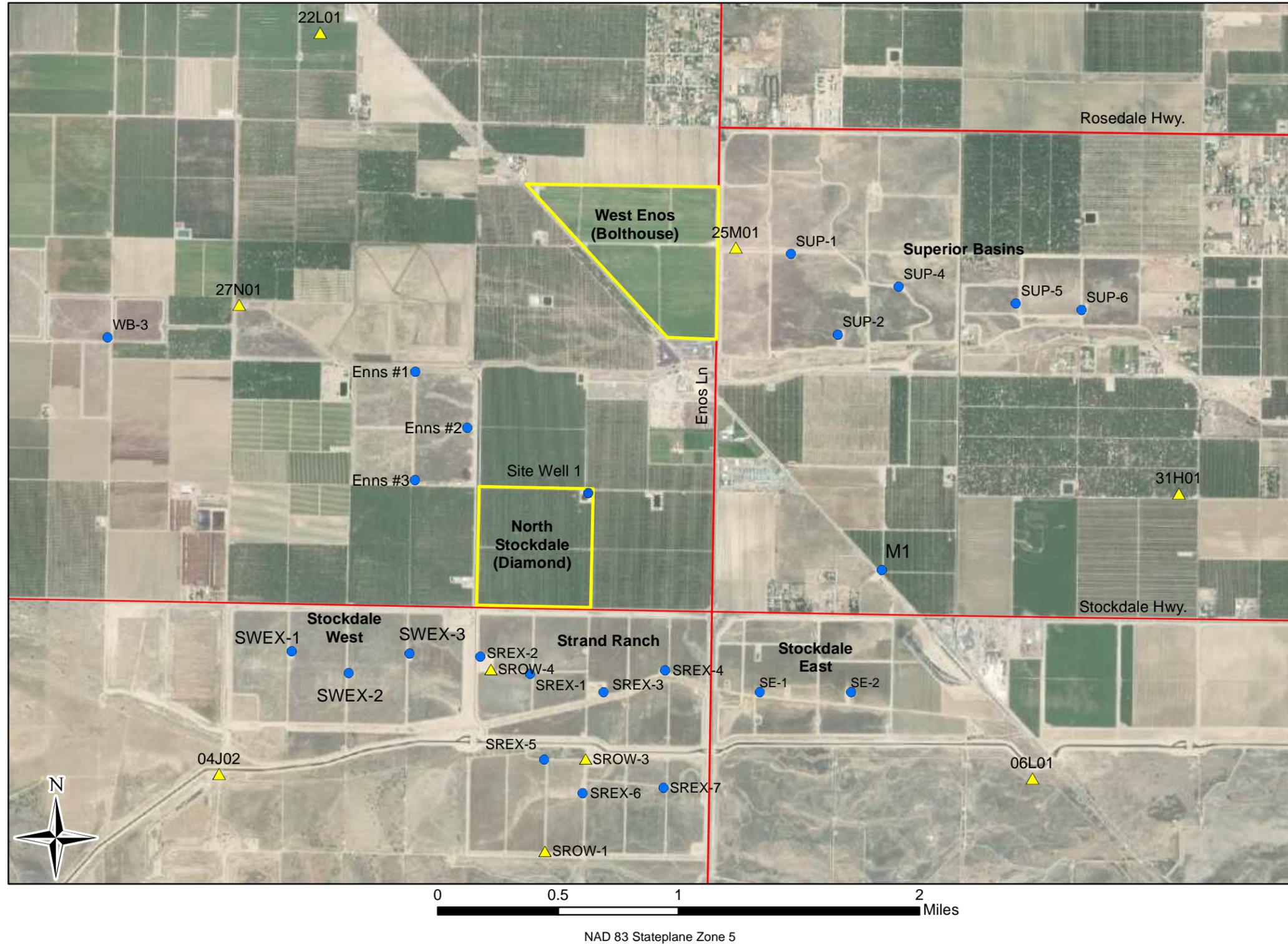
| | West Enos | North Stockdale |
|--|---------------|-----------------|
| Property Size (acres) | 201 | 147 |
| Shallow Subsurface | | |
| West Enos (10-115 ft bgs ¹) | 105 | 115 |
| North Stockdale (10-125 ft bgs) | | |
| Intermediate Subsurface | | |
| West Enos (115-380 ft bgs) | | |
| North Stockdale (125-380 ft bgs) | 265 | 255 |
| Deep Subsurface | | |
| West Enos (380-630 ft bgs) | 250 | 230 |
| Stockdale West (380-610 ft bgs) | | |
| 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:

¹bgs = below ground surface.

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

³acre-ft = acre-feet.



Map Features

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



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



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).

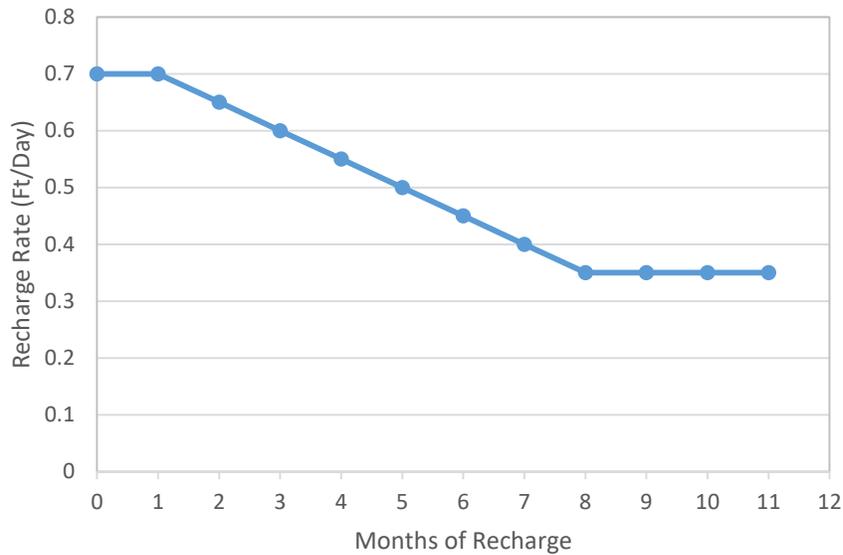


Figure 1. Project Recharge Rate

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 carriage¹ 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.

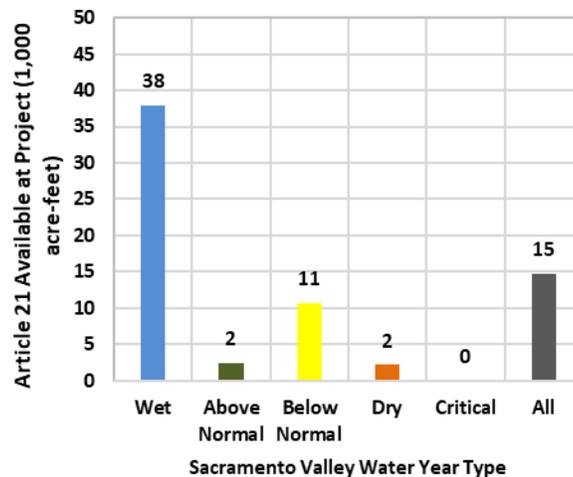


Figure 2. Available Article 21 Supply at Project by Sacramento Valley Water Year Type

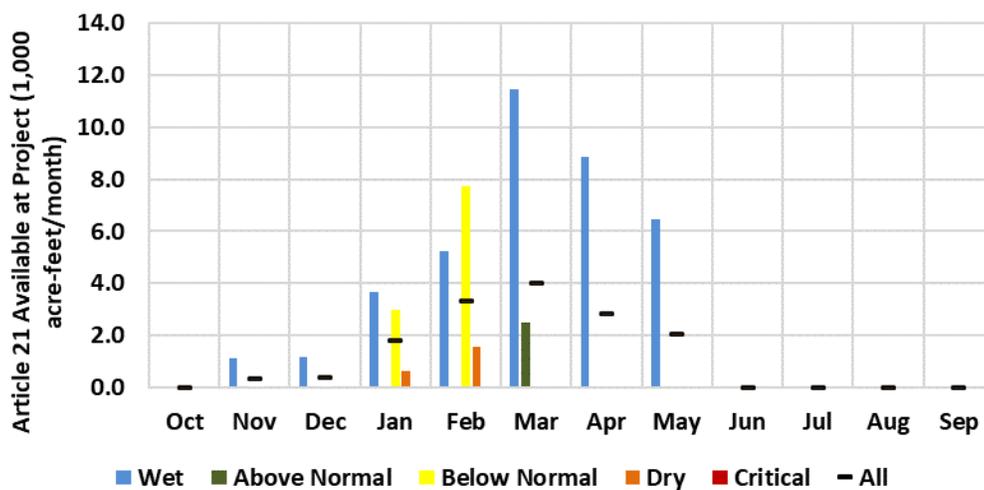


Figure 3. Average Monthly Available Article 21 Supply at Project

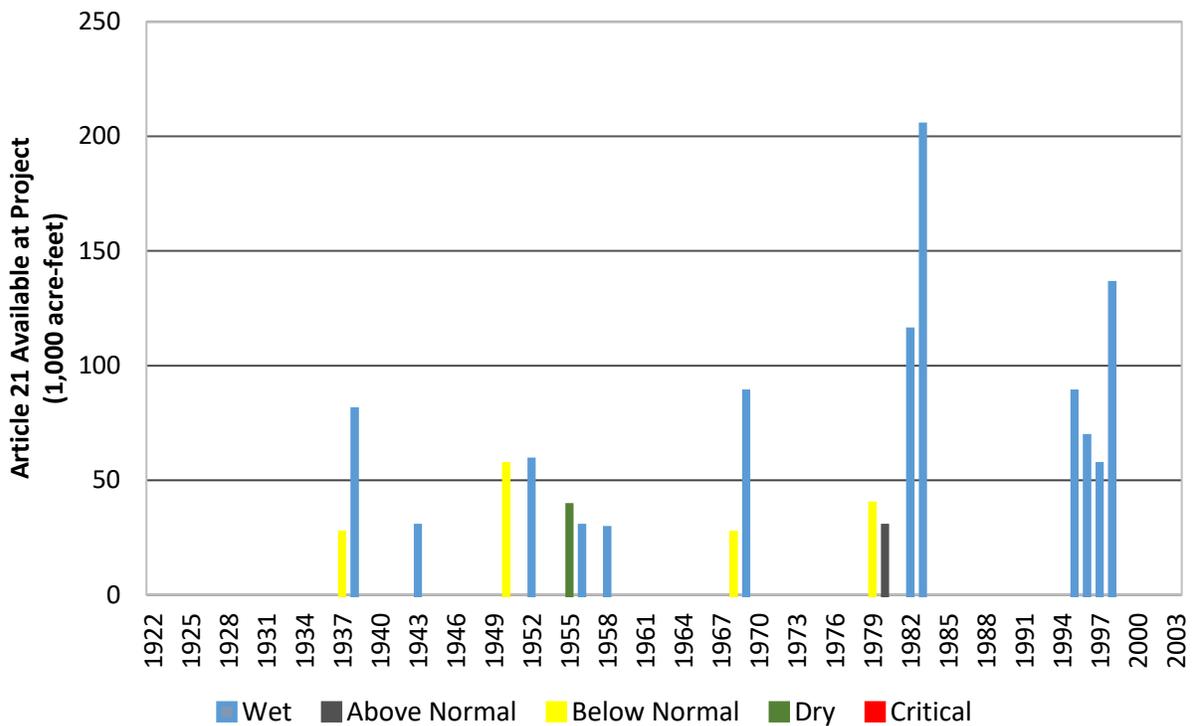


Figure 4. Annual Time-Series of Available Article 21 Supply at Project

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.

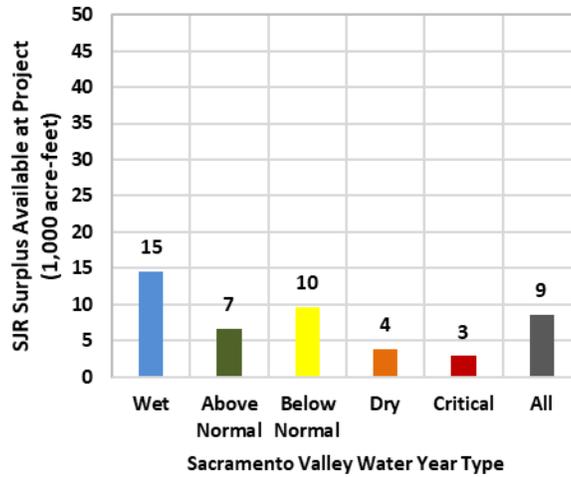


Figure 5. Average Annual Available SJR Surplus Supply at Project by Water Year Type

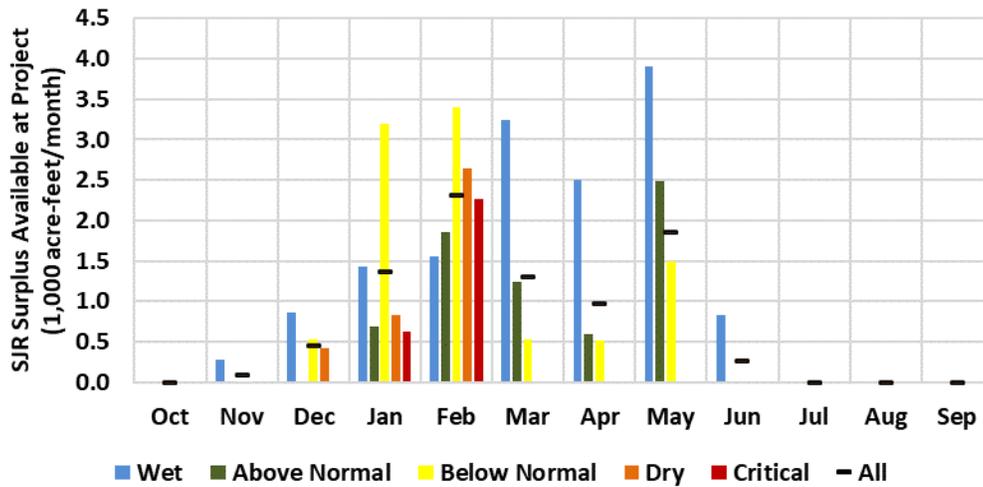


Figure 6. Average Monthly Available SJR Surplus Supply at Project by Water Year Type

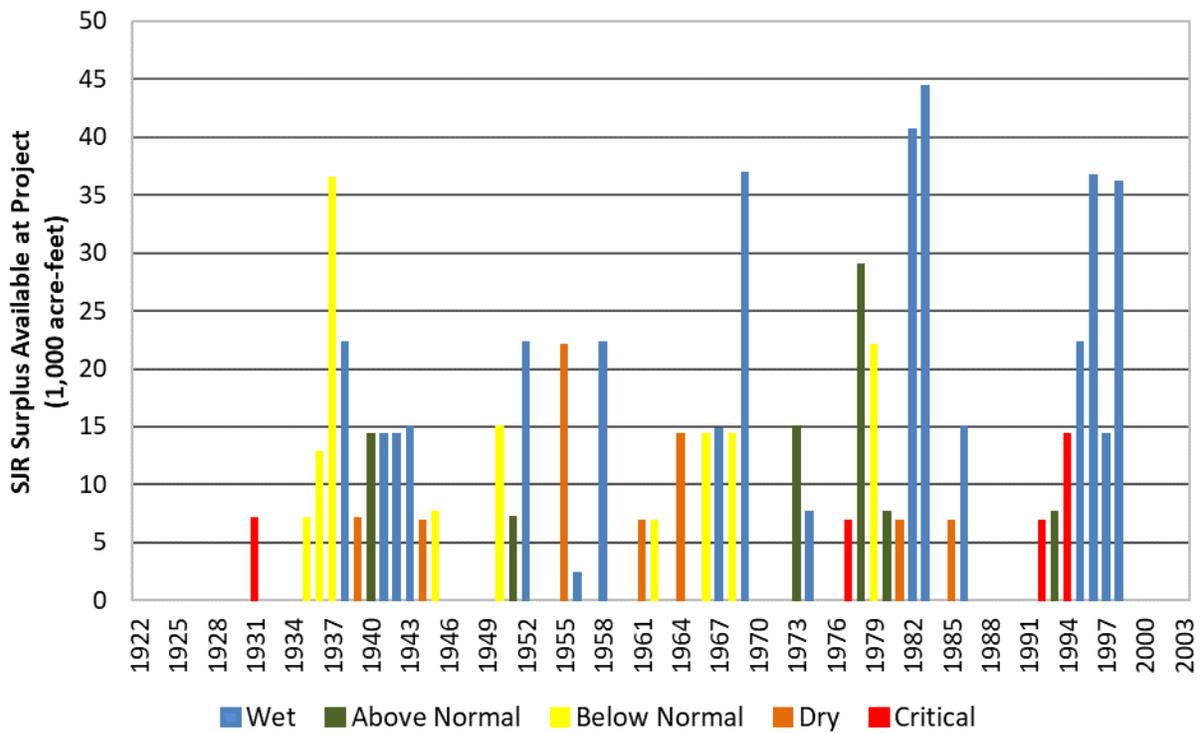


Figure 7. Annual Available SJR Surplus Supply at Project by Year

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.

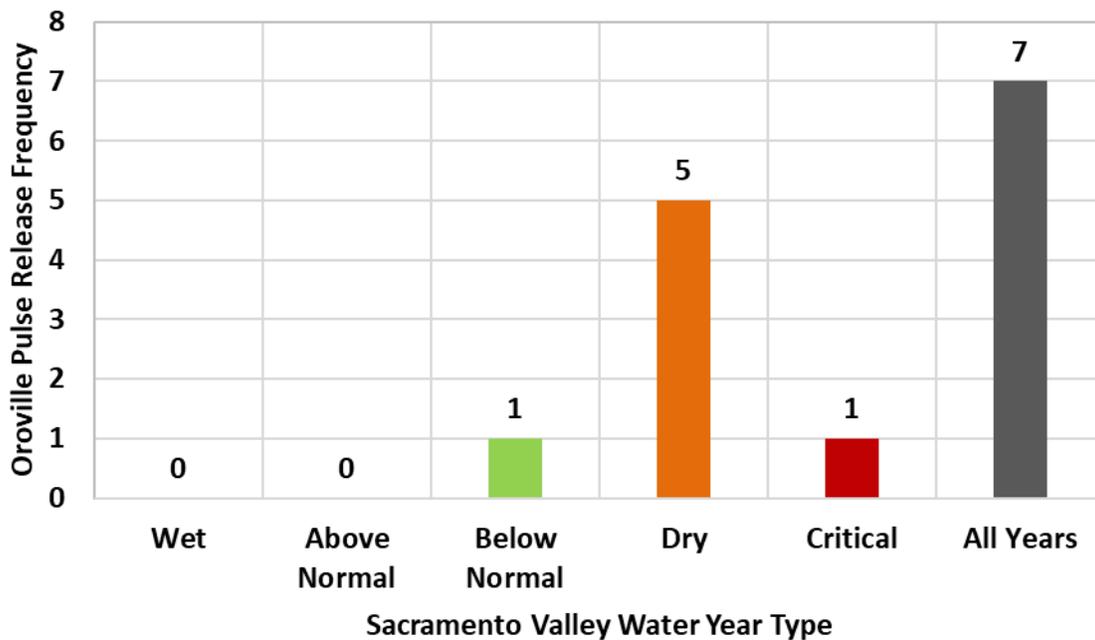


Figure 8. Frequency of Ecosystem Pulses

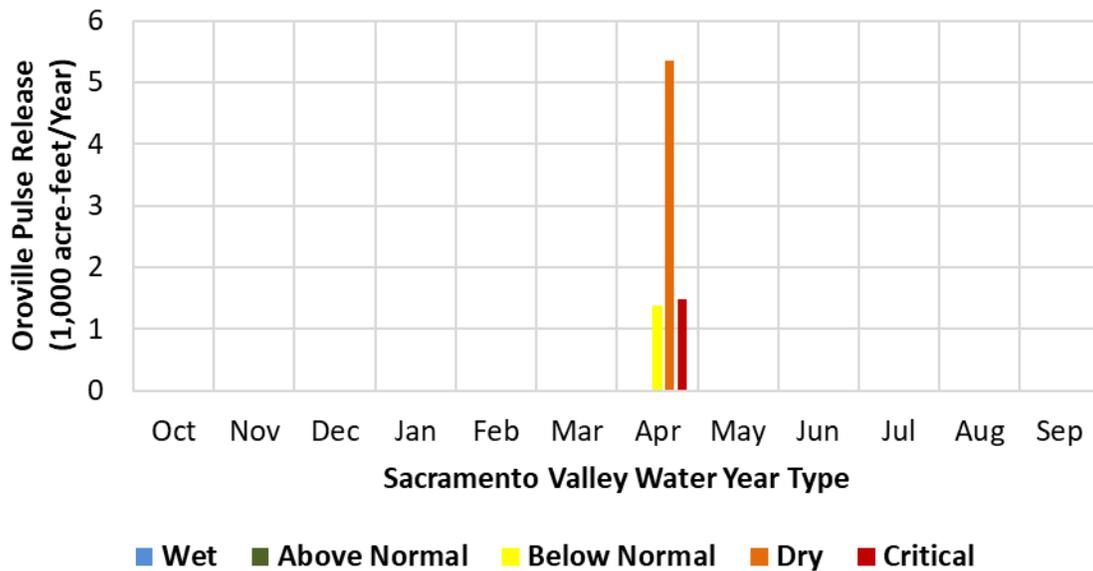


Figure 9. Pulse Release Volume

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.

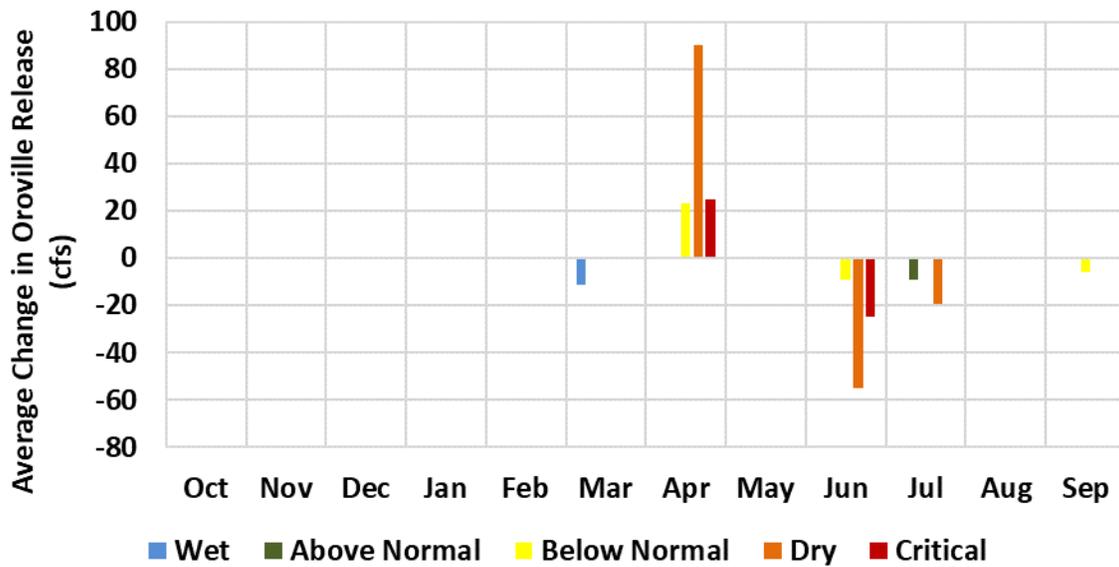


Figure 10. Change in Oroville Releases

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.

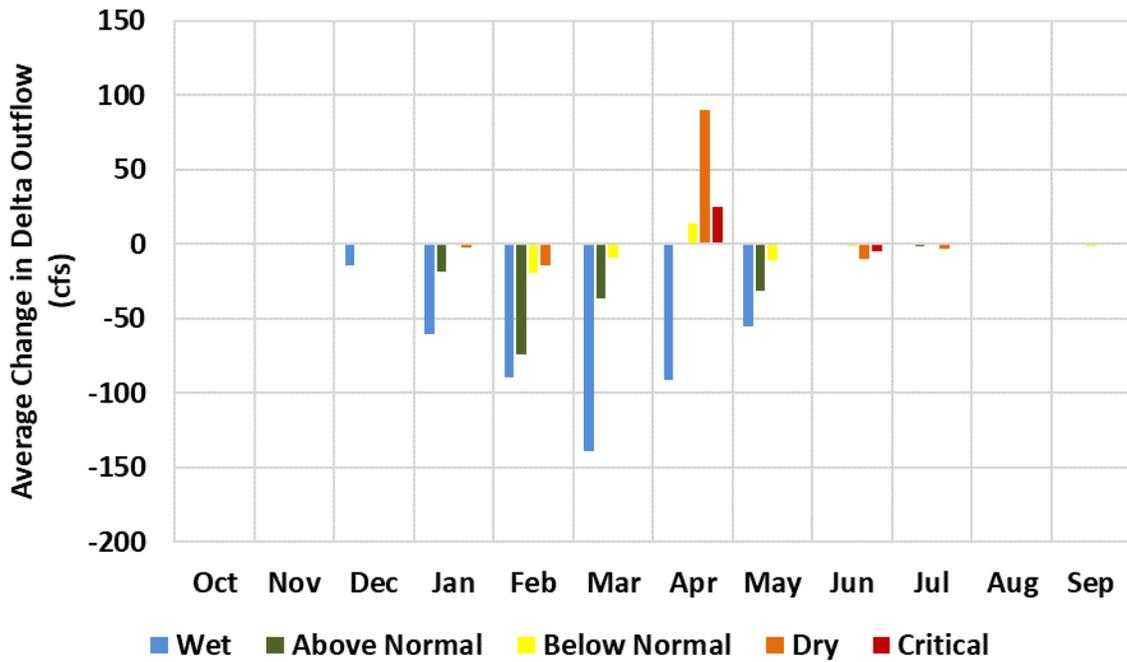


Figure 11. Change in Delta Outflow

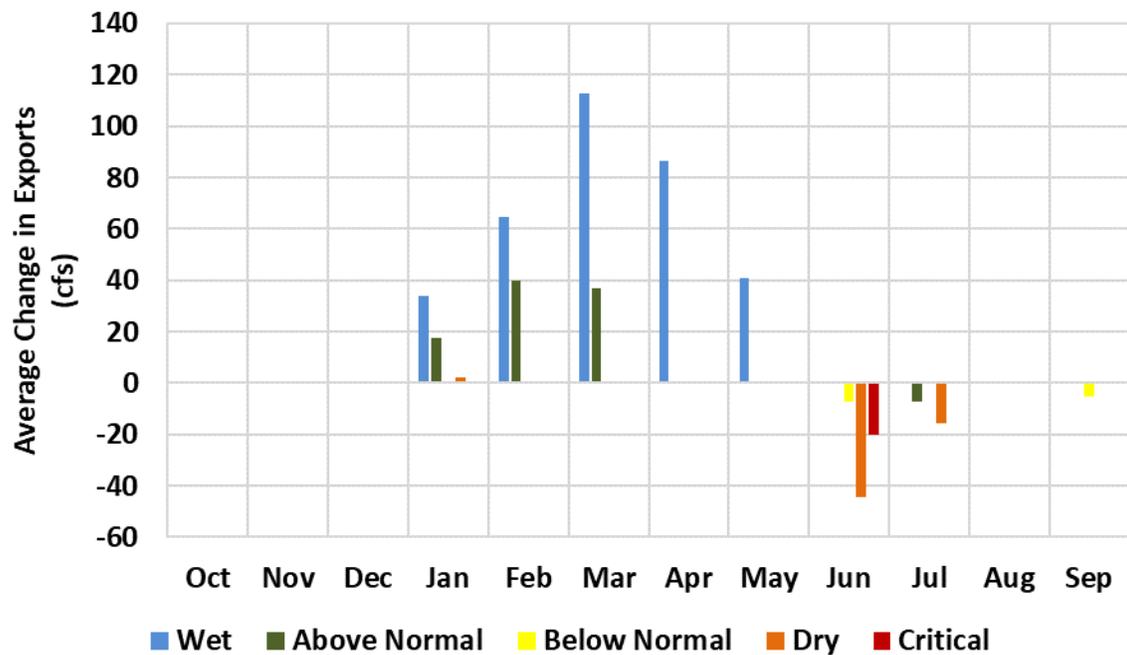


Figure 12. Change in SWP Delta Exports

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.

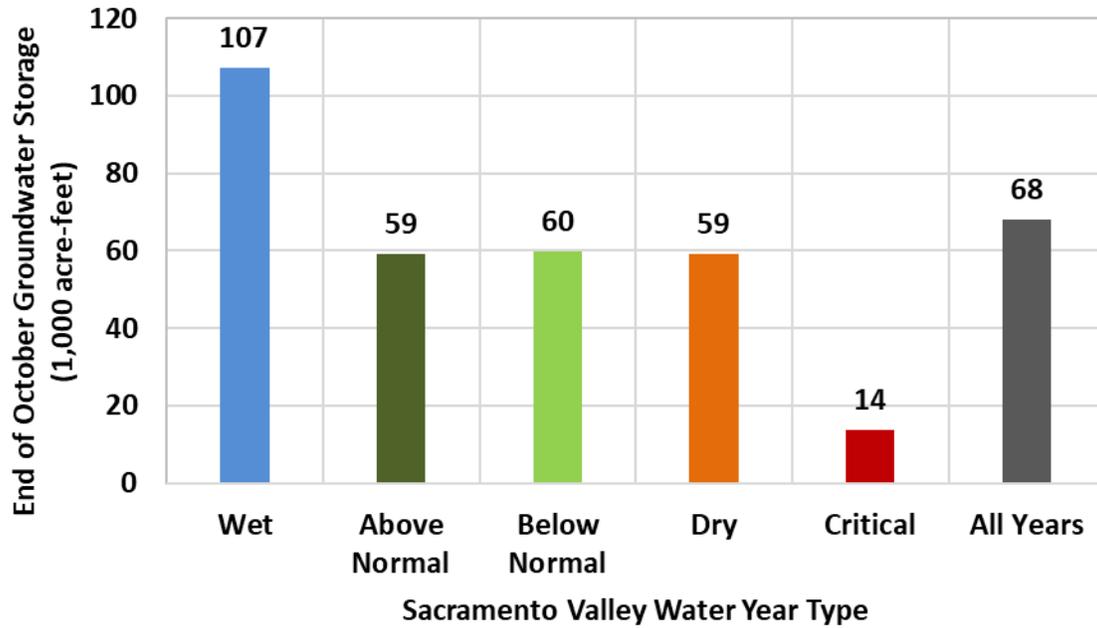


Figure 13. End of October Project Groundwater Storage

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

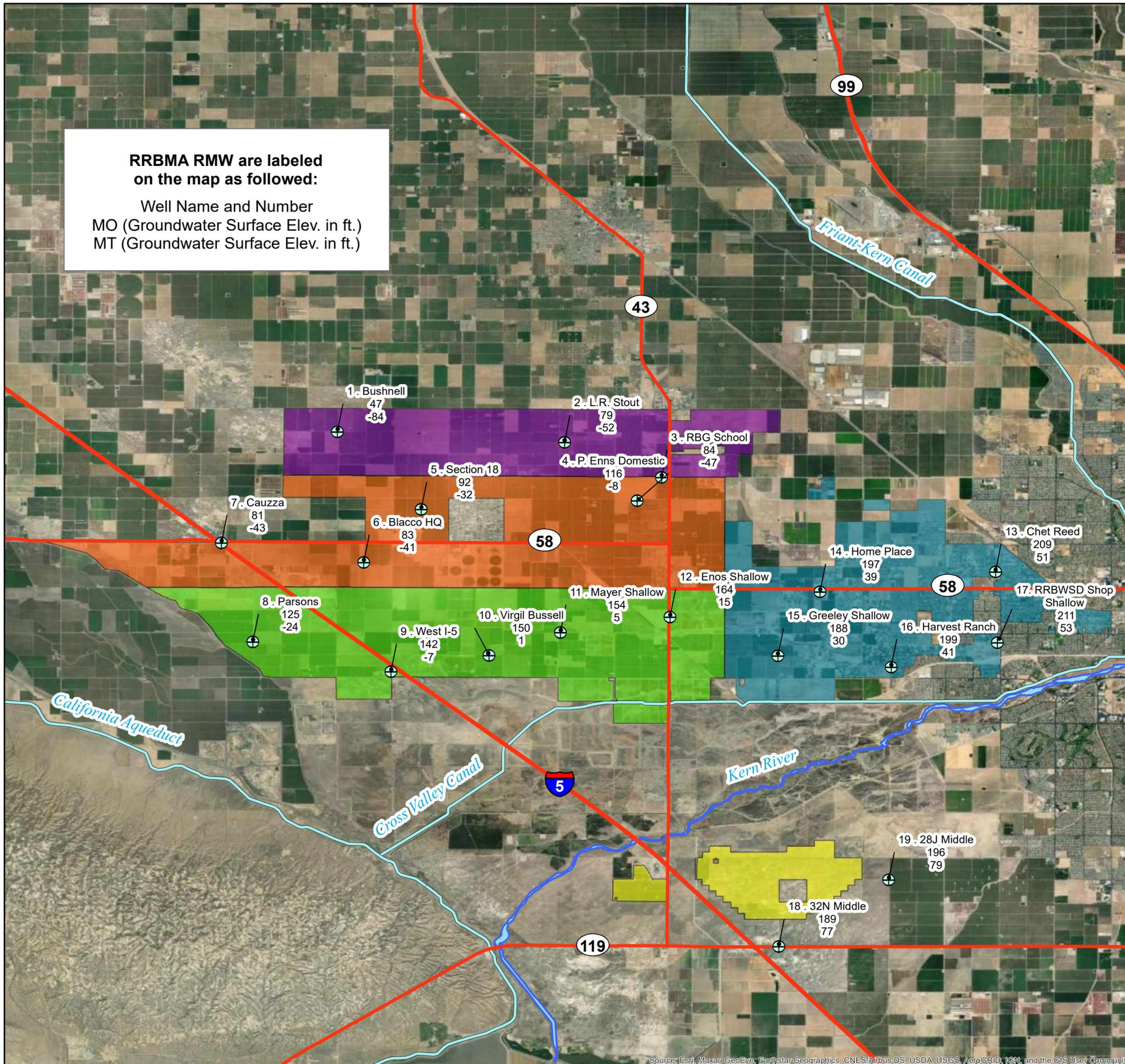
| WY Type | Recharge | | | | Extraction | | | |
|--------------|------------|---------------------|------------------------|---------------------|------------|---------------------|------------------------|---------------------|
| | IRWD | | Rosedale Rio Bravo WSD | | IRWD | | Rosedale Rio Bravo WSD | |
| | 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

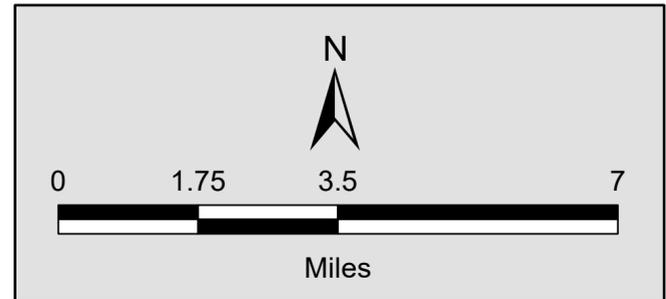
RRBMA Monitoring Areas - RMW Water Level MOs and MTs



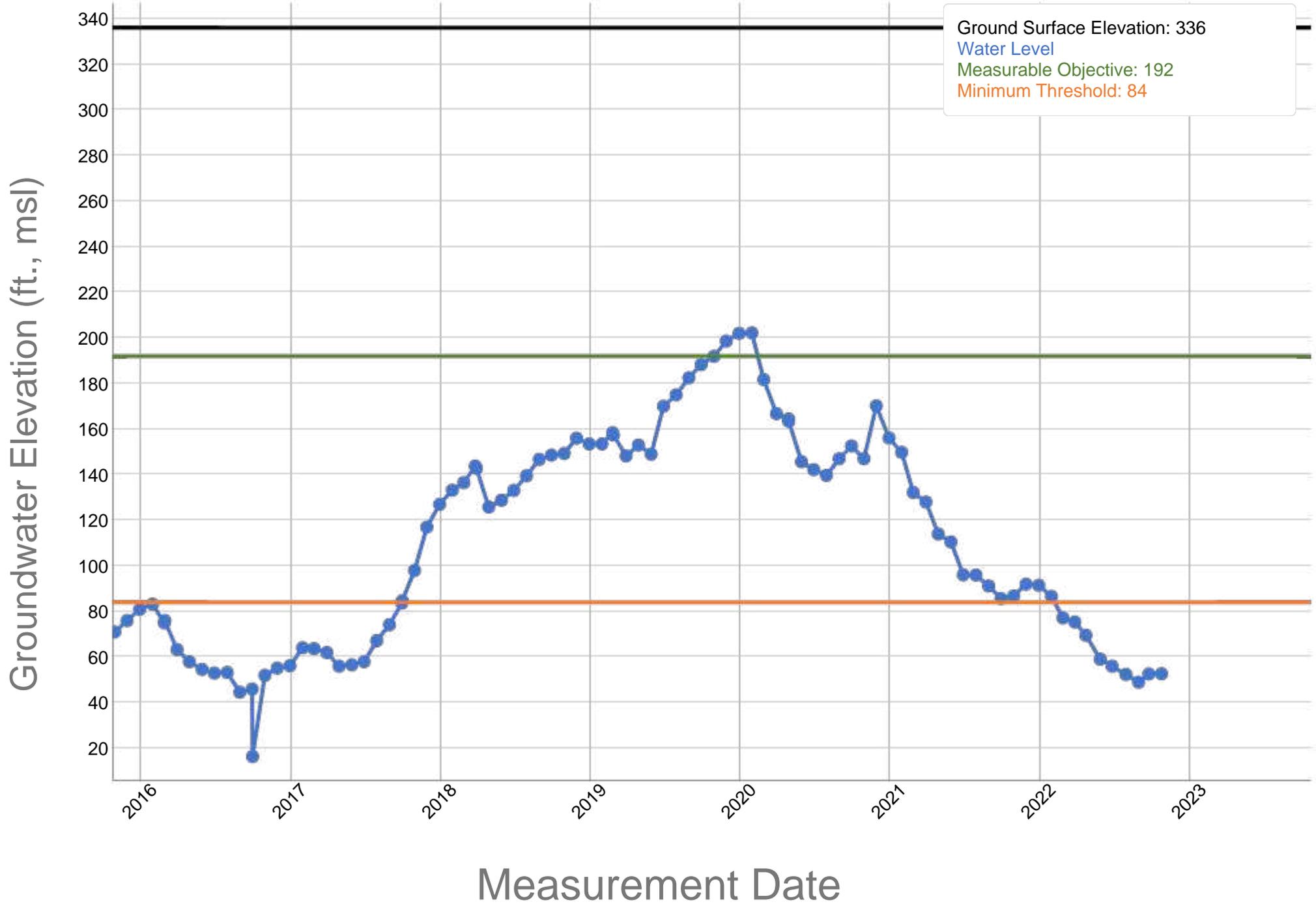
Legend

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

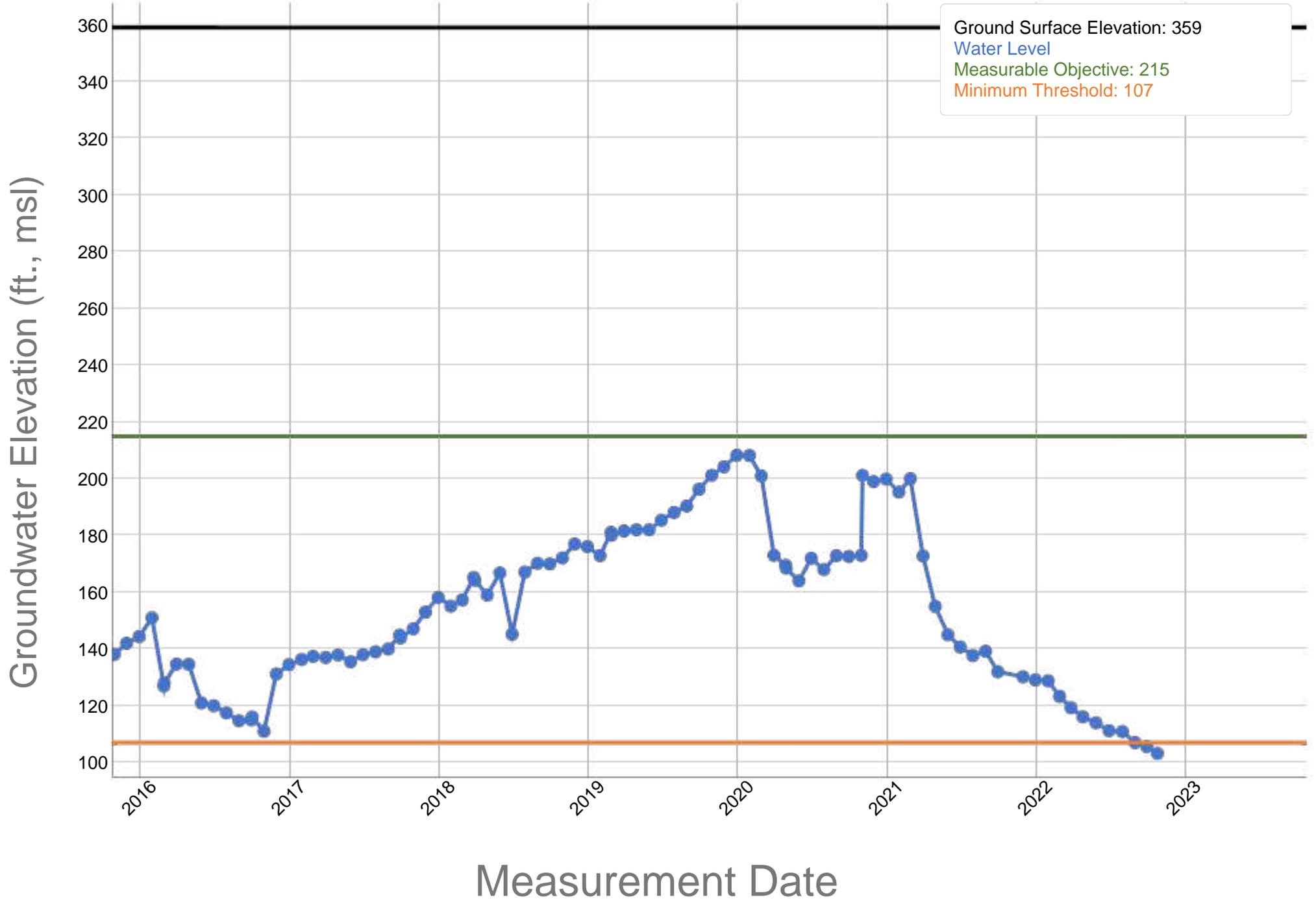
*RMW = Representative Monitoring Well
 MO = Measurable Objective
 MT = Minimum Threshold*



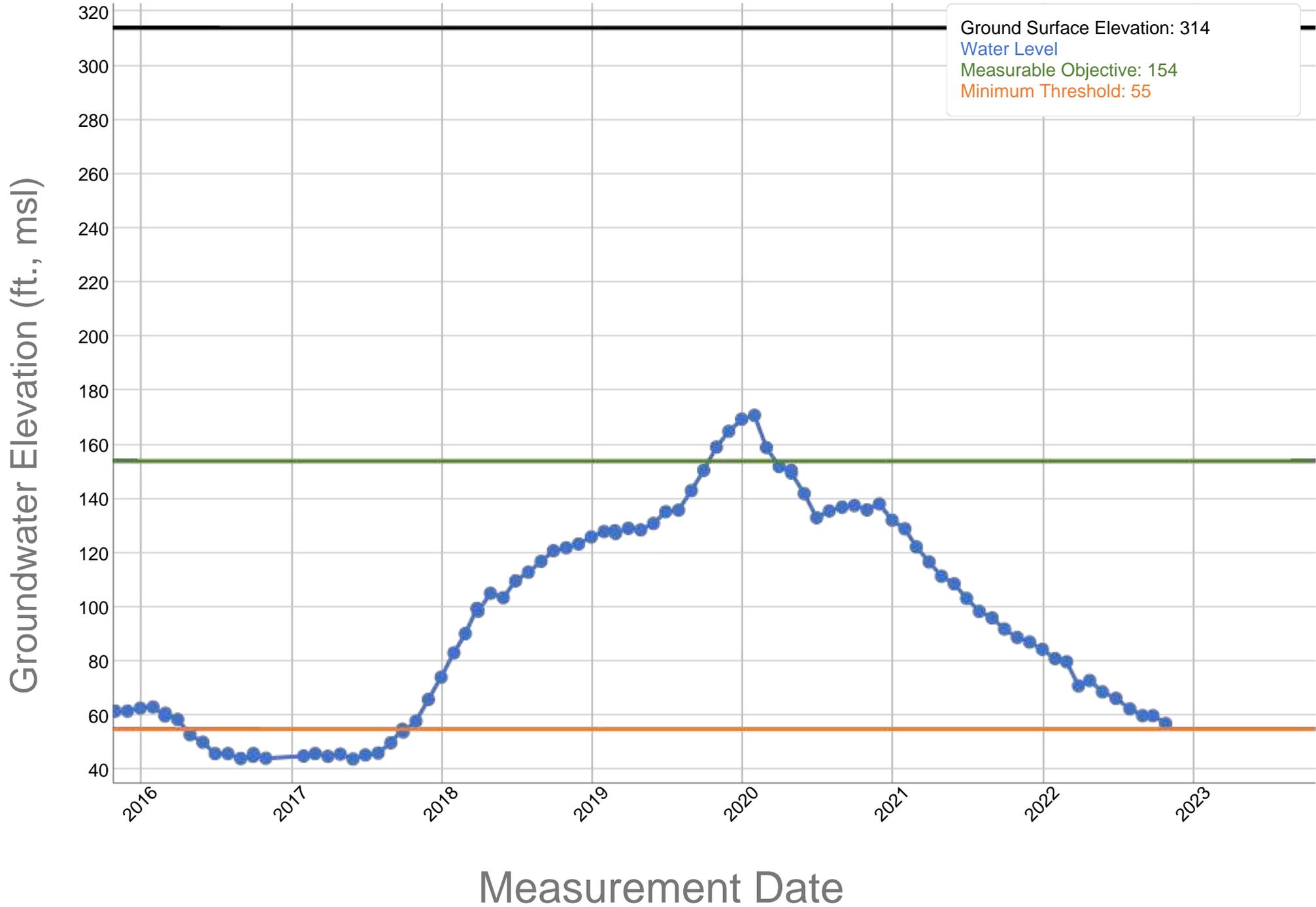
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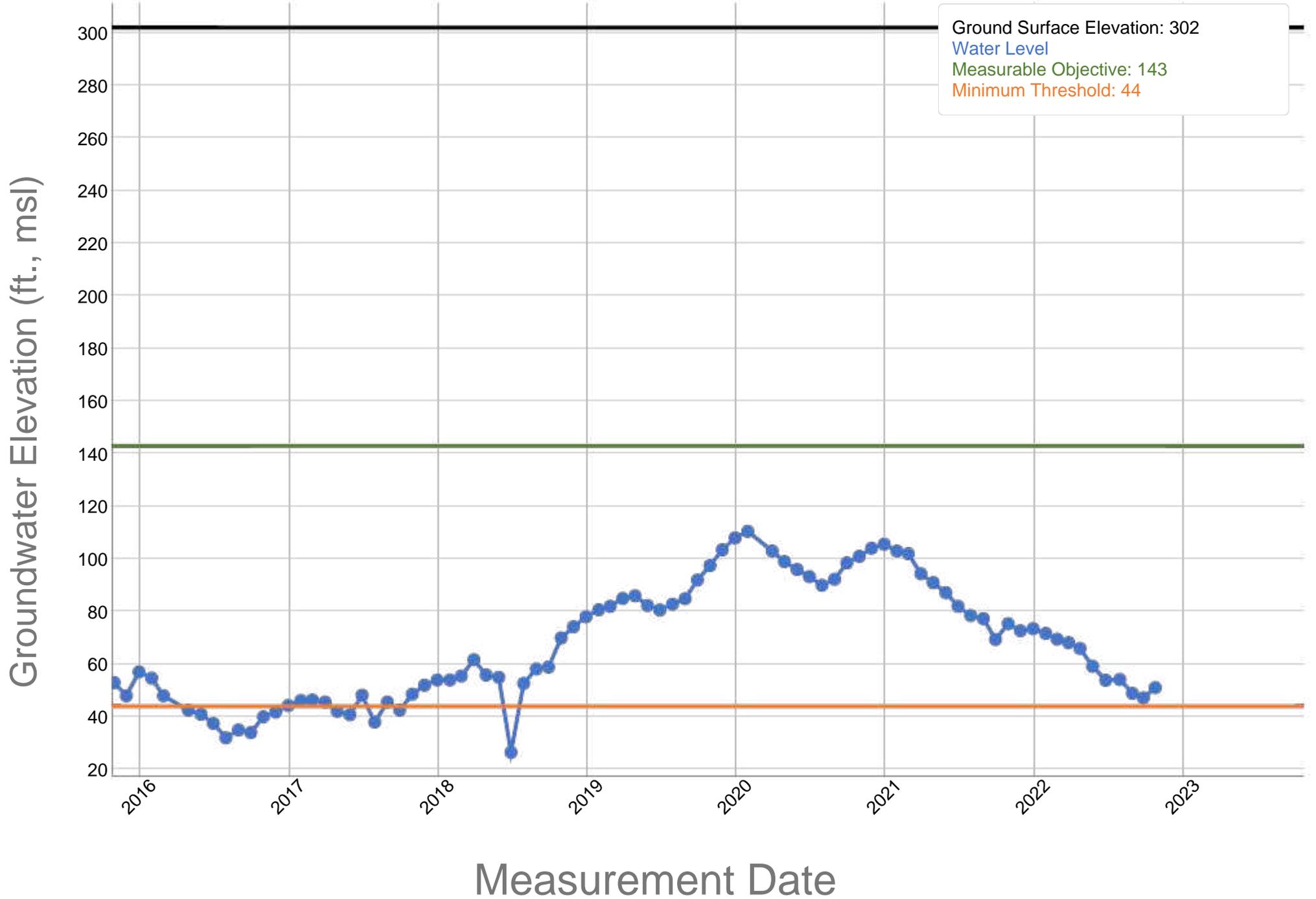
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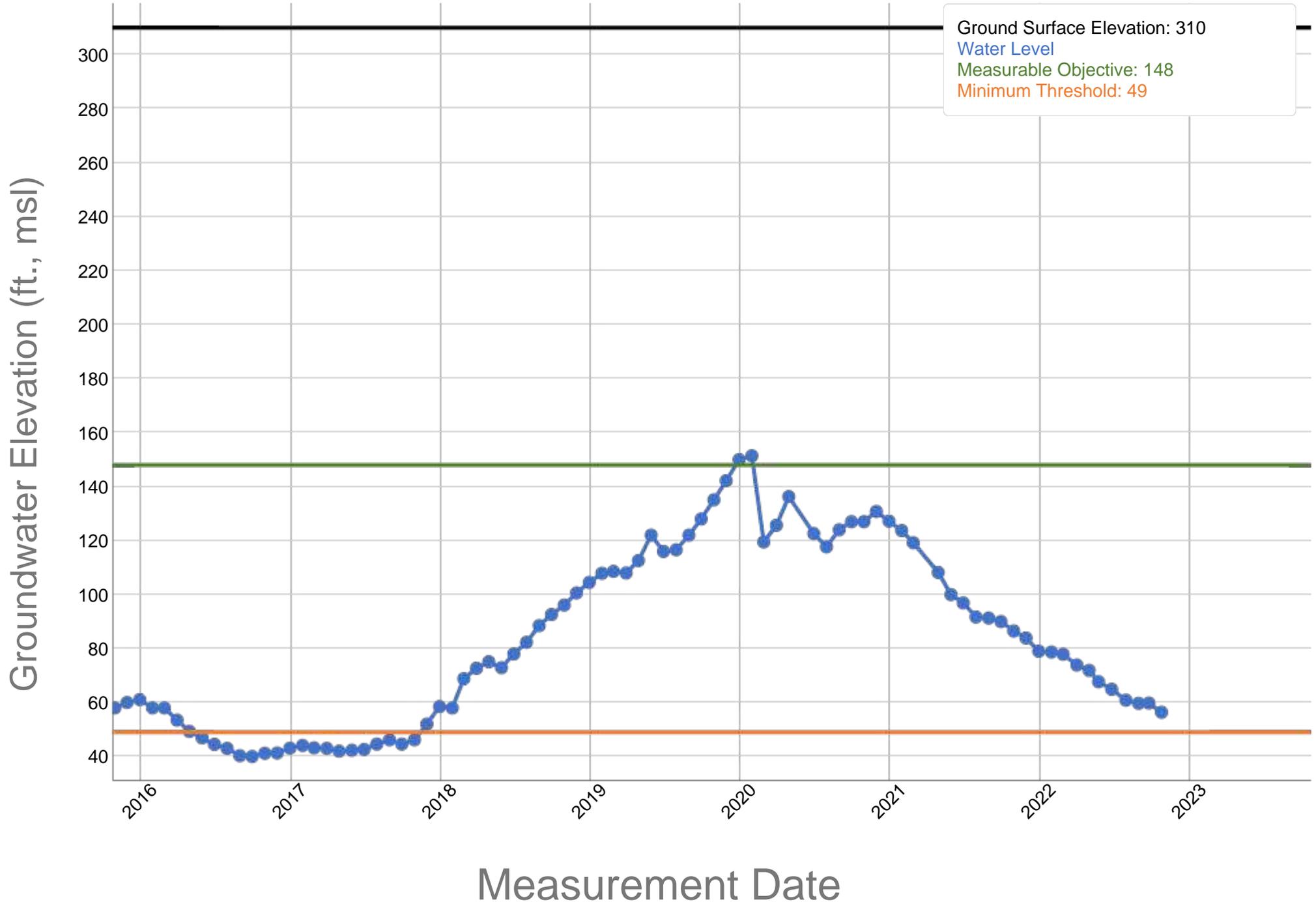
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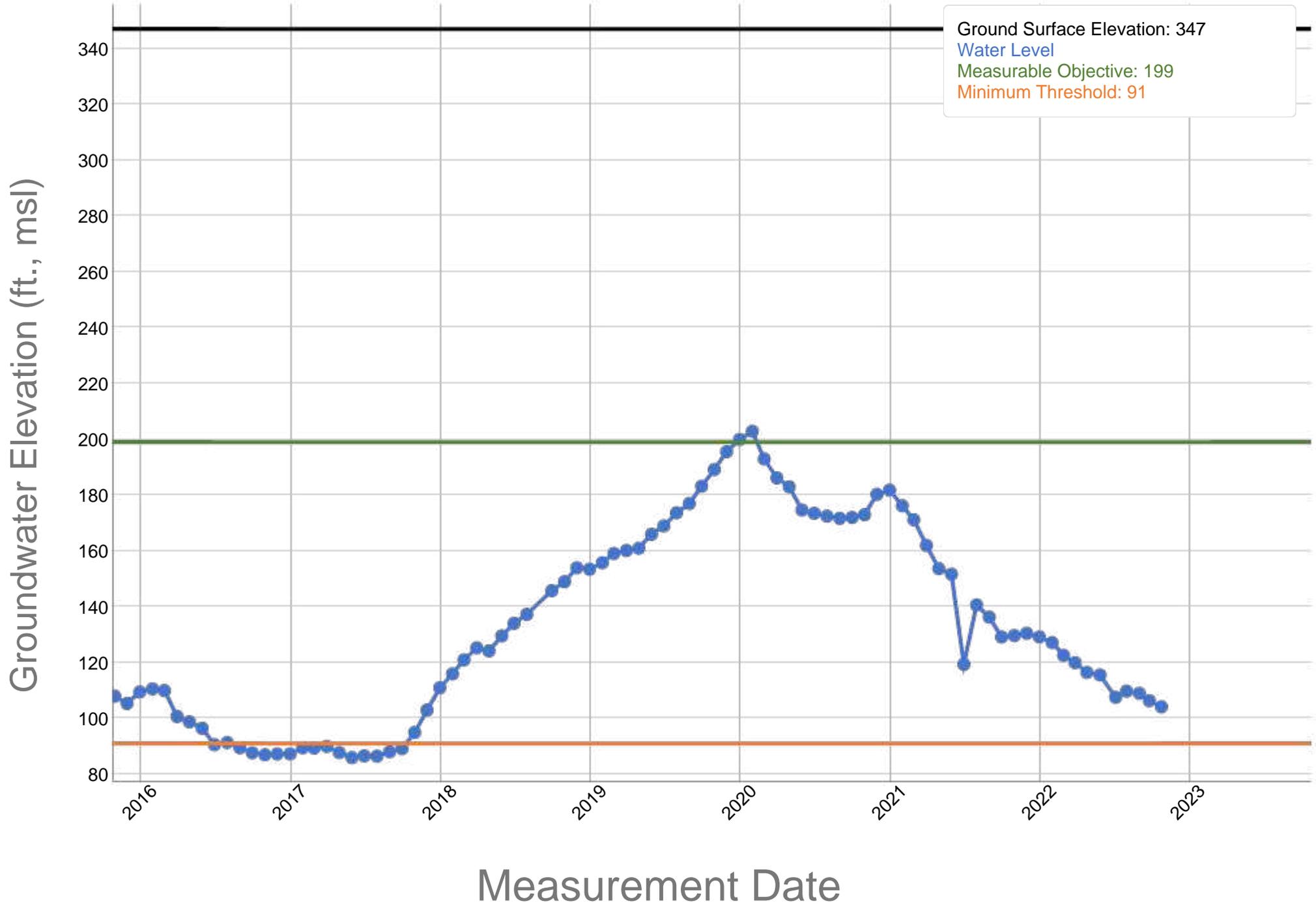
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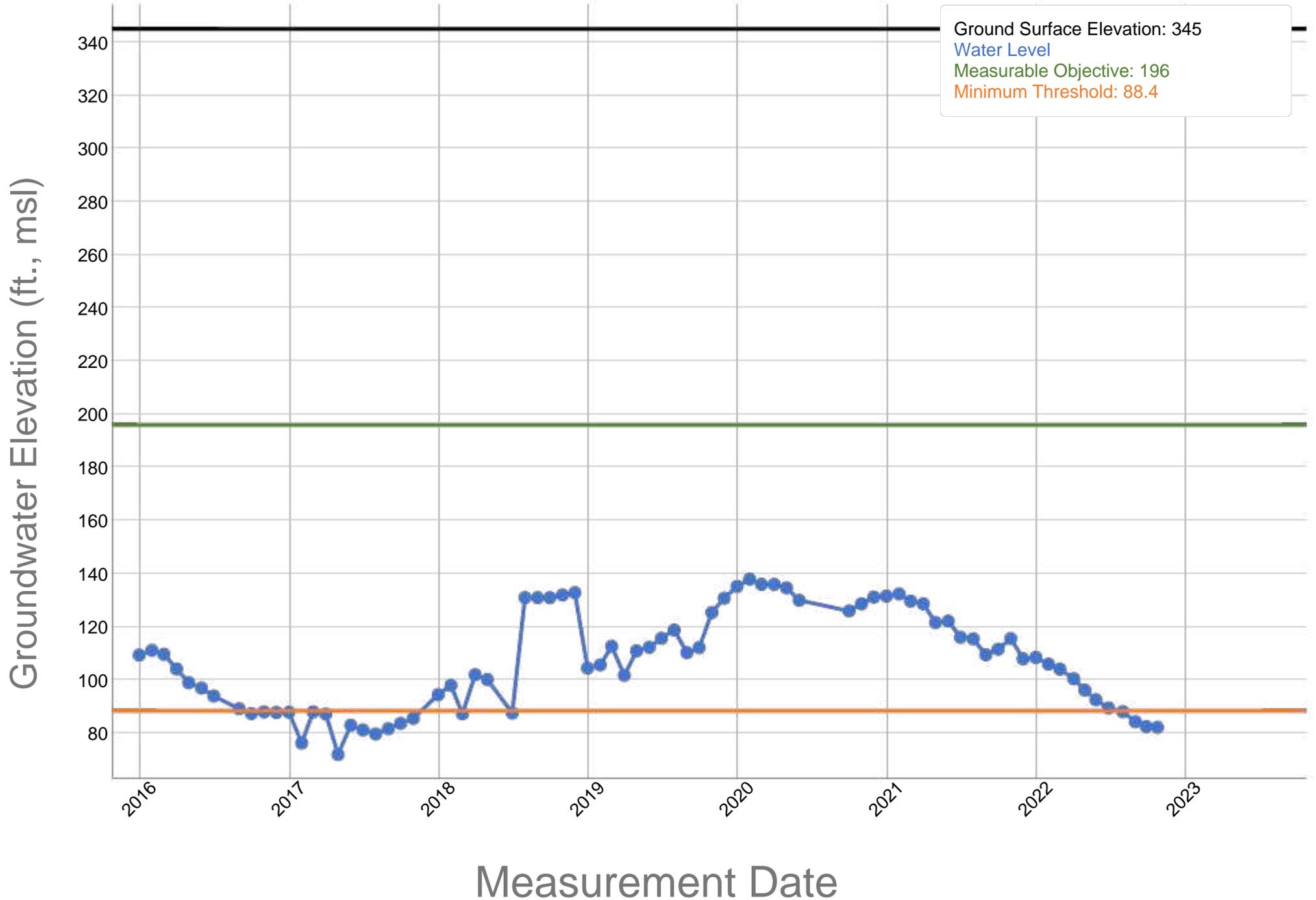
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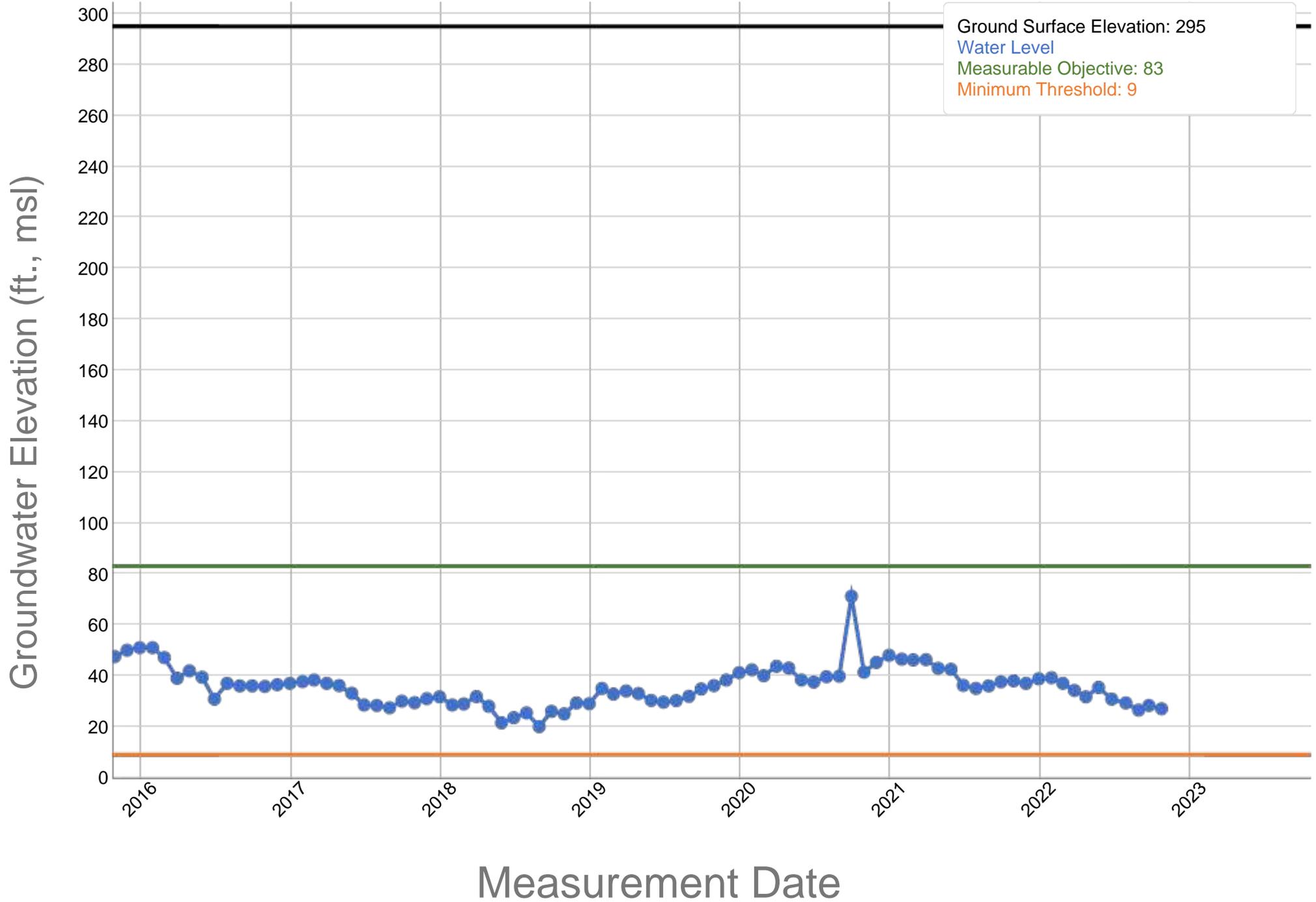
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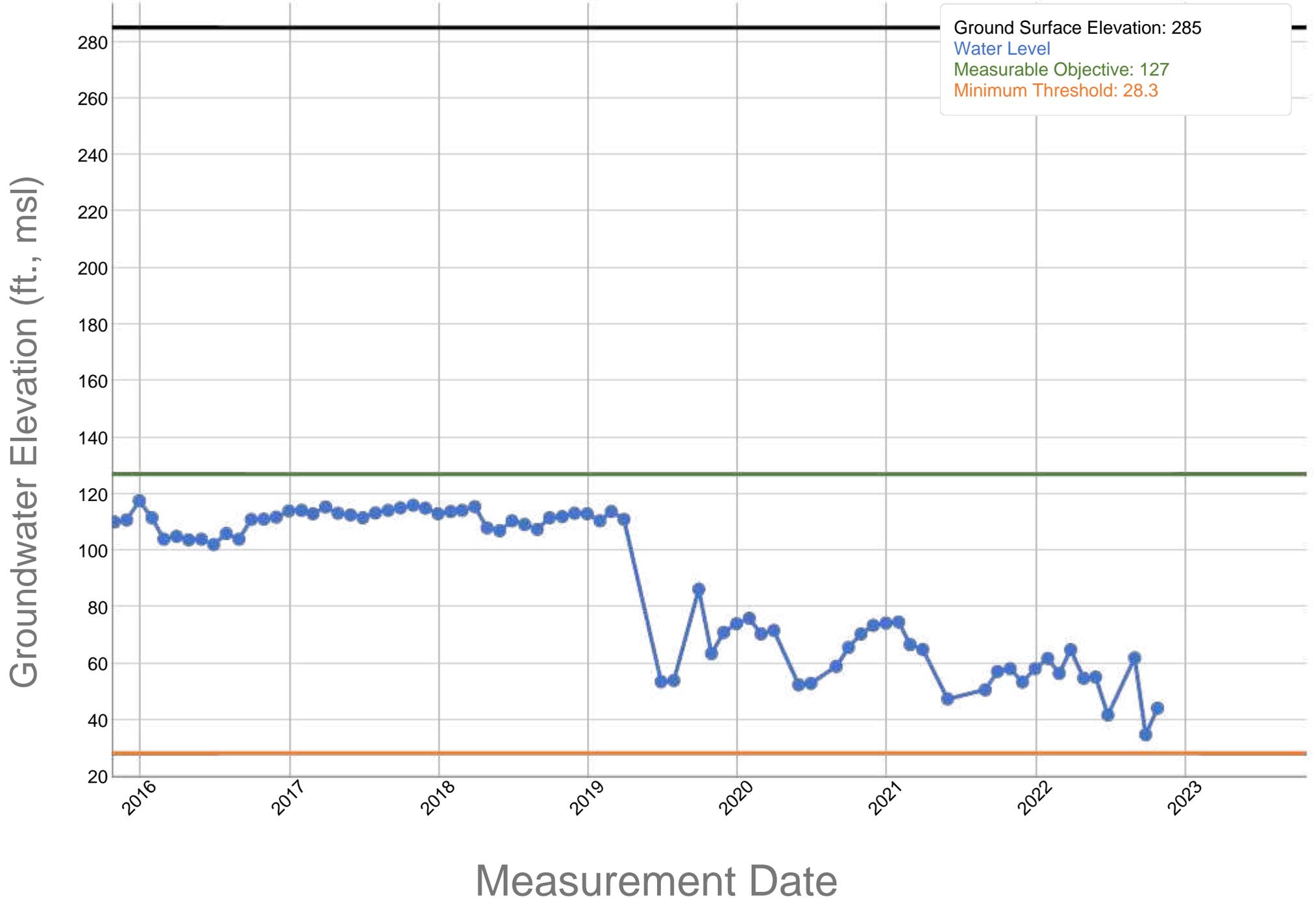
Rosedale-Rio Bravo Water Storage District - 13 Home Place - 353824N1192035W001



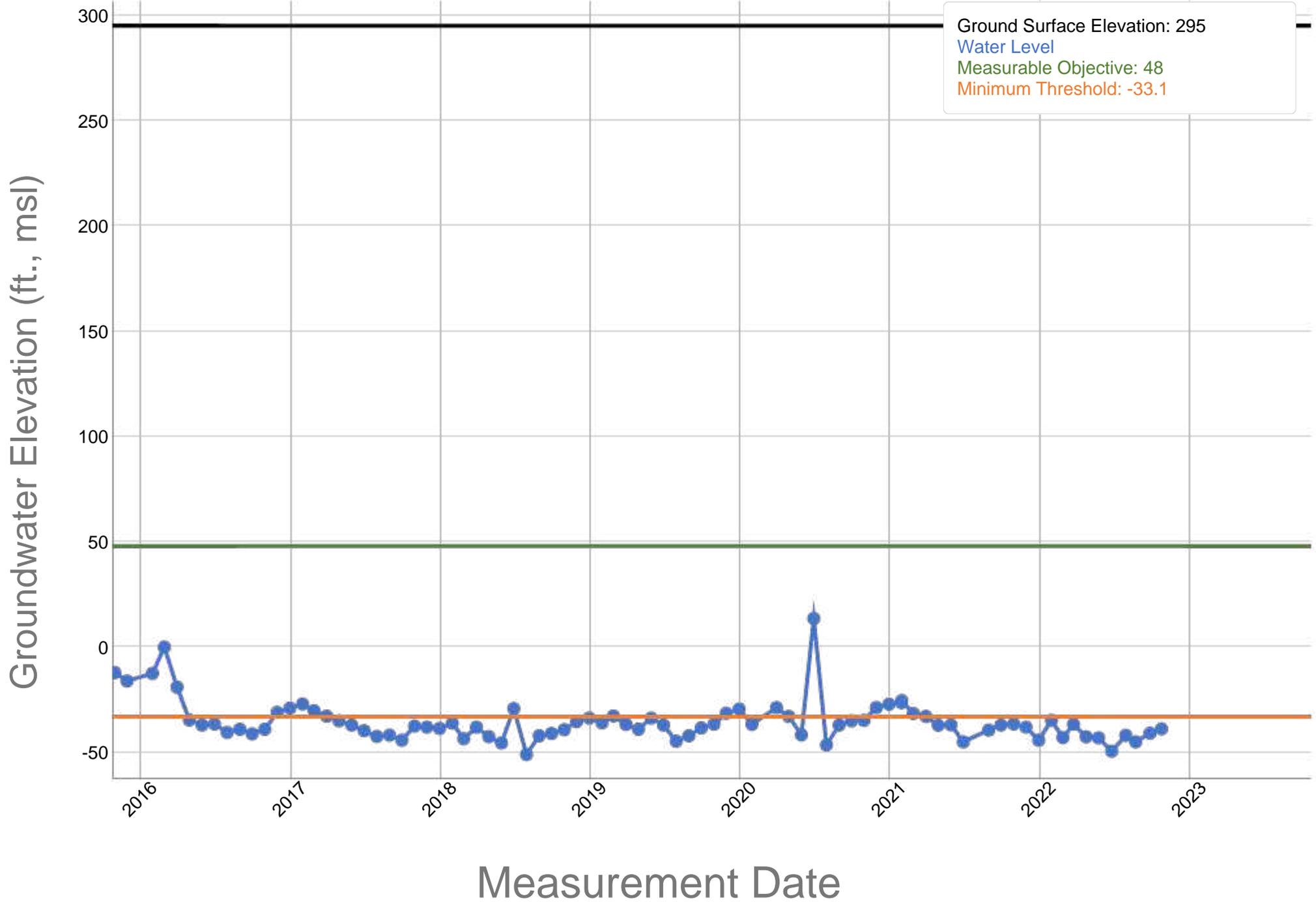
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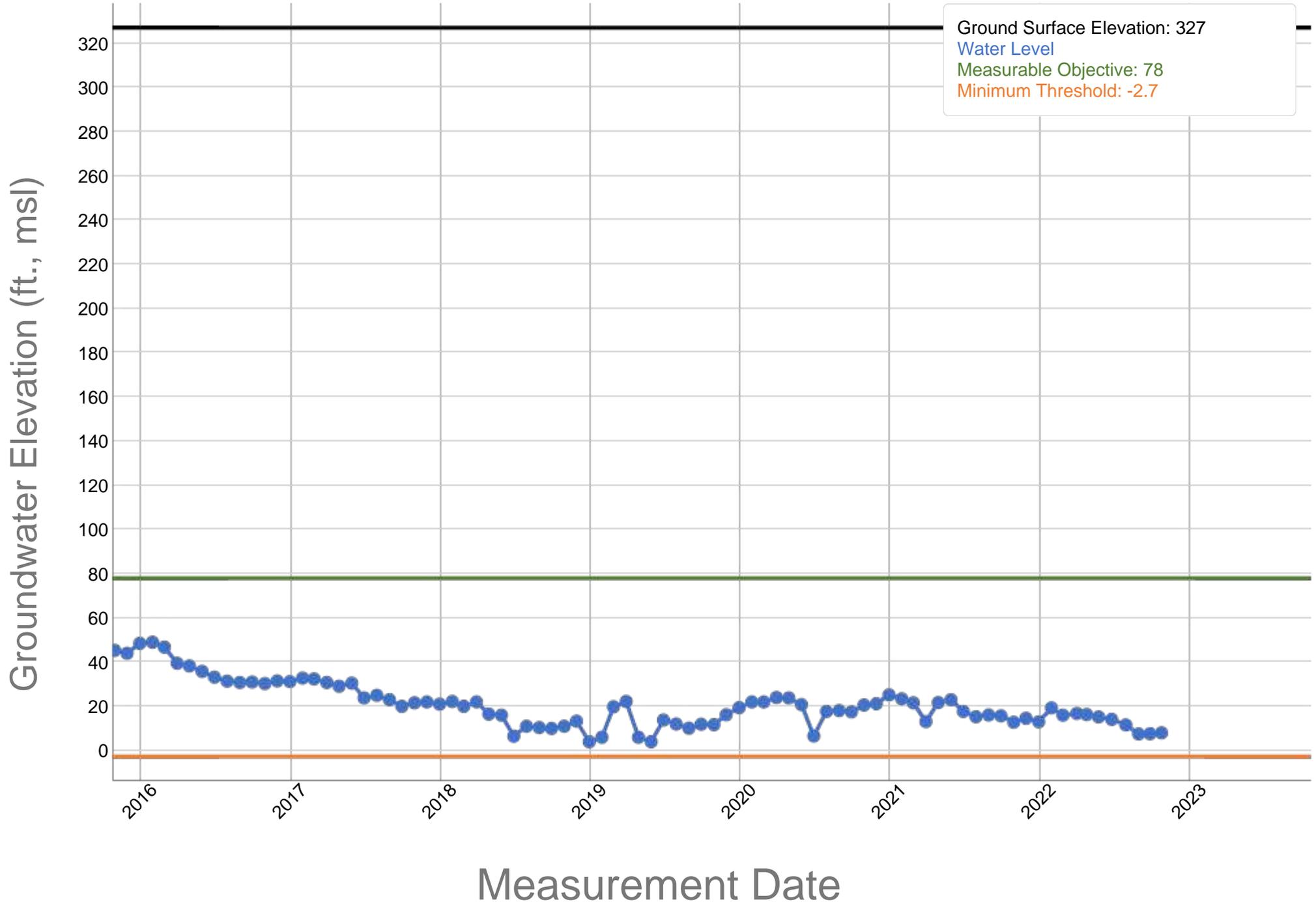
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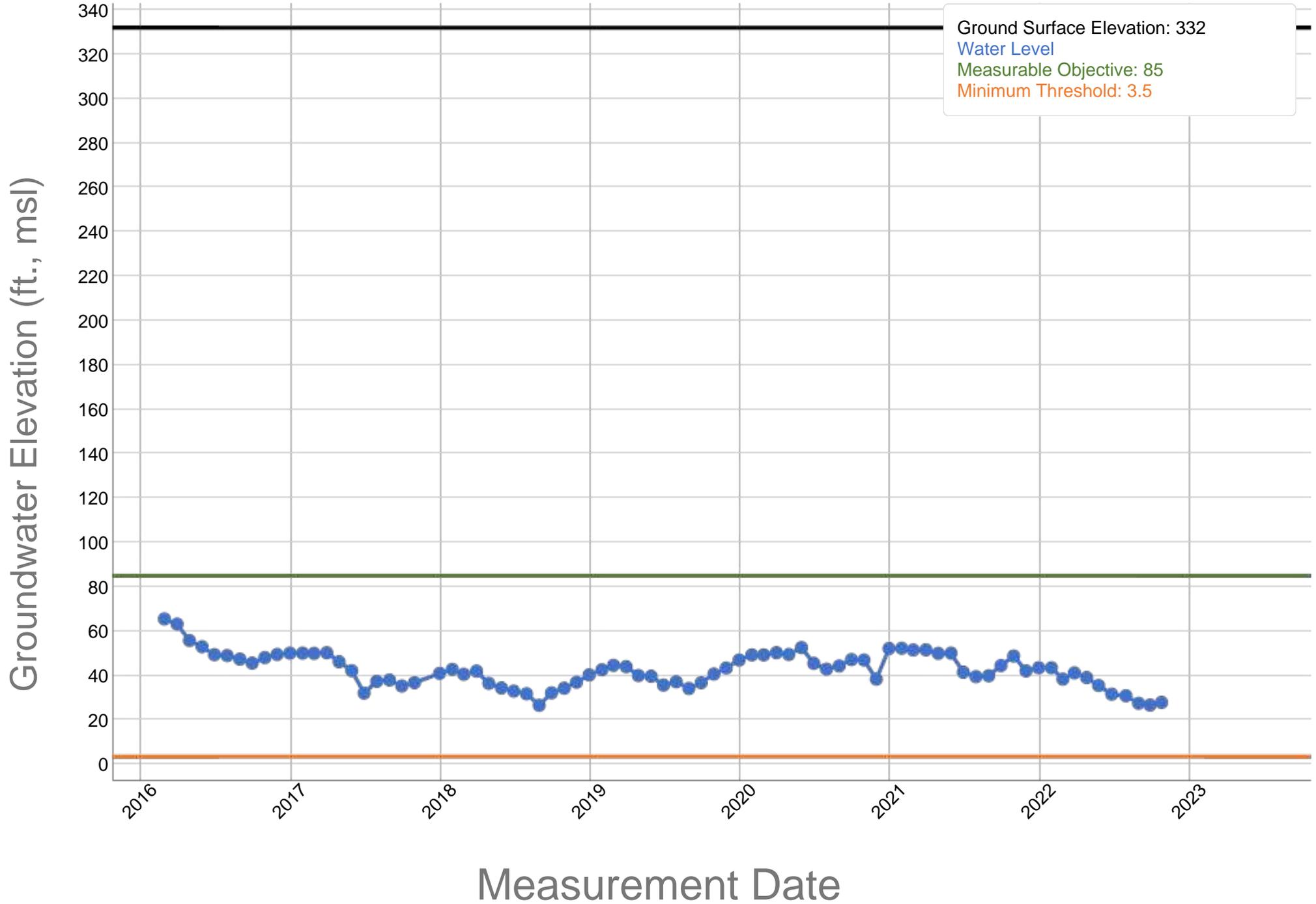
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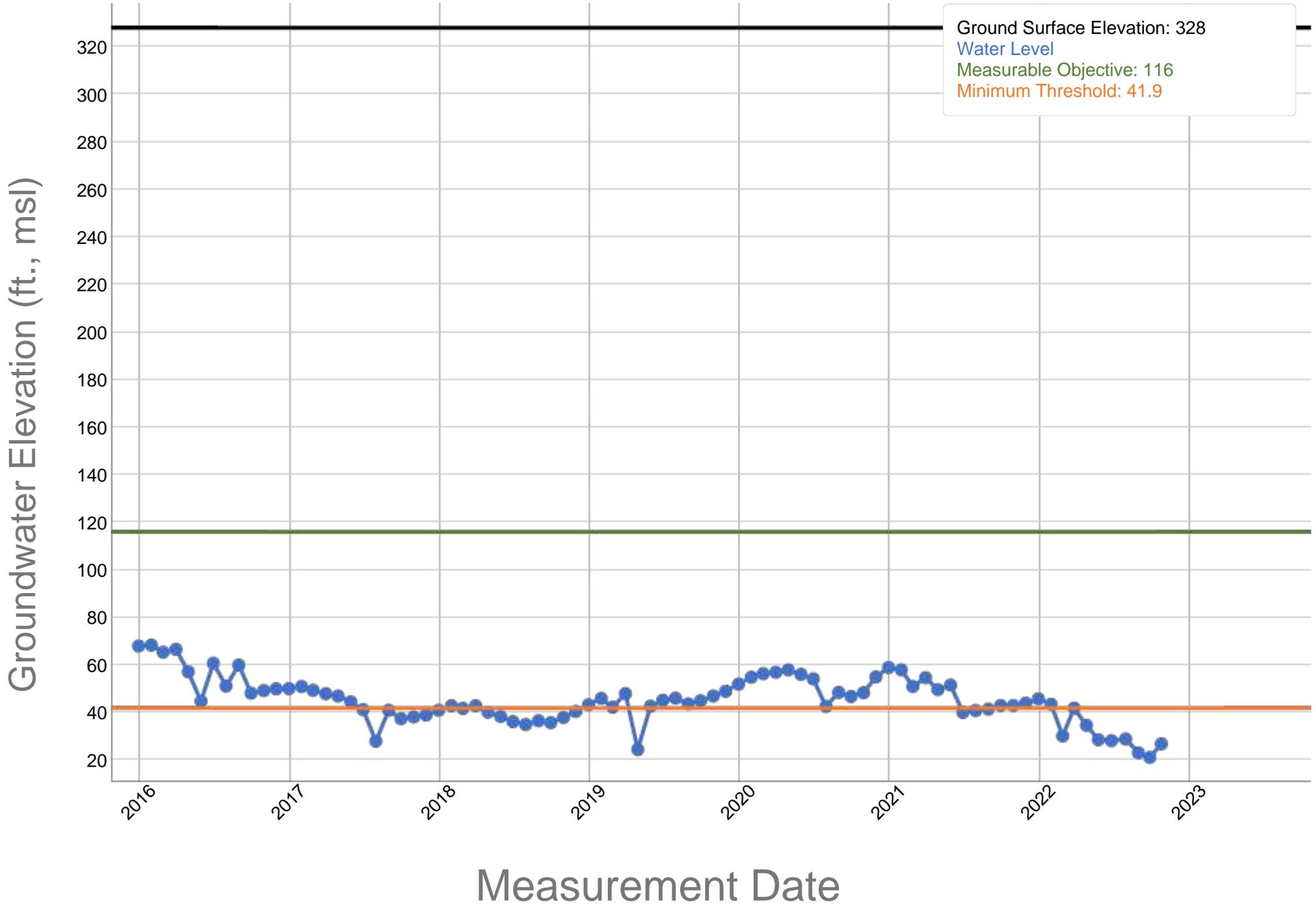
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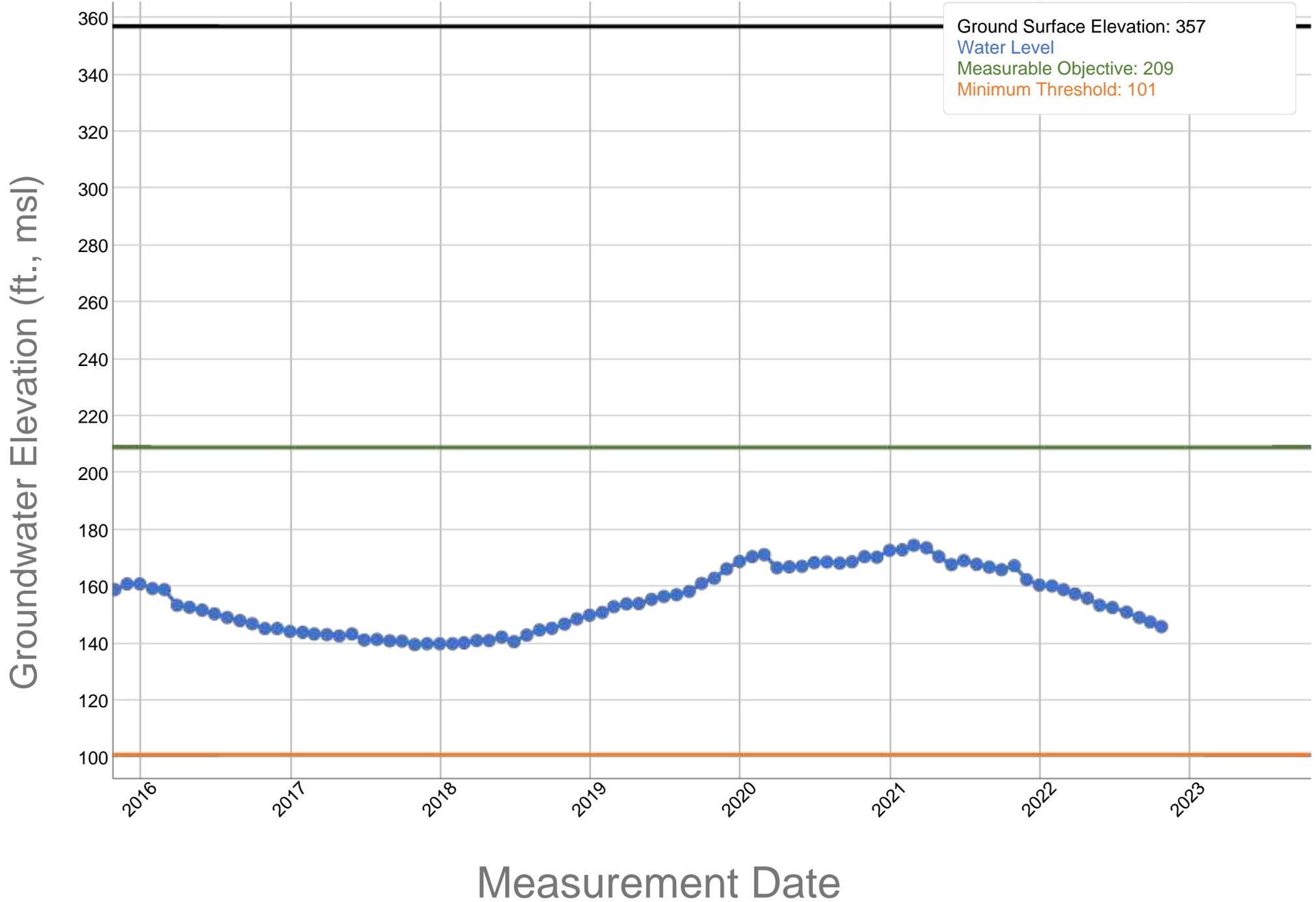
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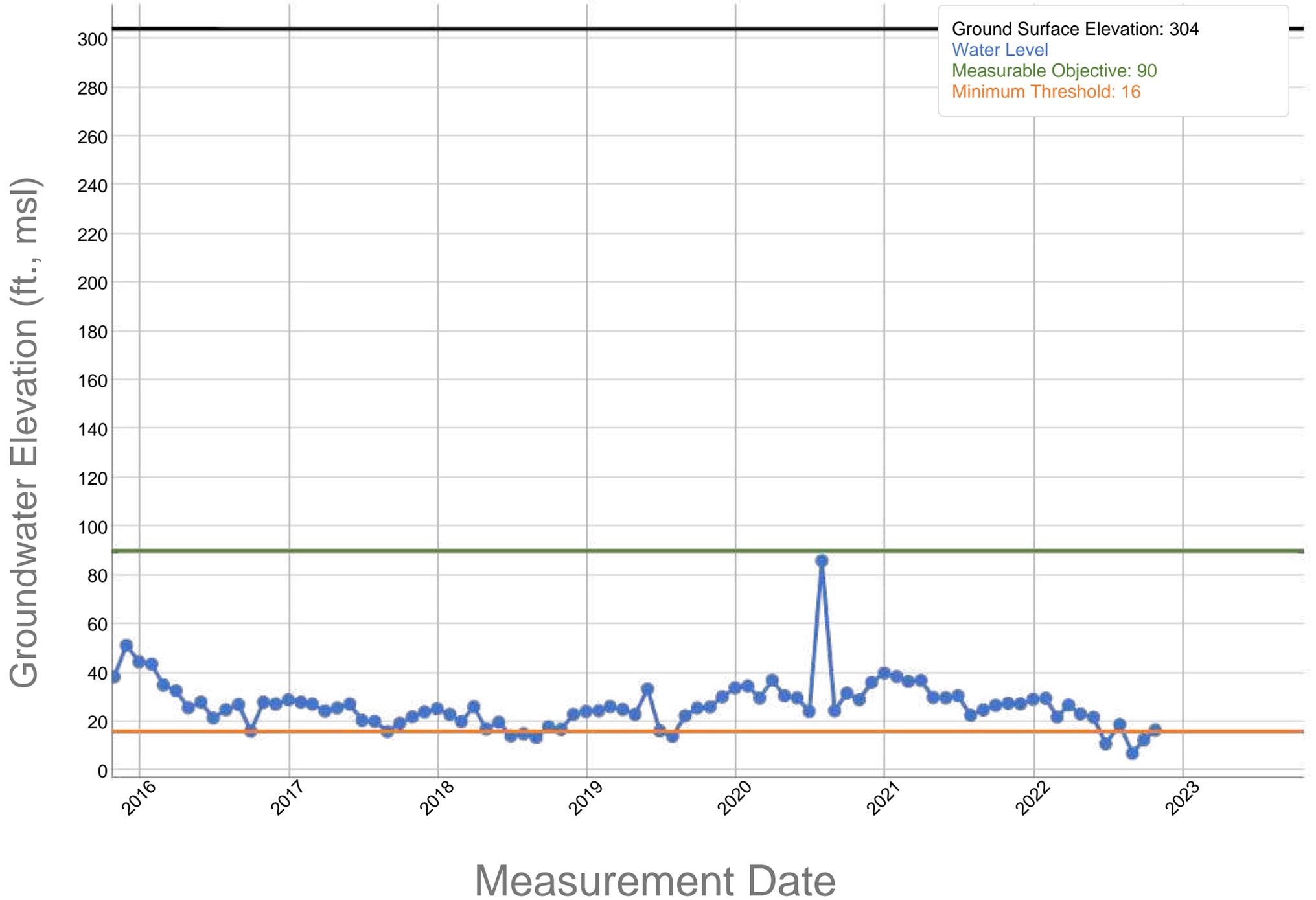
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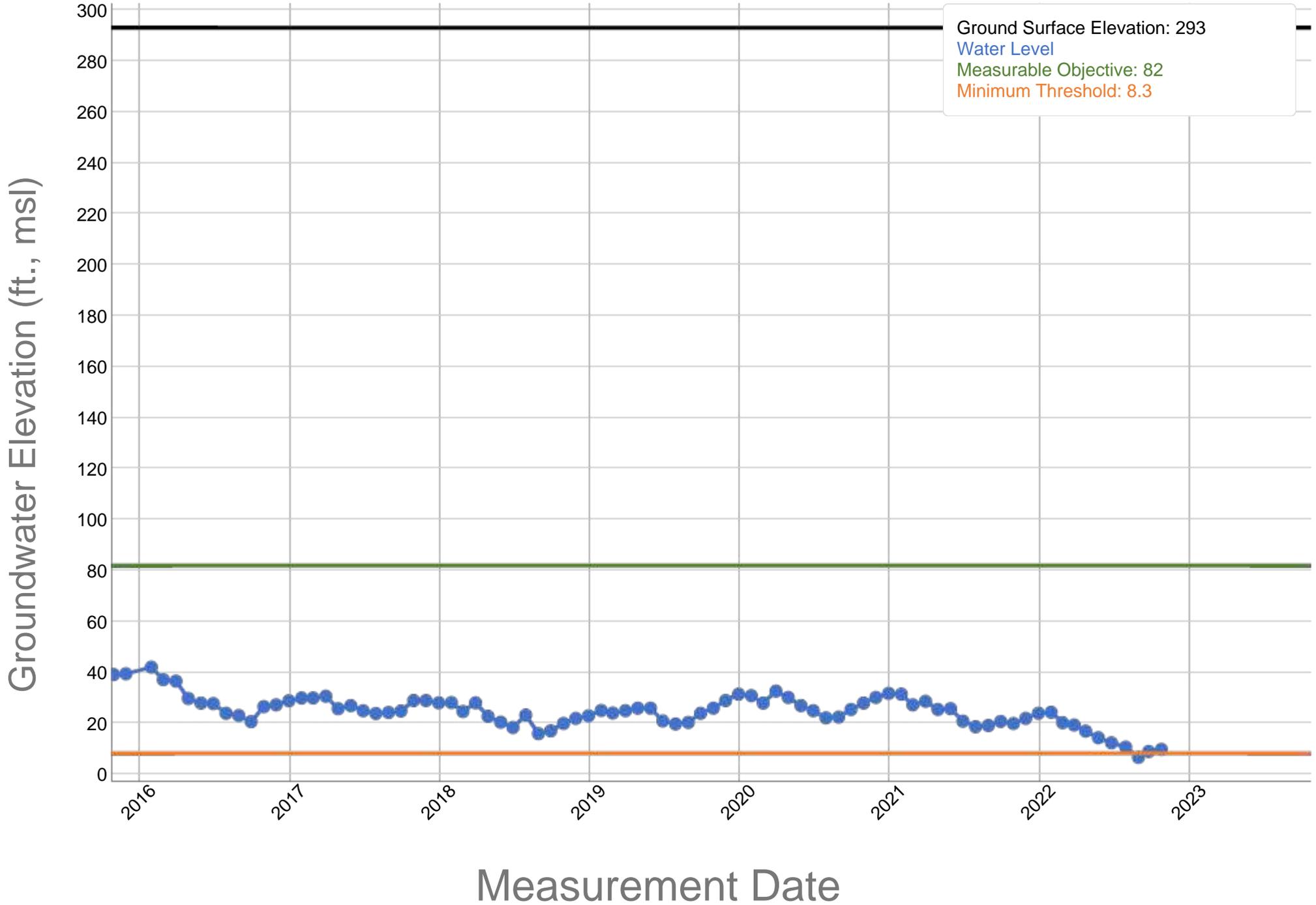
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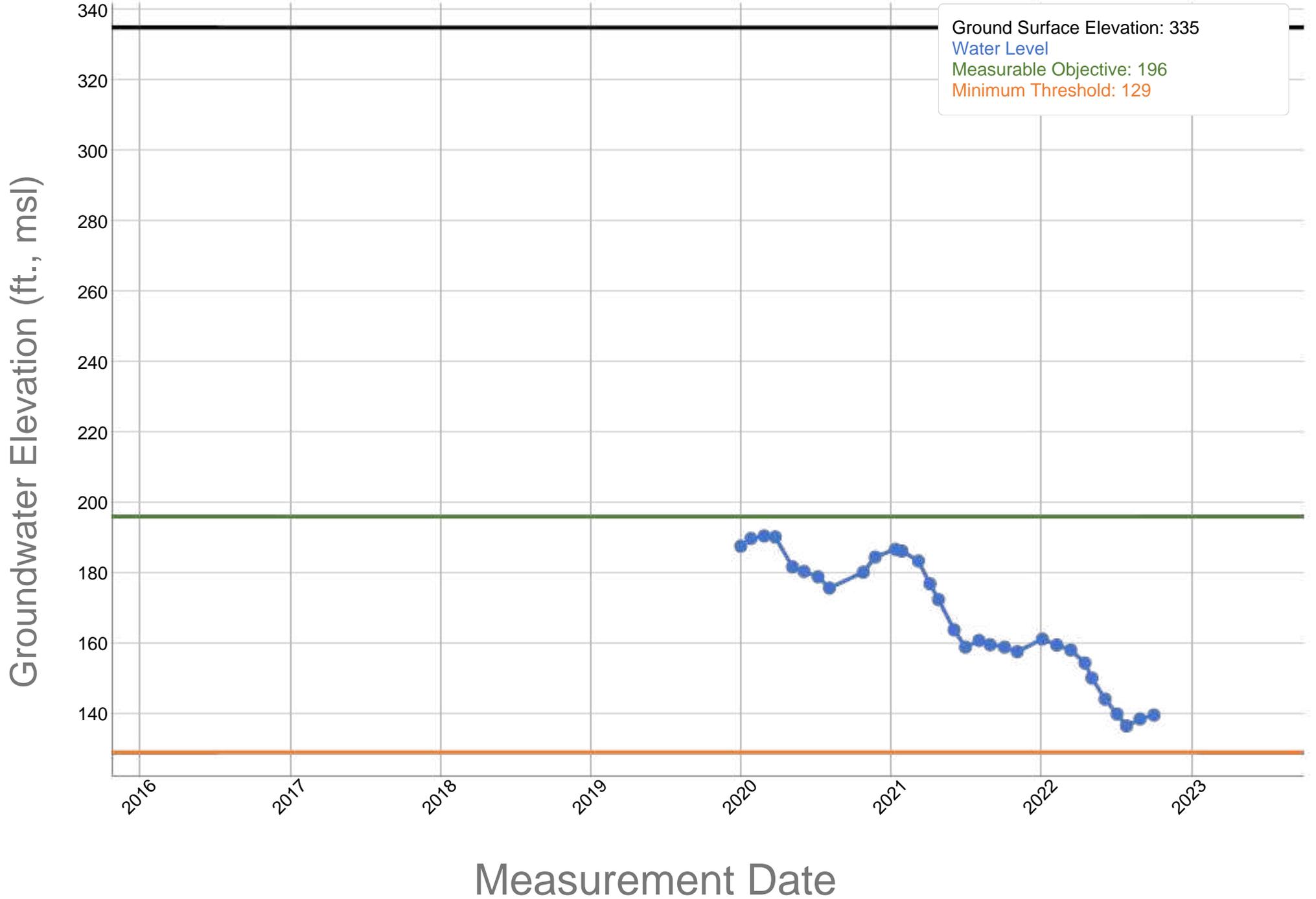
Rosedale-Rio Bravo Water Storage District - 16 Section 18 - 354090N1193318W001



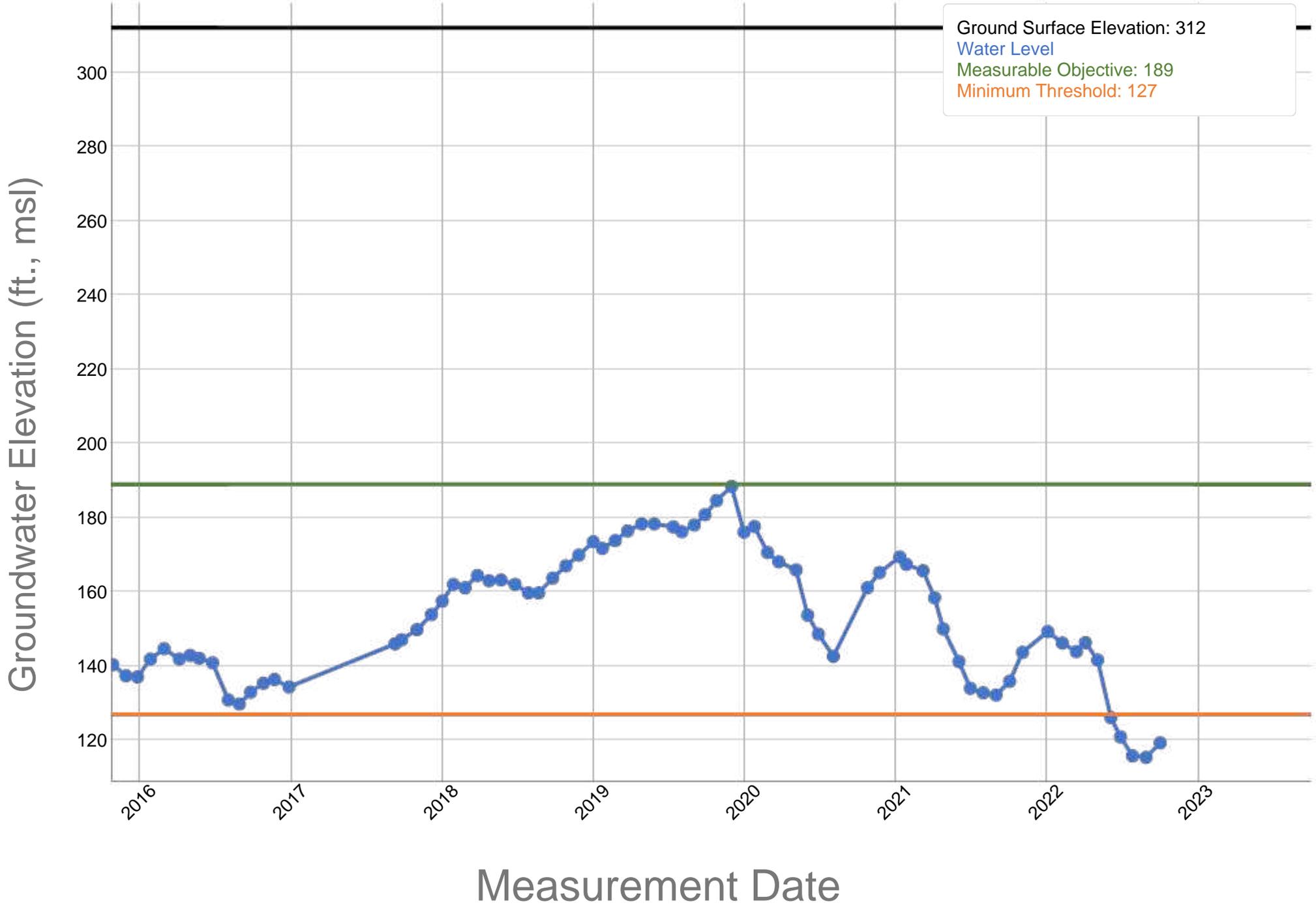
Rosedale-Rio Bravo Water Storage District - 18 Cauzza - 353986N1193948W001



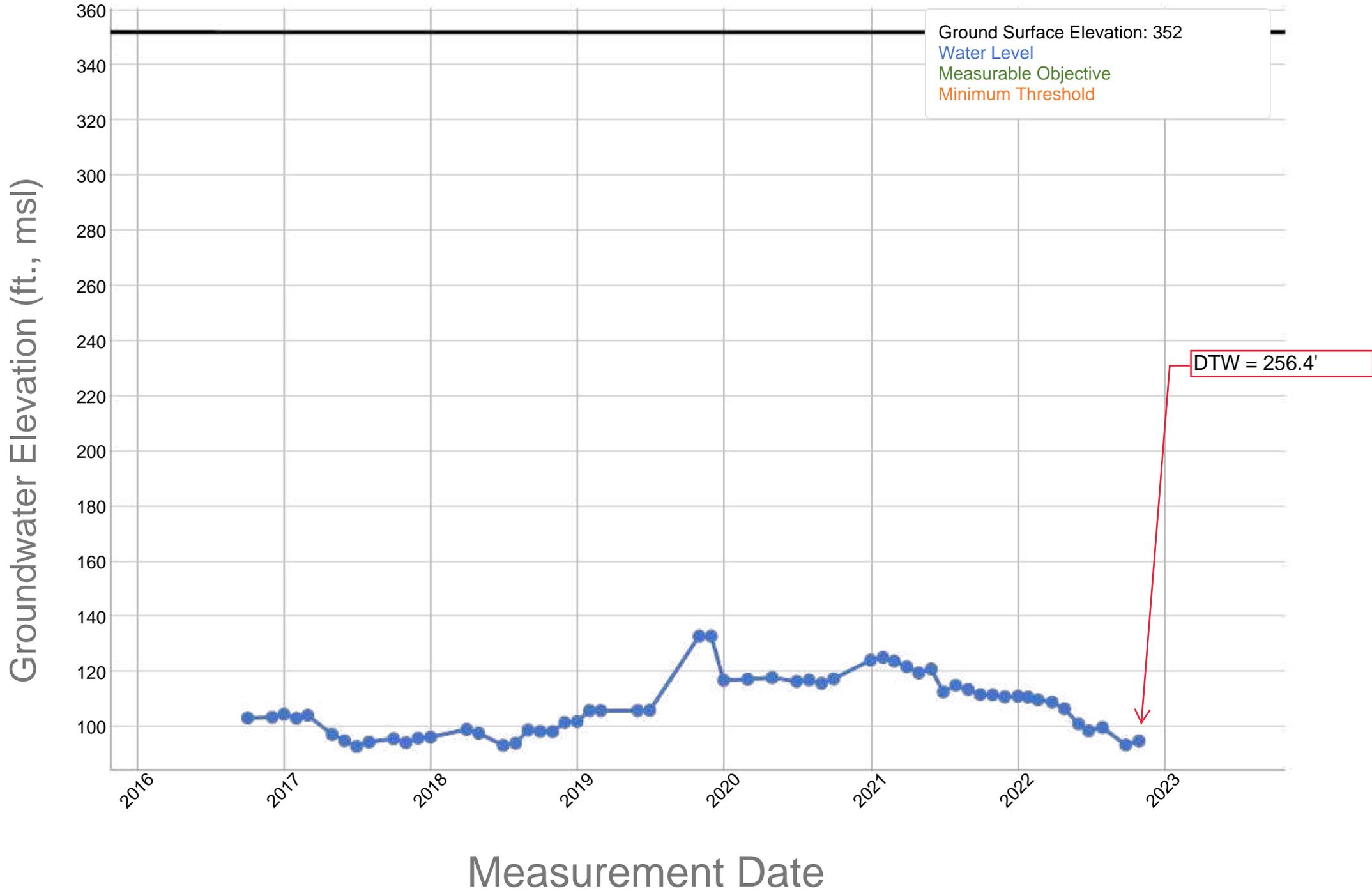
Rosedale-Rio Bravo Water Storage District - 28J Triple - 352889N1191814W001



Rosedale-Rio Bravo Water Storage District - 32N Triple - 352673N1192138W002



Rosedale-Rio Bravo Water Storage District - 353983N1191853W001 Unruh



**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.

Thomas Harder & Co.
1260 N. Hancock St., Suite 109
Anaheim, California 92807
(714) 779-3875

- 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:

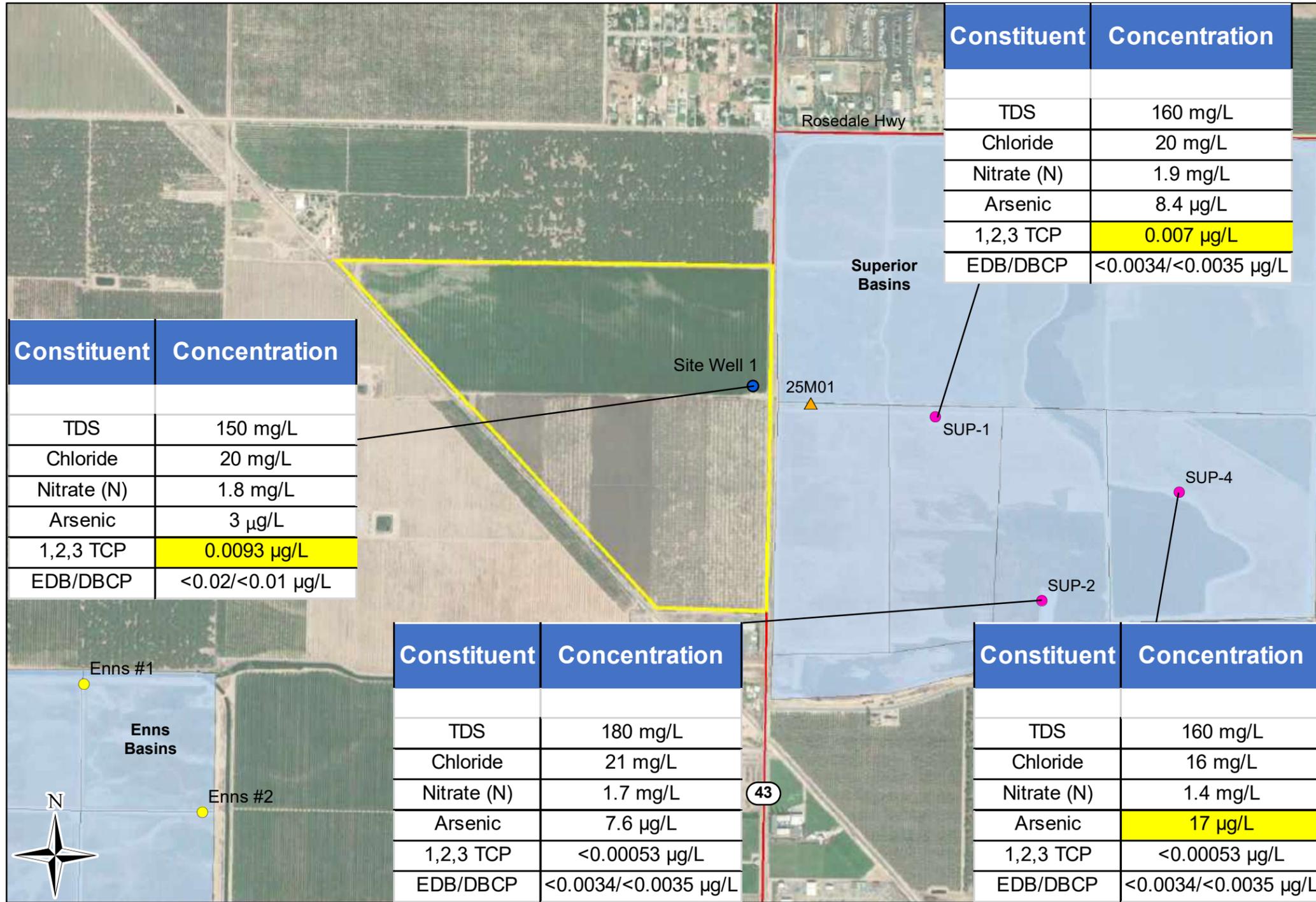
- The Site has historically been used for irrigated agriculture.
- Lithology at nearby wells has been logged primarily as sand and silty sand with clay content increasing below 400 ft bgs. These conditions are similar to subsurface conditions at nearby recharge basins and are expected to yield infiltration 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

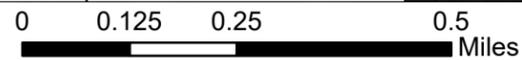
- BSK Associates Laboratory, 2021. Analytical Report for Groundwater Samples Collected from Site Wells on October 15, 2021.
- TH&Co, 2011. Hydrogeological Impact Evaluation Related to Operation of the Kern Water Bank and Pioneer Projects. Prepare for RRBWSD. Dated September 9, 2011.
- TH&Co, 2016. Hydrogeological 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.





Map Features

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



NAD 83 Stateplane Zone 5

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.

Thomas Harder & Co.
1260 N. Hancock St., Suite 109
Anaheim, California 92807
(714) 779-3875

- 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:

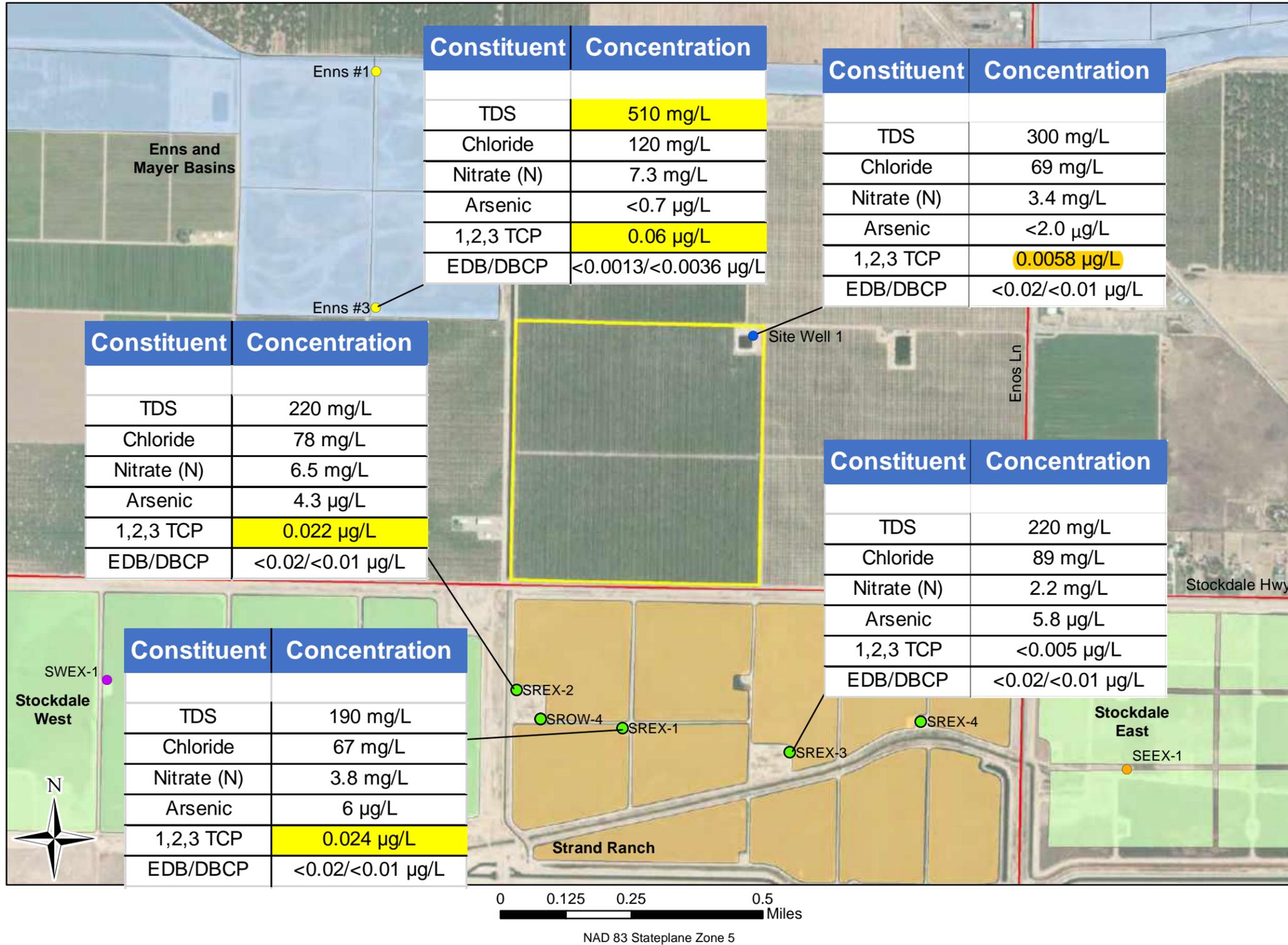
- The Site has historically been used for irrigated agriculture.
- Lithology at nearby wells has been logged primarily as silt in the upper 20 ft bgs. From 20 ft bgs, there is predominantly sand with silt and clay. Clay content increases beyond 550 to 600 ft bgs. These conditions are similar to subsurface 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.





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



Appendix J – Letters of Support

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



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,

A handwritten signature in black ink that reads "Pam Klassen". The signature is written in a cursive, flowing style.

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, 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,

A handwritten signature in blue ink that reads "Katie Porter". The signature is written in a cursive, flowing style.

Katie Porter
Member of Congress

JIM COSTA
16TH DISTRICT, CALIFORNIA
WEB PAGE: www.costa.house.gov
COMMITTEE ON AGRICULTURE
CHAIR – SUBCOMMITTEE ON LIVESTOCK AND
FOREIGN AGRICULTURE
COMMITTEE ON NATURAL RESOURCES
SUBCOMMITTEE ON WATER, OCEANS, AND
WILDLIFE



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

COMMITTEE ON FOREIGN AFFAIRS
SUBCOMMITTEE ON EUROPE, EURASIA, ENERGY
AND THE ENVIRONMENT
**TRANSATLANTIC LEGISLATORS'
DIALOGUE**
CHAIR
NATO PARLIAMENTARY ASSEMBLY
MEMBER

November 21, 2022

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

Dear Commissioner Touton:

This letter is to express my support for the Irvine Ranch Water District (IRWD) and Rosedale-Rio Bravo Water Storage District's (Rosedale) joint application for funding through the Bureau of Reclamation's Small Storage Program.

If awarded, funding would be used for Phase 1 of the Kern Fan Groundwater Storage Project (Kern Fan Project). Phase 1 is a standalone but important component of the overall project.

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 Central Valley Project (CVP), State Water Project (SWP) supplies, or flood flows. 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 storage water 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), and the project would provide both public and non-public benefits. Phase 1 will provide approximately 28,000 acre-feet of new storage in the Central Valley and will store surplus SWP and CVP water during wet years for later use in dry years.

Phase 1, along with the full Kern Fan Project, will provide regional and state benefits, such as improved local groundwater conditions, increased drought resiliency when other supplies may be reduced or interrupted, enhanced agricultural water supply reliability and preservation of productive agriculture acres. Phase 1 also provides significant federal environmental benefits and benefits to federal water operations.

The entire Kern Fan Project will also provide significant environmental benefits to endangered species in the Delta. Approximately a quarter of the water will be available to benefit endangered winter- and spring-run Chinook salmon by providing short-term ecosystem pulse flows from Lake Oroville in exchange of the same amount of water extracted from the project.

Additionally, 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.

According to the project applicants, the total cost for the overall 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 more than \$400 million. The total cost for Phase 1 is \$50.16 million, or an annual cost of \$1.68 million, while the annual benefits are \$4.04 million.

California has recognized the value of this project by selecting it as one of eight projects to receive water storage funds through Proposition 1, a water bond approved by voters in November 2014. The California Water Commission has allocated \$89.1 million to the project. The Kern Fan Project is a strong candidate for federal funding because it meets water supply security needs while producing important ecological and agricultural benefits.

As a lifelong resident of the San Joaquin Valley, I urge you to give Phase 1 of the Kern Fan Groundwater Storage Project your full and fair consideration under the Small Storage Program.

Sincerely,



JIM COSTA
Member of Congress

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

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



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,

A handwritten signature in blue ink that reads "Vince Fong". The signature is written in a cursive style with a large initial "V".

Vince Fong
Assemblymember, 34th 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 Kern 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
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SACRAMENTO, CA 94249-0088
(916) 319-2068
FAX (916) 319-2168



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,

A handwritten signature in blue ink that reads "Steven S. Choi". The signature is written in a cursive, flowing style.

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



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

DIRECTORS:

John Vidovich - President
Terry Chioce - Vice President
Julien Parsons - Secretary
Craig Andrew
Jeof Wyrick

STAFF:

Tim Ashlock – Engineer-Manager
Andrew Bell – Hydrographer
Marybeth Brooks – Controller
Adam Sevier – Superintendent
Angela Thompson – Executive Assistant

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,

A handwritten signature in blue ink, appearing to read 'Tim Ashlock', with a long, sweeping flourish extending to the right.

Tim Ashlock
Engineer – Manager
Buena Vista Water Storage District

DUDLEY RIDGE WATER DISTRICT

DIRECTORS

KIMBERLY M. BROWN, PRESIDENT
LARRY RITCHIE, VICE PRESIDENT
STEVEN D. JACKSON, SECRETARY
JOHN VIDOVICH
BERNARD PUGET

455 W. FIR AVENUE
CLOVIS, CALIFORNIA 93611

PHONE (559) 449-2700
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GENERAL MANAGER

MARK A. GILKEY

ASST. MANAGER-ENGINEER

DALE K. MELVILLE

ASSESSOR-COLLECTOR-TREASURER

RICK BESECKER

LEGAL COUNSEL

JOSEPH D. HUGHES

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,

A handwritten signature in black ink, appearing to read 'KMB', is written over a horizontal line.

Kimberly M. Brown
President



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

The Honorable Senator Feinstein
The Honorable Senator Padilla
June 10, 2021
Page 2

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



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



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

Senator Feinstein and Senator Padilla
June 10, 2021
Page two

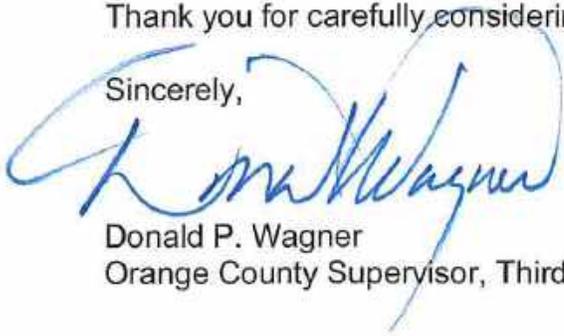
Proposition 1, a water bond approved by voters in November 2014, water storage funds. The Commission has allocated \$87.8 million to the project.

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

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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.

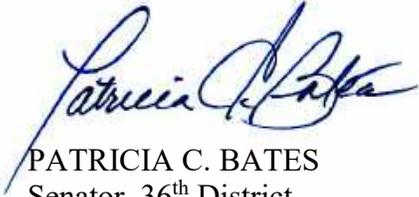
The total cost for the project is \$246 million, but a federal feasibility study for the Kern Fan Project quantified the net present value of the Kern Fan Project's benefits at more than \$400 million. The study showed that the Kern Fan Groundwater Storage Project will not only provide regional and state 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,

A handwritten signature in blue ink that reads "Patricia C. Bates". The signature is written in a cursive style with a large initial "P".

PATRICIA C. BATES
Senator, 36th District



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

715 P Street, 20th Floor, Sacramento, CA 95814 Ph. 916.653.5656 <http://resources.ca.gov>



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 IJA 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

Appendix K – Multi-benefit Recharge Diagram

Key features of multibenefit recharge

Basins 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.

Grading is the recommended method for vegetation management due to its low cost and effectiveness. There is a risk of soil compaction if berms are too dense or if graders are applied for an extended duration. Grazing should only be used when soil conditions are dry to avoid soil compaction.

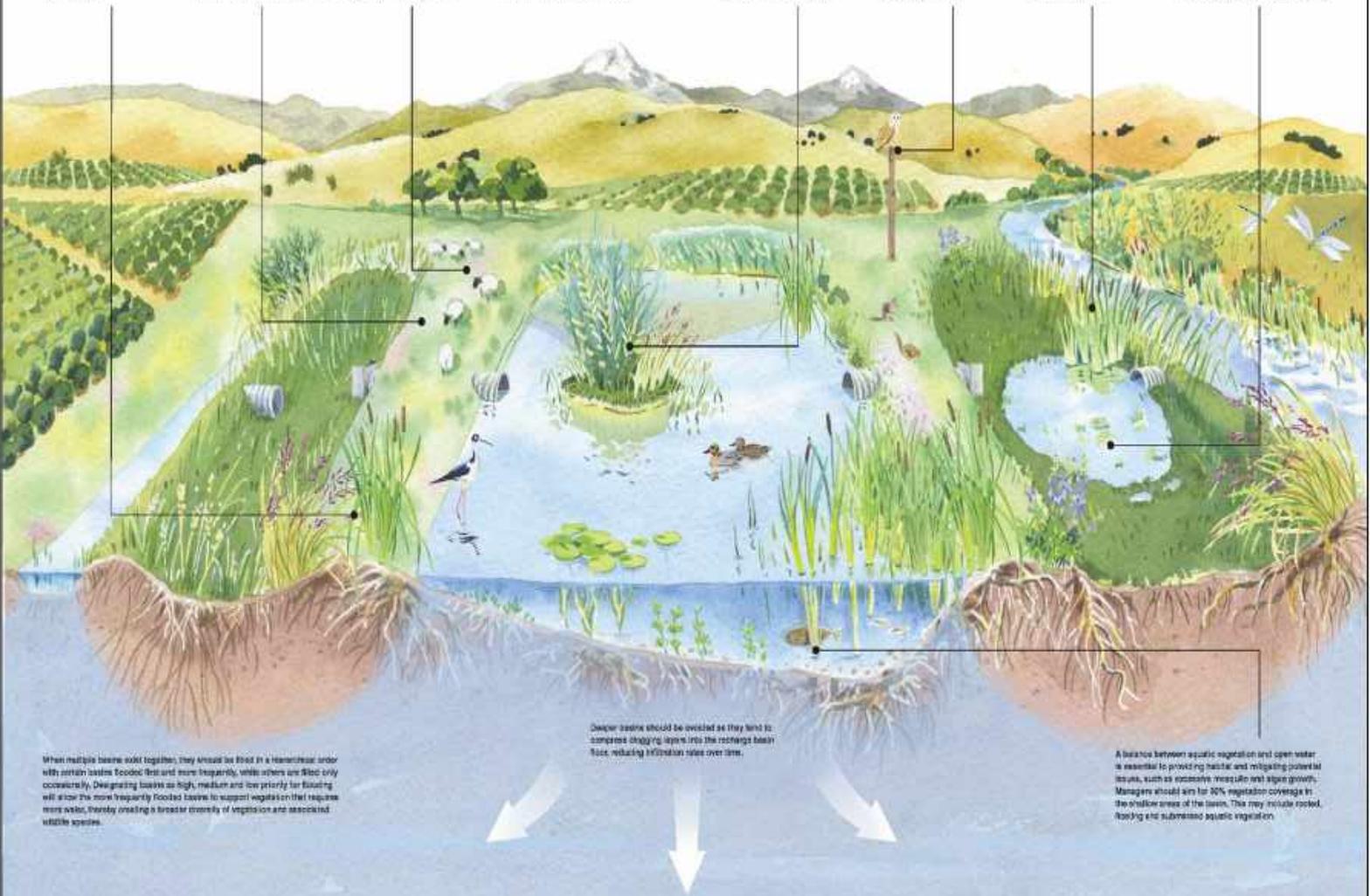
Frequent heavy tilling and mowing is not recommended for vegetation removal as heavy equipment can result in soil compaction and reduced infiltration rates. However, these methods may be needed periodically to control overgrowth of cattails or tules.

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 nesting habitat for waterbirds.

Burrowing rodents can cause structural damage to earthen berms. Because rodents like to northern berms, 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 optimize the introduction of vegetation and invertebrates, which can act to jump-start faunal succession.

Establishing a vegetated forbsay 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 flooded in a hierarchical order with certain basins flooded first and more frequently, while others are flooded 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 greater 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 vegetation and algae growth. Managers should aim for 50% vegetation coverage in the shallow areas of the basin. The zone includes 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 |

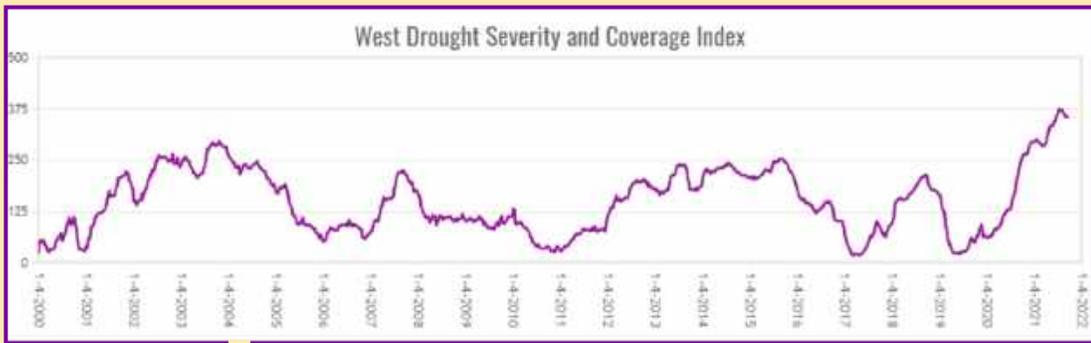
Q

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.

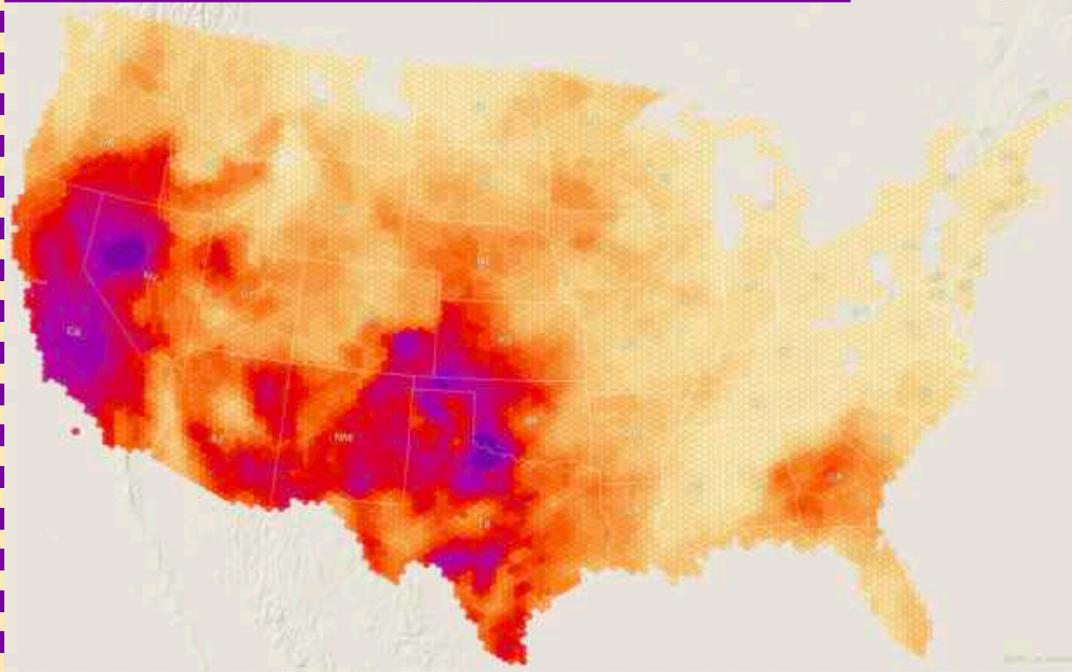


Five+ Years of Drought:

An extended look at drought intensity and duration in the contiguous United States

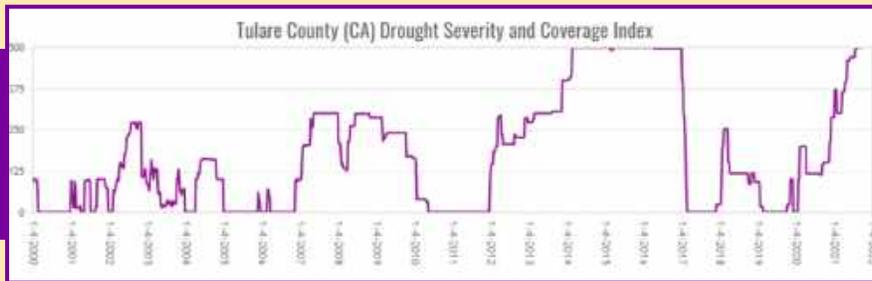
Based on U.S. Drought Monitor data for 2011–2016

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.

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.

$$D0 + D1 + D2 + D3 + D4 = \text{DSCI}$$

Or, use categorical (not cumulative) Drought Monitor data, and compute a weighted sum of the percentages for D0 through D4:

$$1(D0) + 2(D1) + 3(D2) + 4(D3) + 5(D4) = \text{DSCI}$$

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

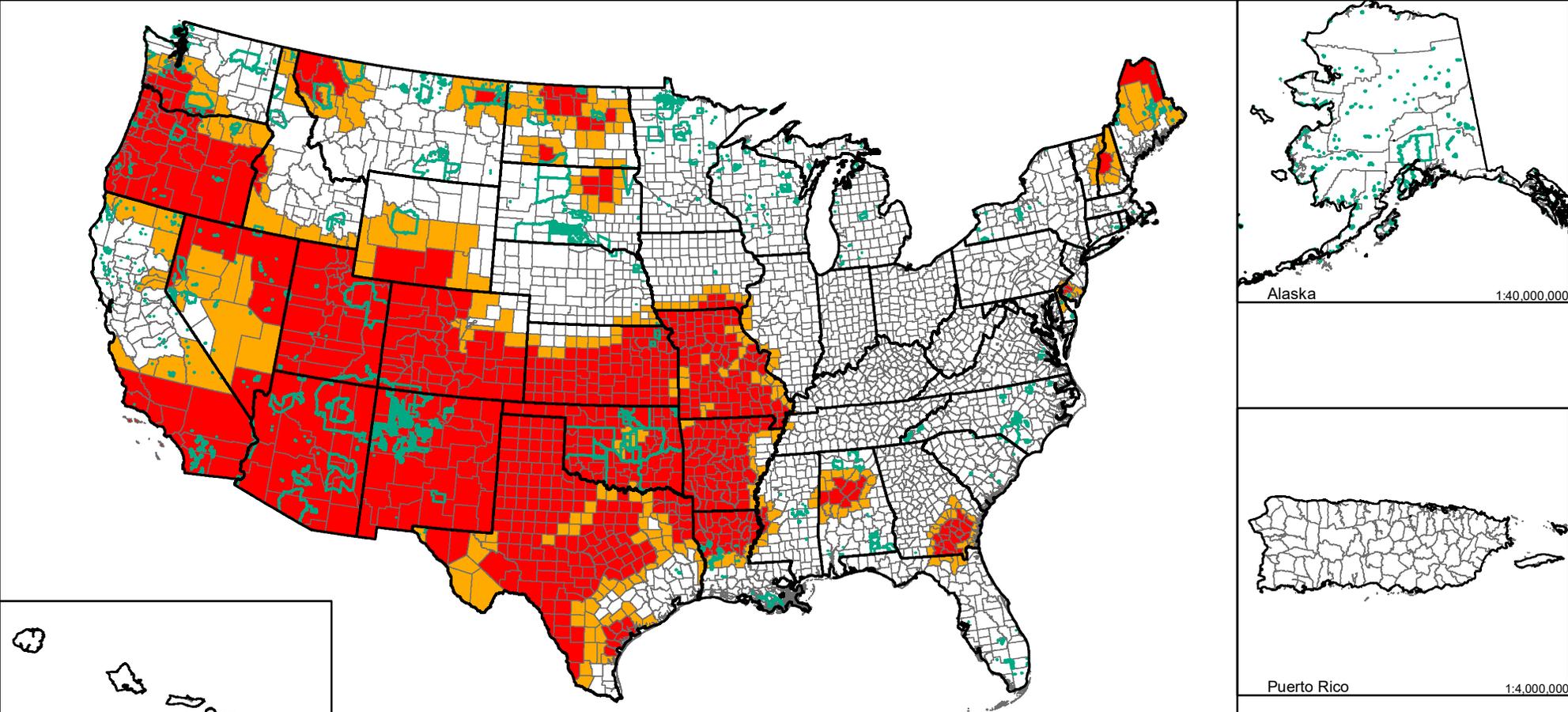
Credit

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 (2018-2022)

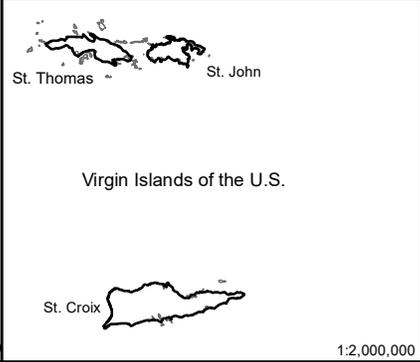
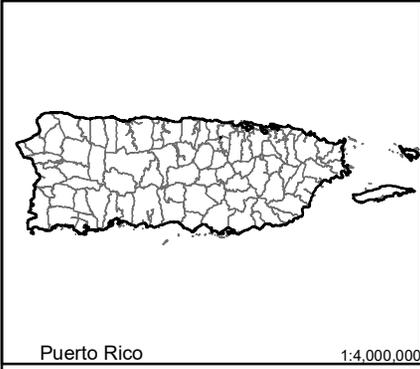
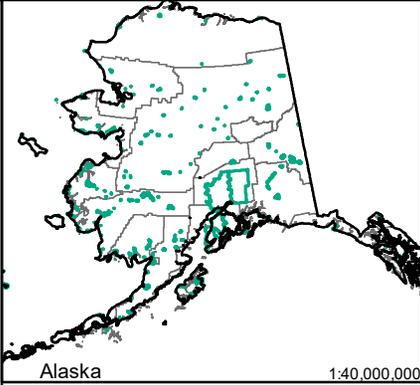
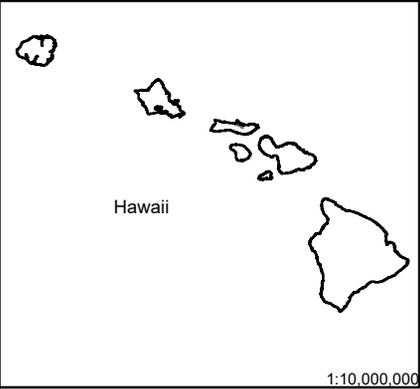
2018 Secretarial Drought Designations - All Drought



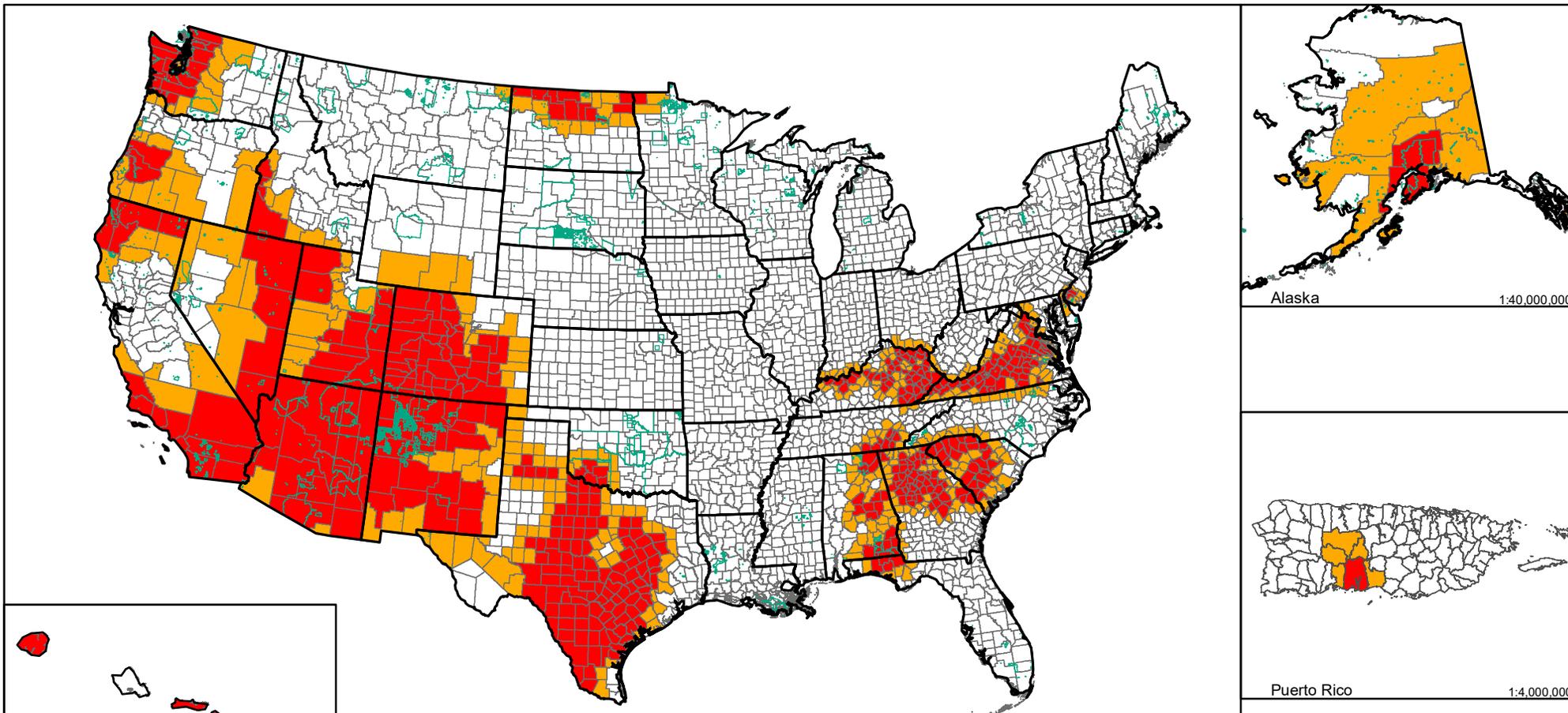
Secretarial Drought Designations for 2018

Disaster Incidents as of September 3, 2019

-  State Boundary
-  County Boundary
-  Tribal Lands
-  Primary Counties: 737
-  Contiguous Counties: 311



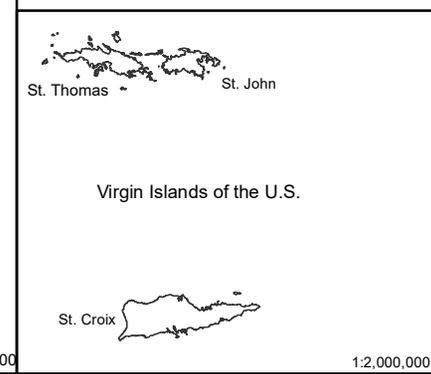
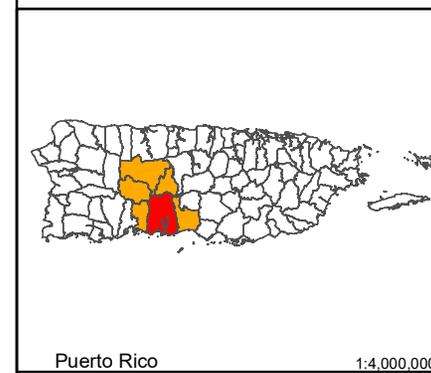
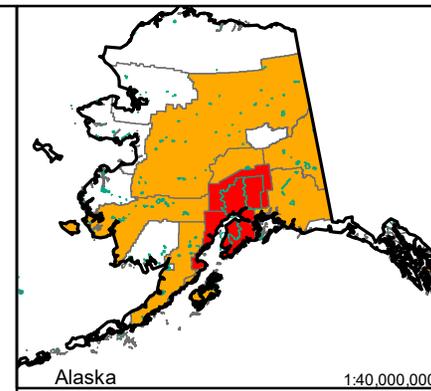
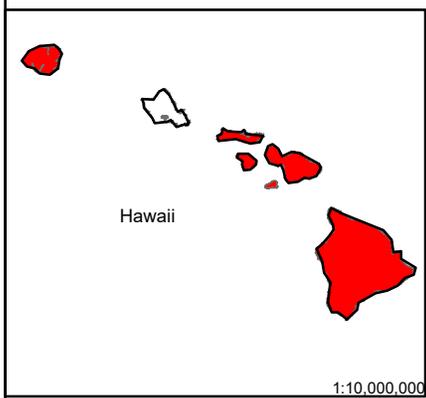
2019 Secretarial Drought Designations - All Drought



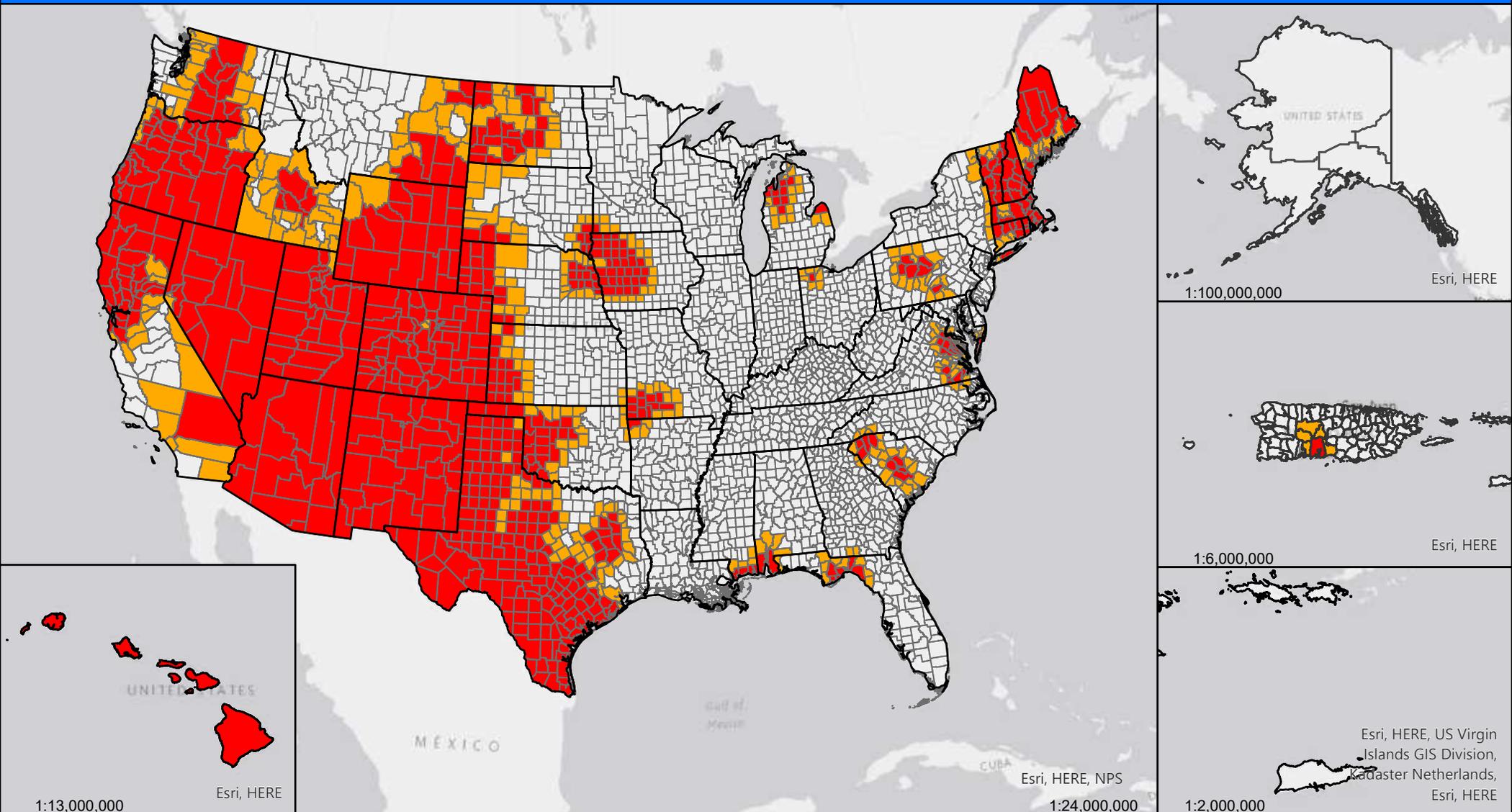
Secretarial Drought Designations for 2019

Disaster Incidents as of July 22, 2020

-  State Boundary
-  County Boundary
-  Tribal Lands
-  Primary Counties: 472
-  Contiguous Counties: 428



2020 Secretarial Drought Designations - All Drought



Secretarial Drought Designations for 2020

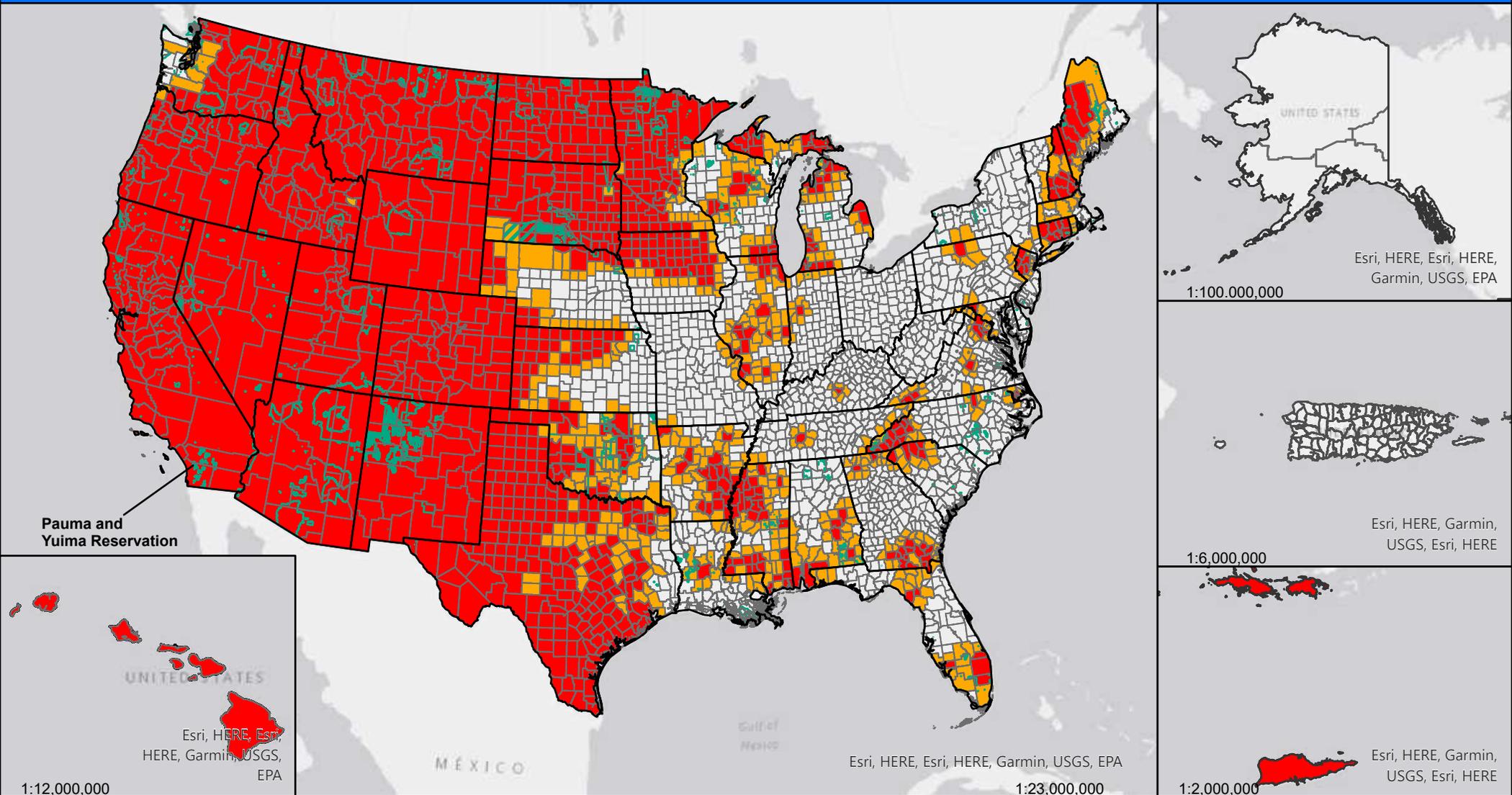
Disaster Incidences as of April 28, 2021

- Primary Counties: 669
- Contiguous Counties: 381



Secretarial Disaster Designations - CY 2021

Primary and Contiguous Counties Designated for Crop Disaster Losses



All Secretarial Designations as of May 25, 2022

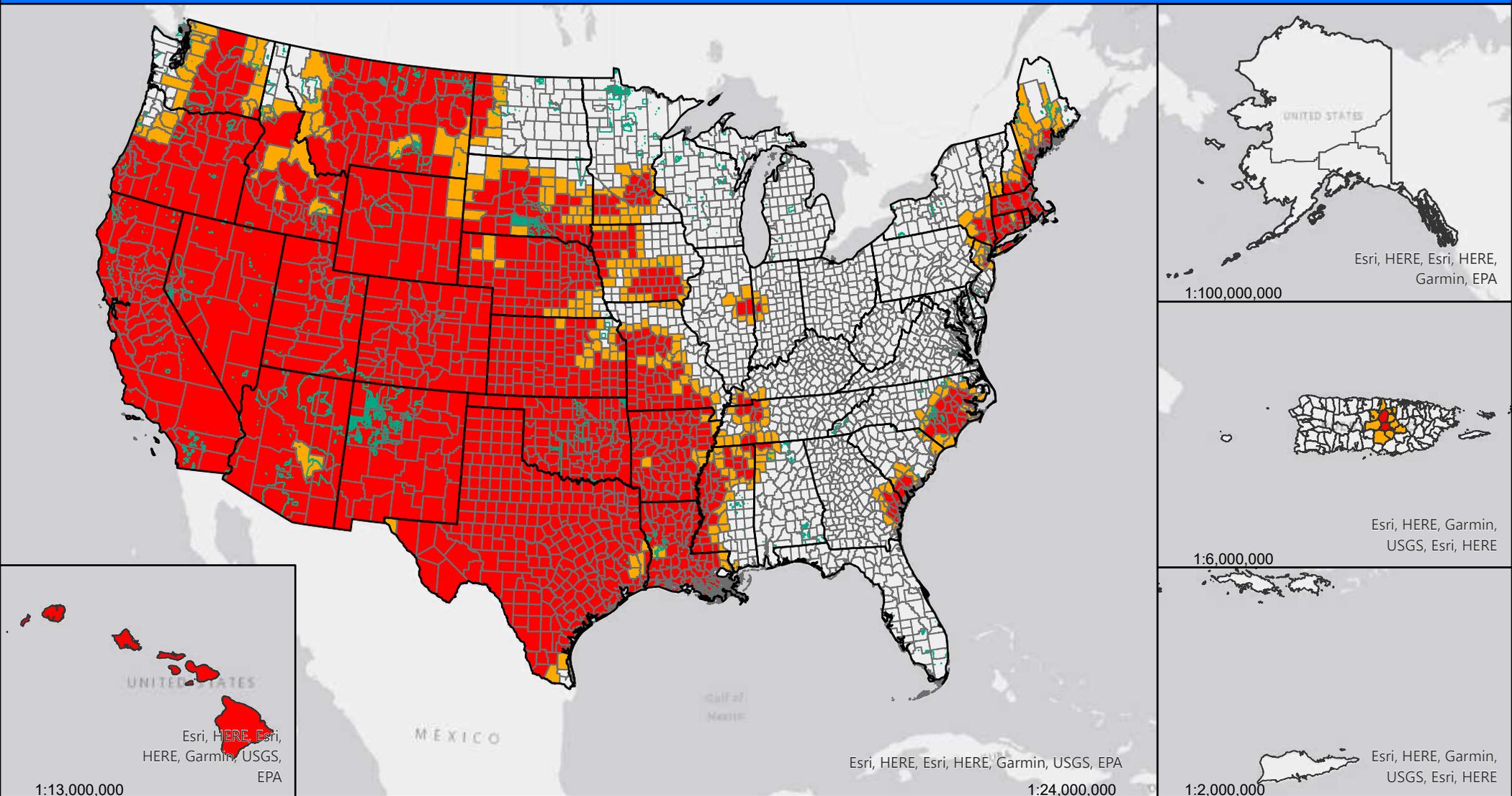
Total All Crop Approval Designations

- State Boundary
- County Boundary
- Tribal Lands
- Secretarial_Tribal_Areas: 2
- Primary Counties: 1,095
- Contiguous Counties: 588

This is the final map for 2021.



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





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.

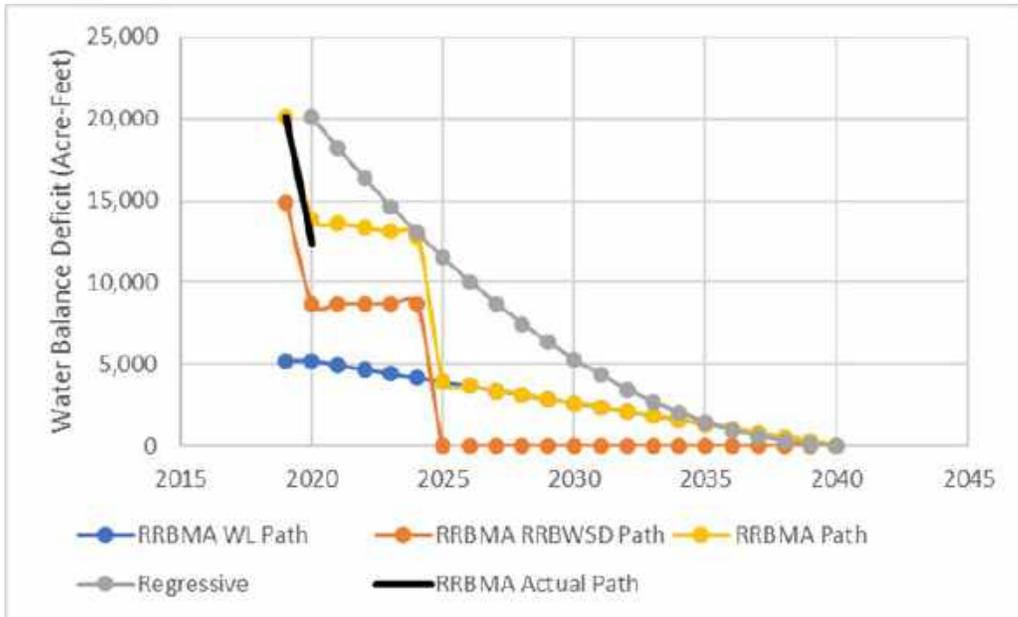
Regulation Governing Disaster Designation Process

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 – RRBMA SGMA Goals and Path to Sustainability



RRBMA Path to Sustainability

| | Projects (AFY) | | Management Actions (AFY) | | Total (AFY) | |
|--------------|----------------|---------------|--------------------------|---------------|--------------|---------------|
| | Actual | Milestone | Actual | Milestone | Actual | Milestone |
| 2020 | 6,500 | 5,000 | 1,250 | 1,250 | 7,750 | 6,250 |
| 2020-2021 | 0 | | 434 | | 434 | |
| 2025 | | 11,500 | | 5,300 | | 16,800 |
| 2030 | | 10,000 | | 1,300 | | 11,300 |
| 2035 | | 1,000 | | 1,300 | | 2,300 |
| 2040 | | 0 | | 1,300 | | 1,300 |
| TOTAL | 6,500 | 27,500 | 1,684 | 10,450 | 8,184 | 37,950 |

RRBMA Projects and Management Action Milestones

Appendix O – Kern Fan Project Phase 1 Proposed and Capital Budget

Kern Fan Groundwater Storage Project Proposed Projects and Capital Budget for 2022-23 through 2024-25

SCOPE OF WORK

A capital outlay program has been prepared for the next three years and is outlined below. It primarily involves the development of two recharge and recovery properties referred to as the:

- 1) **Bolthouse Property** – Approximately 200 acres located on the west side of Enos Lane and north of the Goose Lake Channel in Section 26, T29S, R25E also being APN's 104-240-22, 104-240-30, and 104-240-31.
- 2) **Diamond Property** – Approximately 160 acres located north of Stockdale Hwy and east of the Rosedale Intake Canal in Section 35, T29S, R25E also being APN 104-291-07.

The development work includes, but is not limited to, recharge basins, recovery wells (two per property), well conveyance pipelines, interconnection with the Central Intake Pipeline for the Bolthouse property, interconnection with the Strand Ranch North CVC Turnout for the Diamond property, interconnection with the RRBWSD-CVC intertie pipeline for the Diamond property return flows, a potential conveyance facility in the Goose Lake Channel to either property, and a SCADA and PLC communication system.

The capital cost estimate at this time is considered a Class 3 Estimate. Class 3 estimates include semi-detailed unit costs and are generally prepared to support project budgeting and become the first of the project phase "control estimates" against which all actual costs and resources will be monitored for variations to budget. The Class 3 estimate is used as the project budget until replaced by more detailed estimates. The accuracy range for the cost estimates varies from -10% to -20% on the low side and +10% to +30% on the high side.

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 and the non-contract costs which include project management, engineering design, bid administration, and construction management and inspection. The 20% contingency utilized herein is consistent with the Class 3 Estimate criteria per ACE International Practice No. 18R-97 and the Reclamation Manual Directives and Standards document FAC 09-01. The unlisted items amount is consistent with the Reclamation Manual Directives and Standards Section E. "Special Allowances".

Fiscal Year 2022-23

The work to be completed in FY2022-23 is anticipated to include the following:

- Land Acquisition for each property
- Environmental work for each property including CEQA and NEPA
- Engineering Design including field surveying, geotechnical work, preliminary engineering design, plans, specifications, cost estimates, bid documents, permitting, and electrical service applications.
- SCADA and PLC system design and software purchase
- Bid Phase Administration for the Bolthouse Property Recharge Basin Earthwork Project
- Bid Phase Administration for the Bolthouse Property Conveyance Facilities including well conveyance pipelines, Enos Lane road crossing, interconnection with the Central Intake Pipeline and potential Goose Lake Channel pump station facility
- Bid Phase Administration for the Bolthouse Property Well Drilling and Well Equipping for two recovery wells
- Bid Phase Administration for the Diamond Property Recharge Basin Earthwork Project
- Construction of the Bolthouse Property Recharge Basin Earthwork Project. Estimating completion of the project this fiscal year.
- Construction of the Bolthouse Property Conveyance Facilities including well conveyance pipelines, Enos Lane road crossing, interconnection with the Central Intake Pipeline and potential Goose Lake Channel pump station facility. Estimating completion of approximately fifty-percent (50%) of the project this fiscal year.
- Construction of the Bolthouse Property Well Drilling and Well Equipping for two recovery wells. Estimating completion of the drilling of one recovery well.
- Construction Management and Inspection for the above referenced projects including construction staking, daily field inspection, materials testing, and project management.

Total Estimated Budget for FY2022-23 is \$16,100,365.00.

Fiscal Year 2023-24

The work to be completed in FY2023-24 is anticipated to include the following:

- Completion of Engineering Design, Electrical Service Applications, and Permitting
- Completion of SCADA and PLC system design and hardware purchase
- Bid Phase Administration for the Diamond Property Well Drilling and Well Equipping for two recovery wells

- Bid Phase Administration for the Diamond Property interconnection pipeline to the RRBWSD-CVC Intertie Pipeline
- Bid Phase Administration for the Diamond Property water supply conveyance from the Strand Ranch North CVC Turnout including Stockdale Hwy road crossing
- Bid Phase Administration for the SCADA and PLC Programming project
- Completion of the Bolthouse Property Conveyance Facilities including well conveyance pipelines, Enos Lane road crossing, interconnection with the Central Intake Pipeline and potential Goose Lake Channel pump station facility.
- Completion of the Bolthouse Property Well Drilling and Well Equipping project.
- Construction of the Diamond Property Recharge Basin Earthwork Project. Estimating completion of this project this fiscal year.
- Construction of the Diamond Property Conveyance Facilities including well conveyance pipelines with a road crossing at Stockdale Hwy and a connection to the existing RRBWSD-CVC Intertie pipeline for return flows from the Diamond Property. Estimating completion of approximately 20% of the project this fiscal year.
- Construction of the Diamond Property Well Drilling and Well Equipping for two recovery wells. Estimating completion of the drilling for two wells this fiscal year.
- Construction of the Diamond Property water supply conveyance from the Strand Ranch North CVC Turnout including Stockdale Hwy road crossing. Estimating completion of approximately thirty-percent (30%) of the project this fiscal year.
- Construction Management and Inspection for the above referenced projects including construction staking, daily field inspection, materials testing, and project management.

Total Estimated Budget for FY2023-24 is \$13,361,289.00.

Fiscal Year 2024-25

The work to be completed in FY2024-25 is anticipated to include the following:

- Completion of the Diamond Property Conveyance Facilities including well conveyance pipelines with a road crossing at Stockdale Hwy and a connection to the existing RRBWSD-CVC Intertie pipeline for return flows from the Diamond Property.
- Completion of the Diamond Property Well Drilling and Well Equipping for two recovery wells. Estimating completion of the well equipping for two wells this fiscal year.
- Completion of the Diamond Property water supply conveyance from the Strand Ranch North CVC Turnout including Stockdale Hwy road crossing.
- Construction of the SCADA and PLC Programming System

Total Estimated Budget for FY2024-25 is \$7,163,671.00.

LIST OF EXHIBITS

Exhibit A: Proposed Capital Budget

EXHIBIT A
Proposed Capital Budget

Groundwater Banking Joint Powers Authority

Proposed Capital Budget

| Task No. | Task Description | Project Capital Cost | FY2022-23 | FY2023-24 | FY2024-25 |
|----------|--|----------------------|-----------------|-----------------|----------------|
| 1 | Land Acquisition | \$8,995,398.00 | \$8,995,398.00 | | |
| 2 | Engineering Design and Project Management | \$1,245,000.00 | \$895,000.00 | \$350,000.00 | |
| 3 | Environmental Work | \$130,000.00 | \$30,000.00 | \$50,000.00 | \$50,000.00 |
| 4 | Construction Management and Inspection | \$1,500,000.00 | \$371,077.78 | \$781,909.64 | \$347,012.58 |
| 5 | SCADA Communication Design & Equipment | \$250,000.00 | \$100,000.00 | \$150,000.00 | |
| 6 | Bolthouse Property 200 acre Recharge Earthwork | \$2,866,963.95 | \$2,866,963.95 | | |
| 7 | Bolthouse Property 200 acre Conveyance Facilities | \$3,683,850.00 | \$1,841,925.00 | \$1,841,925.00 | |
| 8 | Bolthouse Property 200 acre Well Drilling (Two Wells) | \$2,601,616.05 | \$1,000,000.00 | \$1,601,616.05 | |
| 9 | Bolthouse Property 200 acre Well Equipping (Two Wells) | \$3,080,658.00 | | \$3,080,658.00 | |
| 10 | Diamond Property 160 acre Recharge Earthwork | \$2,123,005.00 | | \$2,123,005.00 | |
| 11 | Diamond Property 160 acre Conveyance Facilities | \$4,305,000.00 | | \$861,000.00 | \$3,444,000.00 |
| 12 | Diamond Property 160 acre Well Drilling (Two Wells) | \$2,521,175.00 | | \$2,521,175.00 | |
| 13 | Diamond Property 160 acre Well Equipping (Two Wells) | \$3,080,658.00 | | | \$3,080,658.00 |
| 14 | SCADA System Communication Installation | \$242,000.00 | | | \$242,000.00 |
| | Total Budget: | \$36,625,324.00 | \$16,100,364.73 | \$13,361,288.69 | \$7,163,670.58 |

| 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 | | | | | | |
| 1 | Mobilization | EA | 2 | \$ 1,057,567.40 | | \$ 2,115,134.80 |
| 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 Full Flow 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 | | | | | | |
| 1 | Mobilization | EA | 2 | \$ 1,252,300.00 | | \$ 2,504,600.00 |
| 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: | | | | | | |
| 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: | | | 20.0% | | \$ 2,079,847.96 | |
| Field Cost: | | | | | \$ 12,479,087.75 | |
| 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: | | | | | \$ 13,959,087.75 | |
| QUANTITIES | | | | PRICES | | |
| BY <i>Curtis Skaggs</i> | CHECKED | BY <i>Curtis Skaggs</i> | CHECKED | | | |
| DATE PREPARED September 29, 2022 | PEER REVIEW / DATE | DATE PREPARED September 29, 2022 | PEER REVIEW / DATE | | | |

| 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 | | | | | | |
| 1 | Mobilization | EA | 2 | \$ 1,024,867.40 | | \$ 2,049,734.80 |
| 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 Full Flow 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 | | | | | | |
| 1 | Mobilization | EA | 2 | \$ 1,252,300.00 | | \$ 2,504,600.00 |
| 2 | Demobilization | EA | 1 | \$ 22,500.00 | \$ 22,500.00 | |
| 3 | Final Cleanup | EA | 1 | \$ 22,500.00 | \$ 22,500.00 | |
| 4 | Water Supply | EA | 1 | \$ 9,000.00 | \$ 9,000.00 | |
| 5 | Environmental Mitigation | EA | 1 | \$ 13,500.00 | \$ 13,500.00 | |
| 6 | Construct well site earthwork | EA | 1 | \$ 18,000.00 | \$ 18,000.00 | |
| 7 | Furnish and install well concrete foundation | CY | 2400 | \$ 9.00 | \$ 21,600.00 | |
| 8 | Furnish and install electrical concrete foundation | CY | 20 | \$ 1,080.00 | \$ 21,600.00 | |
| 9 | Furnish and install discharge pipe concrete pad | CY | 15 | \$ 1,080.00 | \$ 16,200.00 | |
| 10 | Furnish and install transformer pad | CY | 5 | \$ 1,080.00 | \$ 5,400.00 | |
| 11 | Furnish and install 12" FBE Steel Well Discharge Piping | EA | 1 | \$ 9,000.00 | \$ 9,000.00 | |
| 12 | Furnish and install 12" FBE Steel Well Discharge Piping | LF | 45 | \$ 600.00 | \$ 27,000.00 | |
| 13 | Furnish and install Deep Well Air Release Valve | EA | 1 | \$ 3,500.00 | \$ 3,500.00 | |
| 14 | Furnish and install 12" Dresser Coupling | EA | 1 | \$ 2,500.00 | \$ 2,500.00 | |
| 15 | Furnish and install 12" Check Valve | EA | 1 | \$ 4,500.00 | \$ 4,500.00 | |
| 16 | Furnish and install 12" Flow Meter | EA | 1 | \$ 8,000.00 | \$ 8,000.00 | |
| 17 | Furnish and install 12" FBE Steel Tee | EA | 1 | \$ 2,500.00 | \$ 2,500.00 | |
| 18 | Furnish and install 12" Butterfly Valve | EA | 1 | \$ 5,500.00 | \$ 5,500.00 | |
| 19 | Furnish and install 2" Air Release Valve | EA | 1 | \$ 2,500.00 | \$ 2,500.00 | |
| 20 | Furnish and install Pressure Gauges | EA | 2 | \$ 500.00 | \$ 1,000.00 | |
| 21 | Furnish and install Pipe Supports | EA | 3 | \$ 1,000.00 | \$ 3,000.00 | |
| 22 | Furnish and install vertical turbine well pump assembly | EA | 1 | \$ 162,000.00 | \$ 162,000.00 | |
| 23 | Furnish and install vertical turbine well motor | EA | 1 | \$ 67,500.00 | \$ 67,500.00 | |
| 24 | Furnish and install well enclosures and appurtenances | EA | 1 | \$ 18,000.00 | \$ 18,000.00 | |
| 25 | Furnish and install electrical Main Switchboard | EA | 1 | \$ 45,000.00 | \$ 45,000.00 | |
| 26 | Furnish and install electrical Motor Control Center | EA | 1 | \$ 180,000.00 | \$ 180,000.00 | |
| 27 | Furnish and install Electrical Service and Transformer | EA | 1 | \$ 22,500.00 | \$ 22,500.00 | |
| 28 | Furnish and install Site Lighting | EA | 2 | \$ 15,000.00 | \$ 30,000.00 | |
| 29 | Furnish and install Multi-Lin | EA | 1 | \$ 9,000.00 | \$ 9,000.00 | |
| 30 | Furnish and install RTU and HMI | EA | 1 | \$ 15,000.00 | \$ 15,000.00 | |
| 31 | Furnish and install Electrical Instrumentation | EA | 1 | \$ 30,000.00 | \$ 30,000.00 | |
| 32 | Furnish and install Electrical Conduit, Wires, and Grounding | EA | 1 | \$ 135,000.00 | \$ 135,000.00 | |
| 33 | Furnish and install pre-fabricated metal canopy | EA | 1 | \$ 63,000.00 | \$ 63,000.00 | |
| 34 | Furnish and install site ground cover | CY | 200 | \$ 45.00 | \$ 9,000.00 | |
| 35 | Furnish and install site fencing | LF | 400 | \$ 45.00 | \$ 18,000.00 | |
| 36 | Furnish and install site painting | EA | 1 | \$ 9,000.00 | \$ 9,000.00 | |
| 37 | Furnish and install VFD's | EA | 1 | \$ 220,000.00 | \$ 220,000.00 | |
| 38 | Phase I 160 Acres Well Recovery Pipeline - 15" PVC | LF | 4000 | \$ 150.00 | \$ 600,000.00 | |
| 39 | Phase I 160 Acres Well Recovery Pipeline - 18" PVC | LF | 3500 | \$ 200.00 | \$ 700,000.00 | |
| 40 | Stockdale Hwy Cased Crossing | LS | 1 | \$ 200,000.00 | \$ 200,000.00 | |
| 41 | CVC Turn-In | LS | 1 | \$ 150,000.00 | \$ 150,000.00 | \$ 1,650,000.00 |
| 42 | 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: | | | | 20.0% | \$ 2,045,972.73 | |
| Field Cost: | | | | | \$ 12,275,836.40 | |
| 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: | | | | | \$ 13,670,836.40 | |
| QUANTITIES | | | PRICES | | | |
| BY <i>Curtis Skaggs</i> | CHECKED | BY <i>Curtis Skaggs</i> | CHECKED | | | |
| DATE PREPARED September 29, 2022 | PEER REVIEW / DATE | DATE PREPARED September 29, 2022 | PEER REVIEW / DATE | | | |

Appendix P – 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 Q – GBJPA Official
Resolution No. 2022-05**

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**

WHEREAS, 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

WHEREAS, 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

WHEREAS, 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, 20 22 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 R – 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

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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.

A handwritten signature in blue ink that reads "Davis Firm LLP". The signature is written in a cursive, slightly slanted style.

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.

MANAGEMENT’S DISCUSSION AND ANALYSIS (Continued)

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

| | 2022 | 2021 | Increase/(Decrease) | |
|------------------------------|--------------|--------------|---------------------|------------|
| | | | 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

MANAGEMENT’S DISCUSSION AND ANALYSIS (Continued)

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

| | 2022 | 2021 | Increase/(Decrease) | |
|--|---------------------|---------------------|---------------------|---------------|
| | | | 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 | <u>49,844</u> | <u>48,567</u> | <u>1,277</u> | <u>2.6%</u> |
| 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 | <u>49,844</u> | <u>48,567</u> | <u>1,277</u> | <u>2.6%</u> |
| Income (Loss) before capital contributions | <u>-</u> | <u>-</u> | <u>-</u> | <u>0.0%</u> |
| 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 | <u>10,417,452</u> | <u>1,691,261</u> | <u>8,726,191</u> | <u>516.0%</u> |
| Changes in net position | 10,417,452 | 1,691,261 | 8,726,191 | 516.0% |
| Beginning net position | <u>1,691,261</u> | <u>-</u> | <u>1,691,261</u> | <u>100.0%</u> |
| Ending net position | <u>\$12,108,713</u> | <u>\$ 1,691,261</u> | <u>\$10,417,452</u> | <u>616.0%</u> |

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,

MANAGEMENT’S DISCUSSION AND ANALYSIS (Continued)

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

| | 2022 | 2021 | Increase/(Decrease) | |
|--------------------------|----------------------|---------------------|---------------------|---------------|
| | | | 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 | <u>\$ 11,204,572</u> | <u>\$ 1,762,587</u> | <u>\$ 9,441,985</u> | <u>535.7%</u> |

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)

| | <u>2022</u> | <u>2021</u> |
|---------------------------------|----------------------|---------------------|
| ASSETS | | |
| Current assets: | | |
| Cash | \$ 957,962 | \$ 7,557 |
| Prepaid items | 3,167 | - |
| Total current assets | <u>961,129</u> | <u>7,557</u> |
| Noncurrent assets: | | |
| Capital assets, non-depreciable | 11,204,572 | 1,762,587 |
| Total noncurrent assets | <u>11,204,572</u> | <u>1,762,587</u> |
| TOTAL ASSETS | <u>12,165,701</u> | <u>1,770,144</u> |
| LIABILITIES | | |
| Current liabilities: | | |
| Accounts payable | 56,988 | 78,883 |
| TOTAL LIABILITIES | <u>56,988</u> | <u>78,883</u> |
| NET POSITION | | |
| Investment in capital assets | 11,204,572 | 1,762,587 |
| Unrestricted | 904,141 | (71,326) |
| TOTAL NET POSITION | <u>\$ 12,108,713</u> | <u>\$ 1,691,261</u> |

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.

Groundwater Banking Joint Powers Authority

Notes to the Basic Financial Statements

For the Fiscal Year Ended June 30, 2022

(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.

Groundwater Banking Joint Powers Authority

Notes to the Basic Financial Statements, Continued

For the Fiscal Year Ended June 30, 2022

(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 GBJPA 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.

| <u>Authorized Investment type</u> | <u>Maximum Maturity</u> | <u>Maximum Percentage Allowed</u> | <u>Maximum Investment In One Issuer</u> |
|-------------------------------------|-------------------------|-----------------------------------|---|
| 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 |

Groundwater Banking Joint Powers Authority

Notes to the Basic Financial Statements, Continued

For the Fiscal Year Ended June 30, 2022

(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 S – 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 | \$ 8,995,398.00 | (property acquisition costs) | | |
| 5 | | | 2. 2023 | \$ 6,532,958.74 | | | |
| 6 | | | 3. 2024 | \$ 12,853,448.84 | | | |
| 7 | | | 4. 2025 | \$ 7,590,727.79 | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | 2022 | 2023 | 2024 | 2025 | |
| 11 | | Property Acquisition | \$ 8,995,398.00 | | | | |
| 12 | | West Enos Recharge Basin | | \$ 2,866,963.95 | | | |
| 13 | | West Enos Conveyance Facilities | | \$ 1,841,925.00 | \$ 1,841,925.00 | | |
| 14 | | West Enos Well Drilling | | \$ 1,000,000.00 | \$ 1,601,616.05 | | |
| 15 | | West Enos Well Equipping | | | \$ 3,080,658.00 | | |
| 16 | | Stockdale North Recharge Basin | | | \$ 2,123,005.00 | | |
| 17 | | Stockdale North Conveyance Facilities | | | \$ 861,000.00 | \$ 3,444,000.00 | |
| 18 | | Stockdale North Well Drilling | | | \$ 2,521,175.00 | | |
| 19 | | Stockdale North Well Equipping | | | | \$ 3,080,658.00 | |
| 20 | | SCADA Construction | | | | \$ 242,000.00 | |
| 21 | | interest during construction | | \$ 824,069.79 | \$ 824,069.79 | \$ 824,069.79 | |
| 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) | \$ 35,000.00 | | | | |
| 29 | | Engineering and Admin Services | \$ 1,495,000.00 | | | | |
| 30 | | | \$ 1,660,000.00 | | | | |
| 31 | | | | | | | |
| 32 | | Description of Replacement Requirement | Year | Replacement Cost | Lifespan | | Present Costs |
| 33 | | Interbasin Recharge Basin Structures (West Enos) | 2073 | \$ 436,037 | 50 years | | \$ 162,000 |
| 34 | | Interbasin Recharge Basin Structures (Stockdale North) | 2074 | \$ 290,692 | 50 years | | \$ 108,000 |
| 35 | | Conveyance (West Enos) | 2099 | \$ 16,267,275 | 75 years | | \$ 3,683,850 |
| 36 | | Conveyance (Stockdale North) | 2100 | \$ 19,010,172 | 75 years | | \$ 4,305,000 |
| 37 | | (2) Wells (West Enos) | 2073 | \$ 7,002,479 | 50 years | | \$ 2,601,616 |
| 38 | | (2) Wells (Stockdale North) | 2074 | \$ 6,785,964 | 50 years | | \$ 2,521,175 |
| 39 | | (2) Pump, Motor, Well Appurtenances (West Enos) | 2034 | \$ 3,755,305 | 10 years | | \$ 3,080,658 |
| 40 | | (2) Pump, Motor, Well Appurtenances (Stockdale North) | 2035 | \$ 3,755,305 | 10 years | | \$ 3,080,658 |

**Future Value
Definition Formula**

$$FV = PV (1 + i)^n$$

FV = Future Value
PV = Present Value
i = Interest (discount) rate
n = Period number

Appendix T – Operation and Maintenance Backup

ANNUALIZED REPLACEMENT COST ESTIMATES FROM DJA CONSTRUCTION COST ESTIMATE

| <i>Description</i> | <i>Cost</i> |
|---|-----------------------|
| 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 pumj | \$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 Tra | \$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 |
| <i>Total Estimated Annual Replacement-></i> | \$35,400.00 |

REPLACEMENT COSTS PV CALCULATION

| <i>Operations Year</i> | <i>Calendar Year</i> | <i>Replacement Cost</i> |
|--------------------------------|----------------------|-------------------------|
| 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

| <i>Year Type</i> | <i>Monthly Cost</i> | <i>Annual Cost</i> |
|-----------------------------|---------------------|--------------------|
| 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

| <i>Year Type</i> | <i>Based on MBK results using</i> |
|-----------------------------|-----------------------------------|
| 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

| <i>Year Type</i> | <i>Total Cost</i> | <i>Project Life Years</i> |
|-----------------------------|-------------------|---------------------------|
| 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