



STATE OF CALIFORNIA

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 12/2019)

CALIFORNIA ENERGY COMMISSION

A) New Agreement # EPC-20-008 (to be completed by CGL office)

B) Division	Agreement Manager:	MS-	Phone
ERDD	Joseph Sit		301-637-2761

C) Recipient's Legal Name	Federal ID Number
Antelope Valley Water Storage, LLC	20-8945728

D) Title of Project
Long Duration 200 kW Energy Storage with Aquifer Pumped Hydro

E) Term and Amount

Start Date	End Date	Amount
3/26/2021	6/28/2024	\$ 6,406,950

F) Business Meeting Information

☐ ARFVTP agreements \$75K and under delegated to Executive Director

Proposed Business Meeting Date 3/17/2021 ☐ Consent ☒ Discussion

Business Meeting Presenter Joseph Sit Time Needed: 5 minutes

Please select one list serve. EPIC (Electric Program Investment Charge)

Agenda Item Subject and Description:

ANTELOPE VALLEY WATER STORAGE, LLC. Proposed resolution adopting California Environmental Quality Act findings for Antelope Valley Water Storage, LLC's Aquifer Pumped Hydro project, and grant agreement for project implementation. (EPIC funding) Contact: Joseph Sit. (Staff Presentation: 5 minutes)

i. CALIFORNIA ENVIRONMENTAL QUALITY ACT FINDINGS. Proposed resolution finding that based on: (a) Kern County's 2006 Environmental Impact Report for the Antelope Valley Water Bank Project [later renamed the Willow Springs Water Bank Project] (State Clearinghouse #2005091117); (b) Rosamond Community Services District's 2018 Addendum to the 2006 EIR; and (c) Antelope Valley Water Storage, LLC's representations, the proposed project presents no new significant or substantially more severe environmental impacts beyond those already considered.

ii. Proposed resolution approving Agreement EPC-20-008 with Antelope Valley Water Storage, LLC for a \$6,406,950 grant to fund a behind-the-meter demonstration of a non-lithium ion energy storage technology, namely Aquifer Pumped Hydro (APH). This pumped-water hydroelectric storage project would provide a minimum of 10 hours of energy storage/discharge capability at a minimum rating of 200 kilowatts. The project will improve understanding of APH and define the value and benefits of longer duration energy storage using APH technology.

G) California Environmental Quality Act (CEQA) Compliance

1. Is Agreement considered a "Project" under CEQA?

☒ Yes (skip to question 2)

☐ No (complete the following (PRC 21065 and 14 CCR 15378)):



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Explain why Agreement is not considered a "Project":

2. If Agreement is considered a "Project" under CEQA:

- a) ☐ Agreement **IS** exempt.
- ☐ Statutory Exemption. List PRC and/or CCR section number:
- ☐ Categorical Exemption. List CCR section number:

- ☐ Common Sense Exemption. 14 CCR 15061 (b) (3)



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Explain reason why Agreement is exempt under the above section:

b) Agreement **IS NOT** exempt. (consult with the legal office to determine next steps)

Check all that apply

- ☐ Initial Study
☐ Negative Declaration
☐ Mitigated Negative Declaration
☒ Environmental Impact Report
☐ Statement of Overriding Considerations

H) List all subcontractors (major and minor) and equipment vendors: (attach additional sheets as necessary)

Legal Company Name:	Budget
TBD - Design Build Contractor	\$ 2,050,000
HDR Engineering, Inc.	\$ 1,042,400
Energy and Environmental Economics, Inc.	\$ 500,000
Larry Dale Associates	\$ 480,000
3RValve LLC	\$ 251,084
Water and Energy Consulting	\$ 350,000
Rosamond Community Services District	\$ 70,000
TBD - Geotech	\$ 33,600
TBD - Survey Research Contractor	\$ 24,000
Gary Fitts	\$ 80,000
Mike Carnall	\$ 96,000
TBD - Hydrology	\$ 50,000
Sarah Lewis	\$ 80,000
Wapiti Consulting	\$ 98,916

I) List all key partners: (attach additional sheets as necessary)

Legal Company Name:

J) Budget Information

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
EPIC	18-19	301.001F	\$2,000,000
EPIC	19-20	301.001G	\$4,406,950

R&D Program Area: ESRO: ETSI

TOTAL: \$ 6,406,950

Explanation for "Other" selection

Reimbursement Contract #: Federal Agreement #:



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K) Recipient's Contact Information

1. Recipient's Administrator/Officer

Name: Tommy Ta

Address: 1672 W Avenue J Ste 207

City, State, Zip: Lancaster, CA 93534-2861

Phone: 323-86009523

E-Mail: tta@cimgroup.com

2. Recipient's Project Manager

Name: Mark Beuhler

Address: 1672 W Avenue J Ste 207

City, State, Zip: Lancaster, CA 93534-2861

Phone: 323-860-4829

E-Mail: mbeuhler@wswaterbank.com

L) Selection Process Used

☒ Competitive Solicitation Solicitation #: GFO-19-306

☐ First Come First Served Solicitation Solicitation #:

M) The following items should be attached to this GRF

- | | | |
|---|---|--|
| 1. Exhibit A, Scope of Work | <input checked="" type="checkbox"/> | Attached |
| 2. Exhibit B, Budget Detail | <input checked="" type="checkbox"/> | Attached |
| 3. CEC 105, Questionnaire for Identifying Conflicts | <input checked="" type="checkbox"/> | Attached |
| 4. Recipient Resolution | <input checked="" type="checkbox"/> N/A | <input type="checkbox"/> Attached |
| 5. CEQA Documentation | <input type="checkbox"/> N/A | <input checked="" type="checkbox"/> Attached |

Agreement Manager

Date

Office Manager

Date

Deputy Director

Date

Exhibit A
Scope of Work
ANTELOPE VALLEY WATER STORAGE, LLC

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR ¹	Task Name
1		General Project Tasks
2	X	Design and Construction of WSWB Facilities
3		Regeneration Wells Retrofit
4	X	Operations and Field Tests
5		Economics and Metrics
6		Grid Integration
7		Statewide Application
8		Project Benefits
9		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
APH	Aquifer Pumped Hydro - The energy storage technology discussed in this application. This technology is a form of pumped storage and uses the groundwater aquifer as the lower reservoir and a small, earthen reservoir on the ground surface as the upper reservoir. The individual Aquifer Pumped Hydro unit consists of a reversible pump/turbine, a well, and related equipment. The pump/turbine generates electricity from water flowing down the well hole. It stores electricity at other times by pumping water up the well to the surface using electric power.
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review ¹
DAC	Disadvantaged Communities
IOU	Investor Owned Utilities
NEM	The APH technology is behind-the-meter and will require a Net Energy Metering (NEM) interconnection/agreement with SCE. For the demonstration, the stored energy will be discharged to provide on-peak power to SCE during the evening ramp up and recharged off-peak.
PSPS	Public Safety Power Shutoff
Regeneration	Regeneration wells are retrofitted for pumped storage to release energy as well as extract water
SCE	Southern California Edison
Seasonal Storage	Seasonal storage means the storage of energy during months of surplus renewables, typically in the spring, and the discharge of that energy during months of energy shortage, typically in the summer
SGMA	The Sustainable Groundwater Management Act (SGMA) aims to manage California's groundwater basins sustainably. The Central Valley is currently over-drafted. Pumping is greater than the recharge, causing subsidence. To

¹ Please see subtask 1.3 in Part III of the Scope of Work (General Project Tasks) for a description of Critical Project Review (CPR) Meetings.

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Acronym/Term	Meaning
	fix this problem, SGMA requires that all basins reduce extractions to match recharge. This may require additional recharge, fallowing of farmland, or both.
TAC	Technical Advisory Committee
WSWB	Willow Springs Water Bank

II. PURPOSE OF AGREEMENT, PROBLEM/SOLUTION STATEMENT, AND GOALS AND OBJECTIVES

A. Purpose of Agreement

The purpose of this Agreement is to fund a behind the meter demonstration of a non-lithium ion energy storage technology, Aquifer Pumped Hydro (APH) that can provide a minimum of 10 hours of energy storage/discharge capability at a minimum rating of 200 kilowatts. The project will improve understanding of APH and define the value and benefits of longer duration energy storage using APH technology provides over lithium ion energy storage.

B. Problem/ Solution Statement

Problem

The increased emphasis on resiliency in the state is driving the need for longer duration energy storage backup capabilities. Longer duration energy storage and energy discharge is needed to respond to an unplanned grid outage, curtailment risk, Public Safety Power Shutoffs (PSPS) and to increase renewables penetration. Disadvantaged Communities (DAC) and low-income communities are especially vulnerable to preemptive shutoffs. Many of them cannot afford emergency generators. As wildfires become more common, new energy storage/discharge technology is needed that can provide economical, standalone power when the grid is down.

The California grid is facing three issues that could benefit from longer duration energy storage:

1. **Evening Ramp Up:** There is not enough power for the grid during the 5-hour evening ramp up (from 4:00 to 9:00 p.m.) as solar goes offline but consumers turn on appliances. The 2-4 hour discharge of lithium batteries has trouble covering the 5-6 hour ramp up period.
2. **Public Safety Power Shutoffs (PSPS):** Increased wildfire risks have forced Investor Owned Utilities (IOU) to shut down transmission lines during high wind events. For example, in October of 2019, power to 800,000 customers (2.5-3.0 M people) was shutoff due to wildfire risks. These preemptive shutoffs created major disruptions and may have contributed to at least one death.²

² https://en.wikipedia.org/wiki/2019_California_power_shutoffs

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3. **Overgeneration:** In non-summer months, especially in the springtime, there is a glut of solar energy in the afternoons and a dearth of generation in the early evening hours. This creates risks of overgeneration and curtailment of renewables.

Over 90% of the energy storage systems built to date in California use lithium ion batteries. Excessive reliance on lithium batteries can create materials and minerals shortages, and safety issues from thermal runaway. Also, lithium batteries have a limited lifetime due to the number of cycles that can be performed, typically 500 to 1,500. With daily use, a lithium battery is worn out in about 3 years. Old lithium batteries create a disposal problem. They are also limited to a 2-4 hour discharge, which is not enough to cover the evening ramp up.

Solution

A groundwater storage facility in eastern Kern County, Willow Spring Water Bank (WSWB), will be used for demonstration. Groundwater will be used to fill and drain a small surface reservoir. Five existing wells at WSWB with nameplate capacities ranging from 112 kW (150 HP) to 225 kW (300 HP) will be retrofitted to also act as generators. At 30 percent generation efficiency, each individual WSWB well will produce 34kW to 67 kW of power. The technology is behind-the-meter and will require a Net Energy Metering (NEM) interconnection agreement with Southern California Edison (SCE). For the demonstration, the stored energy will be discharged to provide on-peak power to SCE during the evening ramp up and recharged off-peak. The end-user customer, WSWB, will benefit from the differential between on and off-peak SCE rates.

These facilities will be operated for one year to demonstrate that 10-hour discharges can be produced reliably. The regeneration wells will be operated to provide 200 kW of energy discharge using local groundwater. They will also be operated with imported water to show 100+ hour energy discharge during simulated PSPS outages.

C. Goals and Objectives of the Agreement

Agreement Goals

This Agreement is to demonstrate and define the necessary technical, financial, and operational resources to assess the potential of energy storage/discharge with APH to provide continuous energy discharge during grid outages, during peak periods, and during PSPS events; which provide end-user benefits that may drive wide-scale adoption of the technology in California.

The goals specifically are:

- Demonstrate how APH offers the end user customer the opportunity to receive increased reliability, resiliency, cost saving and other services during times of power interruptions;
- Identify how continuous energy discharge with APH can be applied to avoid disruption of power supply to critical facilities like hospitals, nursing homes, and emergency charging centers during PSPS events;
- Demonstrate how energy storage with APH can provide extra energy discharge during the summer evening ramp up; and provide seasonal storage to address

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ANTELOPE VALLEY WATER STORAGE, LLC

absorption of surplus renewables in the winter and spring on the weekends during off-peak or super off-peak hours, thereby mitigating renewable curtailment;

- Demonstrate how the behind-the-meter APH technology can incentivize participation by IOU customers; and
- Demonstrate the commercial potential of the APH technology in California due to the distributed nature of wells, benefits for transmission congestion, distribution reliability, end-user energy shifting and scalability.

Ratepayer Benefits:³ This Agreement is intended to result in California ratepayer benefits including: (1) reduced peak power cost, (2) power during PSPS event, (3) longer life cycle than lithium battery, and (4) rapid implementation especially within DACs. APH can also be used to inject water into contaminated aquifers where clay layers prevent conventional recharge with percolation, diluting contamination and improving water quality. The benefits will be measured and verified during the demonstration test. The intended benefits are detailed in Table 3: Benefits and Co-Benefits in the Project Narrative of the Recipient's proposal. Ratepayer benefits will be obtained from:

- Reliability improvements for the grid from 10 hours to 100+ hours of energy discharge for PSPS event;
- Cost benefits are expected from lower installation cost, lower life cycle cost, competitive capacity costs and reduced transmission needs due to distributed power sources; and
- Safety benefits due to no thermal runaway risk and less GHGs due to improved renewables penetration.

Technological Advancement and Breakthroughs:⁴ This Agreement is intended to lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals by providing a cost-effective resilient and reliable APH energy storage technology that will address the need for longer term energy storage and discharge during grid outages and PHPS events, growth in peak load, evening ramp up, over-supply and curtailment issues, and the need for ancillary services.

Expected technological advancement and breakthroughs are summarized as follows:

³ California Public Resources Code, Section 25711.5(a) requires projects funded by the Electric Program Investment Charge (EPIC) to result in ratepayer benefits. The California Public Utilities Commission, which established the EPIC in 2011, defines ratepayer benefits as greater reliability, lower costs, and increased safety (See CPUC "Phase 2" Decision 12-05-037 at page 19, May 24, 2012, http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/167664.PDF).

⁴ California Public Resources Code, Section 25711.5(a) also requires EPIC-funded projects to lead to technological advancement and breakthroughs to overcome barriers that prevent the achievement of the state's statutory and energy goals.

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- Energy storage at a capacity cost (\$381/kWh) that is comparable to lithium ion batteries (~\$470 per kWh based on \$1876/kW installation cost and 4-hour discharge for lithium);
- Discharge durations of 10 hours or longer;
- Ability to absorb renewables during non-summer season and provide seasonal storage;
- Continuous power (200 kW) for critical facilities during PSPS events (up to 7 days using imported water);
- Scalable and rapid implementation due to the use of existing infrastructure and US-made equipment;
- Targeted development in low-income and DAC communities;
- Distributed storage for transmission congestion relief, distribution reliability, and deferral of upgrades;
- Use of imported recharge water to reduce energy costs and provide recharge co-benefits; and
- No local safety risk due to waste disposal, thermal runaway, and leakage, especially to DACs.

When the IOU and investment community gain confidence in APH technology and its long-term performance then the market breakthrough is:

- IOUs solicit procurements for energy storage/discharge programs with incentives for agricultural and municipal pumpers that intend to mitigate the impacts by the Sustainable Groundwater Management Act (SGMA) and PSPS events.

Agreement Objectives

The objectives of this Agreement are detailed under 7 major tasks:

- Design and Construction of WSWB facilities: Complete the design/build process for a 200 kW APH system to conduct a demonstration of the APH energy storage/discharge capabilities at WSWB
- Regeneration Wells Retrofit: Design and retrofit wells to enable the injection of water to enable energy storage and discharge for the well regeneration system
- Operations and Field Tests: Perform real-time field demonstration and monitor performance of APH system to determine costs, technical constraints, and define operating parameters
- Economics and Metrics: Determine the economics of the APH technology by assessing utility tariffs, interconnection requirements, and various operational metrics
- Grid Integration: Determine how to integrate long duration energy storage using APH technology (>10 hours) into the grid and grid values to identify the integration pathway for long duration energy storage
- Statewide Application: Provide an estimate of the potential for APH technology in California's Central Valley by estimating the number of wells available for injection and corresponding horsepower
- Project Benefits: Provide an assessment of resilience, reliability, cost savings, and safety benefits for the IOU ratepayers. These benefits will be verified including: (1) reduced peak power cost, (2) power during PSPS event, (3) longer

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life cycle than lithium battery, and (4) rapid implementation especially within DACs

Key Project Deliverables:

- A template (spreadsheet tool) for developing 200 kW sites throughout California – a checklist that an interested party can use to perform a feasibility assessment, perform an initial economic assessment, install the necessary equipment, and monitor the operation of the project;
- A template for the interconnection agreements (net-energy metering) needed to function as a 200kW behind-the-meter long duration energy storage system, including additions needed for combining two 200-kW modules into a single 400-kW energy storage system;
- A survey of statewide APH locations that could store energy economically to benefit end-users.; and
- A survey of low-income and DACs that would be good candidates for APH technology.

III. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Subtask 1.1 Products

The goal of this subtask is to establish the requirements for submitting project products (e.g., reports, summaries, plans, and presentation materials). Unless otherwise specified by the Commission Agreement Manager (CAM), the Recipient must deliver products as required below by the dates listed in the **Project Schedule (Part V)**. Products that require a draft version are indicated by marking “**(draft and final)**” after the product name in the “Products” section of the task/subtask. If “(draft and final)” does not appear after the product name, only a final version of the product is required. With respect to due dates within this Scope of Work, “**days**” means working days.

The Recipient shall:

For products that require a draft version, including the Final Report Outline and Final Report

- Submit all draft products to the CAM for review and comment in accordance with the Project Schedule (Part V). The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt, unless otherwise specified in the task/subtask for which the product is required.
- Consider incorporating all CAM comments into the final product. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final product.
- Submit the revised product and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period, or approves a request for additional time.

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For products that require a final version only

- Submit the product to the CAM for acceptance. The CAM may request minor revisions or explanations prior to acceptance.

For all products

- Submit all data and documents required as products in accordance with the following Instructions for Submitting Electronic Files and Developing Software:

- **Electronic File Format**

- Submit all data and documents required as products under this Agreement in an electronic file format that is fully editable and compatible with the Energy Commission's software and Microsoft (MS)-operating computing platforms, or with any other format approved by the CAM. Deliver an electronic copy of the full text of any Agreement data and documents in a format specified by the CAM, such as memory stick or CD-ROM.

The following describes the accepted formats for electronic data and documents provided to the Energy Commission as products under this Agreement, and establishes the software versions that will be required to review and approve all software products:

- Data sets will be in MS Access or MS Excel file format (version 2007 or later), or any other format approved by the CAM.
- Text documents will be in MS Word file format, version 2007 or later.
- Documents intended for public distribution will be in PDF file format.
- The Recipient must also provide the native Microsoft file format.
- Project management documents will be in Microsoft Project file format, version 2007 or later.

- **Software Application Development**

Use the following standard Application Architecture components in compatible versions for any software application development required by this Agreement (e.g., databases, models, modeling tools), unless the CAM approves other software applications such as open source programs:

- Microsoft ASP.NET framework (version 3.5 and up). Recommend 4.0.
- Microsoft Internet Information Services (IIS), (version 6 and up) Recommend 7.5.
- Visual Studio.NET (version 2008 and up). Recommend 2010.
- C# Programming Language with Presentation (UI), Business Object and Data Layers.
- SQL (Structured Query Language).
- Microsoft SQL Server 2008, Stored Procedures. Recommend 2008 R2.
- Microsoft SQL Reporting Services. Recommend 2008 R2.
- XML (external interfaces).

Any exceptions to the Electronic File Format requirements above must be approved in writing by the CAM. The CAM will consult with the Energy Commission's Information Technology Services Branch to determine whether the exceptions are allowable.

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MEETINGS

Subtask 1.2 Kick-off Meeting

The goal of this subtask is to establish the lines of communication and procedures for implementing this Agreement.

The Recipient shall:

- Attend a “Kick-off” meeting with the CAM, the Commission Agreement Officer (CAO), and any other Energy Commission staff relevant to the Agreement. The Recipient will bring its Project Manager and any other individuals designated by the CAM to this meeting. The administrative and technical aspects of the Agreement will be discussed at the meeting. Prior to the meeting, the CAM will provide an agenda to all potential meeting participants. The meeting may take place in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.

The administrative portion of the meeting will include discussion of the following:

- Terms and conditions of the Agreement;
- Administrative products (subtask 1.1);
- CPR meetings (subtask 1.3);
- Match fund documentation (subtask 1.7);
- Permit documentation (subtask 1.8);
- Subcontracts (subtask 1.9); and
- Any other relevant topics.

The technical portion of the meeting will include discussion of the following:

- The CAM’s expectations for accomplishing tasks described in the Scope of Work;
- An updated Project Schedule;
- Technical products (subtask 1.1);
- Progress reports and invoices (subtask 1.5);
- Final Report (subtask 1.6);
- Technical Advisory Committee meetings (subtasks 1.10 and 1.11); and
- Any other relevant topics.

- Provide an *Updated Project Schedule, List of Match Funds, and List of Permits*, as needed to reflect any changes in the documents.

The CAM shall:

- Designate the date and location of the meeting.
- Send the Recipient a *Kick-off Meeting Agenda*.

Recipient Products:

- Updated Project Schedule (*if applicable*)
- Updated List of Match Funds (*if applicable*)
- Updated List of Permits (*if applicable*)

CAM Product:

- Kick-off Meeting Agenda

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Subtask 1.3 Critical Project Review (CPR) Meetings

The goal of this subtask is to determine if the project should continue to receive Energy Commission funding, and if so whether any modifications must be made to the tasks, products, schedule, or budget. CPR meetings provide the opportunity for frank discussions between the Energy Commission and the Recipient. As determined by the CAM, discussions may include project status, challenges, successes, advisory group findings and recommendations, final report preparation, and progress on technical transfer and production readiness activities (if applicable). Participants will include the CAM and the Recipient, and may include the CAO and any other individuals selected by the CAM to provide support to the Energy Commission.

CPR meetings generally take place at key, predetermined points in the Agreement, as determined by the CAM and as shown in the Task List on page 1 of this Exhibit. However, the CAM may schedule additional CPR meetings as necessary. The budget will be reallocated to cover the additional costs borne by the Recipient, but the overall Agreement amount will not increase. CPR meetings generally take place at the Energy Commission, but they may take place at another location, or may be conducted via electronic conferencing (e.g., WebEx) as determined by the CAM.

The Recipient shall:

- Prepare a *CPR Report* for each CPR meeting that: (1) discusses the progress of the Agreement toward achieving its goals and objectives; and (2) includes recommendations and conclusions regarding continued work on the project.
- Submit the CPR Report along with any other *Task Products* that correspond to the technical task for which the CPR meeting is required (i.e., if a CPR meeting is required for Task 2, submit the Task 2 products along with the CPR Report).
- Attend the CPR meeting.
- Present the CPR Report and any other required information at each CPR meeting.

The CAM shall:

- Determine the location, date, and time of each CPR meeting with the Recipient's input.
- Send the Recipient a *CPR Agenda* and a *List of Expected CPR Participants* in advance of the CPR meeting. If applicable, the agenda will include a discussion of match funding and permits.
- Conduct and make a record of each CPR meeting. Provide the Recipient with a *Schedule for Providing a Progress Determination* on continuation of the project.
- Determine whether to continue the project, and if so whether modifications are needed to the tasks, schedule, products, or budget for the remainder of the Agreement. If the CAM concludes that satisfactory progress is not being made, this conclusion will be referred to the Deputy Director of the Energy Research and Development Division.
- Provide the Recipient with a *Progress Determination* on continuation of the project, in accordance with the schedule. The Progress Determination may include a requirement that the Recipient revise one or more products.

Recipient Products:

- CPR Report(s)
- Task Products (draft and/or final as specified in the task)

CAM Products:

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- CPR Agenda
- List of Expected CPR Participants
- Schedule for Providing a Progress Determination
- Progress Determination

Subtask 1.4 Final Meeting

The goal of this subtask is to complete the closeout of this Agreement.

The Recipient shall:

- Meet with Energy Commission staff to present project findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement. This meeting will be attended by the Recipient and CAM, at a minimum. The meeting may occur in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.

The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be divided into two separate meetings at the CAM's discretion.

- The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.
- The administrative portion of the meeting will involve a discussion with the CAM and the CAO of the following Agreement closeout items:
 - Disposition of any state-owned equipment.
 - Need to file a Uniform Commercial Code Financing Statement (Form UCC-1) regarding the Energy Commission's interest in patented technology.
 - The Energy Commission's request for specific "generated" data (not already provided in Agreement products).
 - Need to document the Recipient's disclosure of "subject inventions" developed under the Agreement.
 - "Surviving" Agreement provisions such as repayment provisions and confidential products.
 - Final invoicing and release of retention.
- Prepare a *Final Meeting Agreement Summary* that documents any agreement made between the Recipient and Commission staff during the meeting.
- Prepare a *Schedule for Completing Agreement Closeout Activities*.
- Provide *All Draft and Final Written Products* on a CD-ROM or USB memory stick, organized by the tasks in the Agreement.

Products:

- Final Meeting Agreement Summary (*if applicable*)
- Schedule for Completing Agreement Closeout Activities
- All Draft and Final Written Products

REPORTS AND INVOICES

Subtask 1.5 Progress Reports and Invoices

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The goals of this subtask are to: (1) periodically verify that satisfactory and continued progress is made towards achieving the project objectives of this Agreement; and (2) ensure that invoices contain all required information and are submitted in the appropriate format.

The Recipient shall:

- Submit a monthly *Progress Report* to the CAM. Each progress report must:
 - Summarize progress made on all Agreement activities as specified in the scope of work for the preceding month, including accomplishments, problems, milestones, products, schedule, fiscal status, and an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. See the Progress Report Format Attachment for the recommended specifications.
- Submit a monthly or quarterly *Invoice* that follows the instructions in the “Payment of Funds” section of the terms and conditions, including a financial report on Match Fund and in-state expenditures.

Products:

- Progress Reports
- Invoices

Subtask 1.6 Final Report

The goal of this subtask is to prepare a comprehensive Final Report that describes the original purpose, approach, results, and conclusions of the work performed under this Agreement. The CAM will review the Final Report, which will be due at least **two months** before the Agreement end date. When creating the Final Report Outline and the Final Report, the Recipient must use the Style Manual provided by the CAM.

Subtask 1.6.1 Final Report Outline

The Recipient shall:

- Prepare a *Final Report Outline* in accordance with the *Style Manual* provided by the CAM. (See Task 1.1 for requirements for draft and final products.)

Recipient Products:

- Final Report Outline (draft and final)

CAM Product:

- Style Manual
- Comments on Draft Final Report Outline
- Acceptance of Final Report Outline

Subtask 1.6.2 Final Report

The Recipient shall:

- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline, Style Manual, and Final Report Template provided by the CAM with the following considerations:
 - Ensure that the report includes the following items, in the following order:
 - Cover page (**required**)

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- Credits page on the reverse side of cover with legal disclaimer (**required**)
- Acknowledgements page (optional)
- Preface (**required**)
- Abstract, keywords, and citation page (**required**)
- Table of Contents (**required**, followed by List of Figures and List of Tables, if needed)
- Executive summary (**required**)
- Body of the report (**required**)
- References (if applicable)
- Glossary/Acronyms (If more than 10 acronyms or abbreviations are used, it is required.)
- Bibliography (if applicable)
- Appendices (if applicable) (Create a separate volume if very large.)
- Attachments (if applicable)
- Ensure that the document is written in the third person.
- Ensure that the Executive Summary is understandable to the lay public.
 - Briefly summarize the completed work. Succinctly describe the project results and whether or not the project goals were accomplished.
 - Identify which specific ratepayers can benefit from the project results and how they can achieve the benefits.
 - If it's necessary to use a technical term in the Executive Summary, provide a brief definition or explanation when the technical term is first used.
- Follow the Style Guide format requirements for headings, figures/tables, citations, and acronyms/abbreviations.
- Ensure that the document omits subjective comments and opinions. However, recommendations in the conclusion of the report are allowed.
- Include a brief description of the project results in the Abstract.
- Submit a draft of the report to the CAM for review and comment. The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt
- Consider incorporating all CAM comments into the Final Report. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final product
- Submit the revised Final Report and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period or approves a request for additional time.
- Submit one bound copy of the *Final Report* to the CAM along with *Written Responses to Comments on the Draft Final Report*.

Products:

- Final Report (draft and final)
- Written Responses to Comments on the Draft Final Report

CAM Product:

- Written Comments on the Draft Final Report

MATCH FUNDS, PERMITS, AND SUBCONTRACTS

Subtask 1.7 Match Funds

The goal of this subtask is to ensure that the Recipient obtains any match funds planned for this

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Agreement and applies them to the Agreement during the Agreement term.

While the costs to obtain and document match funds are not reimbursable under this Agreement, the Recipient may spend match funds for this task. The Recipient may only spend match funds during the Agreement term, either concurrently or prior to the use of Energy Commission funds. Match funds must be identified in writing, and the Recipient must obtain any associated commitments before incurring any costs for which the Recipient will request reimbursement.

The Recipient shall:

- Prepare a *Match Funds Status Letter* that documents the match funds committed to this Agreement. If no match funds were part of the proposal that led to the Energy Commission awarding this Agreement and none have been identified at the time this Agreement starts, then state this in the letter.

If match funds were a part of the proposal that led to the Energy Commission awarding this Agreement, then provide in the letter:

- A list of the match funds that identifies:
 - The amount of cash match funds, their source(s) (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied.
 - The amount of each in-kind contribution, a description of the contribution type (e.g., property, services), the documented market or book value, the source (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Recipient must identify its owner and provide a contact name, address, telephone number, and the address where the property is located.
 - If different from the solicitation application, provide a letter of commitment from an authorized representative of each source of match funding that the funds or contributions have been secured.
- At the Kick-off meeting, discuss match funds and the impact on the project if they are significantly reduced or not obtained as committed. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide a *Supplemental Match Funds Notification Letter* to the CAM of receipt of additional match funds.
- Provide a *Match Funds Reduction Notification Letter* to the CAM if existing match funds are reduced during the course of the Agreement. Reduction of match funds may trigger a CPR meeting.

Products:

- Match Funds Status Letter
- Supplemental Match Funds Notification Letter (*if applicable*)
- Match Funds Reduction Notification Letter (*if applicable*)

Subtask 1.8 Permits

The goal of this subtask is to obtain all permits required for work completed under this Agreement in advance of the date they are needed to keep the Agreement schedule on track. Permit costs and the expenses associated with obtaining permits are not reimbursable under

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this Agreement, with the exception of costs incurred by University of California recipients. Permits must be identified and obtained before the Recipient may incur any costs related to the use of the permit(s) for which the Recipient will request reimbursement.

The Recipient shall:

- Prepare a *Permit Status Letter* that documents the permits required to conduct this Agreement. If no permits are required at the start of this Agreement, then state this in the letter. If permits will be required during the course of the Agreement, provide in the letter:
 - A list of the permits that identifies: (1) the type of permit; and (2) the name, address, and telephone number of the permitting jurisdictions or lead agencies.
 - The schedule the Recipient will follow in applying for and obtaining the permits.

The list of permits and the schedule for obtaining them will be discussed at the Kick-off meeting (subtask 1.2), and a timetable for submitting the updated list, schedule, and copies of the permits will be developed. The impact on the project if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in progress reports and will be a topic at CPR meetings.

- If during the course of the Agreement additional permits become necessary, then provide the CAM with an *Updated List of Permits* (including the appropriate information on each permit) and an *Updated Schedule for Acquiring Permits*.
- Send the CAM a *Copy of Each Approved Permit*.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the CAM within 5 days. Either of these events may trigger a CPR meeting.

Products:

- Permit Status Letter
- Updated List of Permits (*if applicable*)
- Updated Schedule for Acquiring Permits (*if applicable*)
- Copy of Each Approved Permit (*if applicable*)

Subtask 1.9 Subcontracts

The goals of this subtask are to: (1) procure subcontracts required to carry out the tasks under this Agreement; and (2) ensure that the subcontracts are consistent with the terms and conditions of this Agreement.

The Recipient shall:

- Manage and coordinate subcontractor activities in accordance with the requirements of this Agreement.
- Incorporate this Agreement by reference into each subcontract.
- Include any required Energy Commission flow-down provisions in each subcontract, in addition to a statement that the terms of this Agreement will prevail if they conflict with the subcontract terms.
- If required by the CAM, submit a draft of each *Subcontract* required to conduct the work under this Agreement.
- Submit a final copy of the executed subcontract.
- Notify and receive written approval from the CAM prior to adding any new subcontractors (see the discussion of subcontractor additions in the terms and conditions).

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1
2
3
4

Products:

- Subcontracts (*draft if required by the CAM*)

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TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)

The goal of this subtask is to create an advisory committee for this Agreement. The TAC should be composed of diverse professionals. The composition will vary depending on interest, availability, and need. TAC members will serve at the CAM's discretion. The purpose of the TAC is to:

- Provide guidance in project direction. The guidance may include scope and methodologies, timing, and coordination with other projects. The guidance may be based on:
 - Technical area expertise;
 - Knowledge of market applications; or
 - Linkages between the agreement work and other past, present, or future projects (both public and private sectors) that TAC members are aware of in a particular area.
- Review products and provide recommendations for needed product adjustments, refinements, or enhancements.
- Evaluate the tangible benefits of the project to the state of California, and provide recommendations as needed to enhance the benefits.
- Provide recommendations regarding information dissemination, market pathways, or commercialization strategies relevant to the project products.

The TAC may be composed of qualified professionals spanning the following types of disciplines:

- Researchers knowledgeable about the project subject matter;
- Members of trades that will apply the results of the project (e.g., designers, engineers, architects, contractors, and trade representatives);
- Public interest market transformation implementers;
- Product developers relevant to the project;
- U.S. Department of Energy research managers, or experts from other federal or state agencies relevant to the project;
- Public interest environmental groups;
- Utility representatives;
- Air district staff; and
- Members of relevant technical society committees.

The Recipient shall:

- Prepare a *List of Potential TAC Members* that includes the names, companies, physical and electronic addresses, and phone numbers of potential members. The list will be discussed at the Kick-off meeting, and a schedule for recruiting members and holding the first TAC meeting will be developed.
- Recruit TAC members. Ensure that each individual understands member obligations and the TAC meeting schedule developed in subtask 1.11.
- Prepare a *List of TAC Members* once all TAC members have committed to serving on the TAC.
- Submit *Documentation of TAC Member Commitment* (such as Letters of Acceptance) from each TAC member.

Products:

- List of Potential TAC Members

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- List of TAC Members
- Documentation of TAC Member Commitment

Subtask 1.11 TAC Meetings

The goal of this subtask is for the TAC to provide strategic guidance for the project by participating in regular meetings, which may be held via teleconference.

The Recipient shall:

- Discuss the TAC meeting schedule with the CAM at the Kick-off meeting. Determine the number and location of meetings (in-person and via teleconference) in consultation with the CAM.
- Prepare a *TAC Meeting Schedule* that will be presented to the TAC members during recruiting. Revise the schedule after the first TAC meeting to incorporate meeting comments.
- Prepare a *TAC Meeting Agenda* and *TAC Meeting Back-up Materials* for each TAC meeting.
- Organize and lead TAC meetings in accordance with the TAC Meeting Schedule. Changes to the schedule must be pre-approved in writing by the CAM.
- Prepare *TAC Meeting Summaries* that include any recommended resolutions of major TAC issues.

The TAC shall:

- Help set the project team's goals and contribute to the development and evaluation of its statement of proposed objectives as the project evolves.
- Provide a credible and objective sounding board on the wide range of technical and financial barriers and opportunities.
- Help identify key areas where the project has a competitive advantage, value proposition, or strength upon which to build.
- Advocate on behalf of the project in its effort to build partnerships, governmental support and relationships with a national spectrum of influential leaders.
- Ask probing questions that insure a long-term perspective on decision-making and progress toward the project's strategic goals.

Products:

- TAC Meeting Schedule (draft and final)
- TAC Meeting Agendas (draft and final)
- TAC Meeting Back-up Materials
- TAC Meeting Summaries

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IV. TECHNICAL TASKS

Products that require a draft version are indicated by marking “(draft and final)” after the product name in the “Products” section of the task/subtask. If “(draft and final)” does not appear after the product name, only a final version of the product is required. Subtask 1.1 (Products) describes the procedure for submitting products to the CAM.

Note: Under the grant agreement’s terms and conditions, the solicitation and the Recipient’s proposal under that solicitation are incorporated by reference into the grant agreement (Exhibit C, section 2). The original Recipient’s proposal included more work and equipment, at a larger cost, than reflected in this Scope of Work (which corresponds to a lesser cost). Where there are differences in the number or characteristics of work or equipment, such as the number of wells to be refitted, the description in this Scope of Work supersedes the description in the original proposal. By mutual agreement, conflicting numbers or characteristics of work or equipment in the original proposal are not incorporated by reference from the Recipient’s original proposal.

TASK 2: DESIGN AND CONSTRUCTION OF WSWB APH FACILITIES

The goal of this task is to provide project administration, engineering design, and construction services for WSWB facilities.

Subtask 2.1, Engineering Design and Construction Services for APH Systems

The Recipient shall:

- Determine best project delivery approach such as Design/Bid/Build or Progressive Design/Build with GMP, etc. for engineering design of 200 kW APH system at WSWB, construction management, and inspection services to retrofit 5 wells for regeneration, including pipes, 25 acre-feet onsite reservoir, and power supply components for 5 wells, including single SCE meter for Net Energy Metering
- Develop and execute a *Commissioning Plan* with consultation from the CAM and the TAC
- Develop and execute an *Operations and System Test Plan* to cover 12 months with consultation from the CAM and the TAC.
- Provide to CAM *Facility Certification, Start-up and Commissioning Documents*, to include, but not limited to: design drawings, specifications, and as-built drawings, as well as the start-up, operating, and decommissioning plans.
- Prepare *CPR Report #1* and attend CPR Meeting per subtask 1.3.

Products:

- Commissioning Plan
- Operations and System Test Plan
- Facility Certification, Start-up, and Commissioning Documents
- CPR Report #1

Subtask 2.2 Design Build Project Delivery Services to Construct a 200 kW APH System

The Recipient shall:

- Provide labor, materials and equipment to manage, design and construct the facilities described in subtask 2.1 above.

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- Provide to CAM *Delivery Method Report*, to include but not be limited to:
recommendations on project delivery methods, including an assessment of traditional
design/bid/build and alternative design/build delivery methods to save time.

Products:

- Delivery Method Report

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TASK 3: REGENERATION WELLS RETROFIT

The goal of this task is to retrofit wells to enable energy release for the well regeneration systems.

The Recipient shall:

- Summarize lessons learned from other APH well sites and related facilities;
- Provide consulting on engineering design and construction to retrofit wells to install regeneration systems;
- Provide consulting for 1 year of operations during testing period
- Provide consulting on interpretation of operational results during testing period and how they relate to the lessons learned at other sites.
- Provide *Regeneration Well Retrofit Lessons Learned Technical Memorandum*

Products:

- Regeneration Well Retrofit Lessons Learned Technical Memorandum

TASK 4: OPERATIONS AND FIELD TESTS

The goal of this task is to conduct 1 year of operations to demonstrate the 200kW APH system

The Recipient shall:

- Create and execute a *Measurement and Verification Plan* with consultation from the CAM on metrics. Metrics shall include, but not be limited to the following: value that longer-duration energy storage provides with specific information on increased resiliency, higher reliability, added cost savings from peak load reductions, load shifting, providing increased services to the electric grid during times of grid stability challenges; value of longer-duration storage when compared to the normal 2-4 hours of storage current systems provide.
- Measurement and Verification Plan will include the collection and measurement and verification (M&V) of data on the installation over the one-year demonstration period. The duration of data collection may be reduced with prior CAM written approval. M&V includes plots of charge/discharge power levels, storage efficiencies, and ambient temperatures, as a function of time.
- Conduct one-year operations to test and demonstrate the APH system and create a *1-Year Operations Report* that includes, but is not limited to, the following details:
 - Provide engineering and design services to manage the operation, maintenance and repair of the 200 kW APH system for 12 months during the demonstration period;
 - Provide management, all labor and materials to operate, maintain and repair the 200 kW APH system for 12 months during the demonstration period;
 - Implementation of operations and system plan for 12 months;
 - Operate for 4 summer months for 5 hours each weekday during evening ramp up to shift peak load;
 - Operate periodically during the 8 months of winter and spring to absorb surplus renewables for seasonal storage and to establish well plugging constraints;
 - Operation of APH system to demonstrate for a minimum of 10-hour discharge periods; Operate system to demonstrate PSPS power for 7 days (168 hrs.);

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- Results of execution of the Measurement and Verification Plan;
- Determine clogging constraints using imported water; and
- Develop life cycle maintenance requirements.
- Prepare *CPR Report #2* and attend CPR Meeting per subtask 1.3.

Products:

- Measurement and Verification Plan (draft and final)
- 1 Year Operations Report (draft and final)
- CPR Report #2

TASK 5: ECONOMICS AND METRICS

The goal of this task is to determine the economics and define metrics for a standalone 200kW APH system. Discuss the primary benefits the system will deliver to the recipient, end user, and the grid including increased reliability, resiliency, safety and other services during times of power interruptions caused by weather, grid system failures or public safety power shutoffs.

Subtask 5.1 Determine APH System Costs and Economics

The Recipient shall:

- Determine initial installation cost for 200 kW unit using a 3R Valve retrofit;
- Determine cost of interconnection and controls, and utility tariff for NEM contract implications;
- Investigate separate interconnection for each well vs single point of interconnection for multiple wells; and
- Determine economics of operation, maintenance and replacement cost over a 30-year life cycle; and
- Survey low-income and DACs and determine communities that would be good candidates where APH could economically store energy to benefit end-users.
- Develop a template for interconnection agreements to help others navigate the process.
- Provide to CAM, a *Technical Memo on Metrics and Economics*
- Provide to CAM, a *Template for Interconnection Agreement*

Products:

- Technical Memo on Metrics and Economics
- Template for Interconnection Agreement

Subtask 5.2 Determine APH System Grid Value and Metrics

The Recipient shall:

- Determine value of APH during PSPS event when the grid is down;
- Establish metrics for APH and grid integration; and
- Benefits of modular expansion of APH using less than 200 kW per module and the potential to provide 400 kW with two 200-kW modules.
- Provide an *APH Application/Evaluation Template* to CAM.

Products:

- APH Application/Evaluation Template

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TASK 6: GRID INTEGRATION

The goal of this task is to determine how to integrate long duration energy storage using APH Technology (>10 hours) into the grid.

The Recipient shall:

- Determine value of >10 hours of discharge, including possible bimodal loads;
- Determine value of standalone power supply to DACs when the grid is de-energized;
- Value the distribution of APH units in the Central Valley for reduced transmission needs;
- Value the ability of APH to start rapidly during evening ramp up or in unplanned outage;
- Optimize renewables penetration, GHG reductions, and reliability for evening ramp up;
- Assess benefit of Demand Response using onsite storage to shut down wells on-peak;
- Provide a *Technical Memo on Grid Integration*

Products:

- Technical Memo on Grid Integration

TASK 7: STATEWIDE APPLICATION

The goal of this task is to assess and determine the potential statewide application of APH technology to wells in California.

The Recipient shall:

- Determine the total number of high capacity wells (~1,000 gallons per minute) in the Central Valley;
- Determine potential horsepower of wells that could be used to generate power;
- Assess horsepower on a county by county level, starting with Kern County;
- Determine number of wells close enough to imported water canal to inject imported water;
- Assess use of existing wells and percent of time idle, including when in the day;
- Determine anticipated number of wells permanently idled due to SGMA land following;
- Provide to CAM, a *Technical Memo on Statewide Application*.

Products:

- Technical Memo on Statewide Application

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TASK 8: SEASONAL STORAGE

The goal of this task is to assess and determine the potential statewide application of APH technology to wells in California.

The Recipient shall:

- Determine the ability of APH combined with Willow Springs Water Bank to provide seasonal storage of energy. Energy will be stored by shifting when water is delivered to Southern California. The seasonal shift is from the summer months to the non-summer months when there is an expected surplus of renewables and a risk of curtailment. Imported State Water Project water will be pre-delivered to WSWB, using more energy during non-summer months. It may be possible to recharge some of this imported water using APH, making the process more efficient. The pre-delivered water will be replaced by pumping stored water from WSWB back into the California Aqueduct in the summer. APH makes pumping of stored groundwater in the summer more efficient.
- Provide CAM a *Technical Memo on Seasonal Storage Using APH*

Products:

- Technical Memo on Seasonal Storage Using APH

TASK 9: PROJECT BENEFITS

The goal of this task is to report the benefits resulting from this project.

The Recipient shall:

- Complete three Project Benefits Questionnaires that correspond to three main intervals in the Agreement: (1) *Kick-off Meeting Benefits Questionnaire*; (2) *Mid-term Benefits Questionnaire*; and (3) *Final Meeting Benefits Questionnaire*.
- Provide all key assumptions used to estimate projected benefits, including targeted market sector (e.g., population and geographic location), projected market penetration, baseline and projected energy use and cost, operating conditions, and emission reduction calculations. Examples of information that may be requested in the questionnaires include:
 - For Product Development Projects and Project Demonstrations:
 - Published documents, including date, title, and periodical name.
 - Estimated or actual energy and cost savings, and estimated statewide energy savings once market potential has been realized. Identify all assumptions used in the estimates.
 - Greenhouse gas and criteria emissions reductions.
 - Other non-energy benefits such as reliability, public safety, lower operational cost, environmental improvement, indoor environmental quality, and societal benefits.
 - Data on potential job creation, market potential, economic development, and increased state revenue as a result of the project.

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- A discussion of project product downloads from websites, and publications in technical journals.
- A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
- Additional Information for Product Development Projects:
 - Outcome of product development efforts, such copyrights and license agreements.
 - Units sold or projected to be sold in California and outside of California.
 - Total annual sales or projected annual sales (in dollars) of products developed under the Agreement.
 - Investment dollars/follow-on private funding as a result of Energy Commission funding.
 - Patent numbers and applications, along with dates and brief descriptions.
- Additional Information for Product Demonstrations:
 - Outcome of demonstrations and status of technology.
 - Number of similar installations.
 - Jobs created/retained as a result of the Agreement.
- For Information/Tools and Other Research Studies:
 - Outcome of project.
 - Published documents, including date, title, and periodical name.
 - A discussion of policy development. State if the project has been cited in government policy publications or technical journals, or has been used to inform regulatory bodies.
 - The number of website downloads.
 - An estimate of how the project information has affected energy use and cost, or have resulted in other non-energy benefits.
 - An estimate of energy and non-energy benefits.
 - Data on potential job creation, market potential, economic development, and increased state revenue as a result of project.
 - A discussion of project product downloads from websites, and publications in technical journals.
 - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
- Respond to CAM questions regarding responses to the questionnaires.

The Energy Commission may send the Recipient similar questionnaires after the Agreement term ends. Responses to these questionnaires will be voluntary.

Products:

- Kick-off Meeting Benefits Questionnaire
- Mid-term Benefits Questionnaire
- Final Meeting Benefits Questionnaire

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TASK 10: TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

The goal of this task is to develop a plan to make the knowledge gained, experimental results, and lessons learned available to the public and key decision makers.

The Recipient shall:

- Prepare an *Initial Fact Sheet* at start of the project that describes the project. Use the format provided by the CAM.
- Prepare a *Final Project Fact Sheet* at the project's conclusion that discusses results. Use the format provided by the CAM.
- Prepare a *Technology/Knowledge Transfer Plan* that includes:
 - An explanation of how the knowledge gained from the project will be made available to the public, including the targeted market sector and potential outreach to end users, utilities, regulatory agencies, and others.
 - A description of the intended use(s) for and users of the project results.
 - Published documents, including date, title, and periodical name.
 - Copies of documents, fact sheets, journal articles, press releases, and other documents prepared for public dissemination. These documents must include the Legal Notice required in the terms and conditions. Indicate where and when the documents were disseminated.
 - A discussion of policy development. State if project has been or will be cited in government policy publications, or used to inform regulatory bodies.
 - The number of website downloads or public requests for project results.
 - Additional areas as determined by the CAM.
- Conduct technology transfer activities in accordance with the Technology/Knowledge Transfer Plan. These activities will be reported in the Progress Reports.
- When directed by the CAM, develop *Presentation Materials* for an Energy Commission-sponsored conference/workshop(s) on the project.
- When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the California Energy Commission.
- Provide at least (6) six *High Quality Digital Photographs* (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites or related project photographs.
- Prepare a *Technology/Knowledge Transfer Report* on technology transfer activities conducted during the project.

Products:

- Initial Fact Sheet (draft and final)
- Final Project Fact Sheet (draft and final)
- Presentation Materials (draft and final)
- High Quality Digital Photographs
- Technology/Knowledge Transfer Plan (draft and final)
- Technology/Knowledge Transfer Report (draft and final)

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

Memorandum

To: Chair David Hochschild
Karen Douglas
J. Andrew McAllister, Ph.D.
Patty Monahan
Siva Gunda

Date: March 4, 2021

From: Joseph Sit
Utilities Engineer, Energy Research and Development Division

Subject: California Environmental Quality Act Analysis for EPC-20-008, Antelope Valley Water Storage, LLC's Long Duration 200 kW Energy Storage with Aquifer Pumped Hydro

I am a Utilities Engineer in the Research and Development Division, California Energy Commission, and the Commission's Agreement Manager for proposed Agreement EPC-20-008 (GFO-19-306-02) ("Agreement").

INTRODUCTION

I have reviewed the California Environmental Quality Act ("CEQA") documents for the Antelope Valley Water Storage's Aquifer Pumped Hydro Energy Storage project which includes: (a) Kern County's 2006 Environmental Impact Report for the Antelope Valley Water Bank Project [later renamed the Willow Springs Water Bank Project] (State Clearinghouse #2005091117), certified and used for project approvals by the Kern County Planning Commission (7/27/2006) and Board of Supervisors (9/12/2006); (b) Rosamond Community Services District's 2018 Addendum (approved 8/21/2018) to the 2006 EIR; and (c) Antelope Valley Water Storage, LLC's representations about the nature and ownership of the Willow Springs Water Bank and the proposed CEC grant project. I have also reviewed the proposed Agreement EPC-20-008. Antelope Valley Water Storage, LLC (AVWS) is proposing behind-the-meter demonstration of a non-lithium ion energy storage technology, Aquifer Pumped Hydro (APH).

Based on my review and consideration of the above documents, it is my independent and professional opinion that no environmental impacts would occur that could not be reduced through mitigation measures to a level that is less than significant. Furthermore, I have not identified any new information that would change the conclusions of the Rosamond Community Services District's CEQA documents, or render those conclusions inadequate.

It is also my independent and professional opinion that the work to be performed under the proposed Agreement and the project description as detailed in "CEC APH Project Phase 1 EIR" prepared by Antelope Valley Water Station, LLC on January 20, 2021, falls within the CEQA documents' analyses, and that the Agreement will not result in any new significant

environmental impacts or substantially more severe environmental impacts beyond those already considered. Finally, I have not identified any new mitigation measures, within the CEC's authority, that would lessen or further mitigate the impacts of the Antelope Valley Water Storage's Aquifer Pumped Hydro Energy Storage.

PROJECT DESCRIPTION:

The grant recipient, Antelope Valley Water Storage, LLC will carry out the project. The purpose of the CEC's grant Agreement is to demonstrate, behind-the-meter, Aquifer Pumped Hydro (APH) technology. The proposed agreement will utilize five existing wells and a reservoir to create a closed system for stand-alone energy storage. In this storage system, APH, uses local groundwater to store energy and could be built over any aquifer in a distributed network. The aquifer is the lower reservoir. Motors on existing wells are repurposed to act as generators. Water is pumped using electricity to an upper reservoir, off-peak, and released to generate electricity, on-peak.

The APH technology under this Agreement will provide at least 10 hours of energy storage/discharge capability at a minimum rating of 200 kilowatts. The project will use the cluster of five wells at the Willow Springs Water Bank groundwater storage facility in Kern County with nameplate capacities ranging from 112 kW (150 HP) to 225 kW (300HP). They will be retrofitted to also act as generators. At 30 percent generation efficiency, each individual WSWB well will produce 34kW to 67 kW of power.

CEQA DOCUMENTATION AND APPROVAL HISTORY:

Note: In the following pages, the analysis sometimes refers to "approved project" and "modified project" as the 2018 Addendum speaks of these. The "approved project" refers to the 2006 EIR project, i.e., the original water bank project and associated land use entitlements. The "modified project" refers to a larger (acre-feet) and different water bank project. The "modified project" was analyzed in the 2018 Addendum. In contrast to both of these much larger "projects," the CEC grant agreement APH project will use parts of the "modified project" water bank and add a small amount of equipment to it (e.g., pumps located in five wells).

The 2018 EIR addendum covers all of the facilities that the APH will need, or add small equipment to, to develop the APH project. Additional work under the Agreement, as detailed in the attached "CEC APH Project Phase 1 EIR" project description, include retrofitting water wells, adding electronics, and adding pipeline connections to utilize APH. For water well retrofits, a valve will be added to the bottom of the well to control the flow of water in/out of the well when pumping water/generating electricity. There is no change on the surface with the addition of the valve into the bottom of the well; thus there is no additional environmental impact. Also, electronics will need to be installed in the existing well meter box to process the generation of electricity from the pump. There is no environmental impact from adding the

additional electronics. Also, there may be minor pipeline connections necessary for APH. The 2018 EIR includes 38 miles of pipelines. These pipelines are used to convey the water pumped out of the ground to the customers (the aqueduct). APH simply runs the water in the reverse direction – instead of from the well to the aqueduct, APH pumps from the aqueduct into the well. The minor pipeline connections for APH are minimal. Lastly, the APH will utilize a small portion of the proposed reservoirs (2018 EIR Addendum has two – a 48 acre-foot and a 40 acre-foot reservoir) to store water for later reinjection into the aquifer for energy generation.

KERN COUNTY APPROVAL

On September 12, 2006, the Kern County Board of Supervisors approved the Willow Springs Specific Plan amendments needed for construction and operation of the Antelope Valley Water Bank, currently named the Willow Springs Water Bank. The project was approved on the condition that subsequent owners/operators of the water bank would adhere to the Kern County's "A (Exclusive Agriculture) Zoning Ordinance, the certified Final EIR, and the Mitigation Monitoring and Reporting Program. On April 17, 2007, the Kern County Board of Supervisors approved the executed Memorandum of Understanding (MOU) between the County and the owner-operator of the water bank. The implementation of the MOU satisfies the conditions of approval.

In summary, AVWS indicated that no amendments to the Willow Springs Specific Plan or the Kern County Zoning Ordinance are required for the modified WSWB project as detailed in Table 1 "Summary of Modifications to Water Bank Project" in the 2018 EIR addendum, and no conditional use permits are required from Kern County for any land uses or activities planned under the modified project. Therefore, AVWS indicated that no discretionary approvals are required from Kern County for the modified WSWB project.

LOS ANGELES COUNTY APPROVAL

As for Los Angeles county approvals, all of the properties along the pipeline alignments are zoned as A-2 (Heavy Agriculture) and lists uses that are permitted in the A-2 Zoning District subject to approval of a conditional use permit include "...any use normal and appurtenant to the storage and distribution of water." The installation of a new pipeline within Los Angeles County is considered a use "appurtenant to the storage and distribution of water." Therefore, a conditional use permit will be required for construction of the above pipelines within Los Angeles County. This has been analyzed in the CEQA documents, and the conditional use permit may have already been obtained.

ROLE OF ROSAMOND COMMUNITY SERVICES DISTRICT

Willow Springs Water Bank project construction authorization is under the authority of Rosamond CSD which adopted the 2018 EIR Addendum in its role as Responsible Agency under CEQA. The Rosamond CSD is a member agency of the Southern California Water Bank

Authority (SCWBA) which is responsible for the development and operation of the Willow Springs Water Bank.

Aesthetics:

In the 2006 EIR, Kern County staff made an initial determination that there were no potential significant aesthetic impacts associated with the project. The modified project would not involve substantially more significant aesthetic impacts than were identified for the approved project in the 2006 EIR. Therefore, the conclusions of the 2006 EIR with regard to aesthetic impacts remain valid and applicable to the modified project without the need for further analysis.

Agricultural Resources:

It was concluded that the approved water bank project would not contribute considerably to a cumulatively significant impact on agricultural resources. Compared to the approved project, the modified project would similarly not contribute considerably to a cumulatively significant impact on agricultural resources. Therefore, the conclusion of less-than-significant cumulative impact in the 2006 EIR remains valid.

As for mitigation, there will be steps taken with regard to agricultural resources. The Antelope Valley Water Bank monitoring committee shall provide a written report to the relevant parties on an annual basis after commencing operations. The owner/operator will constrain or adjust the locations of recharge operations to prevent the impact or to reimburse the affected farmer for any impacts.

Air Quality

The cumulative impacts associated with the approved project in the 2006 EIR would be significant and unavoidable. Kern County approved the project. However, since overall emissions from the modified 2018 water bank project are far less than the 2006 approved project, the cumulative impact associated with the modified project is also lower than the approved project. Therefore, the 2018 modified project and the APH project would not result in substantially more severe significant impact with regard to air quality.

Following receipt of a grading permit, the owner/operator will implement mitigation measure 4.2-1 dust control measures during construction. Written evidence from the grading contractor of the type of equipment used on the site shall be submitted before site grading. Also, the owner/operator shut off diesel engines when not in use. Finally, fugitive dust plan approval shall be submitted.

Biological Resources

The 2006 EIR concluded that the biological resources impacts of the approved project would be reduced to less than significant levels with mitigation measures. It was concluded the approved project would not contribute considerably to a cumulatively significant impact to biological resources. The modified project would implement the same biological mitigation measures as the approved project, with the addition of updated provisions. It is expected that

the same or similar biological mitigations, along with regulatory requirements for resource protection, would be required for other cumulative projects. Therefore, the modified project would not contribute considerably to a cumulatively significant impact to biological resources, and the cumulative biological impacts would be less than significant.

As for mitigation for biological resources, there are a few different measures. One is review of the corridor plan and recommending appropriate corridor width and placement to avoid Joshua trees within the project site, along with appropriate documentation. Another is to survey the project site and mark where fencing and other barriers would be installed by the Contractor. The owner/operator will also obtain a streambed alteration agreement and a water quality certification. Also, pre-construction surveys shall locate all active Swainson's hawk nests sites within 0.5 mile of the construction area. Another mitigation measure is to monitor the nesting hawks, determine threats to nesting success and identify options for disturbance avoidance. Lastly, there shall be surveys of burrowing owl burrows within the work area and a 250-foot buffer to locate active burrowing owl burrows, and implement the best avoidance/relocation measures for occupied burrows.

Cultural Resources

The 2006 EIR concluded that the cultural and paleontological resources impacts of the approved project would be reduced to less than significant levels through mitigation measures. It was concluded that the cumulative cultural and paleontological resources impacts would be less than significant, and that the approved project would not contribute considerably to a cumulatively significant impact.

The owner/operator will also take various mitigation measures. One is to survey cultural resources. Another is to monitor initial ground disturbing activities and recover and archive cultural materials. Staff will also visit the sites of discovery and appropriately process significant archaeological resources in the event of uncovering buried cultural resources. Project staff will monitor excavations in areas identified as likely to contain paleontological resources, and salvage and preserve any resources encountered.

Energy

The 2006 EIR found that the water bank project would result in an irreversible commitment of fossil-fuel energy resources for construction activities, but that the amount would be small and relatively insignificant.

(The APH project would is intended to provide a benefit regarding the use of energy resources.)

Geology and Soils

The 2006 EIR concluded that the cumulative impacts related to geology and soils would be less than significant. The modified project would not contribute considerably to cumulative impacts related to geology and soils and the impact would be less than significant.

For mitigation, the owner/operator will prepare and implement a Stormwater Pollution Prevention Plan including salvaging and reapplication of topsoil as well as controlling water and wind erosion during construction.

Greenhouse Gas Emissions

The 2006 EIR did not address greenhouse gas (GHG) emissions because there was no requirement under CEQA at that time, but estimated that the approved project would result in a significant cumulative impact in terms of GHG emissions. Under the modified project, the total GHG emissions would be reduced by 24.4 percent compared to baseline conditions under the 2006 approved project and meet Eastern Kern Air Pollution Control District's guidance of 20 percent reduction to reduce GHG emissions to below a significant project impact and below a cumulatively considerable impact. Therefore, the cumulative GHG impacts resulting from the 2018 modified project would not contribute considerably to a cumulatively significant impact, and cumulative GHG emissions impact associated with the modified project would be less than significant. The grant project will have a less than significant impact above existing pollution levels.

Hazards and Hazardous Materials

The 2006 EIR discussed that other projects including open water bodies could provide breeding ground for mosquitoes and a cumulatively significant impact in terms of potential health hazards. However, this impact, along with hazardous materials spills and bird strike hazard impacts, would be mitigated to less than significant levels through mitigation measures. With the implementation of these mitigation measures, the cumulative impact associated with the project would be less than significant. The overall area of recharge basins in the modified project would be reduced relative to the approved project, but would still pose a potential increased health hazard. Using the mitigation measures mentioned in the 2006 EIR, the potential hazards would be less than significant.

A few mitigation measures are set forth. One is to implement a Spill Prevention Control and Countermeasures Plan. Another mitigation measure is to monitor bird activity during recharge activities and notify stakeholders if a potential flight hazard develops. Also, in consultation with the Department of Fish & Game, the owner/operator shall provide a list of the approved methods they will use to discourage flocks of large birds from using the recharge basins. Finally, the owner/operator will comply with mitigation measure 4.6-5 regarding mosquito abatement.

Hydrology and Water Quality

Water Quality The 2006 EIR describes the potential for cumulative degradation of water quality as a result of construction runoff. However, it was concluded in the 2006 EIR that the cumulative water quality impacts would thus be less than significant after mitigation. The modified project would be subject to the same mitigations for water quality projection. Therefore, the conclusion of the 2006 EIR that cumulative water quality impacts would be less than significant after mitigation is still valid.

Groundwater Resources The 2006 EIR describes the over drafted condition of the underlying aquifer in the Antelope Valley. The approved project has a beneficial impact on the local groundwater resources and would help reduce the rate of overdraft. Therefore, the project's impact to groundwater resources will not be cumulatively significant. The modified project will also have a beneficial impact on groundwater resources. Therefore, the conclusion of the 2006 EIR that the cumulative impact of the project on groundwater resources will not be significant is still valid for the modified project.

For mitigation, the owner/operator will take a few different steps. One is obtain coverage under the National Pollutant Discharge Elimination System General Construction Permit to address construction-related water quality effects. Another measure is to prepare and implement a Spill Prevention Control and Countermeasures Plan. Also, the owner/operator will use a monitoring committee to track impact of operations on groundwater levels and quality to ensure local landowners are protected. An additional measure is to provide an Engineering and Survey Services plan regarding recharge basins. The owner/operator will provide evidence of compliance that installation/operation of recovery wells do not adversely impact the quality of groundwater. Finally, the Antelope Valley Water Bank monitoring committee shall provide findings from water samples from domestic drinking water wells located within one mile of the recharge basins to ensure that project operations do not adversely impact the quality of nearby residents' drinking water.

Land Use and Planning

As stated in the 2006 EIR, a cumulative land use impact might occur if the combination of cumulative projects would result in substantial inconsistencies with plans, policies, or regulations. However, these inconsistencies are unlikely since no projects would be approved, unless amendments to the applicable plan or regulation were included as part of the approval.

The conditions for the approved project are still applicable to the modified project. The modified water bank project contributions to any cumulative land use and planning impact would be not cumulatively considerable, nor cumulatively significant.

Mineral Resources

The 2006 EIR states that the placement of incompatible uses near mineral recovery sites could prevent recovery of such resources and result in cumulative loss of access to mineral resources. The approved project site contains no important mineral resources and therefore the project cumulative impact to mineral resources would be less than significant. The modified project is subject to the same mineral resource conditions for the approved project and thus the 2006 EIR that the project impact to mineral resources would be less than significant is still valid.

Noise

The 2006 EIR concludes that the cumulative noise impacts associated with the project would be less than significant after mitigation. For the modified project, conditions in the area have

changed substantially since the EIR was certified in 2006. However, the modified project's cumulative noise impacts would be less than significant.

For mitigation, the owner/operator will determine if any residences that could be affected, identify and employ noise-reducing construction practices so that noise from construction, well operation, or lift station operation does not exceed noise-level standards at adjacent residences.

Population and Housing

The 2006 EIR discussed that economic, population, and housing growth would not result in a cumulative impact to population and housing. The modified project would involve substantial changes to the number of workers employed at the project. The 2018 Addendum concluded that the modified project would not result in a cumulative impact on population and housing. There are no impacts related to Population and Housing for this project.

Public Services

The project would result in low demand for public services and would result in no impact on need for new or expanded facilities for these services. Therefore, the project would not result in a cumulatively significant impact to public services. The proposed project may provide a net benefit in the reduction of forest fuels and wildfire risk, as it relates to fire protection.

Recreation

The project would not result in increased demand for recreational facilities. Thus, the modified project would not result in a cumulatively significant impact to recreation.

Transportation and Traffic

Traffic Operations The 2006 EIR discussed that the approved project would not result in cumulative traffic impacts. Considering the modifications and circumstances around the project, the conclusion from the 2006 EIR that the project would not have a cumulative impact on traffic operations, is still valid and applicable to the modified project.

Traffic Operations The 2006 EIR concluded that the project would not have a cumulative impact in terms of traffic hazards and emergency access with implementation of mitigation measures. Considering the modifications and circumstances around the project, the 2006 EIR conclusion that the cumulative traffic hazard and emergency access impacts of the project, with mitigation, would not have a cumulative impact in this regard, are still valid.

For mitigation measures, there are few actions that will be taken. One is to implement a traffic safety plan before the onset of the construction. Another action is to contact local emergency-response agencies to provide information on the timing and location of any traffic control measures required to complete the Project. The owner/operator shall submit a plot plan detailing the location of buildings to be used for operational staff.

Utilities and Service Systems

The 2006 EIR that the project contribution would not be cumulatively considerable or cumulatively significant on public utilities. The modified project similarly would result in little or no demand for such services, and the 2006 EIR conclusions are still valid.

Conclusion

The proposed Aquifer Pumped Hydro project presents no new significant or substantially more severe environmental impacts beyond those already considered in the prior CEQA documents.

**CEC APH Project Phase 1 [EPC-20-008]
Facilities included in 2018 Environmental Impact Report (EIR) Addendum**

**Prepared by:
Antelope Valley Water Storage LLC for the CEC
January 20, 2021**

APH (Aquifer Pumped Hydro)

When electricity is supplied to a water pump they function to pump water. Conversely, when water is forced down a well column the pump rotates in reverse, producing electricity. This injection of water into a well to produce electricity is called Aquifer Pumped Hydro (APH).

APH requires four components:

- A valve at the bottom of the well to control the flow of water out of the well (when pumping) and water coming into the well (when generating)
- Additional electronics in the meter box to control the generation of electricity
- Piping to allow the flow of water back into the well
- A surface storage reservoir to store the water that is used to generate the electricity.

2018 EIR addendum

The 2018 EIR addendum covers all of the facilities need to develop the California Energy Commission (CEC) APH Phase 1 project. Table 1 is taken from the 2018 EIR addendum, and the facilities need for the CEC APH project are highlighted in yellow.

Water Wells

The 2018 EIR included 77 wells. The CEC APH project will use 5 wells (already existing). Remember that the valve necessary for APH operation goes into the bottom of the well – there is no change on the surface with the addition of the valve.

Electronics

Additional electronics, necessary to process the generation of electricity from the pump, will need to be installed in the existing well meter box. There is no environmental impact from adding the additional electronics.

Pipelines

The 2018 EIR includes 38 miles of pipelines. These pipelines are used to convey the water pumped out of the ground to the customers (the aqueduct). APH simply runs the water in the reverse direction – instead of from the well to the aqueduct from the aqueduct into the well. There may be minor pipeline connections necessary for APH but they are *de minimus*.

Regulating Reservoir

A regulating reservoir is simply a small surface reservoir that is used to store water.

The 2018 EIR Addendum has two - a 48 acre-foot (ac) and a 40 af reservoir. APH will utilize a small portion of the proposed reservoirs to store water for later reinjection into the aquifer for energy generation.

TABLE 1
SUMMARY OF MODIFICATIONS TO WATER BANK PROJECT

Project Element	Approved Water Bank Project (2006)	Modified Water Bank Project (2018)	Project Changes
Water Bank Land Area	12,160 acres (~19 sq. mi.)	8,650 acres (~13.5 sq. mi.)	Reduction of 3,510 acres (~5.5 sq. mi.)
Water Bank Storage Capacity (max)	500,000 AF	1,000,000 AF	Increase of 500,000 AF
Annual Recharge Capacity (max)	100,000 AF	250,000 AF	Increase of 150,000 AF
Annual Recovery Capacity (max)	100,000 AF	225,000 AF	Increase of 125,000 AF
Annual Period of Recharge	4-5 months (winter-spring)	12 months as needed in response to demand	Increase of 7-8 months of annual recharge
Recharge Basin Area	1,612 gross acres	1,106 gross acres	806 acres removed. 300 acres added. Net reduction of 506 acres.
Instantaneous Recharge Capacity	350 cfs	350 cfs	No change.
Recovery Wells	57 wells (propane) Max 466 hp	77 wells (electric) Max 300 hp	Increase of 20 wells Reduction of 166 hp in max pump power rating
Instantaneous Recovery Capacity	250 cfs	250 cfs	No change.
Collection Pipelines from Recovery Wells	18 miles	38 miles	Increase of 20 miles of collection pipeline
Supply Pipeline from CA Aqueduct	8.75 miles	9.2 miles	Increase of 0.45 miles of supply pipeline
Booster Pump Station at Recharge Basins	8,137 hp (propane)	17,600 hp (electric)	Increase of 9,463 hp in pump power rating
Regulating Reservoir at Pump Station	Storage capacity – 48 AF Land area – 12 acres	Storage capacity – 48 AF Land area – 12 acres	No change.
Supply Pipeline from LA Aqueduct #2	Not included	2.0 miles	Newly added 2.0 miles of supply pipeline
Booster Pump Station on LAA #2 Pipeline	Not included	3,300 hp (electric)	Newly added 3,300 hp booster pump station
Regulating Reservoir at Pump Station on LAA #2 Pipeline	Not included	Storage capacity – 40 AF Land area – 10 acres	Newly added regulating reservoir with 40 AF capacity on 10 acres
Pipeline to AVEK West Feeder	4.0 miles (1.5 miles completed)	2.5-mile unconstructed segment removed from project.	Reduction of 2.5 miles of pipeline
Booster Pump Station at AVEK West Feeder	2,700 hp (propane)	Not included	Removal of 2,700 hp booster pump station
Connecting Pipeline to AVEK South-North Intertie Pipeline (SNIP)	Not included	2.5-mile pipeline	Newly added 2.5-mile connecting pipeline

The following Figure 1 shows the facilities needed for the CEC APH project. The area of the CEC APH project is roughly a rectangle with the east side bounded by 150th St, west side bounded by 170th St, north side by Gaskell Rd, and south side by Avenue A.

Figure 1. Willow Springs Water Bank (WSWB) Site Layouts for Energy Project

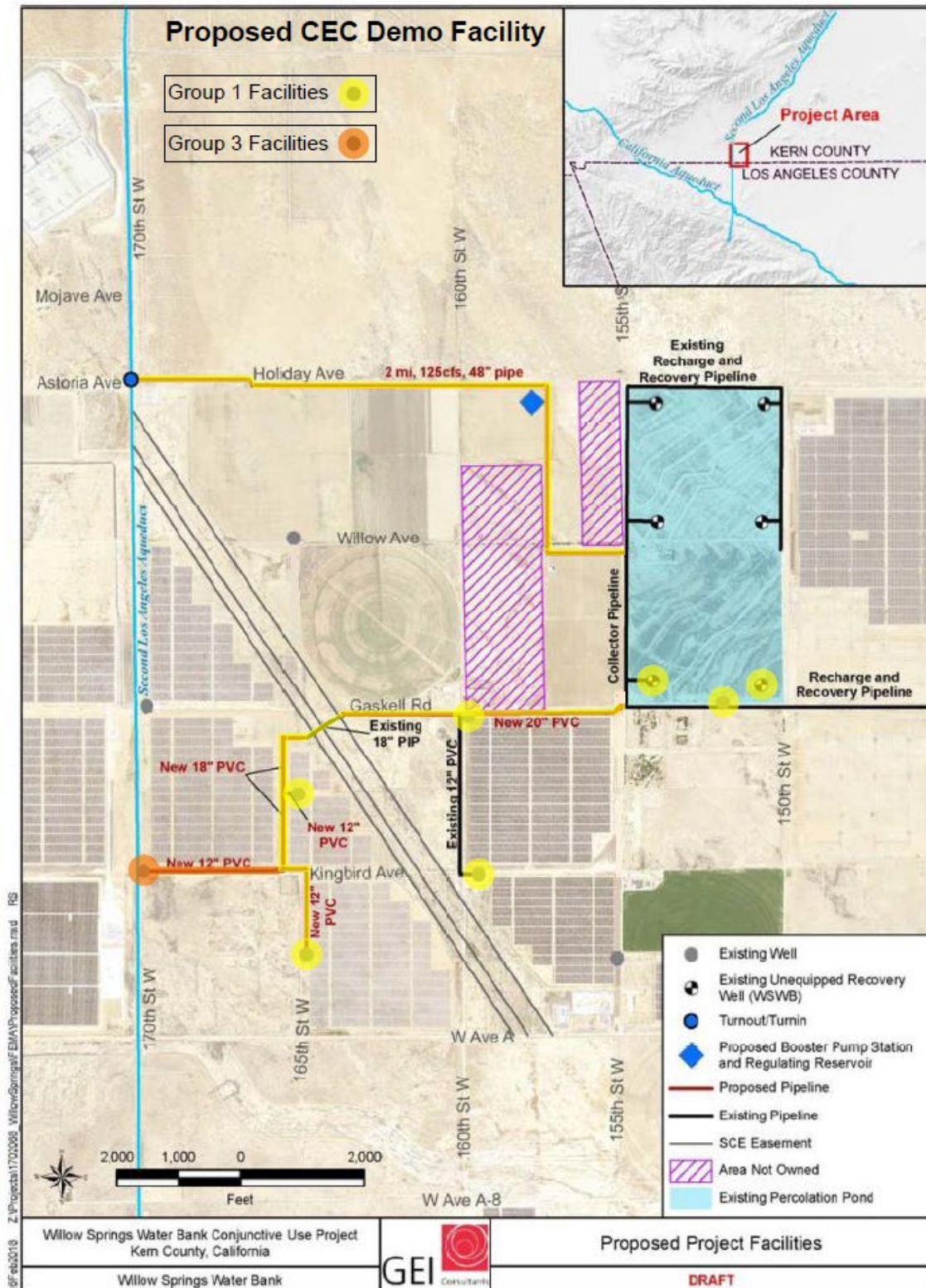
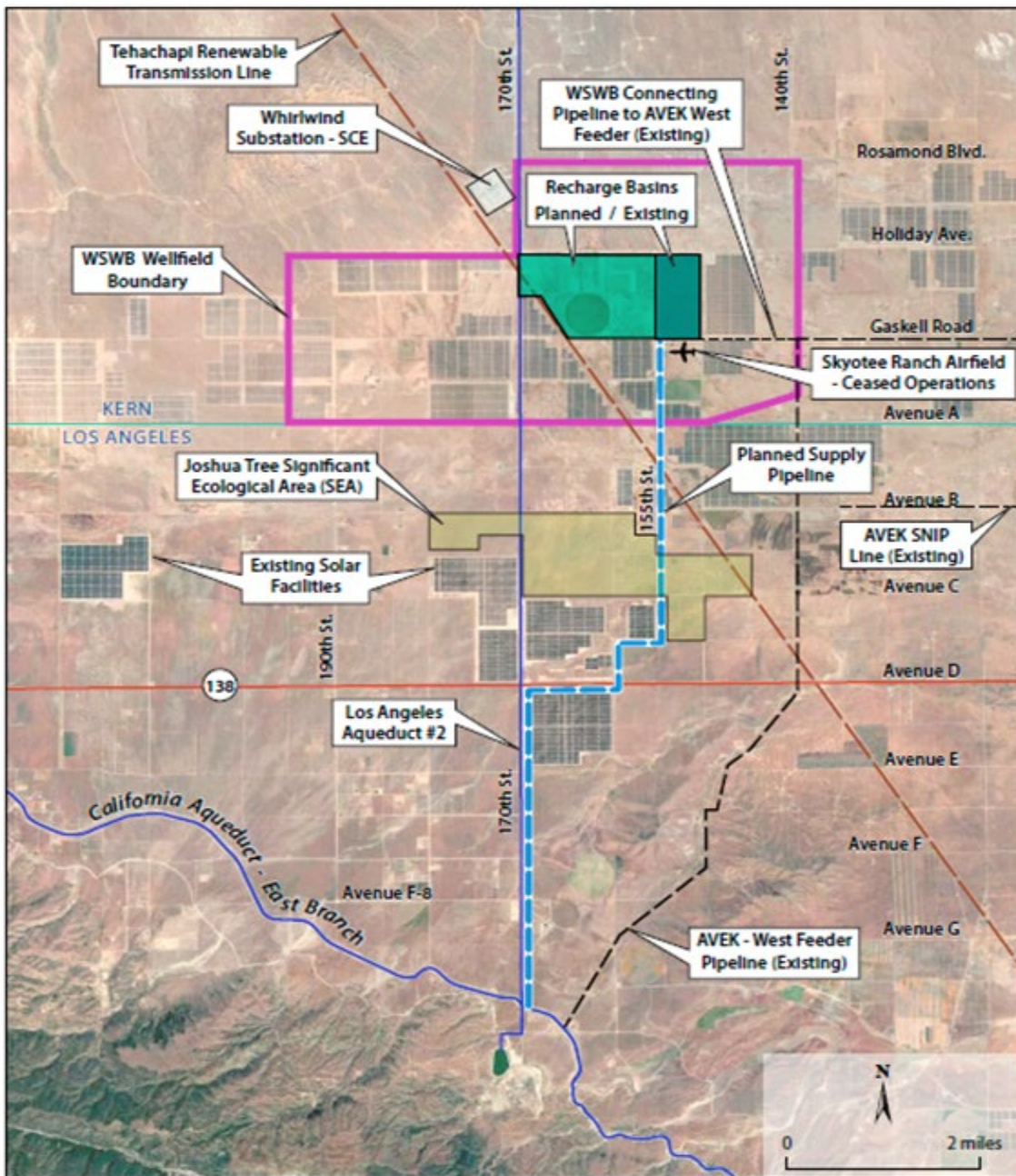


Figure 2 is a copy of Figure 2 from the 2018 EIR Addendum. The EIR covers the entire area in purple. Water related facilities can be built anywhere within the purple area. The area of the CEC APH project is roughly a rectangle with the east side bounded by 150th St, west side bounded by 170th St, north side by Gaskell Rd, and south side by Avenue A, completely within the purple area.

Figure 2. WSWB Site Layouts from 2018 EIR Addendum

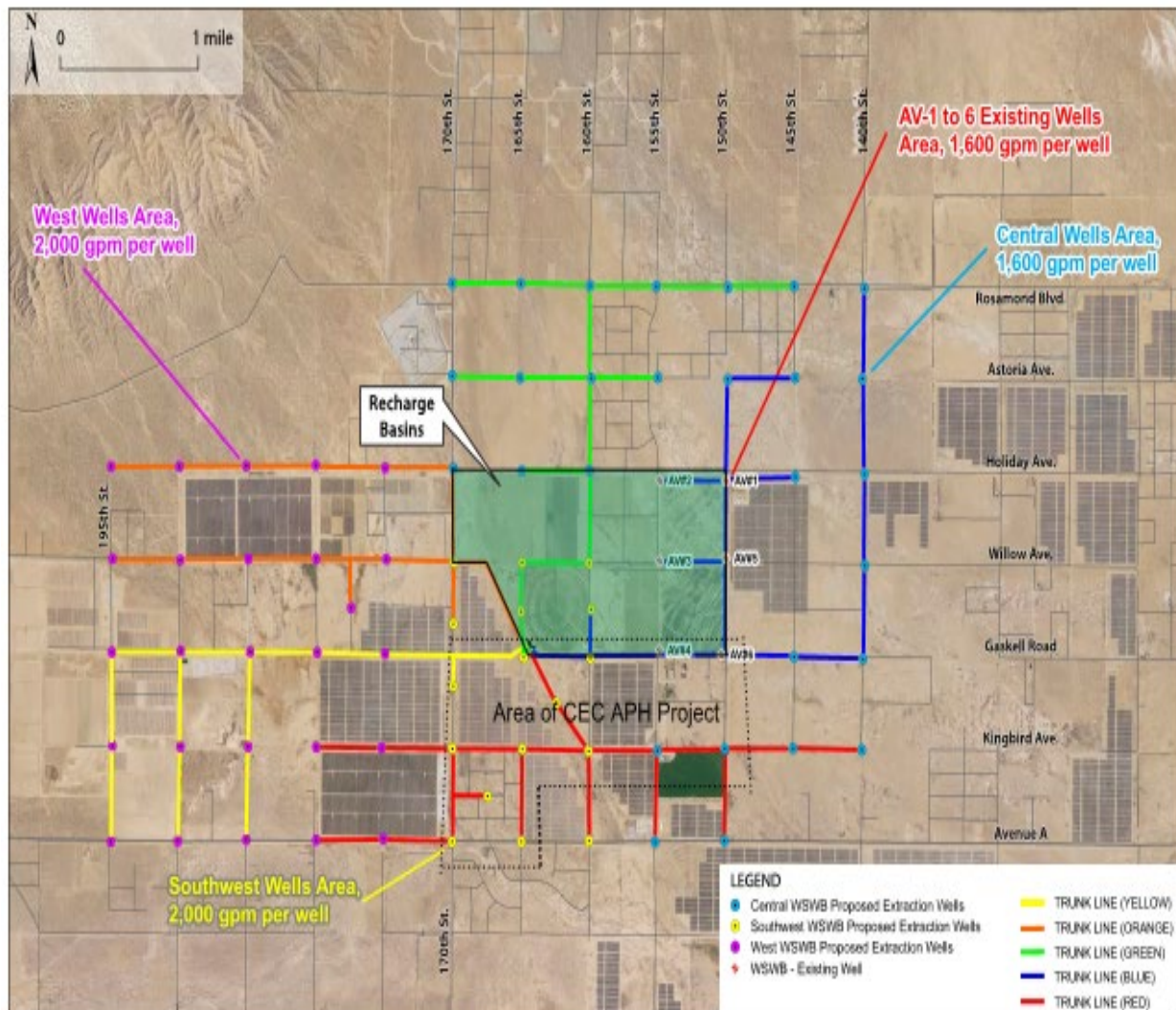


Sources: WSWB; Google Earth, 2018

**Project Vicinity
Figure 2**

Figure 3 is a copy of Figure 3 from the 2018 EIR Addendum in which the CEC APH project area is delineated. Note that all of the facilities needed for the CEC APH project are covered by the 2018 EIR Addendum. The area of the CEC APH project is roughly a rectangle with the east side bounded by 150th St, west side bounded by 170th St, north side by Gaskell Rd, and south side by Avenue A. The existing SCE transmission line (not shown in this figure) runs from approximately 170th St. and Astoria Ave to 160th St and Avenue A.

Figure 3. Willow Spring Water Bank Site Layouts from 2018 EIR Addendum with CEC APH Project Area Delineated



Source: WSWB, 2018

Planned Recovery Wells and Collection Pipes
Figure 3

**California Energy Commission
March 17, 2021 Business Meeting -- Agenda Item #3**

Antelope Valley Water Storage, LLC, “Long Duration 200 kW Energy Storage with Aquifer Pumped Hydro” (EPC-20-008)

The full California Environmental Quality Act (CEQA) supporting documentation for EPC-20-008 can be obtained at:

<https://aquiferpumpedhydro.com/eir>

(This web page is maintained by Water and Energy Consulting. Water and Energy Consulting is a subcontractor to the grant recipient, Antelope Valley Water Storage, LLC.)

The following page provides a list of these documents.

EPC-20-008, Antelope Valley Water Storage, LLC California Environmental Quality Act Backup Materials (Part 2 for CEC Business Meeting) 2/26/2021

These documents can be found at the web page, maintained by Water and Energy Consulting, shown on the CEC's backup documents reference page. (Water and Energy Consulting is a subcontractor to the grant recipient, Antelope Valley Water Storage, LLC.)

Item	Short title	Description or citation
1	EIR Vol. I (2006) - Chapters 1-3	Kern County Planning Department, <i>Draft Environmental Impact Report, Antelope Valley Water Bank Project (by Western Development and Storage, LLC), Specific Plan Amendment No. 13, Map 232, Specific Plan Amendment No. 2, May 233 [etc.]</i> , SCH#2004091117, Volume I, dated April 10, 2006. -- Chapters 1 through 3
2	EIR Vol. I (2006) - Chapter 4	-- Chapter 4
3	EIR Vol. I (2006) - Chapters 5-10	-- Chapters 5 through 10
4	EIR Vol. II (2006)	Kern County Planning Department, <i>Draft Environmental Impact Report</i> , Volume II, Appendices, April 2006
5	EIR Vol. III (2006)	Kern County Planning Department, <i>Chapter 7 Response to Comments Draft Environmental Impact Report</i> , Volume III, July 2006
--	--	Note: The applicants for the land use approvals above were Western Development and Storage, LLC and the Van Dam family landowners. According to Antelope Valley Water Storage, LLC, it obtained the applicants' land, water rights, land use entitlements, and CEQA-related obligations under the Kern County land use approvals through purchase and/or assignment from the original applicants (through several steps).
6	County Planning Commission Minutes	SUMMARY OF PROCEEDINGS, KERN COUNTY PLANNING COMMISSION, Regular Meeting, July 27, 2006, item 2, Specific Plan Amendment #13, Map #232; Specific Plan Amendment #2, Map #233; Agricultural Preserve #24 - Inclusion [etc.], (pp. 1-2) (describing proceedings and Planning Commission approval of the project).
7	County NOD for EIR	Clerk of the Board of Supervisors, County of Kern, Notice of Determination (California Environmental Quality Act of 1970) (re:

Item	Short title	Description or citation
		2006 EIR), Sept. 15, 2006. (NOD) (Note: The NOD was also sent to the State Clearinghouse.)
8	MOU between County and applicants	Kern County Planning Department (Ted James, Director), "Proposed Memorandum of Understanding and Agreement for Performance of Zoning Ordinance and Mitigation Measures as Environmental Restrictions (MOU) with the Van Dam Farms and Western Development and Storage, LLC for the Antelope Valley Bank by Western Development and Storage, LLC in Eastern Kern," April 17, 2007 (signed by parties, except County of Kern)
9	County's confirmation letter re: MOU	Office of the County Counsel, County of Kern, Letter to Mr. Scott Kuney, Esq., re: "September 2006 Antelope Valley Water Bank Approval," from Bruce Divilbiss, Chief Deputy County Counsel, dated Aug. 2, 2007, with attachments (opining that the condition of approval regarding a Memorandum of Understanding was fully satisfied by property owner's timely execution of MOU, although the MOU was not executed by the Board of Supervisors until April 17, 2007).
10	RCSD's EIR Addendum Report (2018)	Rosamond Community Services District, <i>Addendum to the Environmental Impact Report for the Willow Springs Water Bank Project (formerly Antelope Valley Water Bank Project)</i> , SCH#2004091117, July 2018 (Report)
11	RCSD's EIR Addendum Appendices (2018)	Rosamond Community Services District, <i>Addendum to the Environmental Impact Report for the Willow Springs Water Bank Project</i> (Appendices)
12	RCSD Board Minutes	Rosamond Community Services District, Regular Board Meeting - Minutes, Regular Meeting of the Board of Directors of the Rosamond Community Services District, Aug. 21, 2018.
13	RCSD NOD	Rosamond Community Services District, Notice of Determination, Aug. 18, 2018 (signed by Ronald Smith, General Manager) (stating District Board approved project on Aug. 21, 2018) (filed with Kern County, Aug. 22, 2018) (see p. 3)

Notice of Determination**Appendix D****To:**

☒ Office of Planning and Research
 U.S. Mail: _____ Street Address: _____
 P.O. Box 3044 1400 Tenth St., Rm 113
 Sacramento, CA 95812-3044 Sacramento, CA 95814

☐ County Clerk
 County of: _____
 Address: _____

From:

Public Agency: California Energy Commission
 Address: 1516 Ninth Street, MS-51
 Sacramento, CA 95814
 Contact: Joseph Sit
 Phone: 301-637-2761

Lead Agency (if different from above):
 Kern County Planning Department
 Address: 2700 "M" Street., Suite 100
 Bakersfield, CA 93301-2370
 Contact: Lorelei H. Oviatt AICP, Director
 Phone: 661-862-8600

SUBJECT: Filing of Notice of Determination in compliance with Section 21108 or 21152 of the Public Resources Code.

State Clearinghouse Number (if submitted to State Clearinghouse): _____

Project Title: Long Duration 200 kW Energy Storage with Aquifer Pumped Hydro

Project Applicant: Antelope Valley Water Storage, LLC

Project Location (include county): 16071 Gaskell Road, Rosamond, CA 93560-7037 (Kern County)

Project Description:

Kern County prepared a 2006 EIR for the (renamed) Willow Springs Water Bank Project (SC#2005091117). As a responsible agency, the Rosamond Community Services District prepared a 2018 Addendum to the 2006 EIR. The CEC will provide a grant of \$6,406,950 to Antelope Valley Water Storage, LLC for demonstrating an energy storage technology, Aquifer Pumped Hydro. The Water Bank facilities to be used as part of the proposed grant activities have been evaluated under CEQA. The CEC finds the proposed grant project presents no new significant or substantially more severe environmental impacts beyond those already considered.

This is to advise that the California Energy Commission _____ has approved the above
 (☐ Lead Agency or ☒ Responsible Agency)

described project on 3/17/2021 _____ and has made the following determinations regarding the above
 (date)

1. The project [☐ will ☒ will not] have a significant effect on the environment.
2. ☒ An Environmental Impact Report was prepared for this project pursuant to the provisions of CEQA.
☐ A Negative Declaration was prepared for this project pursuant to the provisions of CEQA.
3. Mitigation measures [☐ were ☒ were not] made a condition of the approval of the project.
4. A mitigation reporting or monitoring plan [☐ was ☒ was not] adopted for this project.
5. A statement of Overriding Considerations [☐ was ☒ was not] adopted for this project.
6. Findings [☒ were ☐ were not] made pursuant to the provisions of CEQA.

This is to certify that the final EIR with comments and responses and record of project approval, or the negative Declaration, is available to the General Public at:

CEQA supporting documentation for EPC-20-008 can be obtained at: <https://aquiferpumpedhydro.com/eir>

Signature (Public Agency): _____ Title: _____

Date: _____ Date Received for filing at OPR: _____

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: ANTELOPE VALLEY WATER STORAGE, LLC

WHEREAS, to fulfill duties under the California Environmental Quality Act ("CEQA"), Kern County prepared a 2006 Environmental Impact Report for the Antelope Valley Water Bank Project [later renamed the Willow Springs Water Bank Project] (State Clearinghouse #2005091117), that was certified and used for project approvals by the Kern County Planning Commission (7/27/2006) and by the Board of Supervisors (9/12/2006); and

WHEREAS, Kern County approved the project on condition that future owners and operators of the water bank would be bound by the certified Final EIR, the Mitigation Monitoring and Reporting Program, and the County's "A (Exclusive Agriculture) Zoning Ordinance," and that a Memorandum of Understanding between the County and the owner-operator of the water bank memorialized these requirements (4/17/2007);

WHEREAS, due to changes in the Willow Springs Water Bank Project (including an increase of planned maximum storage capacity from 500,000 acre-feet of water to 1,000,000 acre-feet), and changes in site conditions, as a responsible agency for authorizing construction of improvements for the water bank, the Rosamond Community Services District prepared a 2018 Addendum to the 2006 Environmental Impact Report;

WHEREAS, the Rosamond Community Services District approved the Addendum and the Willow Springs Water Bank Project (8/21/2018);

WHEREAS, Antelope Valley Water Storage, LLC has made representations and presented evidence that it has replaced the original applicants for the above Willow Springs Water Bank Project approvals; that it owns and controls the Willow Springs Water Bank and is obligated to carry out the CEQA mitigation measures and other conditions of approval currently applicable to the Willow Springs Water Bank; and that the Willow Springs Water Bank facilities to be used as part of the proposed EPC-20-008 grant activities (Aquifer Pumped Hydro project) have been evaluated under CEQA as described above;

WHEREAS, Aquifer Pumped Hydro is a form of pumped storage, wherein reversible pumps/turbines in groundwater wells connect the groundwater aquifer, acting as the lower reservoir, to a reservoir at ground surface, acting as the upper reservoir;

WHEREAS, the proposed Antelope Valley Water Storage, LLC's EPC-20-008 grant Agreement project would involve use of a portion of the Willow Springs Water

Bank Project facilities and would add certain equipment, such as reversible pump/turbines in wells and additional electronics in the meter box, for Aquifer Pumped Hydro operation of certain wells, pipelines, reservoirs, and related facilities;

WHEREAS, the State Energy Resources Conservation and Development Commission (“Energy Commission”) is considering proposed grant Agreement EPC-20-008, with Antelope Valley Water Storage, LLC, for a \$6,406,950 grant to design and construct the facilities necessary for the Aquifer Pumped Hydro project; and

WHEREAS, the Energy Commission has reviewed the 2006 Environmental Impact Report, 2018 Addendum to the 2006 Environmental Impact Report, and various Kern County and Rosamond Community Services District documents providing land use entitlements and related approvals for the Willow Springs Water Bank Project and establishing mitigation measures and conditions for its development and operation, which include facilities that would be used for the Aquifer Pumped Hydro project;

WHEREAS, the Energy Commission has considered the proposed design, facilities, construction, and operation of the Aquifer Pumped Hydro project and associated research, with regard to environmental impacts;

WHEREAS, the Energy Commission has used its own independent judgment to consider the potential environmental impacts of grant Agreement EPC-20-008 and the Aquifer Pumped Hydro project;

THEREFORE BE IT RESOLVED, that the Energy Commission finds, on the basis of the entire record before it that, with the implementation of the mitigation measures and conditions of approval previously determined, the proposed Aquifer Pumped Hydro project presents no new significant or substantially more severe environmental impacts beyond those already considered.

BE IT FURTHER RESOLVED, that the Energy Commission finds that none of the circumstances contained in the California Code of Regulations, title 14, section 15162 are present, so that no subsequent or supplemental environmental review is required; and

BE IT FURTHER RESOLVED, that the Energy Commission approves Agreement EPC-20-008 with Antelope Valley Water Storage, LLC for \$6,406,950; and

BE IT FURTHER RESOLVED, that the Executive Director or his/her designee shall execute the same on behalf of the Energy Commission.

CERTIFICATION

The undersigned Secretariat to the Commission does hereby certify that the foregoing is a full, true, and correct copy of a Resolution duly and regularly adopted at a meeting of the California Energy Commission.

AYE: [List Commissioners]

NAY: [List Commissioners]

ABSENT: [List Commissioners]

ABSTAIN: [List Commissioners]

Cody Goldthrite
Secretariat