California WATER COMMISSION

Water Storage Investment Program Concept Paper Form

Please complete the questions below and return your completed concept paper by email to cwc@water.ca.gov by 5:00 p.m. on March 31, 2016. Completed concept papers should not exceed four pages.

Contact Information

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Agency/Organization Name: El Dorado Irrigation District and El Dorado County Water Agency	
Agency Type (select one):	☒ Public Agency ☐ Nonprofit Organization ☐ Public Utility ☐ Tribe ☐ Mutual Water Company ☐ Local Joint Powers Authority ☐ Other:

Project Information

Project Name: Alder Reservoir	
Project Type:	☐ CALFED Surface Storage ☐ Groundwater Storage ☐ Groundwater Contamination Prevention or Remediation ☐ Conjunctive Use ☐ Reservoir Reoperation ☒ Local Surface Storage ☒ Regional Surface Storage ☐Other:
Estimated Project Cost: $909,000,000	
Estimated WSIP Funding Request: $450,000,000	

See attached

Per Water Code section 79753, the Commission may only fund the public benefits of water storage projects. Further, ecosystem improvements must make up 50% of the funded public benefits (Water Code section 79756(b)). What public benefits does your project provide? (select all that apply):

☒ Ecosystem Improvements ☒ Water Quality Improvements ☒ Flood Control
☒ Emergency Response ☒ Recreation

Please describe the magnitude of the public benefits and how the project will be operated to provide the public benefits:

See attached

Water Code section 79752 requires that funded projects provide measurable improvements to the Delta ecosystem or to the tributaries of the Delta. Please describe how your project provides ecosystem improvements in the Delta or tributaries to the Delta:

See attached

Water Code sections 79755 and 79757 require the Commission to make a finding that a project will advance the long-term objectives of restoring ecological health and improving water management for beneficial uses in the Delta prior to allocating funding for a project. Please describe how your project could help advance the long-term objectives of restoring ecological health and improving water management for beneficial uses in the Delta:

See attached

Please describe any other benefits provided by your project, such as water supply reliability benefits, and the potential beneficiaries:

See attached

Alder Reservoir Concept

Background

Alder Creek Dam and Reservoir is located in the headwater catchment of Alder Creek, a tributary of the South Fork American River (SOFAR), 25 miles east of Placerville in El Dorado County, California at an elevation of 5,500 feet. Several Alder Creek Reservoir concepts have been studied over the years, the first dating back to a 1916 U.S. Bureau of Reclamation (Reclamation) report. Alder Reservoir also appears in Pacific Gas & Electric Company's original 1922 Federal Energy Regulatory Commission (FERC) license for Project 184. The project began to take shape in the 1970's as a principal storage feature of the South Fork American River (SOFAR) project. When the SOFAR Management Authority was unable to obtain financing to construct the project, several smaller versions of the Alder Creek Reservoir were considered. In 2004 the 108th Congress passed H.R. 3597, which authorized the Secretary of the Interior to conduct a feasibility study for construction of a water storage project on Alder Creek. Currently, Alder Reservoir is included in Reclamation's Sacramento-San Joaquin River Basin Study as a potential climate change adaptation measure. A wide range of Alder Reservoir scenarios have been studied over the last several decades: a 32,000 acre-foot (AF) water supply reservoir with a 10MW powerhouse and power generation of up to 56,000 MWh annually; a 60,000 AF water supply and seasonal pumped storage reservoir with a 14 MW powerhouse and power generation up to 81,000 MWh annually; and a 175,000 AF reservoir with 110 MW capacity at 3 powerhouses and power generation up to 470,000 MWh annually. This "Large Alder" project, with its potential to provide the greatest public benefit, is the focus of this concept paper.

Project Description

Water storage where runoff is first generated at higher elevations best captures the natural hydrology of California and ensures public trust water resources are put to maximum beneficial use. Conversely, reservoirs at lower elevations such as in the Central Valley, while still providing numerous public benefits, cannot offer the same dynamic range of benefits as reservoirs located at higher elevations. At higher elevations, water storage benefits include: use for renewable hydroelectric power generation; flood protection; cold-water pool conservation in the downstream Central Valley Project (CVP) and State Water Project (SWP) reservoirs and facilities; specialized recreational activities such as whitewater boating; local and regional water supply, directly and via transfer or exchange; local in-stream flow and aquatic habitat enhancement; and Delta water quality flow augmentation. As source area watersheds, water quality is typically the best of any storage reservoir alternative because of limited upstream runoff to dilute or otherwise contaminate inflow to the reservoir. Furthermore, rather than flowing as a flood wave gaining turbidity before entering a downstream reservoir, such as experienced at Folsom Reservoir, water is captured virtually pristine near its source.

The Alder Reservoir project, shown on Attachment 1, would divert water from the South Fork American and Silver Fork to Alder Reservoir through approximately 6.6 miles of pipelines and 8.8 miles of tunnels. In an average water year these diversions would total about 180,000 AF. At Alder Reservoir, this water, along with local Alder Creek runoff (23,480 AF per year on average), would be stored and then released as required for renewable energy generation, to meet water supply demands, and provide environmental flows. These releases would be conveyed through three powerhouses arranged in series, through approximately 18 miles of pipelines, tunnels and penstocks, with a total elevation drop of approximately 3,600 feet, back into the American River at the current site of the El Dorado Hydroelectric Project (FERC Project No. 184) El Dorado Powerhouse. To improve local supply reliability in dry years, water could be diverted from the project upstream of the El Dorado Powerhouse into Jenkinson Lake and/or at El Dorado Forebay and used to meet consumptive and irrigation demands. The project would also allow for coordinated operations with Reclamation for releases at Folsom Reservoir, similar to other large reservoirs in the American River watershed, for enhanced water supply reliability, temperature management for anadromous fish in the Lower American River and for broader CVP/SWP benefits including improvement to ecosystems, water quality, flood control, emergency response and recreation. The cost of the Alder Dam and Reservoir Project was estimated at $250 million in 1978 (ENR CCI=2776). Adjusted to today's dollars, project costs are estimated to be about $909 million (ENR CCI=10092).

Public Benefits

Folsom Dam, a CVP facility, provides flood control, fish and wildlife protection, recreation, protection of the Delta from intrusion of saline ocean water, irrigation and municipal and industrial water supplies and hydroelectric power generation. Folsom Reservoir has a capacity of 977,000 AF. The total upstream reservoir storage above Folsom Lake is approximately 820,000 AF for a total of 1.8 million AF in the watershed. Alder Reservoir storage is approximately 18% the size of Folsom Reservoir and represents a 10% increase in storage in the American River watershed above Folsom Reservoir. A 10% increase in storage in the basin will provide measurable benefit and contribute to greater operational flexibility at Folsom Reservoir and in the broader CVP/SWP to meet CVP water quality and Bay-Delta Water Quality Control Plan requirements, and provide other benefits.

Ecosystem and Water Quality Improvements

Locally, Alder Reservoir would provide a new and unique opportunity to enrich the habitat quality of small order tributaries like Alder Creek and lower river reaches of the South Fork American River that traditionally do not benefit from an upstream supply source for such functions. Areas along these reaches could also be assessed for potential improvement and include adjacent wetlands, side and back channels, and hydrologically linked backwater ponds.

Water supply developed at Alder Reservoir, currently lost through flood-control operations at Folsom Reservoir, would provide significant downstream benefits. It could contribute to the water supply necessary to support the CVP/SWP Long-Term Operation (LTO) related flow augmentation for: 1) temperature management in the Lower American River for fall-run Chinook salmon (a federal species of concern) and steelhead trout (federally listed as a threatened species under ESA); 2) Delta salinity standards by maintaining Delta outflow, X2, Rio Vista flows, chloride minimums and other Bay-Delta Water Quality Standards; 3) CVP Improvement Act B2 water deliveries for fisheries management; and 4) Cosumnes River flow augmentation for fisheries management and groundwater recharge, via Jenkinson Lake. Each of these beneficial uses is in critical need of additional water supply.

Across the CVP/SWP, Folsom Reservoir has long served as a first-responder to late-season imbalanced conditions in the Delta. The travel distance for managed releases from Folsom Reservoir is the shortest of the major CVP/SWP reservoirs. A new Alder Reservoir upstream would provide Folsom Reservoir with greater flexibility to make contributions to meet these periodic needs without compromising existing water supply obligations to local and regional contractors. Proximity to the areas of need is an important evaluation criterion as a new reservoir in the more distant reaches of the State may not possess the same real-time benefits for in-Delta needs as a closer facility.

Flood Control

Located high in the major tributary watersheds of the CVP/SWP, a significant benefit of the Alder Reservoir project is flood control, both locally and regionally. A storage impoundment in the upper American River watershed would provide enduring benefits to the entire reach of the South Fork American River from Kyburz to Folsom Reservoir and below. The devastating effects of the flood along the South Fork American River in 1997, where levees are not practicable, could have been significantly reduced with a new 175,000 AF reservoir upstream. A new 175,000 AF capacity impoundment upstream of Folsom Reservoir would also provide measurable benefits to existing flood control operations for protection of the Sacramento region. The current flood control operational criteria for Folsom Reservoir consider empty reservoir space in three upstream reservoirs and treat that space as if it were available in Folsom Reservoir. Alder Reservoir could likewise reduce the Folsom Reservoir flood space required to protect the Sacramento region, providing increased opportunity for Folsom Reservoir to store additional water to meet CVP contractor and environmental flow demands.

Emergency Response

Operation of Alder Reservoir could provide further public benefit including an amount of water storage or supply dedicated for emergency response purposes that are outside normal facility operations. This can include emergency supply for downstream customers for human health and safety purposes during declared emergencies and flows for dilution and salinity repulsion following a natural disaster or an act of terrorism.

Recreation/Socioeconomic

Located in the Eldorado National Forest, high within the Sierra Nevada Mountain Range, Alder Reservoir would provide a wide range of recreational and associated economic benefits. Benefitting from the unspoiled waters and

scenery of the Sierra Nevada, camping, fishing, swimming, boating, recreational water craft, hiking, and picnicking would be available. Tourism would be actively promoted with the California Department of Parks and Recreation, El Dorado County, local chambers of commerce, and individual small business entrepreneurs providing significant new recreational opportunities for those in the Sacramento region and beyond. Spin-off businesses could assist the local economy through park concessions, bait and tackle shops, boat rentals, outdoor equipment, campgrounds, grocery stores, restaurants, gas stations, hotels, etc. Winter activities at the reservoir could include cross-country skiing, ice fishing, and snowmobiling and could enhance U.S. Highway 50's status as an alternative to the Interstate 80 corridor for winter recreation. This would represent a significant diversification and employment benefit to small communities in the area, like Kyburz and Pollock Pines.

Long-Term Delta Ecological Health/Water Management Objectives

New water supply yield resulting from Alder Reservoir would advance the long-term Delta objectives of restoring ecological health and improved water management for beneficial uses in the Delta. A new upstream reservoir, by capturing water typically lost through flood evacuation, provides a source of water that could be managed for downstream environmental flow enhancement and water quality protection in the Delta. For example, it could contribute to the water supply necessary to support LTO-related flow augmentation to maintain Delta outflow, X2 (salinity line), Rio Vista flows, chloride minimums and other Bay-Delta Water Quality Standards.

Other Benefits and Beneficiaries

Water Supply

Alder water supply would benefit water needs locally, regionally, and statewide. Locally, water supply reliability in dry and critically dry years would be improved with Alder Reservoir storage which is located above the El Dorado Irrigation District's points of water diversion. Regionally, lower American River water purveyors with current diversion limitations in dry years would benefit from: Folsom Reservoir cold-water pool augmentation provided by Alder Reservoir for fisheries temperature management; and additional supply available for transfer or exchange, including groundwater banking in the Sacramento region. Statewide, additional storage provided by Alder Reservoir upstream of Folsom Reservoir could have a positive effect on CVP/SWP inter-annual yield determinations and increase system yield. A system with enhanced storage facilities would have the potential to retain greater carryover from year to year than the current system of reservoirs.

Renewable Energy Production

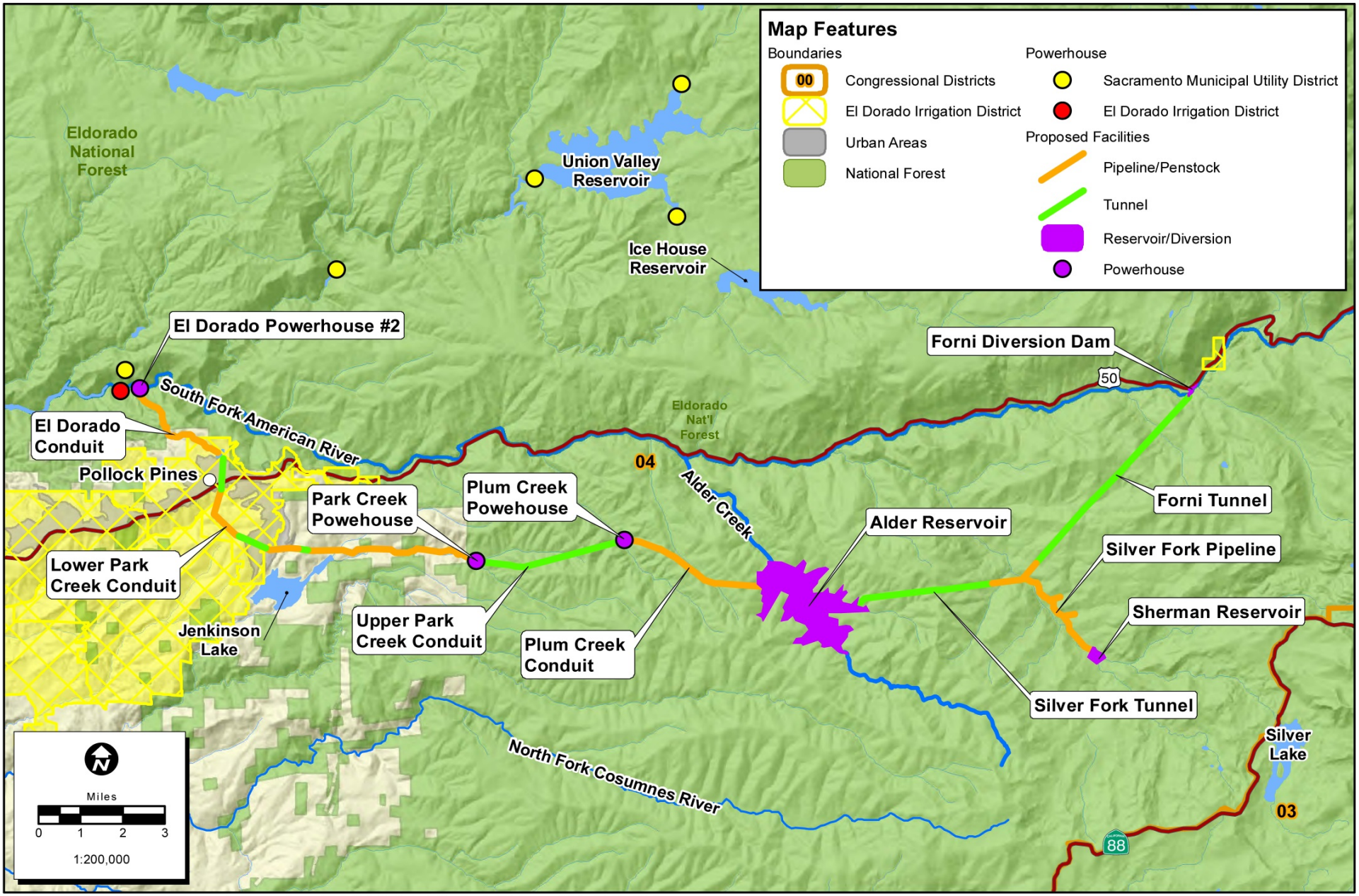
At a 5,500 foot elevation, Alder Reservoir conserves potential energy for power generation at new and existing cascading hydroelectric powerhouses. The Alder Reservoir project includes 110 MW of new hydroelectric generation capacity at three powerhouses and power generation up to 470,000 MWh annually. Hydroelectric releases from Alder Reservoir will also become available for power generation at three additional powerhouses located downstream on the American River, including Folsom Reservoir. Compared to other renewable energy sources such as wind, solar, tidal, and geothermal, only hydroelectric power generation provides the flexibility to balance the power grid by ramping up generation during peak power demand periods.

Minimization of Facility Footprint and Evaporation

A deep confined reservoir in a mountainous setting, such as Alder Reservoir, has a much smaller footprint than a shallow, broad, extensive facility in the Central Valley or in the foothills. The overall extent of the impoundment structures would be much less than a facility situated in more gentle terrain or that of the Delta, which would require a 360-degree impoundment. Furthermore, a deeply confined reservoir would result in less converted acreage (less clearing and land conversion) than its foothill or valley floor counterparts. Evaporative losses in much of California are very high. As future air temperatures continue to increase, evaporation rates will also rise. A deep reservoir has a smaller evaporation/volume ratio than a shallow reservoir resulting in significantly less evaporative water loss. Evaporation loss is further minimized by cooler temperatures and high surrounding relief that shortens daily sun exposure.

Institutional Simplicity

As a facility unattached and unassociated with the other CALFED Bay-Delta Program reservoir options, Alder Reservoir would not be encumbered by operational integration with existing CVP/SWP, except as it relates to potential coordinated operations. Separate and independent from the CVP/SWP system, its regulatory approvals, administrative oversight, contracting, and public/stakeholder input would be controlled by a single local agency.



Location: N:\2012\2012-091 SOFAR Project Benefits Map Development\MAPS\Hydro\AlderDam\Alder_Inset1_AlderDam.mxd *(eck, 10/25/2012)* - jswager

Attachment 1 - Alder Dam and Reservoir Project

03/31/2016 California Water Commission

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS