

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

Contact Name: Jim Watson
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Phone Number: 530.410.8250
Agency/Organization Name: Sites Project Authority
Agency Type (select one): <input type="checkbox"/> Public Agency <input type="checkbox"/> Nonprofit Organization <input type="checkbox"/> Public Utility <input type="checkbox"/> Tribe <input type="checkbox"/> Mutual Water Company <input checked="" type="checkbox"/> Local Joint Powers Authority <input type="checkbox"/> Other:

Project Information

Project Name: Sites Reservoir
Project Type: <input checked="" type="checkbox"/> CALFED Surface Storage <input type="checkbox"/> Groundwater Storage <input type="checkbox"/> Groundwater Contamination Prevention or Remediation <input type="checkbox"/> Conjunctive Use <input type="checkbox"/> Reservoir Reoperation <input type="checkbox"/> Local Surface Storage <input type="checkbox"/> Regional Surface Storage <input type="checkbox"/> Other:
Estimated Project Cost: \$4.4 Bn (<i>escalated cost for Alternative C</i>)
Estimated WSIP Funding Request: \$2.2 Bn (50%)
Please describe your project, including location, water source, facilities, and operations: <u>Location:</u> Sites Reservoir would be a new offstream reservoir located 8 miles west of Maxwell, CA. <u>Water Source:</u> During times when excess flows are available in the Sacramento River for diversion at the intakes for both the existing Tehama-Colusa canal (Red Bluff) and Glenn-Colusa canal (Hamilton City) combined with a new intake/outlet (Delevan), located west of the Moulton Weir. The diversion rate is limited primarily due to the capacity of these conveyance systems while continuing to ensure compliance with existing water rights and applicable laws and statutes such as, but not limited to, water quality, ESA, and CESA. <u>Facilities:</u> (see last page for map) <ul style="list-style-type: none"> • 1,800,000 acre-foot Sites Reservoir will consist of two main dams (Golden Gate and Sites), each located on an ephemeral creek, plus nine saddle dams. A conveyance tunnel will connect Sites Reservoir to the planned pumping/generating plant at Holthouse Reservoir. • 6,500 acre-foot Holthouse Reservoir. When filling Sites Reservoir, it will regulate flows from both the existing Tehama-Colusa Canal and new Delevan Intake/Outlet as well as to combine flows from the existing Glenn-Colusa Canal. During releases from Sites Reservoir, flows will be redistributed to both the Tehama-Colusa and Glenn-Colusa canals and to the new Delevan Intake/Outlet.

- A pumping/generating plant at Holthouse Reservoir will operate seasonally by pumping when water is available for storage into Sites reservoir and electric power generation as water is released to meet water demands.
- TCCA Intake: Two additional pumps will be added to the existing Tehama-Colusa Canal, behind the existing fish-screened intake. The existing 2,250 acre-foot Funks Reservoir will be expanded to create the 6,500 acre-foot Holthouse Reservoir.
- GCID Intake: The existing Glenn-Colusa Canal with its fish-screened intake will be modified to add a 1,200-acre-foot Terminal Regulating Reservoir. Pumps and a pipeline will interconnect it with Holthouse Reservoir.
- Delevan Intake/Outlet: A new fish-screened intake/outlet structure on the Sacramento River and associated pumping/generating plant that will be connected to Holthouse Reservoir by approximately 17 miles of double-barreled, 12-foot-diameter pipeline.
- Powerlines and substations will separately interconnect the state's electric grid with the pumping/generating plants at Holthouse and at the Delevan Intake/Outlet.
- A dual-lane bridge to restore traffic flow on the existing Sites-Lodoga Road and new, restricted-access, service roads will provide access to maintain and operate project facilities.
- Two new recreation areas (Stone Corral and Peninsula Hills) with an additional boat ramp facility; all of which are accessible from the Sites-Lodoga road.

Water Operations: Sites Reservoir operations will improve the state water system by capturing some of the surplus Sacramento River flows to be put to beneficial uses later in the year and by integrating its operations with the operations of both the existing Central Valley Project and State Water Project; all of which will improve the overall water supply reliability while providing public benefits associated with (a) measurable ecosystem and water quality improvements in the Delta as well as below the rim dams on the Sacramento River, Feather River, and American River; (b) emergency response for dilution and salinity repulsion in the Delta; and (c) flood control benefits in the Sacramento River watershed. Its flexible operations supports the State's co-equal goals policy (water code § 85020) and will enable water to be reprogrammed and/or redirected to respond to future uncertainty.

Specific benefits in all water year types include:

- Improvement to the reliability (i.e. frequency and duration) to achieve the State's ecosystem, water quality, and emergency response benefits to, in turn, measurably improve the associated conditions in the Delta and Sacramento River.
- For anadromous fish survival in the Sacramento Valley, increase the amount of cold water available to improve spawning, egg incubation and juvenile survival rates as well as provide pulse flow conditions to protect out-migrating juveniles.
- Improve flows for Delta fisheries habitat based on the X2 (isohaline) location
- Improve water supply reliability to the areas served by the existing Central Valley Project, State Water Project, and other water rights diversions
- Improve Delta water quality in the summer and fall at municipal and industrial intakes

Additional conjunctive use benefits during non-drought conditions include:

- In the Sacramento Valley, improve groundwater sustainability by (a) supplying water directly for recharge and providing surface water in lieu of groundwater to enhance aquifer recovery and (b) should a local groundwater bank be created, Sites Reservoir has the potential to provide water at rates and times to improve its effectiveness.
- In the south of Delta, provide surface water in lieu of groundwater to enhance aquifer recovery and reduce subsidence rates.

Hydropower Operations: Refer to last section.

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:

Based on current CALSIM modeling results, Sites Reservoir could provide an average long-term annualized available supply of 500 thousand acre-feet (TAF)/year, with up to 50 percent of these releases available for public benefits. Through integrated operations, additional benefits are achieved such as an increase in September end-of-year carryover storage (Sites, Trinity, Shasta, Oroville, and Folsom Lakes) of approximately 1,300 TAF on a long-term annualized basis and approximately 770 TAF during dry- or critical- water year types.

Ecosystem Benefits:

- Shasta and Sacramento River: Improves the reliability of coldwater pool storage in Shasta Lake, resulting in more suitable water temperatures in the Sacramento River. End-of-May and end-of-September storage in critical years would increase by approximately 11 and 18 percent, respectively.

Provides releases from Shasta Dam, Keswick Dam, and Lewiston Dam to maintain daily water temperatures year-round at levels suitable for all species and lifestages of anadromous salmonids with emphasis on months of highest temperatures during critical years. Monthly temperature reductions in critical years of approximately 3.2 percent in the Trinity River and 2.5 percent in the Sacramento River at Bend Bridge are anticipated.

Stabilizes Sacramento River flows between Keswick Dam and Red Bluff to minimize dewatering of fall-run Chinook salmon redds, particularly during fall months. Monthly flows from December through February are improved by up to 20 percent in dry years.

Provides modeled (AQ-01 IOS lifestage model) improvements of a 33.1 percent increase in egg to fry survival with an 8.5 percent increase in the return of female spawners for winter-run Chinook salmon during critical years.

With three fish-screened intakes spaced tens of miles apart, when juvenile salmonids are present at

an intake location, the diversion operations could be adjusted to improve out-migration survival.

- Folsom & American River: Improves the reliability of coldwater pool storage in Folsom Lake, resulting in more suitable water temperatures in the American River for juvenile steelhead and over-summer rearing and fall-run Chinook salmon spawning. End-of-May and end-of-September storage in critical years would increase by approximately 3 and 7 percent, respectively.
- Oroville & Feather River: Improves the reliability of coldwater pool storage in Lake Oroville, resulting in more suitable water temperatures in the lower Feather River for juvenile steelhead and over-summer rearing and fall-run Chinook salmon spawning. End-of-May and end-of-September storage in critical years would increase by approximately 4 and 7 percent, respectively.
- Other: Provides an opportunity for enhanced water supply to federal wildlife refuges and other locations managed for waterfowl along the Pacific flyway.

Water Quality:

- Reduces electrical conductivity (salinity) by 5 to 7 micromhos per centimeter for Delta waterways export area identified on California's 303(d) list. Other 303(d)-listed locations in the Delta would likely benefit as well. Sites Reservoir would provide supplemental Delta outflow during summer and fall months to improve X2. This increases estuarine habitat and improves food availability for anadromous fishes and other species (e.g. delta smelt, longfin smelt, Sacramento splittail, starry flounder, and California bay shrimp). In addition, it is possible to shift the September and October position of X2 during dry and critical years by up to 1 to 2.5 kilometers.
- Potentially reduces mercury during summer/fall for critical years in 303(d)-listed portions of the Sacramento and American Rivers and in the Delta and Delta Waterways. These benefits are expected, but not yet modeled.
- Potentially reduces temperature, dissolved oxygen, nutrients, mercury, and salinity in 303(d)-listed portions of the San Joaquin River watershed, including the Stockton Deepwater Ship Channel and Middle River. These benefits are dependent on operations. Benefits are expected, but not yet modeled.

Flood Control:

- Reduces the potential for flooding in the Funks Creek and Stone Corral Creek watersheds. Approximately 4,600 acres would experience a reduction in flood risk near Maxwell and another 4,000 acres would receive similar benefits in the Colusa Basin.
- Through integrated operations, Sites Reservoir has the potential to help Shasta at times when Shasta inflows encroach into its flood reservation space. Some of these Shasta releases could be diverted into Sites Reservoir for later reuse.

Emergency Response: Provides a potential to dedicate storage for emergency response and through integrated operations could become an additional source of water to today's reliance on Folsom Reservoir to be the first responder to meet short-term in-Delta water quality requirements on a real-time basis. Sites Reservoir is well positioned to provide these benefits; however, no specific quantity has been dedicated at this time.

Recreation: Sets aside approximately 600 acres for recreation adjacent to the new reservoir, including campsites, hiking, wildlife watching, and boat launches. Lands will be managed for conservation. One boat ramp outside of the designated recreation areas is also planned.

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:

As described in the response to the prior section and assuming 50% of the average long-term annualized available supply of 500 thousand acre-feet (TAF)/year combined with integrated operations that create additional benefits at Shasta, Oroville, and Folsom reservoirs, which are then made available for public benefits, Sites Reservoir would provide improved temperature conditions and stabilized flows in the Sacramento River to just below Shasta Dam with similar improvements in the lower Feather River and lower American River watersheds. Sites Reservoir would also provide for improved salinity management in the Delta (benefiting delta smelt, longfin smelt, and other species) and increased Delta outflow.

Based on the draft Water Storage Investment Program evaluation priorities identified by CDFW in Section 6005 (a), the Sites Reservoir Project contributes to the following:

- (1)(A) Provide cold water at times and locations to increase survival of salmon eggs and fry.
- (1)(B) Provide flows to improve habitat conditions for in-river rearing and downstream migration of juvenile salmonids.
- (1)(C) Maintain flows and appropriate ramping rates at times and locations that will minimize dewatering of salmonid redds and prevent stranding of juvenile salmonids in side channel habitat.
- (1)(D) Improve ecosystem water quality.
- (1)(E) Provide flows that increase dissolved oxygen and lower water temperatures to support anadromous fish passage.
- (1)(G) Increase Delta outflow to provide low salinity habitat for Delta smelt, longfin smelt, and other estuarine fishes in the Delta, Suisun Bay, and Suisun Marsh.
- (1)(H) Maintain or restore groundwater and surface water interconnection to support instream benefits and groundwater-dependent systems.
- (2)(A) Enhance flow regimes or groundwater conditions to improve the quantity and quality of riparian and floodplain habitats for aquatic and terrestrial species (e.g., Yolo Bypass flows).
- (2)(B) Enhance the frequency, magnitude, and duration of floodplain inundation to enhance primary and secondary productivity and growth and the survival of fish.
Additionally, in the future, should modification to the Fremont Weir and other structures occur (by others), Sites Reservoir could be operated to support such efforts.
- (2)(F) Provide water to enhance seasonal wetlands, permanent wetlands, and riparian habitat for aquatic and terrestrial species on State and Federal wildlife refuges and on other public and private lands.
- (2)(H) Enhance habitat for native species that have recreational uses (e.g., waterfowl).

Based on the draft Water Storage Investment Program evaluation priorities identified by the State Water Resources Control Board in Section 6005(b), the Sites Reservoir Project contributes to the following:

- (4) Potential reductions in mercury for 303(d) listed portions of the Sacramento and American Rivers and in the Delta and Delta Waterways.
- (5) Reduces salinity conditions for Delta waterways export area identified on California's 303(d) list.

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:

Dedicating water stored in Sites Reservoir for managing salinity concentrations will help restore ecological health in the Delta. Improved conditions for anadromous fish in the upstream tributaries are also expected to increase the populations of key species migrating through the Delta and support actions (by others) in the adjacent areas of Suisun Marsh and/or Yolo Bypass, which in turn could provide additional ecological benefits to the Delta.

Based on the draft Water Storage Investment Program evaluation priorities identified by CDFW in Section 6005 (a), the Sites Reservoir Project contributes to the following:

- (1)(D) Improve ecosystem water quality.
- (1)(G) Increase Delta outflow to provide low salinity habitat for Delta smelt, longfin smelt, and other estuarine fishes in the Delta, Suisun Bay, and Suisun Marsh.
- (2)(A) Enhance flow regimes or groundwater conditions to improve the quantity and quality of riparian and floodplain habitats for aquatic and terrestrial species (e.g., Yolo Bypass flows).
- (2)(B) Enhance the frequency, magnitude, and duration of floodplain inundation to enhance primary and secondary productivity and growth and the survival of fish.

Additionally, in the future, should modification to the Fremont Weir and other structures occur (by others), Sites Reservoir could be operated to support such efforts.
- (2)(F) Provide water to enhance seasonal wetlands, permanent wetlands, and riparian habitat for aquatic and terrestrial species on State and Federal wildlife refuges and on other public and private lands.

Based on the draft Water Storage Investment Program evaluation priorities identified by the State Water Resources Control Board in Section 6005(b), the Sites Reservoir Project contributes to the following:

- (4) Potential reductions in mercury for 303(d) listed portions of the Sacramento and American Rivers and in the Delta and Delta Waterways.
- (5) Reduces salinity conditions for Delta waterways export area identified on California's 303(d) list.

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

Water Supply Reliability: Construction of Sites Reservoir and its integrated operations would significantly improve the flexibility and water supply reliability for the State's water system by providing both an average annualized available supply of 500 TAF/year and associated increases in September end-of-year carryover storage (Sites, Trinity, Shasta, Oroville, and Folsom Lakes) by approximately 1,300 TAF on a long-term annualized basis. At present it is assumed that 50% of these improvements would be made available to improve water supply reliability to (a) water users in the Sacramento Valley, some of whom may not also be contractors to either the Central Valle Project or State Water Project, and (b) water agencies outside of the Sacramento Valley who are contractors to either the Central Valley Project or State Water Project and/or have access to receive water from either of these projects.

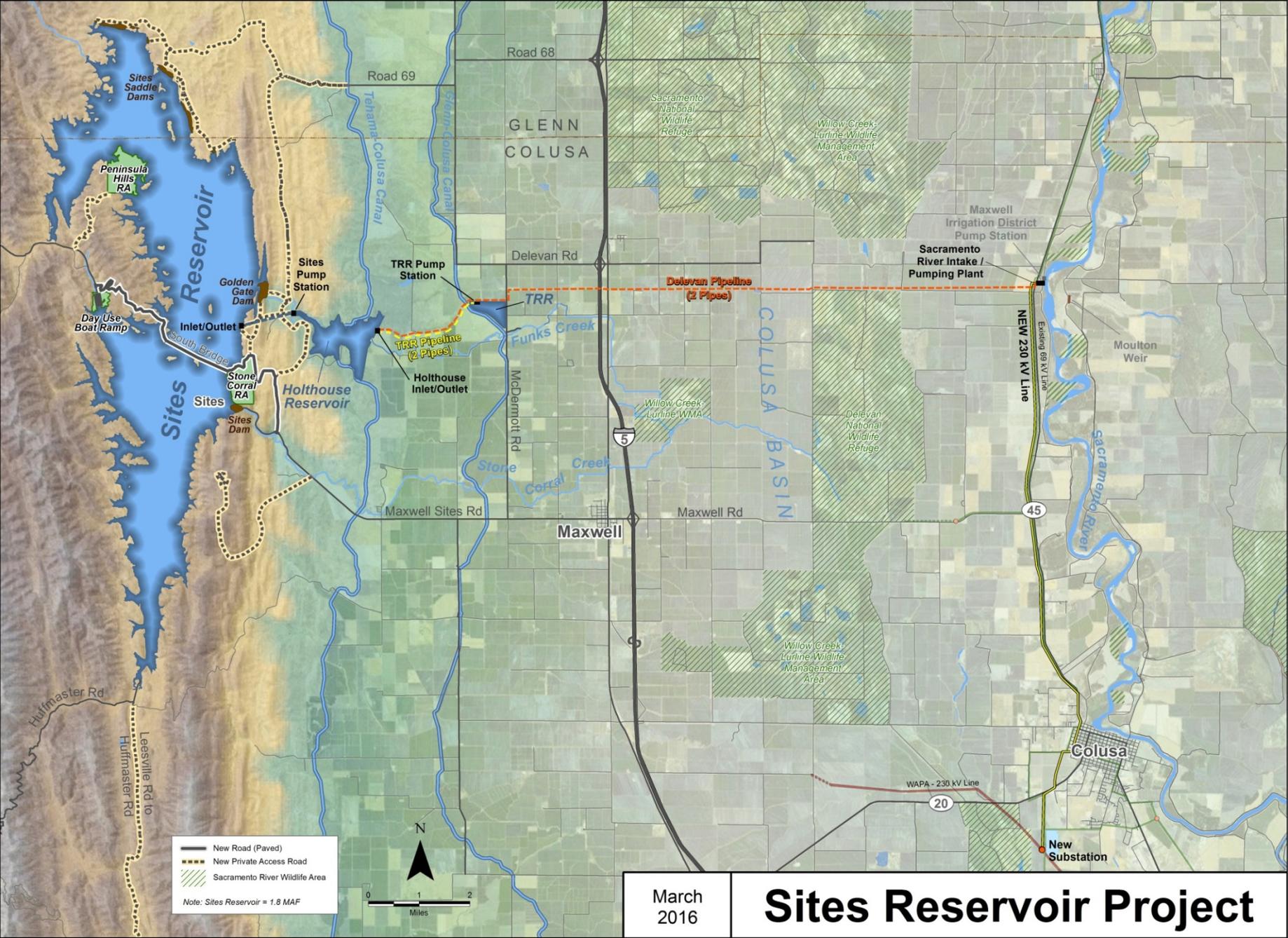
Current planning studies within the Sacramento Valley, include an average water supply increase of

approximately 130 TAF/year to be provided to local water agencies, primarily in Glenn and Colusa Counties. Other potential beneficiaries include communities bordering the lower Sacramento and American River watersheds, the Bay Area, and those exporting water from the Delta and through exchanges, potentially water could be provided to communities below Shasta and above Glenn County.

Water Quality: The Sites Reservoir Project can contribute to provide water for basic human needs, such as drinking, cooking, and bathing, in disadvantaged or similarly situated communities where those needs are not being met, based on the draft Water Storage Investment Program evaluation priorities identified by the State Water Resources Control Board in Section 6005(b)(9).

Hydropower: The environmental benefits from hydroelectric power primarily arise from the replacement or offset of fossil-fuel generation and the associated greenhouse gas emissions and particulates. Sites Reservoir operations could be used to support the following two types of hydropower generation:

- Seasonal hydropower generation as water is released back for beneficial uses to offset the electricity used to pump water into Sites Reservoir. Pumping is expected to coincide with the Pacific Northwest's peak hydropower production and generation is expected to occur when northern California's electricity demand is higher.
- Daily pump-back hydropower operations could be integrated with other renewable energy sources such as wind and solar to extend the duration that renewable energy is used, which supports the state's energy policy and could provide ancillary services to improve reliability of the State's electric transmission system.



Sites Reservoir Project