#### STAFF REPORT

То:	Coastside County Water District Board of Directors			
From:	Mary Rogren, General Manager			
Agenda:	June 11, 2024			
Report Date:	June 7, 2024			
Agenda Title:	Pilarcitos Dam and Reservoir Improvements Project: Project Status – Presentation by San Francisco Public Utilities Commission			

#### <u>Recommendation/Motion:</u> Information Only.

#### **Background:**

Pilarcitos Reservoir is a primary SFPUC water source for the District and has been since 1949. The Reservoir was originally built in 1866, and the California Division of Safety of Dams (DSOD) has been in recent communications with SFPUC about the need for upgrades to the dam to improve its stability.

Steve Ritchie, Assistant General Manager, Water, SFPUC and Alison Kastama, BAWSCA and Wholesale Customer Liaison, SFPUC will join the Board Meeting on June 11 in person to provide a Project Status Update of the Pilarcitos Dam and Reservoir Improvements Project.

Mr. Ritchie's focus will primarily be on the long-term options for Pilarcitos Reservoir. In the short-term, and in coordination with DSOD, SFPUC has lowered the reservoir to below the spillway this month. SFPUC plans to replace the siphons that were destroyed in the January 2023 storms in September 2024, but in the meantime, the District will need to utilize its Crystal Springs SFPUC source.



#### Pilarcitos Dam and Reservoir Improvements Project

# **Project Status**

Coastside County Water District Board Meeting

June 11, 2024



## **Pilarcitos Reservoir**

- Spring Valley Water Company facility constructed in 1866
- Productive watershed supplying water to Coastside CWD and Crystal Springs Reservoir
- Located in close proximity to San Andreas Fault
- Dam survived 1906 and 1989 earthquakes
- CA Division of Safety of Dams has concerns about the stability of the dam and ancillary facilities.





# **Facilities Overview**



# System Map – Pilarcitos Reservoir/Lake



### System Map – Stone Dam





#### **Existing Facilities**







### **Pilarcitos Dam History**





- Condition and Needs Assessment, completed in Dec 2021
- Alternatives Analyses and Evaluation, completed in Dec 2023
- Conceptual Engineering Report, to be completed in 2024
- Pilarcitos Watershed Facilities Improvement Project
- Division of Safety of Dam (DSOD) Coordination
- Coastside County Water District (CCWD) Coordination
- National Marine Fisheries Service (NMFS) Coordination





# **Project Overview**



- CCWD Service Supply
- Diversions into SFPUC Regional Water System at Lower Crystal Springs Reservoir (LCSR)
- Safety Requirements: DSOD
- Environmental Stream Flows: NMFS



- ~25 years data 1998 to 2022
- SFPUC meets ~70% of CCWD's total water needs via gravity and pumping
- % of total CCWD Target Met at CCWD turnout via gravity
  - $\circ$  All years 45%
  - $\circ$  Dry years 35%
  - $\circ$  Wet years 56%



#### Pilarcitos Facility – Operational Objectives and Facility Performance

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Facility	Operational Need	Facility Performance (Condition Assessment Findings)		
Dam	Maintain Existing Total Storage	Existing Total Storage Satisfactory		
Spillway	Delivering water to CCWD	Unsatisfactory		
	Facilitate Environmental Stream flows into Pilarcitos Creek	Unsatisfactory		
	Maintain Existing Operable Storage Capacity	Satisfactory		
Outlet Works	Diversion to Crystal Springs Dam	Satisfactory		
	Minimize unnecessary spills into Pilarcitos Creek	Satisfactory		



# **DSOD Requirements and Performance**

- Embankment Requirement Safe and Reliable Performance under static, and other extreme (seismic and PMF) loading conditions
  - Embankment does not satisfy seismic stability requirements
- Outlet Works Requirement Safe and Reliable Performance under static and seismic loading condition and reservoir draw down
  - Forebay Tower can draw down reservoir in accordance with requirements but is not safe and reliable under seismic loading
- Spillway Requirement Safe and Reliable Performance under static and other extreme (seismic and PMF) loading conditions; Safely Pass PMF flows without dam overtopping and minimum residual freeboard of 1.5 feet without excessive erosion downstream
  - Inadequate capacity to pass PMF flows and inadequate seismic resilience



#### Embankment Section Under Seismic Loading





Pilarcitos Outlet Works – Tunnel No. 1



View of the Pilarcitos Tunnel No. 1 looking upstream from the outlet portal. Note the efflorescence on the walls

# Crack along the left wall of the tunnel with a ½-inch offset

Crack C5

(Note the offset of the tunnel wall.)



### **Pilarcitos Spillway**



View of the bathtub weir intake structure from the boat ramp



Concrete spalls on the right concrete wall of the spillway chute.



# **Alternatives Overview**



# **Remedial Alternatives Identification**





- Environmental Effects and Permitting Challenges
- Operations and Maintenance
- Water Supply and Yield
- Constructability
- Project Costs
- DSOD Acceptability



Alternative ID	Category	Alternative Description
1	New Facility	New Dam, New Spillway, New Outlet Works through Dam Abutment, and Retrofit of Forebay and Tunnel No. 1
2	Retrofit Facility	Embankment Retrofit, New Auxiliary Spillway, Retrofit of Spillway, New Low- Level Outlet Pipe, and Retrofit of Forebay and Tunnel No. 1
3	Retrofit Facility	Embankment Retrofit with Overtopping Channel, Enlargement and Retrofit of Spillway, New Lake Tap, and New Outlet Works and Tunnel by Forebay
4	New Smaller Diversion Facility	Remove Dam and Appurtenant Structures and Construct New Diversion Dam, Spillway, Outlet Works, and Diversion Tunnel
5	Reservoir Level Restriction with Improvements to Spillway and Outlet works	Permanent Reservoir Restriction, New Enlarged Spillway, New Lake Tap, and Retrofit of Forebay and Tunnel No. 1



Alternative 1: New Dam, New Spillway, New Outlet Works through Dam Abutment, and Retrofit of Forebay and Tunnel No.1

- Remove existing embankment
- Excavate to competent foundation
- Construct New embankment
- Increased embankment height for additional freeboard (no increase in reservoir storage)





Alternative 5: Permanent Reservoir Restriction, Spillway Enlargement, New Lake Tap, and Retrofit of Forebay and Tunnel No. 1

- No updates to the existing embankment
- Permanent reservoir restriction (lower water level by ~15'- 20')
- New Enlarged Spillway with lowered crest El. (696.5' to 681.5' or 676.5')
- New Horizontal Directional Drilled (HDD) Lake Tap for operational releases (Inv. El. 650')
  - Reduced reservoir storage but can provide existing operable storage due to Lake Tap





#### Comparison between Alts 1 & 5 and Historical Supply Data

	Historical Data <sup>(1)</sup> and Modeling Results <sup>(2)</sup>			
System Performance at CCWD turnout via gravity % of Total CCWD Target Met	Supply through all years with available data	Supply in the Dry Years (2001- 2002, 2004, 2007- 2008, 2012-2016, 2020-2022)	Supply in the Wet Year	
% of total CCWD Target Met (1998 – 2022) (1)	45%	35%	56%	
Alt 1 – Dam Replacement (2)	84.3%	76.6%	92.7%	
Alt 5 – Permanent Reservoir Restriction (2)	67.2%	53.4%	82.2%	

Note: Modeling results for Alt 1 and 5 assume current 2024 environmental instream flows.



### **Alternatives Evaluation Findings**

Evaluation Criteria	[1] New Dam, New Spillway, New Low- Level Outlet, and Retrofit of Forebay and Tunnel No. 1	[2] Embankment Retrofit, New Auxiliary Spillway, New Low-Level Outlet, and Retrofit of Forebay and Tunnel No. 1	[3] Embankment Retrofit with Overtopping Channel, Enlargement and Retrofit of Spillway, New Lake Tap, and New Outlet Works and Tunnel	[4] Remove Dam and Appurtenant Structures and Construct New Diversion Dam, Spillway, Outlet Works, and Diversion Tunnel	[5] Permanent Reservoir Restriction, Spillway Enlargement, New Lake Tap, and Retrofit of Forebay and Tunnel No. 1
Environmental Effects & Permitting Challenges	High	Higher	Higher	Highest	Low
Operations & Maintenance	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Water Supply	Exceeds Existing Supply	Exceeds Existing Supply	Exceeds Existing Supply	Lower than Existing Supply	Exceeds Existing Supply
Constructability	Easy	Difficult	Difficult	Easy	Easiest
Project Costs	High	Higher	Highest	Low	Lowest
DSOD Acceptability	High	Medium	Low	High	Low
Total Score	21.17	19.00	13.33	16.50	21.00
Ranking	1	2	4	3	1



# **Two Alternatives Summary**

- Alternative 5 Permanent Reservoir Restriction, Spillway Enlargement, New Lake Tap, and Retrofit of Forebay and Tunnel No. 1
  - No new dam but with spillway enlargement and new lake tap
  - Permanent restriction in reservoir elevation, but maintains existing operable storage/yield to meet historic CCWD supply needs
  - o Some uncertainty of DSOD approval
  - \$63M Total Project Costs, least expensive
- Alternative 1 New Dam, New Spillway, New Low-Level Outlet, and Retrofit of Forebay and Tunnel No. 1
  - New dam facilities with Forebay and Tunnel 1 to be retrofitted.
  - Increased Water Supply Potential (Operable Storage/Yield)
  - Potential for dam raise in the future
  - \$273M Total Project Costs, second most expensive
- Pilarcitos Watershed Facilities Improvements Project will go together with either alternative



- Reduce operating level by 10 feet effective June 1
- Reduce operating level another 5 feet by
- Install siphon structures by September 30
- Anticipate DSOD approval and downgrading of dam status from Satisfactory to a lower level





- Complete CER by the end of 2024
- Start design in 2025
- Continue to work on the Pilarcitos Watershed Facilities Improvements Project
- Continue coordination with DSOD
- CCWD Coordination
- NMFS Coordination
- Interim operations will continue until project(s) complete



# **Questions?**

