THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Board Action

- **Board of Directors**
  Engineering, Operations, and Technology Committee

5/14/2024 Board Meeting

7-2

Subject

Amend the Capital Investment Plan for fiscal years 2022/23 and 2023/2024 to include upgrades to the flocculation system at the Joseph Jensen Water Treatment Plant; the General Manager has determined that the proposed action is exempt or otherwise not subject to CEQA

Executive Summary

California experienced multiple atmospheric rivers in late 2022 and early 2023 and one of the wettest three-week periods on record in January 2023, which caused a mudslide into Castaic Lake and impacted the turbidity levels of water entering the Joseph Jensen Water Treatment Plant (Jensen plant). The sudden increase in turbidity levels led to damage to critical components of the flocculation equipment in several basins as the equipment drive assemblies were forced to operate outside of their normal ranges for an extended time. Staff performed interim repairs to bring the basins back to service and investigated the root cause of the damage. The evaluation conducted by staff, with the support of a specialized vendor, concluded that upgrades to the equipment are needed to handle extended turbidity spikes like the one described above, which will likely become more common due to climate change.

This action amends the Capital Investment Plan (CIP) for fiscal years 2022/23 and 2023/24 to include upgrades to the Jensen plant's flocculation system. See **Attachment 1** for the Allocation of Funds and **Attachment 2** for the Location Map.

Proposed Action(s)/Recommendation(s) and Options

Staff Recommendation: Option #1

Option #1

Amend the Capital Investment Plan for fiscal years 2022/23 and 2023/24 to include upgrades to the flocculation system at the Joseph Jensen Water Treatment Plant.

Fiscal Impact: Expenditure of $460,000 in capital funds. It is not anticipated that the addition of the project listed above to the CIP will increase CIP expenditures in the current biennium beyond those that have been previously appropriated by the Board. Approximately $50,000 will be incurred in the current biennium and has been previously appropriated. The remaining funds from this action are accounted for and appropriated under the next biennial budget.

Business Analysis: This option will enhance the reliability and operating efficiency of the Jensen plant.

Option #2

Do not proceed with this project at this time.

Fiscal Impact: None

Business Analysis: This option would forgo an opportunity to reduce the risk of damage to the Jensen plant's flocculation system. Flocculation basins will be removed from service if flocculation equipment fails during a high-influent turbidity event until repairs are completed.

Alternatives Considered

Staff considered implementing flocculation equipment upgrades under a minor capital project. This option would target upgrades for equipment with the highest likelihood of failure. However, after completion of a root cause analysis for the failed equipment, it was determined that partial upgrade strategies would not reduce the risk of repeated failures of the flocculation system. Staff has concluded that the recent high-turbidity event most likely damaged rotating flocculation equipment that is not yet exhibiting signs of failure, and a comprehensive upgrade plan must include this equipment to prevent its failure in the near future. Staff determined that the current approach to upgrade the plant's flocculator system is the most effective approach to sustain operations during unexpected weather events. Consequently, it is recommended that this project be added to the CIP in the current biennium.

Applicable Policy

Metropolitan Water District Administrative Code Section 11104: Delegation of Responsibilities

Related Board Actions

By Minute Item 51598, dated May 14, 2019, the Board awarded a contract for the rehabilitation of eight flocculators in Module Nos. 2 and 3 at the Jensen plant.

By Minute Item 52778, dated April 12, 2022, the Board appropriated a total of $600 million for projects identified in the Capital Investment Plan for Fiscal Years 2022/2023 and 2023/2024.

California Environmental Quality Act (CEQA)

CEQA determination for Option #1:

The proposed action to amend the Capital Investment Plan to include upgrades to the flocculation system at the Jensen plant is not defined as a project under CEQA because it involves the creation of government funding mechanisms or other government fiscal activities that do not involve any commitment to any specific project which may result in a potentially significant physical impact on the environment. (State CEQA Guidelines Section 15378(b)(4)).

CEQA determination for Option #2:

None required

Details and Background

Background

The Jensen plant was placed into service in 1972 and treats raw water from the West Branch of the California State Water Project (SWP), which flows through a series of reservoirs in the Sierra Pelona Mountains, the last of which includes Castaic Lake with a storage capacity of 324,000 acre-feet.

Flocculation, sedimentation, and filtration are important unit processes within a conventional surface water treatment plant. Modules No. 2 and 3 at the Jensen plant contain a total of eight flocculation/sedimentation basins designed in the early 1990s to accommodate a wide range of source water quality from the West Branch of the SWP. The flocculation portion of each basin contains six flocculators comprised of horizontal rotating shafts with paddle arms, which slowly mix the coagulation chemicals to promote the formation of larger particles that settle out in the sedimentation basins.

The Jensen plant's flocculators treat a wide range of flows and influent water quality conditions on a continuous basis. As influent source water turbidity and other water quality parameters fluctuate seasonally, operational adjustments are made to meet settled water treatment goals and maintain a high plant efficiency. Examples of adjustments include modifications to coagulant chemical feed rates and the introduction of additional coagulant aids. For additional chemicals to effectively reduce turbidity and other parameters, the speed of rotating flocculation equipment must be increased, and sufficient time must be allotted for the particles to combine and

settle. When the required rotating speed of the flocculation equipment exceeds maximum design targets, failures typically include shaft and bearing misalignment, breaking of shear pins, and ultimately failure of rotating equipment supports evidenced by cracked grout and concrete foundations, and in some cases cracked and sheared anchor bolts, which hold equipment in place.

The Jensen flocculation equipment was designed to meet anticipated water quality conditions at the plant and has served the Jensen plant without issue since the original construction in the 1990s. In recent years, mechanical components of the flocculation equipment were refurbished to extend their service life. However, the design criteria for the flocculation system was not upgraded at that time to treat water with very high-turbidity spikes for an extended period.

In recent years, there has been an increased frequency and strength of rain events in the vicinity of the SWP and the Jensen plant. These events have impacted the range of source water quality from the West Branch of the SWP and stressed the design limits of Jensen's treatment capabilities beyond their original design criteria. In November 2022, source waters contaminated by an unprecedented mudslide at Castaic Lake reached the Jensen plant. The elevated levels of suspended materials in the water entering the plant led to damage to critical components of the flocculation equipment. Subsequent mudslides in January and March 2023 in the Castaic water shed again elevated turbidity levels entering the plant, which further strained the equipment. Basin outages were required to perform temporary repairs.

Staff recommends moving forward with upgrades to the Jensen flocculation system at this time to enhance operational resiliency during increasingly frequent water quality extremes in the Jensen plant's source water affecting plant operations.

In April 2022, the Board appropriated funds and authorized the General Manager to initiate or proceed with work on all capital projects identified in the CIP, subject to any limits on the General Manager's authority and CEQA requirements. Board authorization is required to commence work on new projects that were not originally included in the board-authorized CIP. This action amends the CIP to include the Jensen Flocculator System Upgrades project. It is not anticipated that the addition of this project to the CIP will increase CIP expenditures in the current biennium beyond the amount appropriated by the Board. Funds required for work to be performed pursuant to the subject projects after fiscal year 2023/24 will be budgeted within the Capital Investment Plan Appropriation for Fiscal Years 2024/25 and 2025/26. This project has been reviewed in accordance with Metropolitan's CIP prioritization criteria and was approved by Metropolitan's CIP Evaluation Team to be included in the Treatment Plant Reliability Program.

Jensen Flocculator System Upgrades – Design

Planned improvements include structural reinforcement for rotating equipment and anchorage; verification and alignment of flocculator shafts, bearings, and related equipment; and inspection and replacement of worn or damaged flocculator components. Planned design activities include conducting field surveys, design of long-term upgrades to extend the lifespan of existing equipment; preparation of drawings and specifications for construction of these upgrades; and project management. Metropolitan staff will perform all work.

A total of $460,000 is allocated for this work. Allocated funds include $28,000 for field investigations; $288,000 for design activities as described above; $82,000 for shutdown planning, project controls, and project management; and $62,000 for remaining budget.

Engineering Services' performance metric target range for final design of projects with a construction cost of less than $3 million is 9 to 15 percent. For this project, the performance metric goal for final design is approximately 13.7 percent of the total construction cost. The estimated cost of construction to upgrade the Jensen plant flocculator system is anticipated to range from $2.1 million to $2.4 million.

Project Milestone

April 2025 – Completion of design of upgrades to the Jensen flocculator system

4/18/2024

John V. Bednarski *Date*
Manager/Chief Engineer
Engineering Services

4/29/2024

Adel Hagekhalil *Date*
General Manager

Attachment 1 – Allocation of Funds

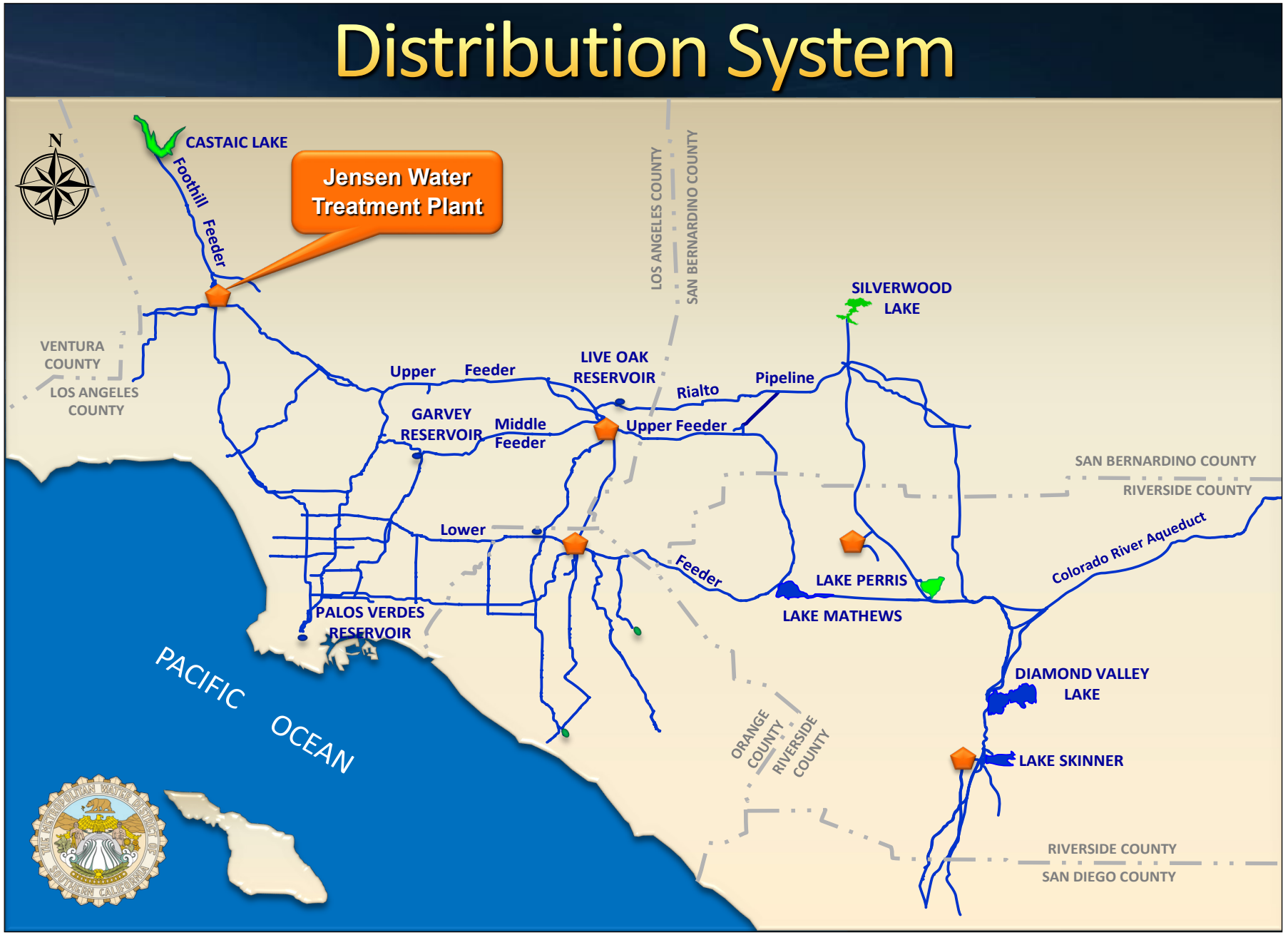
Attachment 2 – Location Map

Ref# es12699345

Allocation of Funds for Jensen Flocculator System Upgrades

	Current Board Action (May 2024)
Labor	
Studies & Investigations	$ 28,000
Final Design	288,000
Owner Costs (Program mgmt., shutdown planning)	82,000
Submittals Review & Record Drwgs.	-
Construction Inspection & Support	-
Metropolitan Force Construction	-
Materials & Supplies	-
Incidental Expenses	-
Professional/Technical Services	-
Right-of-Way	-
Equipment Use	-
Contracts	-
Remaining Budget	62,000
Total	**$ 460,000**

This is the initial allocation of funds for the Jensen Flocculator System Upgrades project. The total estimated cost to complete the project, including the funds allocated for the work described in this action, and future construction costs, is anticipated to range from $2.8 million to $3.4 million.


Distribution System
N
CASTAIC LAKE
Foothill Feeder
Jensen Water Treatment Plant
LOS ANGELES COUNTY
SAN BERNARDINO COUNTY
SILVERWOOD LAKE
VENTURA COUNTY
LOS ANGELES COUNTY
Upper Feeder
LIVE OAK RESERVOIR
Rialto Pipeline
GARVEY RESERVOIR
Middle Feeder
Upper Feeder
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
Lower Feeder
Colorado River Aqueduct
LAKE PERRIS
LAKE MATHEWS
PALOS VERDES RESERVOIR
PACIFIC OCEAN
DIAMOND VALLEY LAKE
ORANGE COUNTY
RIVERSIDE COUNTY
LAKE SKINNER
RIVERSIDE COUNTY
SAN DIEGO COUNTY