THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Board Action

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

2/13/2024 Board Meeting

7-1

Subject

Authorize an increase of $4.34 million to an agreement with Pure Technologies U.S. Inc. for a new not-to-exceed total amount of $4.41 million to furnish and monitor an acoustic fiber optic prestressed concrete cylinder pipe monitoring system along the Foothill Feeder; the General Manager has determined that the proposed action is exempt or otherwise not subject to CEQA

Executive Summary

The Foothill Feeder, which has portions of prestressed concrete cylinder pipe (PCCP), is the primary source of water supply for the Joseph Jensen Water Treatment Plant (Jensen plant) and the western portions of Metropolitan's system. Regular inspections of PCCP lines, including the Foothill Feeder, are an integral component of Metropolitan's long-term management strategy to rehabilitate at-risk PCCP pipelines. However, the Foothill Feeder presents unique inspection challenges due to its large diameter of 201 inches and the complexity of dewatering this pipe for inspections. An acoustic fiber optic (AFO) monitoring system is recommended to provide continuous online monitoring of PCCP portions of the Foothill Feeder; this technology will allow for remote real-time monitoring of the feeder without the need for inspection-related shutdowns to conduct periodic inspections.

This action authorizes an amendment to an existing agreement to furnish a state-of-the-art fiber optic monitoring system within the Foothill Feeder to provide for real-time monitoring of the 5.9 miles of PCCP portions of the feeder, and to provide ten years of monitoring services for the AFO 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

Authorize an increase of $4,340,000 to an existing agreement with Pure Technologies U.S. Inc. for a new amount not to exceed $4,410,000 to furnish and monitor an AFO system for the Foothill Feeder.

Fiscal Impact: Expenditure of $5.89 million in capital funds. Approximately $300,000 will be incurred in the current biennium and has been previously authorized. The remaining funds for this action will be accounted for in the Capital Investment Plan (CIP) budget for the next biennium following board approval of the budget.
Business Analysis: This option would increase the reliability of Metropolitan's distribution system consistent with the goals identified for the PCCP Rehabilitation Program.

Option #2

Do not authorize the agreement at this time.
Fiscal Impact: None
Business Analysis: This option forgoes an opportunity to enhance system reliability with a real-time PCCP pipeline monitoring system.

Alternatives Considered

Staff considered several alternatives to utilizing AFO monitoring, including the continuation of current inspection methods that utilize periodic electromagnetic testing technology. This method requires staff to first shut down and fully drain the entire pipeline. Staff and consultants then walk through the line with the inspection tool. Under this approach, inspections are planned on a five-year cycle, but are highly susceptible to delays due to operational and environmental permitting constraints. Due to the costs and logistic issues associated with this approach, this alternative would potentially delay condition assessment for a critical PCCP pipeline.

Staff also considered using Pure's Pipe Diver® technology for the inspections. Pipe Diver is a long-distance, free-swimming condition assessment tool that operates while the pipeline remains in service. This technology has been used successfully on the Sepulveda Feeder. However, this technology is not appropriate for the 201-inch diameter Foothill Feeder as the Pipe Diver is limited to pipelines with a maximum diameter of 120 inches.

The selected alternative to procure an AFO monitoring system on the Foothill Feeder is a cost-effective alternative when compared to continuing the ongoing electromagnetic inspection program. Staff estimated the potential cost savings of using the AFO monitoring system based on the historical costs of the electromagnetic inspection program which include consultant costs, force labor to support the shutdowns, and the cost of water lost during the shutdown. Using this historical information, the procurement of the AFO monitoring system will be approximately $500,000 less expensive than electromagnetic inspection over an initial 10-year period. These savings assume that two inspections are conducted on the Foothill Feeder over the ten-year period using the current electromagnetic technologies, which require the full dewatering of the pipeline. Additionally, the AFO monitoring system will allow staff to closely monitor the condition of the PCCP portions of the feeder on a continuous real-time basis. With the Foothill Feeder as the sole source of State Water Project water to the Jensen plant, this approach is consistent with Metropolitan's goal of being able to ensure the feeder's continued integrity and operational reliability. Upon positive performance of the AFO monitoring system on this feeder, staff may recommend an expansion of the use of this technology for other Metropolitan pipelines.

Applicable Policy

Metropolitan Water District Administrative Code Section 8121: General Authority of the General Manager to Enter Contracts

Metropolitan Water District Administrative Code Section 8140: Competitive Procurement

Metropolitan Water District Administrative Code Section 11104: Delegation of Responsibilities

Related Board Action(s)/Future Actions(s)

By Minute Item 51128, dated March 13, 2018, the Board certified the Final Supplemental EIR for planned shutdown and inspection of the Foothill Feeder and adopted related documents.

By Minute Item 52778, dated April 12, 2022, the Board appropriated a total of $600 million for projects identified in the CIP for Fiscal Years 2022/23 and 2023/24.

Summary of Outreach Completed

Public outreach was conducted as part of the CEQA process. Further outreach to the general public is not planned as this project is located in remote locations away from homes and businesses. Staff will coordinate shutdown activities with member agencies.

California Environmental Quality Act (CEQA)

CEQA determination for Option #1:

The environmental effects from maintaining the PCCP pipe in the Foothill Feeder were evaluated in the Foothill Feeder Repair and Future Inspection Final Supplemental Environmental Impact Report (Final SEIR), which was certified by the Board on March 13, 2018. During that same meeting, the Board also approved the amended Findings of Fact (findings), the amended Mitigation Monitoring and Reporting Program, the amended Statement

of Overriding Considerations, and the proposed modifications to the originally approved Foothill Feeder Repair and Future Inspection Final SEIR. The present board action is based on shutdown, inspection, and maintenance and not on any changes to the approved project. Hence, the previous environmental documentation approved by the Board in conjunction with the proposed action fully complies with CEQA and the State CEQA Guidelines. Accordingly, no further CEQA documentation is necessary for the Board to act on the proposed action.

CEQA determination for Option #2:

None required

Details and Background

Background

The Foothill Feeder conveys untreated water from the West Branch of the State Water Project into the western portion of Metropolitan's service area. The feeder extends south from Castaic Lake, crosses under the Santa Clara River and several of its tributaries, and terminates at the Jensen plant. The feeder is approximately 14.5 miles long, of which 5.9 miles are constructed of 201-inch-diameter PCCP. This is the largest diameter PCCP pipe in Metropolitan's PCCP inventory.

PCCP consists of a concrete core with high-strength steel prestressing wires tightly wound around the outside. The wires are wrapped around a cement slurry bed and coated with cement mortar, which serves as the finished outer surface. A thin steel cylinder is encased within the concrete pipe to provide a water barrier. The strength of PCCP is provided in large measure by the prestressing wires. PCCP has been found to have a reduced service life due to corrosion and breakage of the prestressing wires under certain conditions.

Metropolitan maintains a comprehensive program to inspect, manage, and rehabilitate its PCCP feeders. This includes inspecting PCCP pipelines every five to seven years using electromagnetic technology, which is the primary means within the industry for identifying broken prestressing wires in PCCP. Successive inspections allow staff to monitor the condition of the pipelines, identify changes to the pipeline baseline condition, track prestressing wire breakage over time, and use this information to proactively prioritize the order of PCCP sections to be relined.

Electromagnetic inspections typically require the pipeline to be dewatered and pipeline inspectors to enter the pipeline and traverse the length of the line with an electromagnetic wire break detection instrument. For the Foothill Feeder, these inspections are usually conducted on a 5- to 7-year cycle, depending on the availability of the feeder to be shut down and dewatered. To date, three electromagnetic inspections of the feeder have been conducted since 2005. However, dewatering of the Foothill Feeder has become increasingly difficult. Dewatering this large-diameter pipeline is a costly and time-consuming process that results in the loss of approximately 150 acre-feet of water. This water is discharged into several natural drainages, which are habitat for the Unarmored Threespine Stickleback (UTS), a fish species listed as endangered under both the Federal and California Endangered Species Acts and a fully protected species under the California Fish and Game Code Section 5515. To allow dewatering, Metropolitan has had to sponsor project-specific legislation, obtain specialized permits, and perform compensatory mitigation for the UTS. To limit impacts to UTS in the Santa Clara River watershed, discharge flows during dewatering are restricted, strictly monitored, and regulated by environmental permit requirements. The dewatering restrictions prolong the duration of the shutdowns, and dewatering typically requires seven days, which can impact member agency operations.

AFO monitoring systems are "listening" devices that are calibrated to detect the sounds of PCCP wire breaks. Unlike the traditional electromagnetic inspection methods, which provide a snapshot of data, AFO systems provide continuous monitoring. An AFO system would eliminate the need for staffed pipe inspections and the time-consuming process of slowly dewatering the pipeline. The AFO system resides in the interior of the pipeline and is monitored remotely. The system includes a fiber optic cable sensitive to the sound caused by wire breaks. The cable extends to a data acquisition computer that continuously "listens" for the distinct sound of wires breaking. When the system detects a potential wire break in the pipeline, it is first sent through a series of acoustic and analog filters, and then proprietary software is used to determine whether the event requires further analysis.

If analysis is required, the acoustic events are manually evaluated to confirm that the event is a wire break and to determine the location.

AFO monitoring systems have been used by water utilities for nearly two decades. In 2011, Metropolitan's Board authorized a piloted test of the technology on the Second Lower Feeder for a one-year period. Although the AFO system performed well, it was decided to discontinue use of the system due to the relative ease to shut down and dewater the feeder. Other utilities using the AFO monitoring systems include the San Diego County Water Authority (SDCWA), the city of Houston, the Washington Suburban Sanitary Commission, and the Miami-Dade Water and Sewerage Department.

Based on the successful use of AFO technology by other large water agencies, staff recommends proceeding with the procurement of an AFO monitoring system for the Foothill Feeder. The AFO system has a proven track record, and its use on this feeder will reduce the number of costly dewatering cycles and provide more timely data on the conditions of Foothill's PCCP segments. Staff will utilize the results from this application to determine if an expanded use of the AFO monitoring system on additional PCCP pipelines is warranted.

Foothill Feeder AFO Monitoring System – Procurement and Monitoring

The planned activities for procurement and monitoring of the Foothill Feeder AFO monitoring system include furnishing the AFO monitoring equipment, including fiber optic cables and data acquisition equipment; providing field services support; and monitoring the data for ten years to be performed by Pure Technologies U.S. Inc. (Pure) as described below. Metropolitan forces will modify existing accessway flanges at eight accessways to allow placement of the AFO cable; construct a 300-foot-long duct bank for the fiber optic cable from the Foothill Feeder to the Foothill Feeder Control Structure; and provide power and install the data acquisition unit within the control structure.

The estimated AFO procurement and monitoring cost is $5,890,000, which includes $4,340,000 for Pure to furnish and monitor the acoustic fiber optic monitoring system for ten years; $321,000 for design of the modifications to accessway piping, AFO duct banks, and connections to the data acquisition unit; $787,000 for Metropolitan force activities as described above; $243,000 for project management, environmental monitoring, and inspection; and $199,000 for remaining budget. See **Attachment 1** for the Allocation of Funds.

Technical Services (Pure Technologies U.S. Inc.) – Amendment to Agreement

Pure is recommended to furnish and monitor the new AFO pipe monitoring system under an existing sole-source agreement for the Foothill Feeder. Pure will furnish the equipment, program the data monitoring system, and remotely monitor the system for a period of ten years. Pure was previously prequalified by Metropolitan in 2017 as the only respondent with technology proven to be able to continuously monitor PCCP pipelines for wire breaks while the pipeline remains in operation. Based on online research and interviews with other large utilities, staff have determined that Pure is the only supplier of commercially available AFO monitoring systems. For example, the SDCWA presently conducts its AFO monitoring system by way of a sole source professional services contract with Pure.

Staff entered into an agreement with Pure to plan and assess the potential application of the AFO system for the Foothill Feeder under the General Manager's authority for agreements less than $250,000. These activities are now complete, and Metropolitan staff is currently designing needed components, which include flange modifications and AFO system connections. The Pure agreement now requires an amendment to furnish the wire break detection equipment and provide monitoring services for up to ten years. Staff contacted other users of the Pure AFO wire break detection system and confirmed the requested amount is consistent with unit prices for similar installations at other agencies.

Project Milestone

January 2025 – AFO Monitoring System online

1/18/2024

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

1/24/2024

Adel Hagekhalil *Date*
General Manager

Attachment 1 – Allocation of Funds

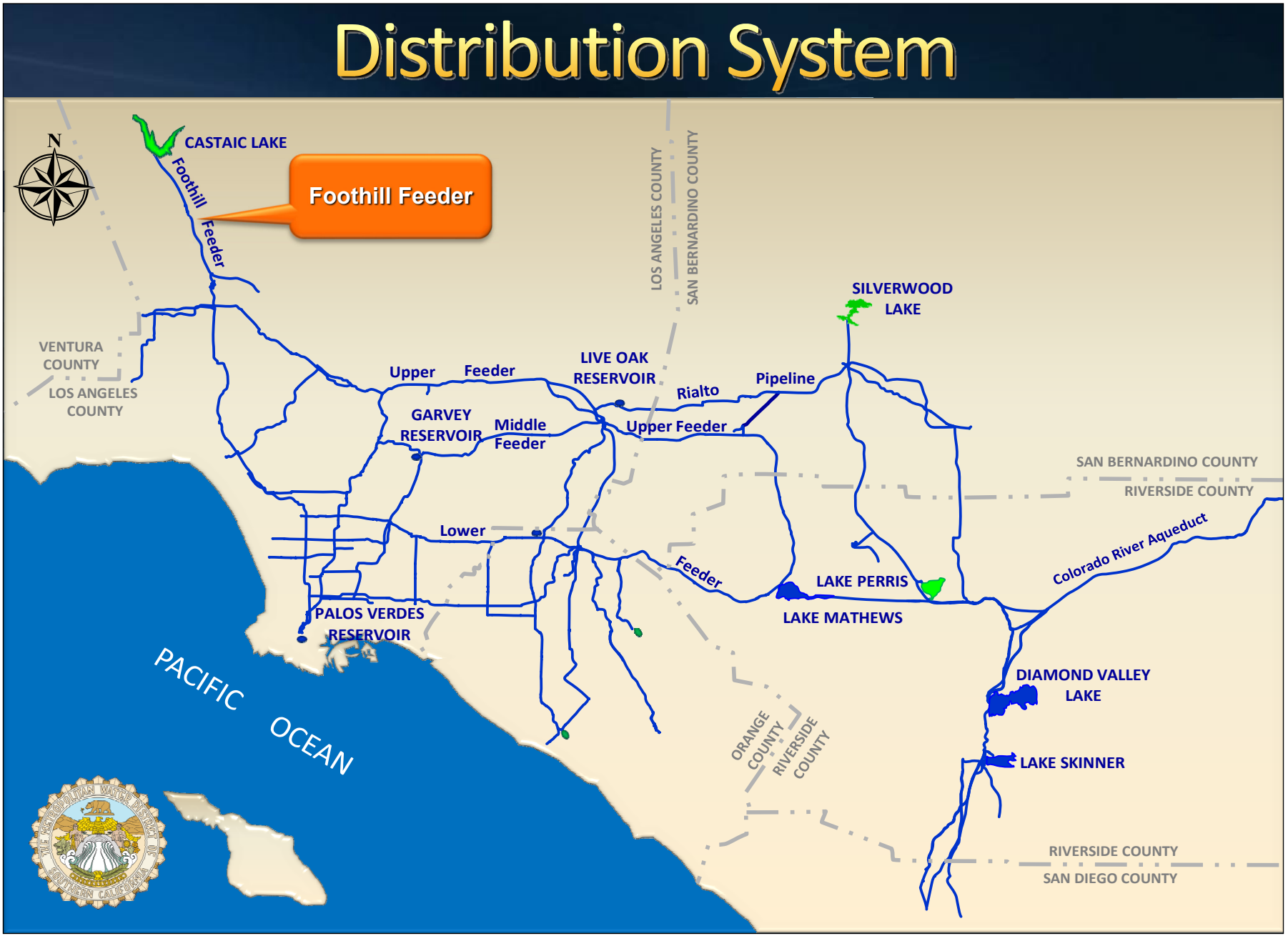
Attachment 2 – Location Map

Ref# Es12691674

Allocation of Funds for Foothill Feeder Acoustic Fiber Optic PCCP Monitoring System

	Current Board Action (Feb. 2024)
Labor	
Studies & Investigations	$ -
Final Design	321,000
Owner Costs (Program mgmt., contract admin.)	149,000
Submittals Review & Record Drwgs.	34,000
Fabrication Inspection & Support	60,000
Metropolitan Force Construction	622,000
Materials & Supplies	150,000
Incidental Expenses	15,000
Professional/Technical Services	
Pure Technologies U.S. Inc.	4,340,000
Right-of-Way	-
Equipment Use	-
Contracts	-
Remaining Budget	199,000
Total	**$ 5,890,000**

The total amount expended to date for the Foothill Feeder Acoustic Fiber Optic PCCP Monitoring System is approximately $63,000. The total estimated cost to complete the project, including the amount appropriated to date and funds allocated for the work described in this action, is $5.953 million.


Distribution System
N
CASTAIC LAKE
Foothill Feeder
Foothill Feeder
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