



- Board of Directors
Engineering and Operations Committee

11/5/2012 Board Meeting

7-5

Subject

Appropriate \$280,000; and authorize preliminary design of upgrades to the Dam Monitoring System and Inlet/Outlet Tower fish screens at Diamond Valley Lake (Approps. 15419 & 15441)

Executive Summary

This action authorizes preliminary design of two projects at Diamond Valley Lake (DVL): (1) Upgrades to the dam monitoring system, which monitors the performance of the lake's three dams; and (2) Rehabilitation of the fish screens on the lake's Inlet/Outlet Tower. The dam monitoring system measures survey monuments and seepage sensors at the dams, collects monitoring data required by the operating permit issued by the California Division of Safety of Dams (DSOD), and provides prompt notification in case of potential problems with the dam embankments or foundations. The original dam monitoring system has reached the end of its service life and needs to be replaced. The fish screens on the Inlet/Outlet Tower prevent fish or debris from being drawn into and damaging the valves and turbines at Hiram W. Wadsworth Pumping Plant. These screens are experiencing premature corrosion and need to be rehabilitated to remain operable and protect the pumping plant equipment.

Timing and Urgency

The three rock-fill dams which form DVL are monitored continuously by the dam monitoring system, which transmits the performance data through Metropolitan's Wide Area Network (WAN) to the Headquarters Building at Union Station and to the Operation Control Center at Eagle Rock. This data is collected to prepare mandatory reports on the dams' performance for submission to DSOD, and to provide early indication of a potential problem within the dam embankments or foundations. After 12 years of continuous operation, the current monitoring equipment has reached the end of its service life. Repair of the existing dam monitoring equipment is challenging, as the units are no longer manufactured and spare parts are difficult to obtain. A new dam monitoring system is needed to maintain Metropolitan's ability to monitor dam performance and to comply with the DSOD operating permit.

The Inlet/Outlet Tower provides the primary means to fill and withdraw water from DVL. When water is withdrawn through the tower, fish screens are placed over the outlet ports to prevent fish, floating debris, or vegetation from passing through and damaging the valves and turbines at Wadsworth Pumping Plant. Rehabilitation of the traveling fish screens is needed to repair corrosion on the lifting blocks, screen supports, and other structural elements. Failure to rehabilitate the corroded elements of the fish screens could render the screens inoperable, and would increase the risk of damage to the pumping plant's valves and turbines.

These projects have been reviewed with Metropolitan's Capital Investment Plan (CIP) prioritization criteria, and are categorized as Infrastructure Rehabilitation projects. Funds for this action are available within Metropolitan's capital expenditure plan for fiscal year 2012/13.

Details

Background

DVL is Southern California's largest surface water reservoir, with a maximum storage capacity of 810,000 acre-feet. The facility provides emergency storage in the event of a major earthquake, carryover storage as a reserve for drought conditions, and seasonal storage to meet annual member agency demands. DVL was completed in 2000 and is located south of the city of Hemet in Riverside County.

An extensive dam monitoring system was installed during construction of the three dams to provide early warning signs of dam distress and to monitor real-time performance of the embankments and foundations. The dam monitoring system uses a wireless communication network to store and transmit real-time data from approximately 300 monitoring instruments, including 189 piezometers, 74 settlement sensors, 16 weirs, 15 strong motion accelerographs, eight deformation monitors, four fixed embankment extensometers, and three inclinometers. The data is collected continuously and transmitted through Metropolitan's wide area network (WAN) to the Headquarters Building at Union Station and to the Operations Control Center at Eagle Rock, where it enables continuous monitoring of dam performance, detection of potential conditions requiring prompt response, and compilation of required reports that are submitted to DSOD.

The Inlet/Outlet Tower is located east of DVL's Owen Dam. The tower is 266 feet high and has nine tiers of twin ports, each spaced 25 feet apart to allow water to enter or exit from different lake elevations. Flow through each 84-inch-diameter port is controlled by a hydraulically operated butterfly valve. The ports open into a wet well that rises the full height of the tower above the pressure tunnel at its base. When lake water passes through the tower into the pressure tunnel, it can be diverted either to Wadsworth pumping plant, which contains a bank of variable-speed turbine/pumps, or to the adjacent pressure control structure, which contains pressure-reducing butterfly valves.

During lake withdrawals, fish screens are placed in front of the ports to prevent fish, floating debris, or vegetation from entering the tower. A pulley system operated by a gantry crane mounted on top of the tower is used to raise and lower the four individual half-cylinder fish screen units (26 feet wide and 19 feet tall) to the desired port elevation.

Project No. 1 – Diamond Valley Lake Dam Monitoring System Upgrades – Preliminary Design Phase (\$170,000)

The current dam monitoring equipment has been in service since 2000 and has reached the end of its service life. The dam monitoring system uses 86 remote terminal units (RTUs) to collect and transmit data via a wireless network to host computers located at each of the three dams and to a base station located at the San Diego Canal. In recent years, the RTUs have begun to deteriorate and require increasing levels of maintenance. The wireless network does not operate reliably at the high ambient temperatures which occur frequently at the site, while the East Dam host computer frequently loses connectivity with the base station located five miles away at the San Diego Canal. Repair of the wireless communication network has become challenging as the system components are no longer manufactured, and spare parts are difficult to obtain. Staff recommends proceeding with preliminary design to upgrade the dam monitoring system in order to reliably monitor performance of the three dams and to comply with the operating permit issued by DSOD.

Planned preliminary design activities include: conducting a condition assessment of the dam monitoring instruments and cabling; detailed evaluation of options for wireless technology upgrades, including new RTUs, new host computers, and upgraded WAN base stations; development of final design criteria; preparation of environmental documentation and a preliminary design report; and development of a construction cost estimate.

This action appropriates \$170,000 and authorizes preliminary design phase activities to upgrade the dam monitoring system at DVL. All work will be performed by Metropolitan staff. The DVL Dam Monitoring System Upgrades project is included within capital Appropriation No. 15419, the Dam Rehabilitation & Safety Improvements Program, which was initiated in fiscal year 2003/04. Other projects authorized under Appropriation No. 15419 include the Dam Seismic Stability Assessment and the Lake Mathews and Lake Skinner

Spillway Capacity Study. With the present action, the total funding for Appropriation No. 15419 will increase from \$3.96 million to \$4.13 million.

Project No. 2 – Diamond Valley Lake Inlet/Outlet Tower Fish Screen Rehabilitation – Preliminary Design Phase (\$110,000)

A recent scheduled inspection of the DVL Inlet/Outlet Tower fish screens identified that the coated carbon steel structural elements are experiencing corrosion damage, including the hoist beam eye bars, support beams, and retaining pins. The corrosion damage is likely caused by galvanic action between the stainless steel and carbon steel components of the screens. While corrosion damage is not yet extensive, continued deterioration could lead to collapse of a screen. Operation of the Inlet/Outlet Tower without the fish screens would risk damage to the valves at the tower, the valves at the DVL pressure control structure, and the pump/turbines at Wadsworth pumping plant. These turbines can generate up to \$4,600 per day in revenue. Staff recommends proceeding with preliminary design to rehabilitate the fish screens so they may continue to operate and protect the pumping plant equipment.

Planned preliminary design activities include: conducting a metallurgical investigation of the corroded items; evaluation of options to eliminate galvanic-induced corrosion, such as replacement of stainless steel components with fiberglass, or the addition of insulation between the steel and carbon steel components; development of final design criteria; preparation of environmental documentation and a preliminary design report; and development of a construction cost estimate.

This action appropriates \$110,000 and authorizes preliminary design phase activities to rehabilitate the fish screens at the DVL Inlet/Outlet Tower. All work will be performed by Metropolitan staff. The DVL Inlet/Outlet Tower Fish Screen Rehabilitation project is included within capital Appropriation No. 15441, the Conveyance and Distribution System Rehabilitation Program - FY 2006/07 Through FY 2011/12, which was initiated in fiscal year 2006/07. Other projects authorized under Appropriation No. 15441 include the PCCP repairs of the Calabazas Feeder, Lake Skinner Outlet Conduit, Rialto Pipeline, San Diego Pipeline No. 5, and Sepulveda Feeder. With the present action, the total funding for Appropriation No. 15441 will increase from \$40,639,000 to \$40,749,000.

This work has been evaluated and recommended by Metropolitan's CIP Evaluation Team, and funds are available within the fiscal year 2012/13 capital expenditure plan. See [Attachment 1](#) for the Financial Statement and [Attachment 2](#) for the Location Map.

Project Milestones

June 2013 – Completion of preliminary design to upgrade the dam monitoring system at DVL

June 2013 – Completion of preliminary design to rehabilitate fish screens at the DVL Inlet/Outlet Tower

Policy

Metropolitan Water District Administrative Code Section 5108: Appropriations

California Environmental Quality Act (CEQA)

CEQA determination for Option #1:

The proposed action is categorically exempt under the provisions of CEQA and the State CEQA Guidelines. The proposed action consists of research, resource evaluation and preliminary design activities which do not result in a serious or major disturbance to an environmental resource. This may be for information gathering purposes, or as part of a study leading to an action which a public agency has not yet approved, adopted or funded. Accordingly, the proposed action qualifies under a Class 6 Categorical Exemption (Section 15306 of the State CEQA Guidelines). In addition, the proposed action is not defined as a project under CEQA because it involves other government fiscal activities, which do not involve any commitment to any specific project which may result in a potentially significant physical impact on the environment (Section 15378(b)(4) of the State CEQA Guidelines).

The CEQA determination is: Determine that pursuant to CEQA, the proposed action qualifies under a Categorical Exemption (Class 6, Section 15306 of the State CEQA Guidelines), and, further, that the proposed action is not subject to CEQA pursuant to Section 15378(b)(4) of the State CEQA Guidelines.

CEQA determination for Option #2:

None required

Board Options

Option #1

Adopt the CEQA determination and

- a. Appropriate \$280,000;
- b. Authorize preliminary design to upgrade the dam monitoring system at Diamond Valley Lake; and
- c. Authorize preliminary design to rehabilitate fish screens at the Diamond Valley Lake Inlet/Outlet Tower.

Fiscal Impact: \$170,000 of capital funds under Approp. 15419; and \$110,000 of capital funds under Approp. 15441.

Business Analysis: This project will protect Metropolitan assets, maintain the ability to efficiently comply with DVL’s operating permit issued by DSOD, and to enhance reliability and public safety.

Option #2

Adopt the CEQA determination and

- a. Appropriate \$170,000;
- b. Authorize preliminary design to upgrade the dam monitoring system at Diamond Valley Lake; and
- c. Do not authorize preliminary design to rehabilitate fish screens at the Diamond Valley Lake Inlet/Outlet Tower.

Fiscal Impact: \$170,000 of capital funds under Approp. 15419

Business Analysis: Under this option, the dam monitoring system upgrade would proceed in order to efficiently comply with DVL’s operating permit issued by DSOD, and to enhance reliability and public safety. Staff would continue to operate the fish screens and repair deteriorated or damaged equipment, as needed. This approach could lead to increased costs.

Option #3


Do not proceed with the two projects at this time.

Fiscal Impact: None

Business Analysis: This option would forego an opportunity to enhance reliability and public safety. As the existing equipment deteriorates, staff would repair damaged fish screens and collect dam monitoring information manually for submission to DSOD.

Staff Recommendation

Option #1


 _____ 10/23/2012
 Gordon Johnson
 Manager/Chief Engineer
 Engineering Services Date


 _____ 10/25/2012
 Jeffrey Kightlinger
 General Manager Date

Attachment 1 – Financial Statements

Attachment 2 – Location Map

Financial Statement for Dam Rehabilitation & Safety Improvements Program

A breakdown of Board Action No. 3 for Appropriation No. 15419 for the DVL Dam Monitoring System Upgrade project* is as follows:

	Previous Total Appropriated Amount (Dec. 2006)	Current Board Action No. 3 (Nov. 2012)	New Total Appropriated Amount
Labor			
Studies & Investigations	\$ 725,300	\$ 124,500	\$ 849,800
Owner Costs (Program mgmt., envir. doc.)	282,700	23,500	306,200
Materials & Supplies	8,000	-	8,000
Incidental Expenses	15,000	1,000	16,000
Professional/Technical Services	2,052,000	-	2,052,000
Contracts	390,000	-	390,000
Remaining Budget	487,000	21,000	508,000
Total	\$ 3,960,000	\$ 170,000	\$ 4,130,000

Funding Request

Program Name:	Dam Rehabilitation & Safety Improvements		
Source of Funds:	Revenue Bonds, Replacement and Refurbishment or General Funds		
Appropriation No.:	15419	Board Action No.:	3
Requested Amount:	\$ 170,000	Capital Program No.:	15419-I
Total Appropriated Amount:	\$ 4,130,000	Capital Program Page No.:	49
Total Program Estimate:	\$ 16,340,000	Program Goal:	I-Infrastructure Reliability

* This is the initial appropriation for the DVL Dam Monitoring System Upgrade project.

**Financial Statement for Conveyance and Distribution System Rehabilitation Program –
FY 2006/07 Through FY 2011/12**

A breakdown of Board Action No. 46 for Appropriation No. 15441 for the DVL Inlet/Outlet Tower Fish Screen Rehabilitation project* is as follows:

	Previous Total Appropriated Amount (Oct. 2012)	Current Board Action No. 46 (Nov. 2012)	New Total Appropriated Amount
Labor			
Studies & Investigations	\$ 2,616,000	\$ 80,000	\$ 2,696,000
Final Design	\$ 3,098,293		3,098,293
Owner Costs (Program mgmt., envir. doc.)	4,746,400	30,000	4,776,400
Submittals Review & Record Dwgs	233,250	-	233,250
Construction Inspection & Support	1,929,550	-	1,929,550
Metropolitan Force Construction	8,783,710		8,783,710
Materials & Supplies	2,296,400	-	2,296,400
Incidental Expenses	872,900	-	872,900
Professional/Technical Services	2,002,000	-	2,002,000
Equipment Use	325,200	-	325,200
Contracts	11,657,944	-	11,657,944
Remaining Budget	2,077,353	-	2,077,353
Total	\$ 40,639,000	\$ 110,000	\$ 40,749,000

Funding Request

Program Name:	Conveyance and Distribution System Rehabilitation Program - FY 2006/07 Through FY 2011/12		
Source of Funds:	Revenue Bonds, Replacement and Refurbishment or General Funds		
Appropriation No.:	15441	Board Action No.:	46
Requested Amount:	\$ 110,000	Capital Program No.:	15441-I
Total Appropriated Amount:	\$ 40,749,000	Capital Program Page No.:	284
Total Program Estimate:	\$ 144,834,000	Program Goal:	I-Infrastructure Reliability

Diamond Valley Lake

