



- Board of Directors  
*Engineering and Operations Committee*

3/14/2017 Board Meeting

---

**7-1**

---

## **Subject**

Adopt CEQA determination and appropriate \$1.65 million; and authorize three rehabilitation projects at Lake Mathews (Appropriation Nos. 15441 and 15480)

---

## **Executive Summary**

This action authorizes three infrastructure rehabilitation projects at Lake Mathews: (1) preliminary design to upgrade the electrical distribution system; (2) final design to repair the forebay and its outlet tower; and (3) construction to repair the lake's hydroelectric plant.

### **Timing and Urgency**

Three projects are recommended to move forward at Lake Mathews to address aging infrastructure and to maintain reliable water deliveries into Metropolitan's Central Pool.

The first project will rehabilitate the existing electrical distribution system at Lake Mathews, which has been in service for over 75 years. This system serves the lake's outlet towers and junction shaft, hydroelectric plant, forebay, chlorination system, administrative offices, and maintenance and repair shops. The electrical distribution system is outdated, has experienced numerous overloads, and lacks capacity for planned additional equipment. The system needs to be upgraded to maintain reliability and meet future power demands.

The second project will repair Lake Mathews' forebay. The forebay contains a reinforced-concrete reservoir with a storage capacity of 31 acre-feet, and features a 60-foot-tall concrete outlet tower with steel walkways and a steel control building. The moist conditions above the forebay's water surface create a corrosive environment that has gradually damaged the concrete surfaces, reinforcing steel, steel walkways, and the control room. While the structural integrity of these facilities remains sound at present, repairs are needed to maintain reliability and prevent further damage.

The third project will repair portions of the Lake Mathews Hydroelectric Plant's concrete structure that have deteriorated over time. The deterioration was caused by exposure to chlorine that was previously added to the turbine's cooling water to prevent algal growth. This exposure led to spalled and cracked concrete, and to corroded reinforcing steel. The reinforcing steel and concrete need to be repaired for the power plant to continue operating safely and reliably.

These projects have been reviewed with Metropolitan's Capital Investment Plan (CIP) prioritization criteria and are included in the Distribution System Reliability Program. Funds for this action are available within Metropolitan's capital expenditure plan for fiscal year 2016/17.

---

## **Details**

### **Background**

Lake Mathews is the terminus of the Colorado River Aqueduct (CRA), which delivers much of the water served to Metropolitan's member agencies. Water stored in the reservoir is withdrawn through the lake's forebay and

hydroelectric plant, and is then conveyed through the Upper Feeder and Lower Feeder to the F. E. Weymouth and Robert B. Diemer Water Treatment Plants, respectively.

Lake Mathews was constructed in the 1930s. The original facilities included the main dam embankment, the lake's first outlet tower, and the forebay with its own outlet tower. In 1961, the main dam embankment was raised and two dikes were constructed to increase the lake volume to its current capacity of 182,000 acre-feet. Lake Mathews is under the jurisdiction of the California Division of Safety of Dams, which requires that the forebay and outlet tower remain operational at all times.

In 1980, the Lake Mathews Hydroelectric Plant was constructed adjacent to the forebay. Depending on system demands, the hydroelectric plant can generate up to 4.9 MW of power and produce annual revenues of up to \$1.3 million. In 2004, a second outlet tower was completed for the lake.

### **Project No. 1 – Lake Mathews Electrical Upgrades – Preliminary Design Phase (\$860,000)**

The electrical distribution system that serves Lake Mathews was initially constructed concurrently with the lake during the 1930s. The distribution system includes a 2.4 kV incoming electrical service, six unit power centers, and both underground and overhead distribution lines that supply power to the lake's outlet towers and junction shaft, the hydroelectric plant, fire water pumps, chlorination system, administrative offices, forebay outlet tower and fixed cone discharge valves, utility buildings, and maintenance and repair shops.

During the decades following the electrical system's original construction, the system was gradually expanded or modified to accommodate increased electrical loads. However, the architecture of the electrical system and its principal components were not updated. Over a period of 75 years, the system has begun to deteriorate and needs to be rehabilitated. The distribution panels' circuit breakers, which protect circuits from damage caused by overloads or short circuits, are now obsolete. Most of the distribution panels are at full capacity, leaving no room for the addition of lighting, monitoring devices, or other modern equipment. In addition, spare parts are no longer available for most of the electrical components.

Planned upgrades include replacing the underground and overhead distribution lines; replacing the existing unit power centers and adding additional unit power centers where needed; and integrating the new electrical system with Metropolitan's system-wide supervisory control and data acquisition system.

Preliminary design phase activities will include confirming the present electrical loads and estimating future loads; conducting a condition assessment of the entire electrical system; evaluating the potential for conversion of the distribution voltage from 2.4 kV to 4.16 kV to match the standard voltage of modern equipment; testing for presence of hazardous materials; preparing conceptual layout drawings; conducting a value engineering review of potential improvements; preparing environmental documentation; and developing a construction cost estimate.

This action appropriates \$860,000 and authorizes preliminary design of upgrades to the electrical distribution system at Lake Mathews. Requested funds include: \$110,000 for field investigations; \$625,000 for preliminary design; \$75,000 for project management and environmental documentation; and \$50,000 for remaining budget. All preliminary design phase activities will be performed by Metropolitan staff.

### **Project No. 2 – Lake Mathews Forebay Repairs – Final Design Phase (\$430,000)**

The Lake Mathews forebay is a reinforced concrete reservoir with a capacity of 31 acre-feet. The forebay's outlet tower is a 60-foot-tall rectangular concrete structure with steel walkways and a steel control building at the top of the tower. The fixed cone valves that control the release of water from the lake into the forebay produce moist conditions above the forebay's water surface. The moisture creates a corrosive environment that has gradually damaged the concrete, reinforcing steel, steel walkways, and control room, along with the lining of the forebay. Over the past decade, the extent of deterioration has increased. While the structural integrity of these facilities remains sound at present, repairs are needed to maintain reliable deliveries into the Central Pool.

The planned repairs include removal of the spalled and damaged concrete down to sound concrete; replacement of severely corroded reinforcing steel; repair of less corroded reinforcing steel by sandblasting and applying a corrosion inhibitor; installation of a cathodic protection system on the forebay tower; replacement of damaged

concrete on the tower and in the forebay; and replacement of the forebay outlet tower's steel walkways and control building.

The final design phase activities will include preparation of drawings and specifications; value engineering; development of a construction cost estimate; and receipt of competitive bids. Final design of the repairs to the forebay lining and replacement of the steel walkways and control building will be performed by Metropolitan staff. Final design of the forebay tower repairs and cathodic protection system will be performed by HDR Engineering, as described below.

This action appropriates \$430,000 and authorizes final design phase activities to repair the forebay at Lake Mathews. The requested funds include: \$313,000 for final design, \$67,000 for bidding and project management; and \$50,000 for remaining budget. For this project, the anticipated cost of final design is approximately 12.5 percent of the total estimated construction cost. Engineering Services' goal for design of projects with construction less than \$3 million is 12 to 15 percent. The estimated cost of construction for the forebay repairs is anticipated to range from \$2.5 million to \$3 million.

The total estimated cost to complete the forebay repairs, including the amount appropriated to date, current funds requested, and future construction cost, is anticipated to range from \$3.5 million to \$4 million.

#### **Engineering Design Services (HDR Engineering) - No action required**

Final design of the forebay tower repairs and cathodic protection system will be performed by HDR Engineering under an existing board-authorized agreement. HDR Engineering was selected due to its experience with structural repairs to concrete structures and cathodic protection systems. The planned scope includes preparation of drawings and specifications for its portion of the project and development of a construction cost estimate. The estimated cost for these services is \$125,000.

For this agreement, Metropolitan established a Small Business Enterprise (SBE) participation level of 18 percent. HDR Engineering has agreed to meet this level of participation. The subconsultants for this agreement are listed in [Attachment 4](#).

#### **Project No. 3 – Lake Mathews Hydroelectric Plant Repairs – Construction (\$360,000)**

Portions of the Lake Mathews Hydroelectric Plant's concrete structure have deteriorated over time from exposure to chlorine that was previously added to the turbine's cooling water to prevent algal growth. This exposure led to spalled and cracked concrete, and to corroded reinforcing steel. The chlorine injection system was removed in 2008 and was replaced with a cooling water system that uses potable water.

The planned repairs include removal of the damaged concrete down to sound concrete; replacement of severely corroded reinforcing steel; repair of less corroded reinforcing steel by sandblasting and applying a corrosion inhibitor; and installation of a cathodic protection system.

Specifications No. 1851 for repair of the hydroelectric plant structure at Lake Mathews was advertised for bids on November 28, 2016. As shown in [Attachment 2](#), seven bids were received and opened on January 25, 2017. The low bid from O'Connell Engineering in the amount of \$207,800 complies with the requirements of the specifications. The six higher bids ranged from \$245,000 to \$297,000, while the engineer's estimate was \$340,000. The contract is planned to be awarded under the General Manager's Administrative Code authority to award contracts of \$250,000 or less. For this contract, Metropolitan established an SBE participation level of at least 14 percent of the bid amount. O'Connell Engineering has committed to meet this level of participation. The subcontractors for this contract are listed in [Attachment 3](#).

This action appropriates \$360,000 and authorizes construction to repair the hydroelectric plant structure at Lake Mathews. In addition to the amount of the contract, the requested funds include \$32,000 for construction inspection; \$54,000 for project management and preparation of record drawings; \$20,000 for submittals review and responding to contractor requests for information; and \$46,200 for remaining budget.

Metropolitan staff will perform inspection of the construction. For this project, the anticipated cost of inspection is approximately 15 percent of the total construction cost. Engineering Service's goal for inspection of projects

with construction less than \$3 million is 12 to 15 percent. The total cost of construction for this project is approximately \$208,000.

The total estimated cost to complete the hydroelectric plant repairs, including the amount expended to date and current funds requested, is approximately \$590,000.

### **Summary**

This action appropriates \$1.65 million, authorizes preliminary design to upgrade the electrical distribution system at Lake Mathews, authorizes final design to repair the Lake Mathews forebay's tower and lining, and authorizes repairs to the hydroelectric plant structure. These projects have been evaluated and recommended by Metropolitan's CIP Evaluation Team, and funds are available within the fiscal year 2016/17 capital expenditure plan. See [Attachment 1](#) for the Financial Statements, [Attachment 2](#) for the Abstract of Bids, [Attachment 3](#) for the listing of Subcontractors for Low Bidder, [Attachment 4](#) for Subconsultants for Agreement with HDR Engineering, and [Attachment 5](#) for the Location Map.

The forebay repairs and hydroelectric plant repairs are included in the Conveyance and Distribution System Rehabilitation Appropriation – FY 2006/07 Through FY 2011/12 (Appropriation No. 15441), which was initiated in fiscal year 2006/07. With the present action, the total funding for Appropriation No. 15441 will increase from \$96,499,000 to \$97,289,000.

The electrical upgrades are included in Appropriation No. 15480, the Conveyance and Distribution System Rehabilitation Appropriation – FY 2012/13 Through FY 2017/18, which was initiated in fiscal year 2012/13. With the present action, the total funding for Appropriation No. 15480 will increase from \$45.22 million to \$46.08 million.

### ***Project Milestones***

August 2017 – Completion of final design of the forebay repairs

February 2018 – Completion of construction of the hydroelectric plant repairs

May 2018 – Completion of preliminary design of the electrical upgrades

### **Policy**

---

Metropolitan Water District Administrative Code Section 5108: Appropriations

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

### **California Environmental Quality Act (CEQA)**

---

#### **CEQA determinations for Option #1:**

#### **Project No. 1 – Lake Mathews Electrical Upgrades – Preliminary Design**

The proposed action is categorically exempt under the provisions of CEQA and the State CEQA Guidelines. The proposed action involves the funding of a study and minor modifications to existing public facilities with negligible or no expansion of use and no possibility of significantly impacting the physical environment. In addition, the proposed action consists of basic data collection and resource evaluation activities, which does not result in a serious or major disturbance to an environmental resource. This may be strictly 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 for both Class 1 and Class 6 Categorical Exemptions (Sections 15301 and 15306 of the State CEQA Guidelines).

The CEQA determination is: Determine that pursuant to CEQA, the proposed action qualifies under two Categorical Exemptions (Class 1, Section 15301 and Class 6, Section 15306) of the State CEQA Guidelines.

**Project No. 2 – Lake Mathews Forebay Repairs – Final Design**

The project was previously determined by the Board to be categorically exempt under Classes 1 and 6 (Sections 15301 and 15306 of the State CEQA Guidelines) on February 11, 2014. With the current action, there is no substantial change proposed since the original project was first approved in 2014. Hence, the previous environmental documentation in conjunction with the project fully complies with CEQA and the State CEQA Guidelines. Accordingly, no further CEQA documentation is necessary for the Board to act with regard to the proposed action.

The CEQA determination is: Determine that the proposed action has been previously addressed in the 2014 categorical exemptions (Classes 1 and 6; Sections 15301 and 15306 of the State CEQA Guidelines) and that no further environmental analysis or documentation is required.

**Project No. 3 – Lake Mathews Hydroelectric Plant Building Repairs – Award Construction**

The project was previously determined by the Board to be categorically exempt under Classes 1 and 2 (Sections 15301 and 15302 of the State CEQA Guidelines) on February 11, 2014. With the current action, there is no substantial change proposed since the original project was first approved in 2014. Hence, the previous environmental documentation in conjunction with the project fully complies with CEQA and the State CEQA Guidelines. Accordingly, no further CEQA documentation is necessary for the Board to act with regard to the proposed action.

The CEQA determination is: Determine that the proposed action has been previously addressed in the 2014 categorical exemptions (Classes 1 and 2; Sections 15301 and 15302 of the State CEQA Guidelines) and that no further environmental analysis or documentation is required.

**CEQA determinations for Option #2:****Project No. 2 – Lake Mathews Forebay Repairs – Final Design**

The project was previously determined by the Board to be categorically exempt under Classes 1 and 6 (Sections 15301 and 15306 of the State CEQA Guidelines) on February 11, 2014. With the current action, there is no substantial change proposed since the original project was first approved in 2014. Hence, the previous environmental documentation in conjunction with the project fully complies with CEQA and the State CEQA Guidelines. Accordingly, no further CEQA documentation is necessary for the Board to act with regard to the proposed action.

The CEQA determination is: Determine that the proposed action has been previously addressed in the 2014 categorical exemptions (Classes 1 and 6; Sections 15301 and 15306 of the State CEQA Guidelines) and that no further environmental analysis or documentation is required.

**Project No. 3 – Lake Mathews Hydroelectric Plant Building Repairs – Award Construction**

The project was previously determined by the Board to be categorically exempt under Classes 1 and 2 (Sections 15301 and 15302 of the State CEQA Guidelines) on February 11, 2014. With the current action, there is no substantial change proposed since the original project was first approved in 2014. Hence, the previous environmental documentation in conjunction with the project fully complies with CEQA and the State CEQA Guidelines. Accordingly, no further CEQA documentation is necessary for the Board to act with regard to the proposed action.

The CEQA determination is: Determine that the proposed action has been previously addressed in the 2014 categorical exemptions (Classes 1 and 2; Sections 15301 and 15302 of the State CEQA Guidelines) and that no further environmental analysis or documentation is required.

**CEQA determination for Option #3:**

None required

**Board Options**

---

**Option #1**

Adopt the CEQA determinations that the proposed actions are categorically exempt, and

- a. Appropriate \$1.65 million;
- b. Authorize construction of structural repairs to the Lake Mathews Hydroelectric Plant; and
- c. Authorize design of two rehabilitation projects at Lake Mathews.

**Fiscal Impact:** \$1.65 million of capital funds under Appropriation Nos. 15441 and 15480

**Business Analysis:** This option will rehabilitate aging infrastructure and enhance the reliability of water deliveries from Lake Mathews to the Weymouth and Diemer plants.

**Option #2**

Adopt the CEQA determinations that the proposed actions are categorically exempt, and

- a. Appropriate \$790,000;
- b. Authorize construction of structural repairs to the Lake Mathews Hydroelectric Plant;
- c. Authorize design of repairs to the Lake Mathews forebay; and
- d. Do not authorize design of electrical upgrades at Lake Mathews.

**Fiscal Impact:** \$790,000 of capital funds under Appropriation No. 15441

**Business Analysis:** This option will rehabilitate deteriorating structures at Lake Mathews. This option would forego an opportunity to reduce the risk of unplanned electrical outages at Lake Mathews, and may result in more costly repairs and maintenance activities.

**Option #3**

Do not proceed with the three rehabilitation projects at this time.

**Fiscal Impact:** None

**Business Analysis:** This option would forego an opportunity to reduce the risk of unplanned electrical outages and interruption of water deliveries from Lake Mathews. This option could lead to higher repair costs, more extensive repairs, and unplanned shutdowns for repairs.

**Staff Recommendation**

---

Option #1

  
 \_\_\_\_\_  
 Gordon Johnson  
 Manager/Chief Engineer  
 Engineering Services

2/21/2017  
 \_\_\_\_\_  
 Date

  
 \_\_\_\_\_  
 Jeffrey Kightlinger  
 General Manager

2/27/2017  
 \_\_\_\_\_  
 Date

**Attachment 1 – Financial Statements**

**Attachment 2 – Abstract of Bids**

**Attachment 3 – Listing of Subcontractors for Low Bidder**

**Attachment 4 – Subconsultants for Agreement with HDR Engineering**

**Attachment 5 – Location Map**

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

A breakdown of Board Action No. 77 for Appropriation No. 15441 for repairs to the forebay and hydroelectric plant at Lake Mathews<sup>1</sup> is as follows:

	<b>Previous Total Appropriated Amount (Dec. 2016)</b>	<b>Current Board Action No. 77 (Mar. 2017)</b>	<b>New Total Appropriated Amount</b>
Labor			
Studies & Investigations	\$ 4,589,914	\$ -	\$ 4,589,914
Final Design	6,186,293	188,000	6,374,293
Owner Costs (Program mgmt.)	8,205,123	121,000	8,326,123
Submittals Review & Record Drwgs	1,462,670	20,000	1,482,670
Construction Inspection & Support	6,501,550	32,000	6,533,550
Metropolitan Force Construction	12,314,710	-	12,314,710
Materials & Supplies	3,453,040	-	3,453,040
Incidental Expenses	1,244,900	-	1,244,900
Professional/Technical Services	3,494,000	-	3,494,000
HDR Engineering	-	125,000	125,000
Right-of-Way	1,150,000	-	1,150,000
Equipment Use	330,200	-	330,200
Contracts	43,571,871	-	43,571,871
O'Connell Engineering	-	207,800	207,800
Remaining Budget	3,994,729	96,200	4,090,929
<b>Total</b>	<b>\$ 96,499,000</b>	<b>\$ 790,000</b>	<b>\$ 97,289,000</b>

**Funding Request**

<b>Appropriation Name:</b>	Conveyance and Distribution System Rehabilitation – FY 2006/07 Through FY 2011/12		
<b>Source of Funds:</b>	Revenue Bonds, Replacement and Refurbishment or General Funds		
<b>Appropriation No.:</b>	15441	<b>Board Action No.:</b>	77
<b>Requested Amount:</b>	\$ 790,000	<b>Budget Page No.:</b>	212
<b>Total Appropriated Amount:</b>	\$ 97,289,000	<b>Total Appropriation Estimate:</b>	\$ 182,700,000

<sup>1</sup>The total amount expended to date for the Lake Mathews forebay repairs is \$440,132 and for the hydroelectric plant repairs is \$224,132. The total estimated cost to complete these repairs, including the amount appropriated to date, current funds requested, and future construction costs, is anticipated to range from \$4.1 million to \$4.6 million.

**Financial Statement for Conveyance and Distribution System Rehabilitation Appropriation – FY 2012/13 Through 2017/18**

A breakdown of Board Action No. 29 for Appropriation No. 15480 for electrical upgrades at Lake Mathews <sup>1</sup> is as follows:

	<b>Previous Total Appropriated Amount (Jan. 2017)</b>	<b>Current Board Action No. 29 (Mar. 2017)</b>	<b>New Total Appropriated Amount</b>
Labor			
Studies & Investigations	\$ 2,042,000	\$ 735,000	\$ 2,777,000
Final Design	7,123,000	-	7,123,000
Owner Costs (Program mgmt.)	3,740,779	75,000	3,815,779
Submittals Review & Record Drwgs	900,000	-	900,000
Construction Inspection & Support	2,759,000	-	2,759,000
Metropolitan Force Construction	3,858,000	-	3,858,000
Materials & Supplies	1,711,000	-	1,711,000
Incidental Expenses	162,000	-	162,000
Professional/Technical Services	2,555,000	-	2,555,000
Right-of-Way	280,000	-	280,000
Equipment Use	5,000	-	5,000
Contracts	16,564,705	-	16,564,705
Remaining Budget	3,519,516	50,000	3,569,516
<b>Total</b>	<b>\$ 45,220,000</b>	<b>\$ 860,000</b>	<b>\$ 46,080,000</b>

**Funding Request**

<b>Appropriation Name:</b>	Conveyance and Distribution System Rehabilitation – FY 2012/13 Through FY 2017/18		
<b>Source of Funds:</b>	Revenue Bonds, Replacement and Refurbishment or General Funds		
<b>Appropriation No.:</b>	15480	<b>Board Action No.:</b>	29
<b>Requested Amount:</b>	\$ 860,000	<b>Budget Page No.:</b>	214
<b>Total Appropriated Amount:</b>	\$ 46,080,000	<b>Total Appropriation Estimate:</b>	\$ 332,500,000

<sup>1</sup> This is the initial action for electrical upgrades at Lake Mathews.

**The Metropolitan Water District of Southern California**  
**Abstract of Bids Received on January 25, 2017 at 2:00 P.M.**  
**Specifications No. 1851**  
**Lake Mathews Hydroelectric Plant Repairs**

This work consists of removing spalled concrete and corroded reinforcing steel from the Lake Mathews Hydroelectric Plant, and replacing with new concrete and steel reinforcement.

Engineer's Estimate: \$340,000

<b>Bidder and Location</b>	<b>Total</b>	<b>SBE \$</b>	<b>SBE %</b>	<b>Met SBE<sup>1</sup></b>
<b>O'Connell Engineering, Winchester CA</b>	<b>\$207,800</b>	<b>\$32,000</b>	<b>15.4</b>	<b>Yes</b>
Kaveh Engineering, Yorba Linda CA	\$244,888	-	-	-
Metro Builders, Newport Beach CA	\$247,200	-	-	-
Robert D. Gosney Const., Hesperia CA	\$268,724	-	-	-
Caltec Corporation, Westminster CA	\$279,000	-	-	-
J. F. Shea Construction, Walnut CA	\$291,944	-	-	-
Unispec, San Pedro CA	\$296,700	-	-	-

<sup>1</sup> Small Business Enterprise (SBE) participation was established at 14% for this contract.

**The Metropolitan Water District of Southern California**

**Subcontractors for Low Bidder**

**Specifications No. 1851  
Lake Mathews Hydroelectric Plant Repairs**

Low Bidder: O'Connell Engineering

<b>Subcontractor and Location</b>
Profuzion Certified Welding, Riverside CA
Archie Ivy Inc., Huntington Beach CA

**The Metropolitan Water District of Southern California****Subconsultants for Agreement with HDR Engineering  
Agreement No. 140027**

<b>Subconsultant and Location</b>
Beyaz & Patel Inc, San Diego, CA
MWA Architects Inc, San Francisco, CA
Ninyo & Moore, Irvine CA
ProjectLine Technical Services, Corona Del Mar, CA
SA & Associates, Arcadia CA
TJC & Associates, Rancho Cordova, CA

# Distribution System

