THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

BOARD ACTION

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

9/11/2018 Board Meeting

8-1

Subject

Adopt CEQA determination and appropriate $6.68 million; and authorize upgrades to three hydroelectric power plants (Appropriation No. 15458)

Executive Summary

This action authorizes the rehabilitation of components of three hydroelectric power plants that have deteriorated over time and need to be upgraded. The planned work includes: (1) design and construction to refurbish the turbine and generator at Red Mountain Power Plant; (2) design to refurbish the turbines and control equipment at Foothill Power Plant; and (3) completion activities for the turbine replacement project at Yorba Linda Power Plant.

Timing and Urgency

Recent inspections conducted by Metropolitan staff have identified that components of the turbines and generators at Foothill and Red Mountain Power Plants need to be refurbished. While the hydroelectric plants continue to perform reliably today, the turbines, generators, and supporting equipment at both plants are exhibiting signs of age-related wear and need to be refurbished. In addition, Foothill Power Plant requires an upgrade of its instrumentation and control equipment. The existing relay-based equipment has become unreliable and will be replaced with a modern microprocessor-based system. Staff recommends proceeding with the work at these two facilities to reduce the risk of damage, unplanned shutdowns, and the corresponding loss of revenue. At Yorba Linda Power Plant, the long-term modification of the turbine is nearing completion and the plant has returned to service. The remaining work includes procurement of spare parts, configuration of the facility's control system to integrate hydraulic control of the Yorba Linda Feeder, and installation of the final enclosure for components of the generator. This action provides funding for the completion activities in order to close out that project.

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 2018/19.

Details

Background

Metropolitan owns and operates 16 small hydroelectric power plants which have produced an average annual revenue of $24 million over the past ten years. The energy generated by these plants is certified as California Renewable and is sold to several electric utility companies. The hydroelectric plants contain mechanical equipment that includes: (1) wicket gates or needle valves to control flow entering the turbines; (2) conical and butterfly valves to isolate equipment items; (3) turbines; (4) generators; (5) auxiliary systems that include cooling water, lubricating oil, and compressed air; and (6) control systems that consist of hard-wired panels, industrial relays, and process boards.

The majority of Metropolitan's hydroelectric plants were constructed in the late 1970s and early 1980s. Staff regularly monitors and inspects the hydroelectric plants, and routinely performs preventive maintenance on the

equipment. While these hydroelectric facilities have received regular maintenance, many have reached the point where mechanical refurbishment and electrical upgrades are necessary.

The planned approach for refurbishing mechanical components of the hydroelectric plants is for Metropolitan forces to disassemble, test, and perform internal condition assessments of the equipment. These facilities must be removed from service and disassembled to fully identify the extent of the rehabilitation work required. Once disassembled, specialized contracts with well-defined scopes for repair, refurbishment, or replacement of individual components will be issued under the General Manager's Administrative Code authority. This approach typically provides the shortest shutdown duration for a facility.

While Metropolitan's hydroelectric plants were considered state-of-the-art at the time they were constructed, the instrumentation and control equipment for these facilities is now often outdated, and can be difficult to maintain or repair. The existing control equipment for the turbines and generators consists primarily of analog relays, while the current industry standard is for digital, microprocessor-based controls that fully integrate with Metropolitan's Supervisory Control And Data Acquisition (SCADA) system. While planning the rehabilitation work for each hydroelectric plant, staff assesses the condition and remaining useful life of the plant's instrumentation and control equipment. At Foothill Power Plant, in order to maintain reliability of the facility, staff recommends replacement of the existing control equipment with a digital, microprocessor-based system.

Project No. 1 – Red Mountain Power Plant Rehabilitation – Design and Construction ($4,660,000)

Red Mountain Power Plant is located along San Diego Pipeline No. 5 in the community of Fallbrook. The plant receives untreated water from Lake Skinner and can generate up to 5.9 megawatts (MW) of power through a single reaction turbine and generator. Depending on pipeline flowrates, the daily revenues can range from $2,000 to $5,500. While the plant has operated reliably for nearly 30 years and has received regular maintenance, the turbine and generator are exhibiting signs of wear. In addition, the turbine's inlet pipe is presently leaking at a pipe coupling. The recommended refurbishment work includes refurbishment or replacement of the turbine's mechanical seal, oil and air coolers, bearings, wear rings, lubricating system, scroll case, wicket gates, generator rotor and stator, and pipe coupling. Since the extent of needed repairs cannot be fully assessed until the machines are disassembled, the specific rehabilitation work will be confirmed by Metropolitan staff during a shutdown of the facility. Staff recommends proceeding with the refurbishment at this time so that major elements of the work can be completed during a scheduled shutdown of San Diego Pipeline No. 5 in early 2019.

Planned design phase activities include: (1) conducting field investigations; (2) preparing drawings and specifications for the repairs; (3) procurement of replacement components and sleeve couplings; and (4) testing for hazardous materials. All design and procurement activities will be performed by Metropolitan staff, except for hazardous material testing, which will be performed by a specialized consultant.

Metropolitan force construction activities will include: (1) disassembly of the turbine and generator; (2) sandblasting and recoating of the turbine inlet pipe, scroll case, draft tube, wicket gates, and component covers and housings; (3) replacement of turbine bearings, air cooler, seals, bushings, gaskets, rings, and hardware; (4) reassembly of the generator; (5) fabrication of a rotor stand; (6) testing and recommissioning of the plant; and (7) fabrication of a new inlet spool piece. Specialty contractors will refurbish the bearings, coolers, and lubrication system, and will align the mechanical components.

This action appropriates $4.66 million and authorizes design and construction to refurbish the turbine and generator at Red Mountain Power Plant. The requested funds include: $280,000 for design activities and technical assessments; $2,208,000 for the Metropolitan force activities described above; $508,000 for materials; $765,000 for mechanical support by specialty contractors; $92,000 for procurement activities, preparation of record drawings, and project management; $122,000 for review of submittals; and $685,000 for remaining budget. The construction contracts for refurbishment of the generator components are planned to be awarded under the General Manager's Administrative Code authority to award contracts of $250,000 or less.

The total estimated cost to refurbish the mechanical equipment at Red Mountain Power Plant is $4.66 million.

Project No. 2 – Foothill Power Plant Rehabilitation – Design Phase ($920,000)

Foothill Power Plant was constructed in 1981 and is located adjacent to the state Department of Water Resources' Castaic Lake facilities. The power plant receives untreated State Water Project flows from the lake and discharges into the Foothill Feeder. Water is then conveyed to the Joseph Jensen Water Treatment Plant in Granada Hills. Foothill Power Plant can produce up to 9.1 MW of electric power through its two reaction turbines. Depending on pipeline flowrates, the daily revenues can range from $3,000 to $7,500.

In March 2012, Metropolitan's Board authorized design to replace electrical components and rehabilitate the cooling water piping at Foothill Power Plant. In December 2014, the Board authorized design of seismic upgrades at the power plant. A recent condition assessment of the facility identified significant wear of the plant's mechanical components such as the turbine, wicket gates, and runners. Instead of continuing to refurbish individual components and systems, staff recommends proceeding with a more comprehensive rehabilitation of the facility. The comprehensive rehabilitation will address structural, mechanical, and instrumentation and control upgrades. Much of the instrumentation and control equipment is failing, and replacement parts are not available. As a result, staff recommends replacing the existing control equipment with a modern, microprocessor-based control system. The planned work includes: (1) replacement of the existing failing control equipment with new microprocessor-based components; and (2) replacement of deteriorated mechanical components including the worn wicket gates and runners for both turbines.

Final design activities for instrumentation and control equipment upgrades will include: (1) preparation of control logic, drawings, and specifications for the new system; (2) development of a construction cost estimate; (3) value engineering review; (4) hazardous materials testing; and (5) receipt of competitive bids. Design of the instrumentation and control equipment upgrades will be performed by Stantec Consulting Services, Inc., while the hazardous material testing and value engineering will be performed by specialized consultants. Both of these agreements are described below. All other work will be performed by Metropolitan staff.

Design activities for refurbishment of the turbines will include: (1) conducting field investigations and condition assessments of the equipment; (2) preparation of drawings and specifications for repairs to the turbines' components; and (3) receipt of multiple competitive bids for specialized repairs. Metropolitan staff will perform all design activities.

This action appropriates $920,000 and authorizes design of instrumentation and control equipment upgrades and refurbishment of two turbines at Foothill Power Plant. The requested funds include $145,000 for the design activities by Stantec Consulting Services, Inc.; $264,000 for the design activities by Metropolitan staff; $85,000 for value engineering and hazardous materials testing; $240,000 for bidding, project management, and technical review; and $186,000 for remaining budget.

The anticipated final design cost as a percentage of the estimated construction cost is approximately 9.1 percent. Engineering Services' goal for design of projects with construction greater than $3 million is 9 to 12 percent. For this project, the construction cost is anticipated to range from $4.5 million to $5 million. The total estimated cost for the comprehensive rehabilitation of Foothill Power Plant, including the amount appropriated to date, current funds requested, and future construction costs, is anticipated to range from $25 million to $30 million. Staff will return to the Board at a later date for award of a construction contract.

Project No. 3 – Yorba Linda Power Plant Modifications, Completion Activities – Design and Procurement ($1,100,000)

The Yorba Linda Feeder conveys a blend of untreated water from the State Water Project and the Colorado River Aqueduct to the Diemer plant. Due to its high delivery pressure, flows from the Yorba Linda Feeder are controlled through the Yorba Linda Pressure Control Structure and the Yorba Linda Power Plant, both of which are located onsite at the Diemer plant. The Yorba Linda Power Plant has a generation capacity of 5 MW through its single reaction turbine and generator. Depending on pipeline flowrates, daily revenues can range from $4,500 to $6,800. In November 2013, Metropolitan's Board awarded a construction contract to replace the plant's turbine and generator.

Primary construction and commissioning of the new unit are now complete, and the plant has returned to service. Several completion activities remain in order to close out the project. These activities include: (1) procurement of spare parts for the turbine, generator, and ancillary equipment; (2) integration of the plant's control system with Metropolitan's SCADA system for hydraulic control of the Yorba Linda Feeder; (3) extension of the Diemer plant's public address system; and (4) installation of the final enclosure for components of the generator. All activities will be performed by Metropolitan staff.

This action appropriates $1.1 million and authorizes completion activities for modifications to the Yorba Linda Power Plant. The requested funds include $610,000 for the design and field activities described above; $80,000 for bidding and project management; $268,000 for procurement of spare parts; and $142,000 for remaining budget.

The total estimated cost to complete the modifications to the Yorba Linda Power Plant, including the amount appropriated to date, current funds requested, and future construction costs, is anticipated to range from $19 million to $21 million. Staff will return to the Board at a later date for award of a contract to construct an enclosure structure for the generator.

Engineering Design Services (Stantec Consulting Services, Inc.) – No Action Required

Final design for upgrade of the instrumentation and control equipment at Foothill Power Plant will be conducted by Stantec Consulting Services, Inc., under an existing board-authorized agreement. Stantec Consulting Services, Inc. was prequalified to provide design services through a competitive process via Request for Qualifications No. 1131. Subsequently, Stantec Consulting Services, Inc. was selected based on its previous experience with hydroelectric plants and the highly specialized nature of this work. The scope of services will include: (1) detailed design of the control system; (2) preparation of drawings and specifications; (3) development of a construction cost estimate; (4) technical assistance during the bid period; and (5) value engineering support. The estimated cost for these activities is $145,000. No amendment to the existing agreement with Stantec Consulting Services, Inc. is required for this work.

For this agreement, Metropolitan established a Small Business (SBE) participation level of 20 percent. Stantec Consulting Services, Inc. has agreed to meet this level of participation. The subconsultants for this agreement are listed in **Attachment 2.**

Other Professional Services Support – No Action Required

The agreements for third-party value engineering and hazardous materials testing are planned to be executed under the General Manager's Administrative Code authority to award contracts of $250,000 or less. The estimated cost for this support is $55,000 for the third-party value engineering review and $30,000 for hazardous material testing. No board action is required for these agreements.

Summary

This action appropriates $6.68 million and authorizes: (1) design and construction to refurbish the mechanical equipment at Red Mountain Power Plant; (2) final design to rehabilitate the turbines and control equipment at Foothill Power Plant; and (3) completion activities for the turbine/generator replacement project at Yorba Linda Power Plant.

These projects are included within capital Appropriation No. 15458, the Hydroelectric Power Plant Improvements Appropriation, which was initiated in fiscal year 2008/09. With the present action, the total funding for Appropriation No. 15458 will increase from $10,897,000 to $17,577,000.

These projects have been evaluated and recommended by Metropolitan's CIP Evaluation Team, and funds have been included in the fiscal year 2018/19 capital budget. See **Attachment 1** for the Financial Statement, **Attachment 2** for the listing of Subconsultants for the Agreement with Stantec Consulting Services, Inc., and **Attachment 3** for the Location Map.

Project Milestones

January 2019 – April 2019 – Planned shutdown of San Diego Pipeline No. 5

February 2019 – Completion of final design to rehabilitate Foothill Power Plant

June 2019 – Delivery of spare parts for the turbine/generator at Yorba Linda Power Plant

October 2019 – Completion of construction to rehabilitate Red Mountain Power Plant

Policy

Metropolitan Water District Administration Code Section 5108: Appropriations

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

By Minute Item 48993, dated March 13, 2012, the Board authorized final design to rehabilitate Foothill and Sepulveda Canyon Hydroelectric Plants; and preliminary design to rehabilitate San Dimas and Venice Hydroelectric Plants.

By Minute Item 49597, dated November 19, 2013, the Board awarded a contract to replace the hydroelectric turbine at Yorba Linda Power Plant.

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 involves the funding, design, minor alteration, and replacement of existing public facilities with negligible or no expansion of use and no possibility of significantly impacting the physical environment. The proposed action also consists of basic data collection and resource evaluation activities, which do 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 under Classes 1, 2 and 6 Categorical Exemptions (Class 1 Section 15301; Class 2 Section 15302; and Class 6 Section 15306 of the State CEQA Guidelines).

The CEQA determination is: Determine that the proposed action is categorically exempt under Class 1 Section 15301; Class 2 Section 15302; and Class 6 Section 15306 of the State CEQA Guidelines.

CEQA determination for Option #2:

None required

Board Options

Option #1

Adopt the CEQA determination that the proposed action is categorically exempt, and

a. Appropriate $6.68 million;
b. Authorize design and construction to rehabilitate Red Mountain Power Plant;
c. Authorize final design and procurement to rehabilitate Foothill Power Plant; and
d. Authorize completion activities for the modification of Yorba Linda Power Plant.

Fiscal Impact: $6.68 million in capital funds under Appropriation No. 15458
Business Analysis: This option will enhance the reliability of the three hydroelectric plants, reduce the risk of damage to equipment, and reduce the risk of costly repairs and unplanned shutdowns.

Option #2

Do not proceed with the upgrade projects at this time.

Fiscal Impact: None initially

Business Analysis: This option would forego the opportunity to enhance the reliability of the three hydroelectric plants, which could lead to loss of revenue of up to $20,000 per day, higher repair costs, and unplanned shutdowns.

Staff Recommendation

Option #1

8/27/2018

Michael J. Rojas *Date*
Interim Manager/Chief Engineer
Engineering Services

8/28/2018

Jeffrey Kightlinger *Date*
General Manager

Attachment 1 – Financial Statement

Attachment 2 – Subconsultants for Agreement with Stantec Consulting Services, Inc.

Attachment 3 – Location Map

Ref# es12652690

Financial Statement for Hydroelectric Power Plant Improvements Appropriation

A breakdown of Board Action No. 10 for Appropriation No. 15458[1] is as follows:

	Previous Total Appropriated Amount (Jan. 2018)	Current Board Action No. 10 (Sep. 2018)	New Total Appropriated Amount
Labor			
Studies & Investigations	$ 1,664,000	$ 220,000	$ 1,884,000
Final Design	918,000	934,000	1,852,000
Owner Costs (Bidding & program mgmt.)	991,000	412,000	1,403,000
Submittals Review & Record Drwgs.	-	122,000	122,000
Metropolitan Force Construction	4,856,525	2,182,000	7,038,525
Materials & Supplies	589,000	776,000	1,365,000
Incidental Expenses	41,000	12,000	53,000
Professional/Technical Services	993,000	-	993,000
Stantec Consulting Services, Inc.	-	145,000	145,000
Hazardous material testing firm	-	30,000	30,000
Value engineering firm	-	55,000	55,000
Equipment Use	59,000	14,000	73,000
Contracts	325,000	-	325,000
Specialty contractors for refurbishment of mech. components	-	765,000	765,000
Remaining Budget	460,475 [2]	1,013,000	1,473,475
Total	**$ 10,897,000**	**$ 6,680,000**	**$ 17,577,000**

Funding Request

Appropriation Name:	Hydroelectric Power Plant Improvements		
Source of Funds:	Revenue Bonds, Replacement and Refurbishment or General Funds		
Appropriation No.:	15458	**Board Action No.:**	10
Requested Amount:	$ 6,680,000	**Budget Page No.:**	103
Total Appropriated Amount:	$ 17,577,000	**Total Appropriation Estimate:**	$ 55,425,000

[1] This is the initial action to refurbish the generator at Red Mountain Power Plant. The total estimated cost to complete that work is approximately $4.66 million.

The total amount expended to date to rehabilitate Foothill Power Plant project is approximately $1.1 million. The total estimated cost to complete the rehabilitation work, including the amount appropriated to date, current funds requested, and future construction costs, is anticipated to range from $25 million to $30 million.

The total amount expended to date to modify the Yorba Linda Power Plant is approximately $17.1 million. The total estimated cost to complete the modifications, including the amount appropriated to date, current funds requested, and future construction costs, is anticipated to range from $19 million to $21 million.

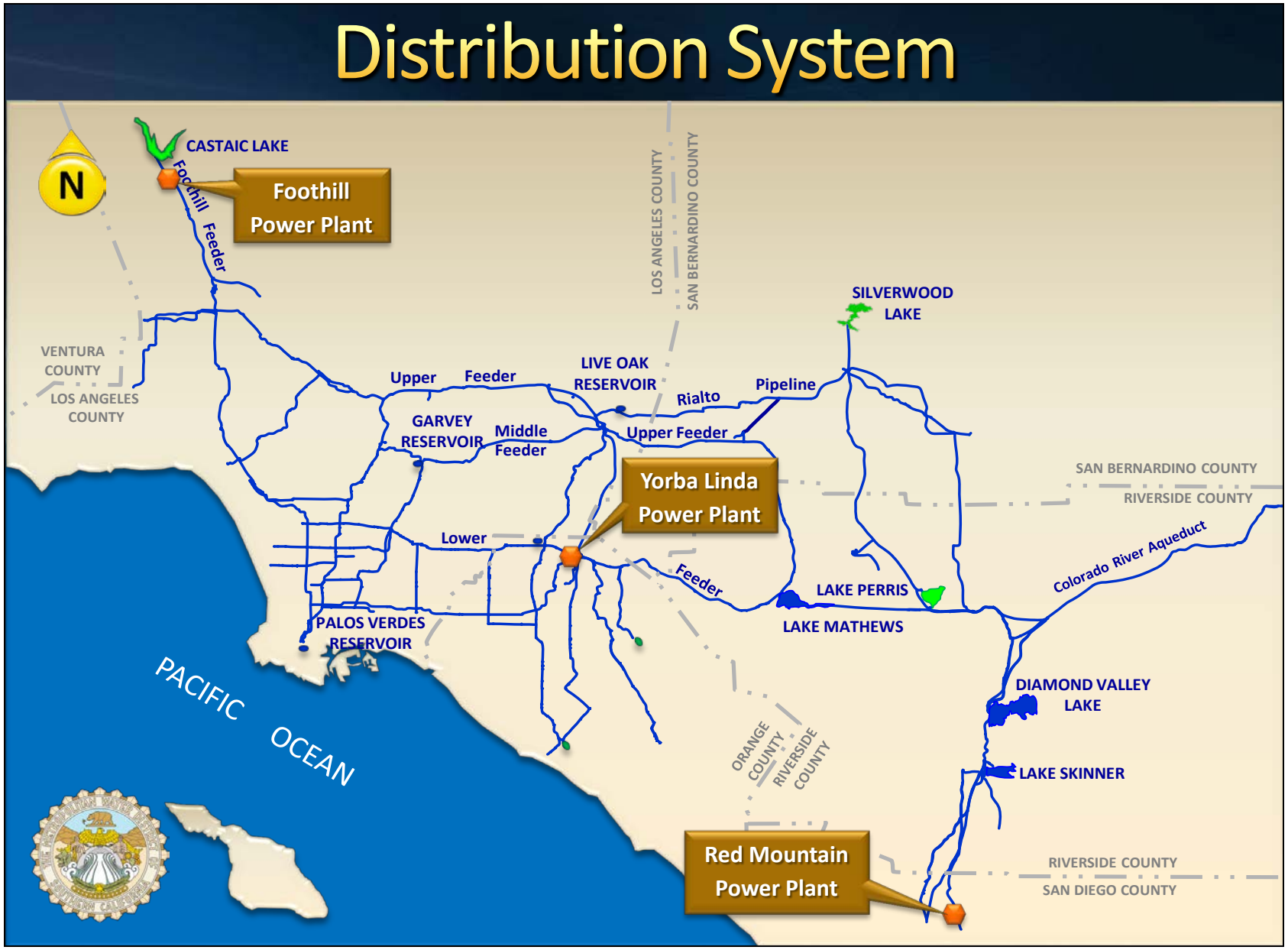
[2] Reflects transfer of $1,169 to Remaining Budget from the hydroelectric power plant reliability assessment, which was completed under budget; and $135,000 from Remaining Budget for hazardous material abatement at Carbon Creek Pressure Control Structure.

The Metropolitan Water District of Southern California

Subconsultants for Agreement with Stantec Consulting Services, Inc.

Agreement No. 140025

Subconsultant and Location
Power-Tech Engineers, Inc., Walnut, CA
Integrated Engineering Management, Los Angeles, CA
ProjectLine Technical Services, Inc., Costa Mesa, CA
Trussell Technologies, Inc., Pasadena, CA
Paul Redvers Brown, Inc., Carlsbad, CA
The Terrazas Group, LLC, Pasadena, CA


Distribution System
N
CASTAIC LAKE
Foothill Feeder
Foothill Power Plant
VENTURA COUNTY
LOS ANGELES COUNTY
LOS ANGELES COUNTY
SAN BERNARDINO COUNTY
SILVERWOOD LAKE
Upper Feeder
LIVE OAK RESERVOIR
Rialto Pipeline
GARVEY RESERVOIR
Middle Feeder
Upper Feeder
Yorba Linda Power Plant
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
Red Mountain Power Plant
RIVERSIDE COUNTY
SAN DIEGO COUNTY