THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Board Action

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

5/13/2025 Board Meeting

8-1

Subject

Award a $131 million procurement contract to Siemens Energy Inc. to furnish 35 high-voltage power transformers; authorize the General Manager to execute change orders for the CRA transformer procurement contract up to an aggregate amount not to exceed $42.5 million; and authorize an increase of $6.5 million to an agreement with HDR Engineering Inc. for a new not-to-exceed amount of $8.2 million for final design services to replace the high-voltage transformers at the five CRA pumping plants; the General Manager has determined that the proposed action is exempt or otherwise not subject to CEQA

Executive Summary

The Colorado River Aqueduct (CRA) system utilizes 69 kV and 230 kV transformers to step down power from Hoover and Parker Dams to the lower voltages used to run the main pumps and other equipment at the five CRA pumping plants. The existing transformers have exceeded their design life, are currently showing signs of deterioration, and require replacement to maintain reliable CRA water deliveries.

This action: (1) awards a $131 million procurement contract to Siemens Energy Inc. to furnish 35 high-voltage power transformers; (2) authorizes the General Manager to execute change orders for the CRA transformer procurement contract up to an aggregate amount not to exceed $42.5 million; and (3) authorizes an increase of $6.5 million to an existing agreement with HDR Engineering Inc. to perform final engineering design services to replace the existing high-voltage power transformers at the five CRA pumping plants with the Metropolitan-furnished transformers that are included in this board action. See **Attachment 1** for the Allocation of Funds, **Attachment 2** for the Listing of Subconsultants, **Attachment 3** for the Location Map, and **Attachment 4** for the Key Agreement Terms.

Proposed Recommendation and Options

Staff Recommendation: Option #1

Option #1

a. Award a $131 million procurement contract to Siemens Energy Inc. to furnish 35 high-voltage power transformers.
b. Authorize the General Manager to execute change orders for the CRA transformer procurement contract up to an aggregate amount not to exceed $42.5 million.
c. Authorize an increase of $6.5 million to an existing agreement with HDR Engineering Inc. for a new not-to-exceed amount of $8.2 million for final engineering design services to replace the high-voltage power transformers at all five CRA pumping plants.

Fiscal Impact: Expenditure of $149.2 million in capital funds. Approximately $5 million will be incurred in the current biennium and has been previously authorized. The remaining funds from this action will be accounted for in subsequent biennial budgets.
Business Analysis: This option will enhance the reliability of the CRA by replacing key elements of its electric power systems.

Option #2

Do not proceed with the project at this time. Staff will continue to monitor the operational status of the transformers.

Fiscal Impact: None

Business Analysis: This option would defer the replacement of the CRA's high-voltage power transformers, which would forego an opportunity to reduce the risk of unplanned outages of the CRA.

Alternatives Considered

During the planning process for this project, staff evaluated replacing the existing single-phase transformers with new three-phase transformers. This option could reduce the number of transformer units at each plant from seven to three, which could potentially lower procurement and maintenance costs. However, this approach would require extensive modifications to upstream and downstream electrical facilities at each pumping plant, including the 230 kV and 69 kV switchyards as well as the 6.9 kV switch houses. After careful evaluation, staff concluded that retaining the single-phase transformer design is the most cost-effective and efficient approach. This approach also minimizes outages and disruptions to CRA water deliveries during construction.

During the preliminary design phase, staff also considered rehabilitating the existing transformer cranes, as the new transformers are expected to weigh less than the current equipment. However, due to the cranes' age, their general condition, limited availability of spare parts, and the current structural codes, rehabilitation was deemed neither feasible nor economical. Staff also evaluated the use of mobile cranes as an alternative to replacing the existing stationary cranes. Outreach to local vendors confirmed that utilizing mobile cranes, where feasible, would be more cost-effective compared to rehabilitating all five existing stationary cranes. This information led to the decision to replace the stationary cranes at only two of the plants and utilize mobile cranes at the three pumping plants that have adequate space for mobile crane operation.

Applicable Policy

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

Metropolitan Water District Administrative Code Section 11104: Delegation of Responsibilities

Metropolitan Water District Administrative Code Section 8150: Best Value Procurement

Related Board Actions/Future Actions

By Minute Item 52330, dated April 13, 2021, the Board authorized preliminary design to replace the CRA main pump transformers.

By Minute Item 53598, dated April 9, 2024, the Board appropriated a total of $636.6 million for projects identified in the Capital Investment Plan for Fiscal Years 2024/25 and 2025/26.

Board Informational Item 9-2 dated January 14, 2025, Update on the Colorado River Aqueduct High-Voltage Transformers Replacement Project.

Award cranes construction contract (future)

Award transformer installation contract(s) (future)

Summary of Outreach Completed

Staff conducted a comprehensive global outreach to identify and prequalify transformer manufacturers with the technical capabilities, resources, and proven expertise to manufacture custom high-voltage power transformers. In addition, staff engaged with other agencies, such as the U.S. Bureau of Reclamation and the Department of Water Resources, that regularly procure custom high-voltage power transformers to gather insights into their procurement practices and experiences with the current market conditions.

California Environmental Quality Act (CEQA)

CEQA determination for Option #1:

On April 13, 2021, the project was determined to be exempt from CEQA pursuant to Sections 15301, 15302, 15303, 15304, and 15311 of the State CEQA Guidelines. The current board action does not result in any substantial change to the project. Accordingly, no further CEQA determinations or documentation are necessary.

CEQA determination for Option #2:

None required

Details and Background

Background

The CRA is a 242-mile-long conveyance system that transports water from the Colorado River to Lake Mathews. It consists of five pumping plants, 124 miles of tunnels, siphons, and reservoirs, 63 miles of canals, and 44 miles of cut-and-cover conduits. The aqueduct was constructed in the 1930s and was placed into service in 1941.

Electrical power for the CRA's five pumping plants is transmitted via 237 miles of high-voltage lines from Hoover and Parker Dams. Higher voltages are used on overhead power lines to increase transmission efficiency, and the voltage is then decreased (stepped down) at the CRA pumping plants to match the lower voltages of plant equipment. Four pumping plants have incoming voltages of 230 kV, while the incoming voltage at the Intake Pumping Plant is 69 kV. Each plant uses seven single-phase power transformers to step down the voltage from its incoming voltage to the operating voltage of 6.9 kV, which is used to operate the main pumps and other equipment. The aqueduct system utilizes 35 high-voltage transformers distributed across all five pumping plants. At each plant, four transformers were installed in 1939 with the initial construction of the aqueduct, and the remaining three transformers were installed in 1959 with the aqueduct's expansion. The seven transformers at each plant are arranged in two banks of three transformers, each with one common spare unit. Each transformer bank powers up to five pump units, or approximately 63 percent of the aqueduct's capacity.

While a typical power transformer's service life is expected to be 40 to 50 years, the CRA's transformers have operated continuously for nearly 85 years due to thorough maintenance and ideal operating conditions in a dry climate. In the mid-1980s, a significant effort was undertaken to rehabilitate and refurbish the original transformers installed in 1939. Most transformers continue to operate reliably, but urgent maintenance is becoming more frequent. In April 2025, urgently needed maintenance of a transformer bushing at the Hinds plant resulted in an unplanned CRA flow reduction for over a week. Also, recent inspections have identified elevated gas levels in the transformer oil, an early indicator of equipment failure. Analysis of this data, along with operational performance and non-destructive microscopic examinations of selected transformers' insulating materials, indicates that the transformers are nearing the end of their service life and require replacement to ensure reliable operation of the CRA.

Due to the specialized nature of the transformers and the continued strong demand for electrical equipment on a global basis, long lead times are required for manufacturing this equipment. As such, staff recommends the transformers be procured before the installation contract is ready for advertisement. This approach ensures the transformers are available when the installation contractor mobilizes to conduct on-site work and minimizes impacts on the plants' operations during installation and commissioning.

CRA High-Voltage Transformers Replacement – Procurement

The scope for the procurement contract includes furnishing 35 high-voltage transformers and associated appurtenances. Deliveries will be staged in batches and stored at each pumping plant until the construction contractor is ready to install the equipment. The transformers may be shipped fully assembled with oil or as disassembled units, depending on the manufacturer's preference and shipping regulations. The transformers will be inspected, assembled, tested, and prepared for long-term storage in accordance with the manufacturer's recommendations. The transformers will be equipped with instrumentation to monitor their condition. The vendor, Siemens, will perform periodic testing and inspections to validate the warranty and ensure the transformers are ready for installation.

A construction contract will be awarded after the first half of the transformers have been received by Metropolitan. Transformers will be replaced one unit at a time, with construction crews working across all plants simultaneously to replace five transformers per year. A detailed installation and delivery schedule has been developed to align with annual CRA shutdowns, minimizing impacts to the CRA operations and ensuring 8-pump flow capacity. Multiple alternative installation options were also considered that would shorten the installation schedule by a few years but restrict the CRA's capacity to five pump flow or below. Staff plans to include provisions within the installation contract to allow the contractor to accelerate the schedule if opportunities arise.

Award of Procurement Contract (Siemens Energy Inc.)

A Request for Qualification No. 1240A was issued on October 8, 2021, to prequalify potential bidders. Statements of Qualifications were received on November 19, 2021. Six manufacturers and authorized distributors were prequalified to bid on the transformer's procurement contract. They included Delta Star Inc., Hitachi, ILJIN Electric USA Inc., Siemens Energy Inc., Turbos Trans Electric, and WEG Transformers USA.

Specifications No. 1897 – Furnishing 69 kV and 230 kV Power Transformers for the Colorado River Aqueduct Pumping Plants was advertised on May 19, 2023, to the prequalified manufacturers. During the bidding period, manufacturers indicated to staff that market conditions had significantly changed since the prequalification list was established, and substantial exceptions would be taken concerning: (1) Technical requirements; (2) Standard contract terms and conditions, including delivery schedule and warranty; and (3) Up-front, fixed pricing for the units. Items affecting fixed pricing include unprecedented global industry demand for transformers, global events that have caused disruptions to supply chains, and significant materials price fluctuations. Collectively, these issues result in even longer lead times to procure the transformers.

The advertisement period for Specifications No. 1897 closed on September 21, 2023, after two separate time extensions were granted at the request of the potential bidders. Metropolitan received one bid that was deemed nonresponsive and rejected, as it only included pricing for seven of the 35 transformers. In addition, the vendor took numerous exceptions to Metropolitan's bidding requirements and technical specifications.

Following these bidding challenges, staff elected to implement best value procurement provisions, per Metropolitan's Administrative Code Section 8150. This approach allows prequalified manufacturers to submit proposals addressing the solicitation's technical specifications while enabling the evaluation of additional factors beyond cost. The proposals include elements such as payment schedules, material escalation clauses, operational performance guarantees, warranty provisions, and delivery schedules, all of which can be negotiated with the manufacturers to ensure the best overall value for Metropolitan. During this process, staff continued to perform outreach efforts and another manufacturer (SGB-SMIT Group) was prequalified.

Request for Proposal (RFP) No. 1360 was issued on March 15, 2024, to the seven prequalified manufacturers. One proposal was received from Siemens Energy Inc. (Siemens), whose manufacturing facilities are located in Austria, on July 18, 2024. Metropolitan completed a thorough review and analysis of the submitted proposal. Siemens has proposed commercial terms that differ materially from those included in Metropolitan's standard procurement contracts. Metropolitan entered negotiations in September 2024 with Siemens on contract pricing, technical requirements, and contractual terms and conditions. This process involved detailed discussions and careful consideration of key terms, including payment terms, material escalation clauses, operational performance guarantees, warranty provisions, and delivery schedules. Staff has negotiated to ensure that the final contract not only meets the technical and operational needs of the project but also provides flexibility and long-term value for Metropolitan. **Attachment 4** highlights the negotiated agreement terms that vary from Metropolitan's standard terms.

This action awards a $131 million procurement contract to Siemens to furnish 35 high-voltage power transformers. This amount includes all sales and use taxes imposed by the State of California. Staff contacted several entities that have recently purchased large transformers and found the initial proposal was reasonable and reflects the high demand and limited manufacturers of the specialty equipment. As a procurement contract, there are no subcontracting opportunities, and no Small Business Enterprise participation level was established for this contract.

A total of $138.8 million is required for the procurement phase. In addition to the amount of the procurement contract described above, other allocated funds for professional services include $920,000 for design review and factory acceptance testing, which will be performed by a specialty firm under an existing board-authorized on-call agreement. Allocated funds for Metropolitan staff activities include $758,000 for fabrication inspection and functional testing; $435,000 for submittals review and responding to manufacturer requests for information; $244,000 for laydown area preparation, transformer monitoring and maintenance during storage to uphold warranty; $550,000 for contract administration and project management; and $4,893,000 for the remaining budget. **Attachment 1** provides the allocation of the required funds.

Change Order Authority for Procurement Contract

Based on Metropolitan's Administrative Code, the General Manager's change order authority for the transformer procurement contract is $6.55 million, which is five percent of the contract amount. On the transformer procurement contract, change orders are anticipated that may potentially exceed the current five percent change order authority.

Potential changes include optional testing procedures if exercised by Metropolitan, and price adjustments due to escalation. Since 2020, the transformer industry has relied on a price adjustment formula based on published indices for materials, labor, and currency exchange rates. Over the past five years, fluctuations have increased approximately six to eight percent annually, potentially resulting in the contract price exceeding the General Manager's change order authority. To accommodate these increases, this action also authorizes an additional approximately $36 million allowance for price adjustments based on the established formula. If the indices drop over the course of the contract, Metropolitan's cost would be reduced.

Staff recommends that the General Manager's change order authority for this procurement contract be increased to $42.5 million. This action authorizes the General Manager to execute change orders for the CRA transformer procurement contract up to an aggregate amount not to exceed $42.5 million.

CRA High-Voltage Transformers Installation – Final Design

Staff recommends executing the planned transformer installation work for the five CRA pumping plants in a two-staged approach. The first stage will focus on replacing the cranes prior to awarding an installation contract. Each plant currently utilizes a stationary crane and cart system to move the transformers to offsite facilities for maintenance or emergency repairs. Despite regular maintenance, the structural steel members of these cranes have deteriorated, and they no longer meet current seismic standards. In addition, the original electrical and control systems are outdated due to obsolete components which are difficult to obtain for replacement. To address these issues, staff recommends demolishing the existing cranes and replacing them with mobile cranes at three of the pumping plants. At Hinds and Intake, where space constraints prohibit the use of mobile cranes, the existing cranes will be replaced with new stationary cranes. The cart systems, which are used to transport the transformers, at all five pumping plants will also be replaced.

The second stage of the installation work consists of an installation contract to install the Metropolitan-furnished transformers, upgrade the foundations to meet current seismic code requirements, construct secondary containment structures around the transformer pads to address environmental and fire protection, and build protective barriers to improve site security. As part of the security improvements, staff is also planning the installation of radar detection systems for protection against aerial threats.

The planned final design work for the installation of the transformers and the new cranes and carts will be conducted by a hybrid effort between Metropolitan staff and consultants. Metropolitan staff will prepare the instrumentation and controls design drawings, provide technical input, manage the project, and administer the consultant agreement.

A total of $10.4 million is required for the final design. Allocated funds for professional services include $6.5 million for the final design activities by HDR as described below; $580,000 for geotechnical and ground motion reports to evaluate the integrity of the soil conditions and foundations; $100,000 for constructability review; $50,000 for third-party technical review; $50,000 for hazardous materials assessment; and $50,000 for historical resources analysis by specialty firms under existing board authorized on-call agreements. Allocated funds for Metropolitan staff activities include $1.5 million for preparing instrumentation and controls design

drawings, technical oversight, and review of consultant's work; and $1 million for environmental support, construction contracts preparation, CIP office support, project controls and project management; and $570,000 for the remaining budget. **Attachment 1** provides the allocation of the required funds.

Final Design Services (HDR Engineering Inc.) – Amendment to Existing Agreement

HDR Engineering Inc. (HDR) will provide final design services under an existing board-authorized agreement for the replacement of the high-voltage transformers. The planned final design activities will include: (1) detailed design of transformer foundations; (2) design and development of procurement and installation documents for the cranes and carts; (3) creation of final design drawings and specifications for transformer installation; (4) preparation of a construction cost estimate; (5) design of security improvements to protect transformers from external threats; and (6) development of a detailed construction sequencing plan. In April 2021, Metropolitan's Board authorized an agreement with HDR to complete preliminary design for the replacement of the CRA high-voltage transformers. HDR was selected through a competitive process via RFP No. 1252 based on the firm's staff expertise, technical approach and methodology, and cost proposal. Preliminary design has been completed, and HDR is now recommended to provide engineering services for final design as described above.

This action authorizes an increase of $6.5 million to the existing agreement with HDR for a new not-to-exceed total of $8.2 million to perform final design to replace the CRA high-voltage transformers. Metropolitan has established a Small Business Enterprise participation level of 25 percent for this agreement. HDR has agreed to meet this level of participation. The planned subconsultants for this work are listed in **Attachment 2**.

Final design will be performed by HDR and Metropolitan staff. Engineering Services' performance metric target range for final design with a construction cost of more than $3 million is 9 to 12 percent. For this project, the performance metric goal for final design is 4.2 percent of the total construction cost. The total estimated cost for design is $9.12 million, which includes $6.5 million for HDR, $1.5 million for Metropolitan staff design and technical oversight, and $1.12 million for transformer procurement which was previously allocated. The estimated cost of construction for the replacement of the CRA main pump transformers is anticipated to range from $220 million to $240 million.

Summary

A total of $149.2 million is required to perform this work, which includes $139 million for procurement and $11 million for final engineering design services. This action: (1) awards a $131 million procurement contract to Siemens to furnish 35 high-voltage power transformers; (2) authorizes the General Manager to execute change orders for the CRA transformer procurement contract up to an aggregate amount not to exceed $42.5 million; and (3) authorizes an increase of $6.5 million to an existing agreement with HDR for final engineering design services to replace the high-voltage power transformers at the five CRA pumping plants.

Project Milestones

December 2025 – Completion of final design of cranes and carts system

December 2028 – Completion of final design of transformer installation

February 2030 – Final delivery of transformers

4/29/2025
Mai Hattar *Date*
Interim Chief Engineer
Engineering Services

4/29/2025
Deven Upadhyay *Date*
General Manager

Attachment 1 – Allocation of Funds

Attachment 2 – Listing of Subconsultants

Attachment 3 – Location Map

Attachment 4 – Key Agreement Terms

Ref# es12688645

Allocation of Funds for CRA High-Voltage Transformers Replacement

	Current Board Action (May 2025)
Labor	
Studies & Investigations	$ -
Final Design	1,500,000
Owner Costs (Program mgmt., envir. monitoring)	1,550,000
Submittals Review & Record Drwgs.	435,000
Construction Inspection & Support	758,000
Metropolitan Force Construction	244,000
Professional/Technical Services	
HDR Engineering Inc.	6,500,000
Fabrication Inspection Consultant	920,000
Geotechnical Services Consultant	580,000
Constructability Review Consultant	100,000
Environmental Services Consultant	50,000
Hazardous Materials Assessment Consultant	50,000
Third-Party Technical Review Consultant	50,000
Contracts	
Siemens Energy Inc.	131,000,000
Remaining Budget	5,463,000
Total	**$ 149,200,000**

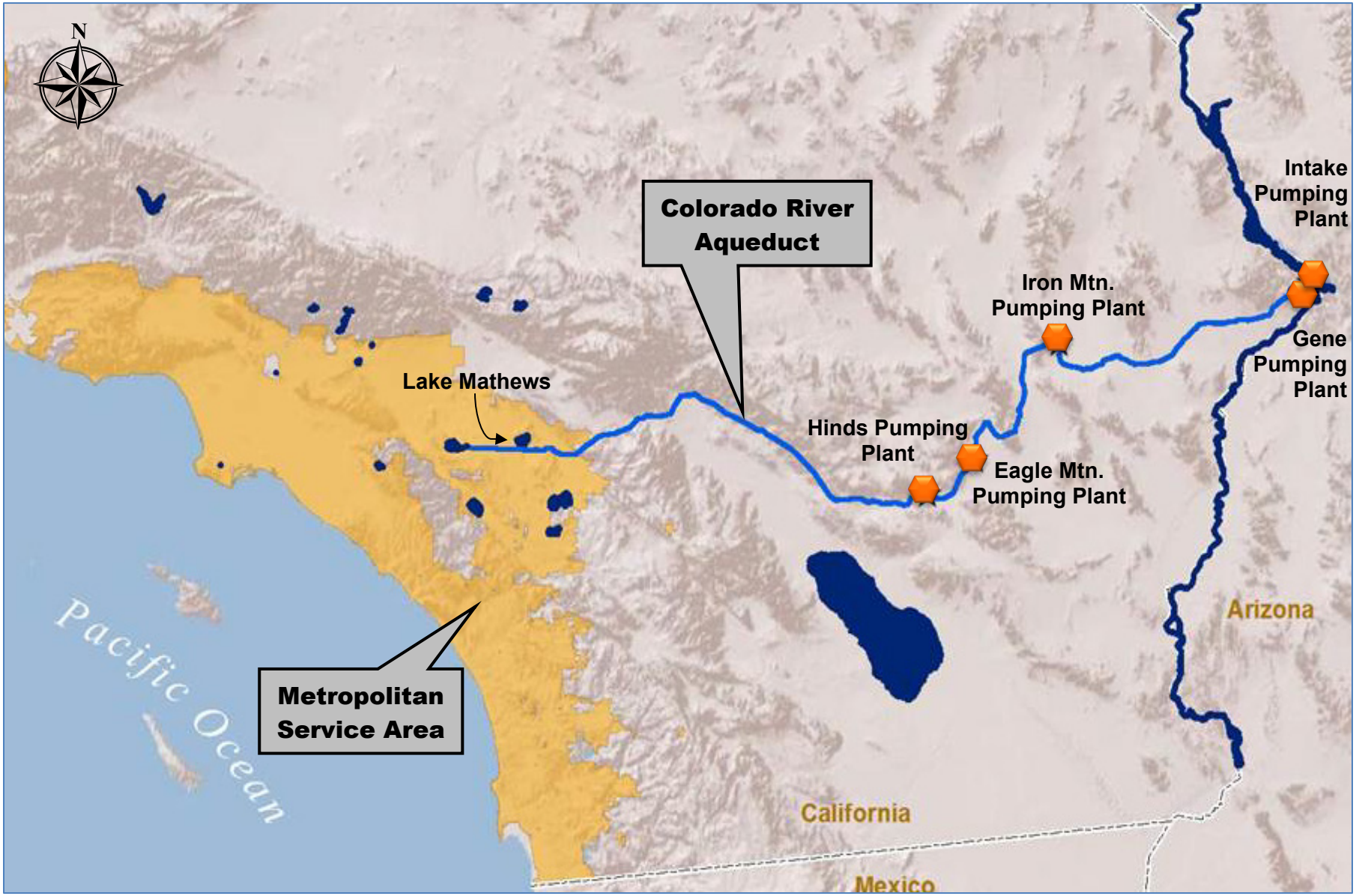
The total amount expended to date to replace the CRA High-Voltage Transformers Replacement is approximately $6.2 million. The total estimated cost to complete this project, including the amount appropriated to date, funds allocated for the work described in this action, and future construction costs, is anticipated to range from $250 million to $300 million.

The Metropolitan Water District of Southern California

Subconsultants for Agreement with HDR Engineering Inc.

Subconsultant and Location	Service Category; Specialty
PGA Engineers Inc. Brea, CA	Transformer Anchorage, Transformer Structural Design, Transformer SPCC Design
ProjectLine Technical Services Costa Mesa, CA	Transformer Instrumentation and Controls Design, Drafting Support
Leland Saylor Associates Los Angeles, CA	Cost Estimating, Scheduling
Health Science Associates Los Alamitos, CA	Hazardous Materials Surveys
Poole Fire Protection Olathe, KS	Fire Protection System Evaluation

Location Map



The Metropolitan Water District of Southern California

CRA High-Voltage Transformers Replacement
Key Agreement Terms

1.	**Payment Schedule:** Due to high global demand and the limited number of factories capable of producing transformers with these specifications, manufacturing and delivery have long lead times. The earliest anticipated delivery is between 2029 and 2030. To secure a production slot, Metropolitan has agreed to an upfront deposit of 3 percent of the contract price. The agreed-upon payment milestones are: • 3 percent upon receipt of contract execution • 7 percent upon approval of submittals and drawings • 25 percent upon receipt of main materials • 40 percent upon successful factory acceptance testing • 15 percent upon delivery • 10 percent upon energization
2.	**Contract Award:** The contract with Siemens is valued at $131 million, which includes: • 35 transformers • Spare parts • Applicable taxes, shipping and ground transportation • Unloading and storage preparation • Extended warranty • Manufacturer's field services during installation • Performance bond
3.	**Limitation on Liability:** Metropolitan's standard language regarding limitations on liability has been revised to cap total liability to the contract value of the affected unit and exclude liability for consequential, incidental, indirect, special, or punitive damages, including lost profits, revenue, production, and power-related costs. In addition, all liability expires at the end of the applicable warranty period, and liability for damage to Metropolitan's property due to the Contractor's negligence or warranted defects is capped at the lesser of the repair/replacement cost or $5 million. Liability for damages arising from technical advice or training services is also limited.

4.	**Insurance:** Metropolitan's standard language regarding insurance coverage has been revised to increase the required general liability insurance coverage from $1 million to $5 million per occurrence and annual aggregate while allowing the required limits to be met through a combination of primary and excess/ umbrella coverages.
5.	**Liquidated Damages (LD):** If the Contractor fails to deliver the transformers on schedule, LDs of 0.5 percent of the contract price per week of delay will apply, up to a maximum of 10 percent of the delayed items' contract price. If this cap is reached, Metropolitan reserves the right to terminate the Contractor's right to proceed and procure similar materials elsewhere, with the costs of cover charged to the Contractor.
6.	**Extended Warranty:** The initial proposal included a warranty of 60 months from energization (66 months from delivery), whereas typical industry warranties range from 1 to 2 years. Through negotiations, Metropolitan has secured an extended warranty of 5 years post-energization (8 years from delivery).
7.	**Termination of Contract** The contract includes provisions for termination by either party under the following circumstances: • Metropolitan may terminate the contract for cause if the Contractor fails to meet key obligations and does not resolve the issue within 30 days of written notice, or under conditions such as abandonment, insolvency, or failure to deliver. If terminated for cause, Metropolitan may procure the remaining materials or services elsewhere, and the Contractor will be responsible for any verified costs. • If Metropolitan breaches the contract or terminates for convenience, the Contractor is entitled to compensation for completed work, materials purchased, profit, and certain unavoidable costs, subject to the terms of the agreed-upon cancellation schedule and good-faith negotiations. The cancellation schedule specifies the Contractor's per-unit damages as follows: o 10 percent after receipt of order o 30 percent after preliminary drawing has been communicated or extended lead time items are being ordered or latest 30 months before ready for shipment date o 50 percent after order of main components (copper, core, tank) or latest 18 months before shipment date o 90 percent after main components have been received at the factory location or latest 10 months before shipment date o 100 percent after core/winding manufacturing has started or latest 7 months before shipment date