THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

BOARD ACTION

- Board of Directors
  Engineering and Operations Committee

7/13/2021 Board Meeting

7-3

Subject

Authorize four actions for the desert region communication system including: (1) an agreement with Nokia of America Corporation in an amount not to exceed $5,297,000 for equipment procurement and design support to upgrade the wide-area network; (2) an amendment to an agreement with Hatfield & Dawson Consulting Engineers, LLC for a new not-to-exceed amount of $730,000 to provide specialized technical support for the upgrade; (3) an amendment to the Capital Investment Plan for fiscal years 2020/2021 and 2021/2022 to include additional communication system improvements at the Colorado River Aqueduct's Gene Pumping Plant; and (4) an agreement in an amount not to exceed $275,000 with HDR Engineering, Inc. for design services related to the construction of a communication line; the General Manager has determined that the proposed actions are exempt or otherwise not subject to CEQA

Executive Summary

The desert region requires high-capacity carrier-grade communication links to provide reliable data, voice, and video transmission. The existing microwave network is over 14 years old and approaching the end of its useful service life. This action authorizes an agreement to procure equipment and furnish supplemental design services to upgrade the microwave radio wide-area network (WAN) communication system at Metropolitan's 24 most critical desert region microwave tower sites. This action also authorizes an amendment to an existing agreement for specialized technical expertise to supplement staff's review of design documents and submittals related to the project.

In addition, this action authorizes design services for construction of approximately two miles of communication line from Parker Dam to Colorado River Aqueduct's Gene Pumping Plant. This new pole-mounted fiber optic communication line will provide an alternative path to transmit critical communication to and from the Gene Pumping Plant. As this project was not included in the Capital Investment Plan (CIP) budget for fiscal years 2020/21 and 2021/22, this action amends the current CIP to include this project.

Details

Background

The Colorado River Aqueduct (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 55 miles of conduits. Given the remoteness and isolation of many of the facilities along the CRA, Metropolitan's wireless WAN provides the primary data transmission and communications path across the desert region.

Metropolitan's microwave radio WAN transmits telephone, voice, data, and video communication between all Metropolitan facilities, utilizing point-to-point microwave transmission. While microwave transmission is highly effective, it is limited to line-of-sight propagation; thus, it cannot pass through mountains or other similar obstacles. The WAN also transmits real-time data from the supervisory control and data acquisition system, automated meter reading system, security cameras and teleprotection, and system alarms to Metropolitan's control facilities, and provides access at remote sites to the email, geographical information system, Oracle financial, timekeeping, and PeopleSoft applications. Many of these systems run 24 hours per day, 7 days per week, as system operators rely on real-time communications to monitor and control Metropolitan's water delivery system.

Metropolitan's microwave radio WAN was constructed in the late 1990s, and presently comprises a network of 72 transmission tower sites located throughout Southern California, including 24 which support the CRA. Along the CRA, each tower is typically located 20 to 50 miles apart. Microwave radio relays transmit signals between two locations on a line-of-sight radio path. The network points are typically located at remote hilltops to provide point-to-point communication links. Each transmission site consists of a tower, directional antennas which transmit incoming and outgoing signals, microwave radio equipment which is typically housed in small masonry structures, and other infrastructure such as fiber optic cable. The remote sites have no redundancy for the transmission link, and, as a result, a malfunction of a single tower along the path can disrupt communications at multiple sites.

Metropolitan's microwave radio WAN is over 14 years of age and approaching the end of its useful service life. Typical life expectancy for these radios range from 12 to 15 years. Recently, reliability issues have caused intermittent network communication failures in the desert portion of the radio WAN system. Additionally, the existing microwave radio WAN does not provide carrier-grade transmission capabilities. This shortcoming effectively limits the amount of data that can be reliably transmitted through the communication system. Staff recommends moving forward with the procurement and initial development phase at this time to upgrade the desert microwave system to carrier-grade transmission capability.

The Gene Pumping Plant is located two miles southeast of Lake Havasu City, Arizona. Recent commercial and residential developments nearby have included the expansion of fiber optic communication connections to locations near Parker Dam. The opportunity now exists to bring high-speed, high-quality fiber optic communications capabilities to some of Metropolitan's desert facilities. Extending a new fiber optic connection from Parker Dam to the Gene Pumping Plant will: (1) provide critical redundancy to the existing desert microwave communications systems; (2) improve the speed and resolution of video surveillance at the Gene Plant; (3) allow desert facilities to access more innovative cloud applications; and (4) improve the communication system overall speed, reliability, and resiliency. This project initiates a long-term plan to install fiber optic communications at the CRA pumping plants.

In April 2020, the Board appropriated funds and authorized the General Manager to initiate or proceed with work on all capital projects identified in the CIP, subject to any limits on the General Manager's authority and CEQA requirements. The upgrades to the desert-wide-area network were included in the CIP, but the extension of fiber optic communications to the Gene Pumping Plant was not. This action amends the CIP to include the Gene fiber optic communication line upgrades. It is not anticipated that the addition of Gene fiber optic communication line upgrades to the CIP will increase CIP expenditures in the current biennium beyond those which have been previously approved by the Board. These projects have been reviewed in accordance with Metropolitan's CIP prioritization criteria and were approved by Metropolitan's CIP Evaluation Team to be included in the System Reliability Program.

Project No. 1 - Desert-Wide-Area Network Upgrade – Procurement and Final Design

This project will replace the current microwave system with a high-capacity carrier-grade microwave system that will provide reliable data, voice, and video transmission equipment in the desert region. The replacement microwave system is anticipated to be comprised of microwave radio equipment which includes: antennas, waveguides, routers, rectifiers, network management system, supporting networking equipment, and direct current power distribution with battery backup systems.

The equipment procurement and initial development phase of the project will be conducted by Metropolitan staff with the assistance of two consultants. Nokia of America Corporation (Nokia) will provide the new microwave radio equipment, conduct microwave path design, and assist staff with preparation of an installation contract. This approach for the project will allow Nokia to provide the microwave radio WAN equipment in advance of the main installation contract. Staff will return to the Board in the future to award this installation contact. The recommended procurement/installation approach will ensure that Metropolitan obtains high-quality equipment, and will also expedite the overall project schedule since much of this equipment consists of long lead time procurement items. Due to the specialized nature of microwave systems designs, Hatfield & Dawson Consulting Engineers, LLC (H&D Consulting) will supplement staff's existing capabilities by providing technical peer reviews and other technical support services related to the design, equipment procurement, and rehabilitation of microwave radio WAN facilities. Metropolitan staff will: (1) prepare drawings and specifications for the

installation of the microwave radio WAN equipment; (2) obtain local agency permits; (3) develop construction cost estimates; (4) prepare environmental documentation; and (5) advertise the installation contract for receipt of competitive bids, perform project control, and project management.

A total of $8,011,000 is required for Project No. 1 work. Allocated funds include $5,297,000 for furnishing microwave radio WAN equipment and integration services by Nokia; $250,000 for technical support by H&D Consulting, as described below; and $60,000 for tower structural analysis. The tower structural analysis will be performed by a specialty firm under a contract planned to be executed under the General Manager's Administrative Code authority to award contracts of $250,000 or less. Allocated funds for Metropolitan staff activities include $800,000 for drawings and specifications for equipment installation design; $350,000 for technical oversight and bidding; $100,000 for Metropolitan furnished equipment; and $375,000 for project controls and project management. Allocated funds also include $779,000 for remaining budget.

As described above, final design for the equipment installation contract will be performed by Metropolitan staff. Engineering Services' performance metric target range for final design with construction greater than $3 million is 9 to 12 percent. For this project, the performance metric goal for final design is 12 percent of the total construction costs. The total estimated cost of construction for this project is anticipated to range from $6.65 million to $7.1 million.

Installation of specific components of the microwave system will be accomplished via a future competitively bid construction contract. Staff will return to the Board at a later date to award a contract for the installation of the equipment.

Microwave Equipment Procurement and Design Support (Nokia of America Corporation) – New Agreement

Metropolitan's teleprotection systems monitor the condition of the desert's high-power transmission lines and activate relay protection features in event a fault is detected. The teleprotection system relies on the microwave radio WAN system for real-time exchange of the line trip commands between protection relays. In addition, a portion of Metropolitan's electrical transmission facilities are integrated with the high voltage grid of other local desert power providers. Nokia has provided similar equipment to other electrical providers in the southwest power grid and is therefore best suited to provide a seamless, region-wide, interconnected system. Therefore, after thorough research of various microwave radio equipment vendors and performance of a pilot test, staff determined that Nokia was best suited to furnish new microwave radio equipment and assist in the preparation of site installation drawings.

Metropolitan initiated the procurement for the microwave radio equipment under Metropolitan Administrative Code Section 8140(1)(l), which allows Metropolitan to "piggy-back" (i.e., gain access to) contracts established by other public agencies that substantially follow Metropolitan's own competitive procurement process. In 2016, the State of Washington Department of Enterprise Services, as the lead agency, along with several other agencies, completed a competitive bid for microwave radio equipment and services. Currently, 22 states participate in this cooperative purchasing program, known as the National Association of State Procurement Officials (NASPO) ValuePoint Cooperative Purchasing Program for Public Safety Communications Support Equipment (Master Agreement Number 05715), including the State of California. Pursuant to section 8140(l)(1), Metropolitan's Office of the General Counsel has determined that the competitive process under which this contract was established substantially complies with Metropolitan's competitive procurement process. Metropolitan utilized the NASPO contract to obtain deep discounts for microwave radio WAN equipment and services. Staff has compared Nokia's prices under this contract to other vendors and concluded that this pricing was very competitive.

The planned activities for Nokia in the procurement and initial development phase of the desert WAN upgrade include: (1) preparing feasibility studies, path surveys, microwave path design, and coordination of radio frequencies; (2) providing site material requirements and equipment placement drawings; (3) furnishing necessary microwave radio WAN equipment including antennas, waveguides, routers, network management system, supporting networking equipment, and power distribution battery backup systems; and (4) providing assistance with the development of the equipment installation contract.

This action authorizes an agreement with Nokia for a not-to-exceed amount of $5,297,000 to furnish WAN equipment and design support of the desert WAN upgrade. For this agreement, Metropolitan has not established a Small Business Enterprise participation level. There are no subconsultants planned for this work.

Specialized Technical Support (Hatfield & Dawson Consulting Engineers, LLC) – Agreement Amendment

An amendment to the agreement with H&D Consulting is recommended for specialized technical support during the procurement and initial development phase. H&D Consulting was initially selected through a competitive process via RFP No. 1179 to provide design services for the replacement microwave radio WAN system. This agreement currently has a maximum payable amount of $480,000. Amendment of the existing agreement with H&D Consulting is consistent with the agreement's scope of work and with the planned approach for project implementation.

A specialized consultant is needed to supplement staff's existing capabilities by providing technical peer reviews and other technical support services related to the design, equipment procurement, and rehabilitation of microwave radio WAN facilities. Specific work activities will include technical review of drawings and specifications, support during leasing negotiations, and review of system frequencies.

This action authorizes an increase of $250,000 to the existing agreement with H&D Consulting for a new not-to-exceed total of $730,000 for specialized technical assistance during the procurement and final design phase for the desert WAN upgrade. For this agreement, Metropolitan has not established a Small Business Enterprise participation level.

Alternatives Considered

During the planning phase for this project, staff examined several alternatives in addition to the recommended project. One alternative involved undertaking a comprehensive in-place rehabilitation of the existing desert microwave radio WAN sites. This alternative would include removing and replacing individual components of the system, with the objective of upgrading as many of the existing components as possible, while leaving in place some of the critical structural elements of the existing systems. Staff determined that replacement of key components may extend the life of the microwave radio WAN system for a limited time but would not achieve the long-term rehabilitation goals of the project because many of the 14-year-old components would remain in place. Replacement of the microwave radio WAN equipment also provides an opportunity to standardize the systems across the desert region; thus, minimizing the capital cost, simplifying maintenance, and improving the interchangeability of parts. The recommended replacements using a single vendor is recommended to increase overall reliability of the system, reduce the risk of communications interruptions, and streamline future system maintenance and operational requirements.

Project No. 2 – Gene Communication System Upgrade - Design

The introduction of fiber optic-based communications equipment in the vicinity of Parker Dam offers Metropolitan the opportunity to connect to this high-quality, high-speed data system to improve a variety of technological challenges at the desert facilities. Planned upgrades under this project include installation of approximately 22 poles and two miles of fiber optic cable from Parker Dam to the Gene Pumping Plant administration building. The new line will be located predominately within existing Metropolitan fee property or will be connected to existing power poles located on private property.

The planned design activities will be conducted by Metropolitan staff and a specialized consultant and will include: (1) conducting field investigations including geotechnical analysis and aerial topographic survey; (2) establishing final design criteria, preparing drawings and specifications, and developing a construction cost estimate; (3) acquiring temporary right-of-way for the contractor staging and work areas; (4) permitting and shutdown planning with member agencies; and (5) advertising and receiving competitive bids. Staff will return to the Board at a later date to award a construction contract.

A total of $665,000 is required for these activities. Allocated funds include: $88,000 for field investigations as described above, including an aerial topographic survey to be performed by a specialty firm under a contract planned to be executed under the General Manager's Administrative Code authority to award contracts of $250,000 or less; $275,000 for design activities and technical assessments by HDR Engineering, Inc. under a new agreement; $49,000 for technical review by Metropolitan staff; $24,000 for preparation of temporary right-of-way

acquisition documentation needed for the contractor staging and work areas; $178,000 for preparation of environmental documentation, project controls, and project management; and $51,000 for remaining budget.

As described above, final design will be performed by HDR Engineering, Inc. Engineering Services' performance metric target range for final design with construction less than $3 million is 9 to 15 percent. For this project, the performance metric goal for final design is 14.9 percent of the total construction costs. The total estimated cost of construction for this project is anticipated to range from $1.2 million to 1.8 million.

Attachment 1 provides the allocation of the required funds. The total estimated cost of Project No. 2 work, including the funds allocated for the work described in this action and future construction costs, is anticipated to range from $1.9 million to $2.5 million. This is the initial action for the Gene Communication System Upgrade project. Staff will return to the Board at a later date for award of a construction contract.

Engineering Services (HDR Engineering, Inc.) – New Agreement

HDR Engineering, Inc. is recommended to provide engineering services for design of the Gene Pumping Plant Communication Upgrade. HDR Engineering, Inc. was selected through a competitive process via Request for Proposals No. 1252 based on the expertise of the firm's staff, technical approach and methodology, and cost proposal for the upgrade of the communication system.

The planned activities for HDR Engineering, Inc. include: (1) development of design criteria; (2) detailed design, preparation of plans and specifications; (3) development of construction cost estimates; and (4) technical support during the bidding period.

This action authorizes an agreement with HDR Engineering, Inc. for a not-to-exceed amount of $275,000 to provide engineering design services for the Gene Pumping Plant Communication system upgrades. For this agreement, Metropolitan has established a Small Business Enterprise participation level of 25 percent. HDR Engineering, Inc. has agreed to meet this level of participation. The planned subconsultants for this work are DRP Engineering, Inc. and TJC and Associates.

Alternatives Considered

Early in the project development phase, staff considered multiple alternatives to improve the reliability and resiliency of the communication system at Gene Pumping Plant. One alternative included adding a third microwave path between Parker Dam and Gene Pumping Plant, and would include a microwave tower at the Metropolitan's Black Metal Mountain Communication site. This alternative was not selected because the Black Metal Mountain site is currently experiencing increased electrical demands from multiple communication companies which lease the site. As such, the site has limited capacity for expansion of the facility at this time. Additionally, continued reliance on microwave towers for desert communications would not allow Metropolitan to take advantage of the technology improvements that are offered by fiber optic communication pathways.

The selected option to install fiber optic cable will provide critical redundancy to the desert communications and will improve speed, reliability, and resiliency without negatively impacting Metropolitan's other communications facilities.

Summary

This action authorizes: (1) an agreement with Nokia for a not-to-exceed amount of $5,297,000 to furnish new microwave radio equipment and network integration support; and (2) an agreement amendment with H&D Consulting for a not-to-exceed amount of $730,000 for specialized technical support to upgrade the desert WAN. This action also authorizes: (1) amending the current CIP to include upgrades to the communication system at Gene Pumping Plant; and (2) a new agreement with HDR Engineering Inc. for a not-to-exceed amount of $275,000 for design services.

These projects have been evaluated and recommended by Metropolitan's CIP Evaluation Team, and funds are available within the fiscal year 2020/21 capital expenditure plan. See **Attachment 1** for the Allocation of Funds, **Attachment 2** for the Location Map.

Project Milestones

September 2022 – Completion of procurement and final design of upgrades for desert region microwave radio WAN

June 2022 – Completion of design for the fiber optic communication system upgrades for the Gene Pumping Plant

September 2023 – Completion of commissioning and testing of all desert microwave radio WAN region sites

Policy

Metropolitan Water District Administrative Code Section 11104: Delegation of Responsibilities

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

Metropolitan Water District Administrative Code Section 8140: Competitive Procurement

By Minute Item 51353, dated October 9, 2018, the Board appropriated a total of $290 million from projects identified in the Capital Investment Plan for fiscal years 2018/19 and 2019/20

California Environmental Quality Act (CEQA)

CEQA determination for Options #1 and #2:

The proposed action is categorically exempt under the provisions of CEQA and the State CEQA Guidelines. The proposed action involves repair, maintenance, permitting, leasing, or minor alterations of existing public or private structures, facilities, mechanical equipment, or topographical features, involving negligible or no expansion of existing or former use, or replacement or reconstruction of existing structures and facilities that will be located on the same site as the structure replaced and will have substantially the same purpose and capacity as the structures replaced. The proposed action may involve minor modifications in the condition of land, water, and/or vegetation, which does not involve removal of healthy, mature, scenic trees. In addition, the proposed action 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 for Class 1, Class 2, Class 4, and Class 6 Categorical Exemptions (Sections 15301, 15302, 15304, and 15306 of the State CEQA Guidelines).

CEQA determination for Option #3:

None required

Board Options

Option #1

a. Authorize an agreement with Nokia of America Inc for a not-to-exceed amount of $5,297,000 for furnishing wide-area network equipment and design support to upgrade the desert region-wide-area network;
b. Authorize increase of $250,000 to the agreement with Hatfield & Dawson Consulting Engineers, LLC for a new not-to-exceed amount of $730,000 for specialized technical support for the upgrade;
c. Amend current CIP to include upgrades to the communication system at Gene Pumping Plant; and
d. Authorize an agreement with HDR Engineering, Inc. for a not-to-exceed amount of $275,000 for design services.

Fiscal Impact: Expenditure of $8.676 million in capital funds. Approximately $6.46 million will be incurred in the current biennium and has been previously authorized. It is not anticipated that the addition of Project No. 2 to the CIP will increase CIP expenditures in the current biennium beyond those which have been previously approved by the Board. The remaining funds from this action and for future construction costs will be accounted for and appropriated under the next biennial budget.
Business Analysis: These projects will enhance the reliability of the CRA and its communication networks.

Option #2

a. Authorize an agreement with Nokia of America Inc for a not-to-exceed amount of $5,297,000 for furnishing wide-area network equipment and design support to upgrade the desert region-wide-area network;
b. Authorize increase of $250,000 to the agreement with Hatfield & Dawson Consulting Engineers, LLC for a new not-to-exceed amount of $730,000 for specialized technical support;
c. Do not amend current CIP to include upgrades to the communication system at Gene Pumping Plant; and
d. Do not authorize an agreement with HDR Engineering, Inc. for a not-to-exceed amount of $275,000 for design services.

Fiscal Impact: Expenditure of $8.011 million in capital funds. Approximately $5.80 million will be incurred in the current biennium and has been previously authorized. The remaining funds from this action and for future construction costs will be accounted for and appropriated under the next biennial budget.
Business Analysis: These projects will enhance the reliability of the CRA and its communication networks. This option would not provide critical redundancy to the existing desert microwave communications systems at Gene Pumping Plant.

Option #3

Do not proceed with these projects at this time.
Fiscal Impact: None
Business Analysis: This option would extend the present risk of an unplanned outage of communication with desert facilities.

Staff Recommendation

Option #1

6/23/2021
Charles Eckstrom *Date*
Group Manager, Information Technology

6/28/2021
Jeffrey Kightlinger *Date*
General Manager

Attachment 1 – Allocation of Budgeted Funds

Attachment 2 – Location Map

Ref# ES12676881

Allocation of Funds for Desert Wide Area Network Upgrade

	Current Board Action (July 2021)
Labor	
Studies & Investigations	$ -
Final Design	800,000
Owner Costs (Program mgmt., envir. monitoring)	350,000
Submittals Review & Tech. Oversight	350,000
Construction Inspection & Support	-
Metropolitan Force Construction	-
Materials & Supplies	100,000
Incidental Expenses	25,000
Professional/Technical Services	-
Nokia	5,297,000
H&D Consulting	250,000
Speciality Consultant - Tower Analysis	60,000
Right-of-Way	-
Equipment Use	-
Contracts	-
Remaining Budget	779,000
Total	**$ 8,011,000**

The total amount expended to date for the Desert Wide Area Network Upgrade is approximately $500,000. 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 $15 million to $16 million.

Allocation of Funds for the Gene Fiber Optic Communication System Upgrade

	Current Board Action (July 2021)
Labor	
Studies & Investigations	$ 59,000
Final Design	49,000
Owner Costs (Program mgmt., envir. monitoring)	178,000
Submittals Review & Record Drwgs.	-
Construction Inspection & Support	-
Metropolitan Force Construction	-
Materials & Supplies	-
Incidental Expenses	10,000
Professional/Technical Services	-
HDR Engineering, Inc.	275,000
Rick Engineering Company	29,000
Right-of-Way	14,000
Equipment Use	-
Contracts	-
Remaining Budget	51,000
Total	**$ 665,000**

This is the initial action for the Gene Communication System Upgrade. 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 $1.9 million to $2.5 million.

Location Map