THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

BOARD ACTION

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

3/14/2017 Board Meeting

8-1

Subject

Adopt CEQA determination and appropriate $4.57 million; authorize preliminary investigations for a system-wide upgrade of Metropolitan's control system; and award $2,305,000 contract to Systems Integrated, LLC for control equipment and support services (Appropriation No. 15467)

Executive Summary

This action authorizes initial investigations for a comprehensive upgrade of Metropolitan's existing control system. The control system spans the conveyance system, treatment plants, and distribution system, and consists of hardware, software, and a communication network. This action also authorizes the replacement of existing control-related field computers to extend the life of the existing control system and ensure it remains reliable and secure against cybersecurity risks until the system-wide upgrade can be completed.

Timing and Urgency

Metropolitan's control system monitors, operates, and collects critical information from the conveyance system, water treatment plants, and distribution system. The current control system was commissioned in the mid-1990s. It relies on proprietary hardware and software, some of which needs to be replaced in the near term to maintain reliability and reduce cybersecurity risks. Over the next several years, major elements of the control system including hardware, software, and the communication network will need to be upgraded. Maintenance and support of the existing system are challenging, as many system components can no longer be replaced and are no longer supported by their manufacturers. A comprehensive upgrade of the entire control system is needed to maintain reliable water deliveries over the long term.

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

Details

Background

Metropolitan's control system was commissioned in the mid-1990s to augment the local, manual controls that were installed during various facilities' original construction. The system is used to monitor and control the operation of pump stations, treatment plants, chemical feed systems, flow control structures, and hydroelectric plants. In addition to its control, monitoring, and alarm functions, the control system compiles operational data, which are critical for regulatory compliance and for daily business processes. The control system includes over 475 field computers, 32 host servers, multiple control room operator interfaces, extensive data communication equipment, and proprietary software, which together connect over 80,000 field instruments and pieces of operating equipment.

The existing control system has operated reliably for over 20 years. A survey of 45 utilities conducted in 2012 found that each of the utilities planned to complete major upgrades of their control system within 15 years of its original commissioning. Nearly half of the utilities planned to modernize their system within the next five years.

In 2013, Metropolitan initiated a review and condition assessment of its control system. This review identified near-term cybersecurity risks with certain components, along with impending technological obsolescence of the system's hardware, software, control, and communication features. While minor upgrades over the past 20 years have extended the system's life and it continues to operate reliably today, the existing system needs to be replaced. Without a reliable control system, a broad range of equipment that was designed to operate remotely would instead need to be operated locally, with manual input. Operational data that are presently collected automatically and compiled for submission to regulatory agencies would instead need to be gathered and logged manually, while safety procedures that include automatic alarms would need to be assessed, modified, and staffed appropriately.

A comprehensive, staged effort is recommended to upgrade the major components of Metropolitan's control system including servers, field computers, input/output devices, software, and communication equipment. The control system upgrades will adopt industry-standard technology, programming, and a modern architecture. The upgrades will be executed in several stages, including:

- Preliminary investigations to define business needs and the architecture of the replacement control system;
- Preliminary design of the replacement control system;
- Proof-of-concept testing with several control system providers;
- Selection and award of a procurement contract to a control system equipment provider; and
- Final design and installation/construction of the new control system in multiple staged contracts.

This system-wide upgrade will extend over a 10-year period. Since security and reliability concerns have been identified with existing field computers, staff also recommends proceeding to replace obsolete computers to extend the life of the existing control system and ensure it remains reliable and secure until the system-wide upgrades can be completed.

This action authorizes two projects. The first project represents the initial stage of the comprehensive, system-wide upgrade of Metropolitan's control system. The second project will replace specific obsolete field computers, addressing components that represent a risk to reliability and security of the existing control system.

Project No. 1 - Control System Upgrades, Stage 1 - Preliminary Investigations ($360,000)

The planned scope for the preliminary investigations includes: definition of Metropolitan's business needs; selection of the control system architecture; and determination of requirements for the network communication system, interfaces, and cybersecurity protective measures. Based on these criteria, the functional requirements for the control system will be defined.

The preliminary investigations effort will include selection of a consultant to provide specialized expertise in control system hardware, software, and communication systems. Staff will return to the Board in mid-2017 to authorize this professional services agreement.

This action appropriates $360,000 and authorizes preliminary investigations to upgrade Metropolitan's control system. The requested funds include $266,000 for Metropolitan staff to initiate the technical activities listed above; $44,000 for project management and consultant selection; and $50,000 for remaining budget.

The conceptual cost to complete the system-wide upgrade of the control system will be developed based on the findings of the preliminary investigations, and will be updated based on the proof-of-concept testing with control system providers.

Project No. 2 - Replacement of Existing Field Computers ($4,210,000)

The planned work includes replacing the central processing unit (CPU), related hardware, and the operating system in approximately 330 field computers that have been in service for 14 years and have far exceeded their normal service life. The CPU replacement is required to ensure that Metropolitan's existing control system remains functional, reliable, and secure in the interim as the long-term system-wide upgrades are completed. The supplier of the existing control system, Systems Integrated, LLC (SI), will continue to provide support during this

period. SI will supply replacement CPUs and related hardware, establish cybersecurity measures, develop and test operating system software, load the software onto the CPUs, and install them in the field computers. Metropolitan staff will provide configuration details for each field computer, plan the equipment outages and manage the special operating conditions needed to upgrade the field computers as they control active operating systems, perform field testing of the upgraded field computers, provide access to facilities, and manage the overall replacement effort.

SI was originally selected through a competitive bidding process to provide Metropolitan's existing control system, and was initially awarded a contract in November 1994. It is impracticable for Metropolitan to obtain the needed hardware and software required through a new competitive procurement because the field computers are unique in nature and proprietary, and the system provider's warranty or guarantee of the existing control system would be compromised. Metropolitan Administrative Code Section 8140(1)(d) provides that competitive procurement is not required if the unique nature of the work makes such procurement impracticable. In accordance with Section 8140(1)(d), Metropolitan established SI as the sole brand for control system computers, and has procured units for both new and replacement applications exclusively from SI over the life of the existing system.

This action appropriates $4.21 million to replace obsolete field computers throughout the conveyance and distribution system and at Metropolitan's treatment plants. This action also awards a $2,305,000 procurement contract to SI to furnish field computers and support services. This amount is consistent with previous purchases of SI equipment. Due to the specialized and proprietary nature of the equipment furnished under this procurement contract, Metropolitan did not establish an SBE participation level for this contract.

In addition to the amount of the procurement contract, the requested funds include $964,000 for installation, testing, and commissioning activities by Metropolitan staff; $484,000 for procurement activities, review of submittals, factory acceptance testing, and project management; and $455,000 for remaining budget.

The total estimated cost to replace the field computers to extend the life of the existing control system until the new system is completed is approximately $4.21 million.

Summary

This action appropriates $4.57 million, authorizes preliminary investigations for a system-wide upgrade of Metropolitan's control system; and awards a procurement contract to SI for computer equipment and support services. This work is included within capital Appropriation No. 15467, Water Operations Control, which was initiated in fiscal year 2009/10. With the present action, the total funding for Appropriation No. 15467 will increase from $15.01 million to $19.58 million.

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. This work is included in Metropolitan's Information Technology Strategic Plan and was reviewed by the IT strategic planning consultant.

See **Attachment 1** for the Financial Statement.

Project Milestones

June 2018 – Completion of installation and commissioning of new field computers to extend the life of the existing control system

October 2018 – Completion of preliminary investigations for a comprehensive system-wide upgrade of the control system

Policy

Metropolitan Water District Administrative Code 5108: Appropriations

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

Metropolitan Water District Administrative Code 8140: Competitive Procurement

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 the funding, design, and minor alterations, reconstruction or replacement of existing public facilities along with the construction of minor appurtenant structures with negligible or no expansion of use and no possibility of significantly impacting the physical environment. Accordingly, the proposed action qualifies under Class 1, Class 2, and Class 3 Categorical Exemptions (Sections 15301, 15302, and 15303 of the State CEQA Guidelines).

The CEQA determination is: Determine that pursuant to CEQA, the proposed action qualifies under three Categorical Exemptions (Class 1, Section 15301; Class 2, Section 15302; and Class 3, Section 15303 of the State CEQA Guidelines).

CEQA determination for Option #3:

None required

Board Options

Option #1

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

a. Appropriate $4.57 million;
b. Award $2,305,000 contract to Systems Integrated, LLC for control equipment and support services; and
c. Authorize preliminary investigations for a system-wide upgrade of Metropolitan's control system.

Fiscal Impact: $4.57 million of capital funds under Appropriation No. 15467
Business Analysis: This option would initiate a comprehensive, long-term effort to replace the existing control system in order to maintain reliable water deliveries to member agencies over the long term. This option would also address near-term reliability and security risks by replacing existing obsolete field computers.

Option #2

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

a. Appropriate $4.21 million;
b. Award $2,305,000 contract to Systems Integrated, LLC for control equipment and support services; and
c. Do not initiate a system-wide upgrade of the control system at this time.

Fiscal Impact: $4.21 million of capital funds under Appropriation No. 15467. Operation and maintenance expenditures will increase as equipment becomes obsolete and fails.
Business Analysis: This option would address near-term reliability and security risks by replacing existing obsolete field computers. This option would forego an opportunity to initiate planning for a comprehensive control system upgrade in order to remain reliable over the long term.

Option #3

Do not proceed with the control system upgrades at this time.
Fiscal Impact: None
Business Analysis: This option would not initiate planning for a comprehensive control system upgrade in order to remain reliable over the long term, or to address near-term reliability and security risks. An extended outage of the control system could occur if the field computers and/or operating system were to be compromised.

Staff Recommendation

Option #1

2/28/2017

Gordon Johnson *Date*
Manager/ Chief Engineer
Engineering Services

2/28/2017

Jeffrey Kightlinger *Date*
General Manager

Attachment 1 – Financial Statement

Ref# bt12653244

Financial Statement for Water Operations Control Appropriation

A breakdown of Board Action No. 5 for Appropriation No. 15467 for the upgrade of Metropolitan's control system[1] is as follows:

	Previous Total Appropriated Amount (July 2014)	Current Board Action No. 5 (Mar. 2017)	New Total Appropriated Amount
Labor			
Studies & Investigations	$ 782,076	$ 266,000	$ 1,048,076
Final Design (Procurement process)	1,602,000	34,000	1,636,000
Owner Costs (Program mgmt, bidding & controls)	468,000	480,000	948,000
Submittals Review & Record Drwgs	303,000	-	303,000
Construction Inspection & Support	340,000	-	340,000
Metropolitan Force Construction		964,000	964,000
Materials & Supplies	1,028,121	-	1,028,121
Incidental Expenses	5,000	16,000	21,000
Professional/Technical Services	8,436,589	-	8,436,589
Equipment Use	-	-	-
Contracts	195,000	-	195,000
Systems Integrated, LLC	-	2,305,000	2,305,000
Remaining Budget	1,850,214 [2]	505,000	2,355,214
Total	**$ 15,010,000**	**$ 4,570,000**	**$ 19,580,000**

Funding Request

Appropriation Name:	Water Operations Control Appropriation		
Source of Funds:	Revenue Bonds, Replacement and Refurbishment or General Funds		
Appropriation No.:	15467	**Board Action No.:**	5
Requested Amount:	$ 4,570,000	**Budget Page No.:**	261
Total Appropriated Amount:	$ 19,580,000	**Total Appropriation Estimate:**	$ 119,300,000

[1] This is the initial action for the control system upgrades.

[2] Includes reallocation of $217,471 to Remaining Budget from the Control System Server Replacement project which was completed under budget.