



- Board of Directors
Engineering and Operations Committee

8/16/2011 Board Meeting

7-2

Subject

Appropriate \$1.92 million; and authorize four improvement projects at the Robert B. Diemer Water Treatment Plant (Approp. 15436)

Description

This action authorizes four projects at the Robert B. Diemer Water Treatment Plant: (1) Final design of water sampling system improvements; (2) Final design and installation of filter process instrumentation; (3) Final design and construction of an overflow monitoring system for residual solids and wastewater; and (4) Final design and construction of supernatant pump station improvements.

Timing and Urgency

Four projects are needed to maintain plant reliability and comply with current water quality and environmental regulations.

- Timely and accurate water quality monitoring results are required to properly control treatment processes, such as the chemical feed rates. Improvements are needed for sample lines, sample pumps, and on-line analyzers to enable reliable and rapid response to changing water quality conditions.
- Process control instruments are essential to provide continuous monitoring of filter operation and filtered water quality. The Diemer plant's aging turbidity meters and filter level/headloss transmitters have exceeded their usual service life and need to be replaced.
- Overflow monitoring for wastewater and residual solids is needed to minimize the risk of accidental release of non-storm water into the Diemer plant's storm drain system, which discharges into protected waterways.
- Rehabilitation of the supernatant pump station is recommended to reliably transfer supernatant from the solids thickeners and belt presses to the washwater reclamation plant.

These projects have been reviewed with Metropolitan's updated Capital Investment Plan (CIP) prioritization criteria and are categorized as Infrastructure Upgrade projects. Each project is budgeted within Metropolitan's CIP for fiscal year 2011/12.

Background

The Diemer plant was placed into service in 1963 with an initial capacity of 200 million gallons per day (mgd). In 1969, the plant was expanded to its present treatment capacity of 520 mgd. The plant delivers a blend of waters from the Colorado River and the State Water Project to Orange County and to Metropolitan's Central Pool portion of the distribution system.

The Diemer plant is located on the top of a hill in the city of Yorba Linda. A residential/golf course development is located directly west and south of the plant, while Chino Hills State Park, which includes Telegraph Creek, Carbon Canyon Creek and open space, is directly north and east of the plant.

Project No. 1: Water Sampling System Improvements – Final Design Phase (\$385,000)

At the Diemer plant, real-time water quality monitoring data are used to control chemical feed rates and treatment processes. Currently, water samples are pumped from 14 process locations within the plant to nearby monitoring stations or to the central laboratory located in the Administration Building. These samples are analyzed by either the local on-line instruments, or by laboratory instruments used by plant staff. The 14 sample pumps are currently operated manually; their operational status is not monitored by the plant's supervisory control and data acquisition (SCADA) system. Additionally, several of the sample points are located more than 1,000 feet from the central laboratory. This distance leads to sample transport times of more than one hour under some conditions.

In 2009, the Diemer plant received water with unexpectedly high chlorine residual, which could have resulted in excessive chlorination of the treated water. The plant's inlet on-line chlorine analyzer was undergoing maintenance at the time and the high chlorine residual was not observed until a grab sample was analyzed in the laboratory. Rapid adjustment of chlorine feed rates was necessary to prevent elevated residuals from entering the distribution system.

Following this incident, staff evaluated the Diemer plant's sampling system and identified the need for water sampling system improvement. For example, the detention time in sample lines was found to be too long for many of the sample points that are distant from the central laboratory. This condition resulted in inconsistent data between local online analyzers and grab samples tested in the laboratory and creates difficulty in making appropriate operational adjustments.

In February 2010, Metropolitan's Board authorized preliminary design to improve the existing water sampling system at the Diemer plant. Preliminary design has been completed, and staff recommends proceeding with final design at this time.

Planned upgrades will allow the sample pumps to operate at higher pressure and flow rates to reduce transport time in the sample lines. At most of the remote sites, transport times will be reduced to less than 10 minutes. In addition, the sample lines will be upgraded from polypropylene tubing to PVC piping to enable higher operating pressures. Sample pumps will be configured to show their operating status in SCADA, with automatic restart after power outages to enable continuous sample flows for regulatory compliance monitoring. In addition, remote on-line analyzers will be installed at five sampling locations to improve the accuracy and timeliness of collected data. Since three of these locations do not have structures to house the on-line instruments, weather-proof cabinetry will be installed with new power feeds, communication lines, and SCADA data lines.

This action appropriates \$385,000 and authorizes final design phase activities for water sampling system improvements at the Diemer plant. Planned activities include field surveys, preparation of drawings and specifications, development of a construction cost estimate, receipt of bids, and all other activities in advance of award of a construction contract. All final design activities will be performed by Metropolitan staff. Requested funds include \$279,600 for final design; \$90,800 for field surveys, bidding process, and project management; and \$14,600 for remaining budget. The cost of final design is approximately 14.6 percent of the estimated construction cost. Engineering Services' goal for design of projects with construction cost less than \$3 million is 9 to 15 percent. The construction cost for this project is anticipated to range from \$1.9 million to \$2 million. Upon completion of final design, staff will return to the Board for award of the construction contract.

Project No. 2: Replacement of Filter Process Control Instruments – Final Design, Procurement and Construction (\$647,000)

The Diemer plant has a total of 48 filters which remove suspended and colloidal matter from the clarified water after it exits the sedimentation basins. Each filter is equipped with a turbidity meter, a filter level transmitter, and a filter headloss transmitter, all of which are located in the plant's piping galleries. In addition, two turbidity meters are dedicated to monitoring the combined filtered water from the east and west modules.

Turbidity meters provide early warning of filter turbidity breakthrough, and are the key instruments used to demonstrate compliance with water quality regulations. If a turbidity meter fails, plant staff must manually collect and analyze water samples every four hours. Water quality regulations mandate that the continuous on-

line measurement must be resumed within five days. Filter level measurements and headloss measurements are also essential to regulate filtration rates in order to maintain normal filter operations.

The existing 15-year-old on-line turbidity meters and 30-year-old filter level and headloss transmitters exceed the expected useful service life and require frequent maintenance and repair. Spare parts are no longer available from the manufacturers or from after-market sources. To improve filter process control and monitoring reliability, staff recommends replacing each of these instruments with up-to-date units.

This action appropriates \$647,000 and authorizes final design, procurement and installation of on-line filter process control instruments at the Diemer plant. The requested appropriation includes \$8,700 for final design; \$534,200 for construction; \$23,900 for project management; and \$80,200 for remaining budget. The total construction cost of \$534,200 includes \$154,400 for Metropolitan forces to remove and replace the instruments; and \$379,800 for materials and supplies. All work will be performed by Metropolitan staff. The cost of final design is approximately 2 percent of the total construction cost. Engineering Services' goal for design of projects with construction cost less than \$3 million is 9 to 15 percent.

Procurement contracts for the 50 turbidity meters, 48 headloss transmitters, 48 filter level transmitters, and two spare units of each type of instrument are planned to be awarded under the General Manager's Administrative Code authority.

Project No. 3: Overflow Monitoring System for Residual Solids and Wastewater – Final Design and Construction (\$365,000)

The Diemer plant's residual solids (generated from the sedimentation basins and washwater reclamation plant) are conveyed by gravity through buried pipes to the plant's solids handling facilities. Domestic wastewater is collected at two lift stations and is pumped to the city of Yorba Linda's wastewater collection system.

The Diemer plant is located on the top of a hill. In the event of a pipe blockage or failed lift station, either wastewater or residual solids could back up and overflow into the plant's on-site storm drain system. These wastes could potentially drain into Chino Hills State Park to the north of the plant, or to the adjacent golf course to the south.

Staff has analyzed the vulnerability of the residual solids and wastewater conveyance systems throughout the Diemer plant, and recommends moving forward with the installation of overflow alarm devices in 16 manholes which convey residual solids or wastewater. The primary locations that need to be monitored include the lift stations and those pipe segments with relatively flat slopes. The planned work involves installation of electrical conduits and level switches in identified manholes, and connection with existing remote terminal units (RTUs). The new instruments will send alarm signals via the SCADA system to the plant's control room upon detection of high levels in the monitored manholes, allowing plant staff to respond to each situation.

This action appropriates \$365,000 and authorizes final design, procurement and installation of level switches on critical waste manholes at the Diemer plant. The requested appropriation includes \$28,400 for final design; \$278,000 for construction; \$12,900 for project management; and \$45,700 for remaining budget. The total construction cost of \$278,000 includes \$198,000 for Metropolitan forces to install level switches and connect to the SCADA system; and \$80,000 for materials and supplies. All work will be performed by Metropolitan staff. The cost of final design is approximately 10 percent of the total construction cost. Engineering Services' goal for design of projects with construction cost less than \$3 million is 9 to 15 percent.

Project No. 4: Supernatant Pump Station Improvements – Final Design, Procurement and Construction (\$523,000)

At the Diemer plant, decant from the solids thickeners and filtrate from the belt presses are conveyed to the supernatant pump station, which pumps these flows to the inlet of the washwater reclamation plant for further treatment. The supernatant pump station was originally constructed in the early 1980s, and was equipped with three vertical turbine pumps. These three pumps have become unreliable and need to be refurbished. The coatings of the existing carbon steel pump columns have failed due to age and occasional entrainment of abrasive solids, which has caused severe corrosion of the columns.

In 2008, two solids thickeners and belt presses were added to the Diemer plant's solids handling facilities. Operation of the additional thickeners and belt presses has increased the amount of flow which needs to be pumped to the washwater reclamation plant. If operation of the pump station were interrupted due to either pump failure or insufficient pump capacity, the decant/filtrate generated from the solids handling processes would overflow the pump station and potentially spill into the on-site storm drain system.

In order to enhance reliability and minimize risk of non-compliance with environmental regulations, staff recommends installing one additional pump and refurbishing the existing three pumps at the supernatant pump station. The highly corroded carbon steel pump columns will be replaced with stainless steel columns.

This action appropriates \$523,000 and authorizes final design and construction of improvements to the supernatant pump station at the Diemer plant. The requested appropriation includes \$51,600 for final designs; \$369,500 for construction; \$18,000 for record drawings; \$19,900 for project management; and \$64,000 for remaining budget. The total construction cost of \$369,500 includes \$189,000 for Metropolitan forces to install the new pump and refurbish the three existing pumps; and \$180,500 for materials and supplies. All work will be performed by Metropolitan staff. The cost of final design is approximately 14 percent of the total construction cost. Engineering Services' goal for design of projects with construction cost less than \$3 million is 9 to 15 percent.

The procurement contract for the new supernatant pump is planned to be awarded under the General Manager's Administrative Code authority.

Summary

This action appropriates \$1.92 million and authorizes four improvement projects at the Diemer plant. These projects have been evaluated and recommended by Metropolitan's CIP Evaluation Team, and funds have been included in the fiscal year 2011/12 capital budget. See [Attachment 1](#) for the Financial Statement and [Attachment 2](#) for the Location Map.

These projects are included within capital Appropriation No. 15436, the Diemer Improvements Program Phase II, which was initiated in fiscal year 2006/07. Appropriation No. 15436 also includes the Diemer Hatch Covers Replacement, Lower Maintenance Road Rehabilitation, and East Washwater Tank Roof Refurbishment. With the present action for the four proposed Diemer improvement projects, the total funding for Appropriation No. 15436 will increase from \$23,119,000 to \$25,039,000.

These projects are consistent with Metropolitan's goals for sustainability by protecting water quality at the Diemer plant, and to maintain reliable water deliveries in the future.

Project Milestones

June 2012 – Completion of installation of the filter process control instruments, overflow monitoring system for residual solids and wastewater, and supernatant pump station improvements

October 2012 – Completion of final design of the water sampling system improvements

Policy

Metropolitan Water District Administrative Code Section 5108: Appropriations

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

California Environmental Quality Act (CEQA)

CEQA determination for Options #1 and #2:

The proposed actions are categorically exempt under the provisions of CEQA and the State CEQA Guidelines. The overall activities involve 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. In addition, this proposed action involves

minor modifications in the condition of land and/or vegetation that do not involve removal of healthy, mature, scenic trees. Accordingly, the proposed actions qualify under Class 1, Class 2, Class 3, Class 4, and Class 11 Categorical Exemptions (Sections 15301, 15302, 15303, 15304, and 15311 of the State CEQA Guidelines).

The CEQA determination is: Determine that pursuant to CEQA, the proposed actions qualify under five Categorical Exemptions (Class 1, Section 15301; Class 2, Section 15302; Class 3, Section 15303; Class 4, Section 15304; and Class 11, Section 15311 of the State CEQA Guidelines).

CEQA determination for Option #3:

None required

Board Options

Option #1

Adopt the CEQA determination and

- a. Appropriate \$1.92 million;
- b. Authorize final design of the water sampling system improvements at the Diemer plant;
- c. Authorize installation of new filter process control instruments;
- d. Authorize installation of overflow monitoring for residual solids and wastewater; and
- e. Authorize supernatant pump station improvements.

Fiscal Impact: \$1.92 million in budgeted funds under Approp. 15436

Business Analysis: Improved water sampling system will enable the Diemer plant staff to respond to process upset conditions in a timely manner, thereby reducing the risk of non-compliance with water quality regulations. Reliable filter process control instruments will enhance reliability and compliance with water quality regulations; early alarms of potential wastewater or residual solids overflows will help prevent unintentional release of non-storm water to protected waterways; and improvement of the supernatant pump station will enhance plant reliability and reduce the risk of non-compliance with environmental regulations.

Option #2

Adopt the CEQA determinations and

- a. Appropriate \$1,032,000;
- b. Authorize final design of the water sampling system improvements at the Diemer plant;
- c. Authorize new filter process control instruments;
- d. Do not proceed with installation of overflow monitoring for residual solids and wastewater; and
- e. Do not proceed with supernatant pump station improvements.

Fiscal Impact: \$1,032,000 in budgeted funds under Approp. 15436

Business Analysis: Under this option, the improved water sampling system and filter process control instruments would enable the Diemer plant to maintain its treatment reliability and enhance its capability to respond to varying water quality conditions in a timely manner. However, this option would forego an opportunity for the plant to reduce the potential risk of un-intentional release of non-storm water into the storm drain system.

Option #3

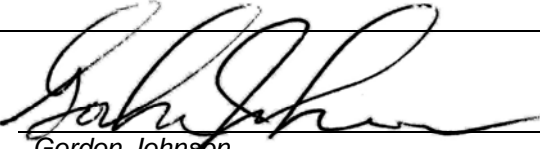
Do not proceed with the four Diemer improvement projects.

Fiscal Impact: None


Business Analysis: This option would forego an opportunity to enhance the Diemer plant's treatment reliability and to reduce the risk of non-compliance with water quality and environmental regulations.

Staff Recommendation

Option #1


Gordon Johnson
Manager/Chief Engineer,
Engineering Services

7/21/2011
Date


Jeffrey Kightlinger
General Manager

8/3/2011
Date

Attachment 1 – Financial Statement

Attachment 2 – Location Map

Ref# es12612129

Financial Statement for Diemer Improvements Program – Phase II

A breakdown of Board Action No. 14 for Appropriation No. 15436 for four Diemer improvement projects* is as follows:

	Previous Total Appropriated Amount (June 2011)	Current Board Action No. 14 (Aug. 2011)	New Total Appropriated Amount
Labor			
Studies and Investigations	\$ 766,600 **	\$ -	\$ 766,600
Final Design	2,389,300	368,300	2,757,600
Owner Costs (Program mgmt., bidding process)	2,014,938	144,000	2,158,938
Submittals Review & Record Dwgs.	419,100	18,000	437,100
Construction Inspection & Support	1,593,791	-	1,593,791
Metropolitan Force Construction	1,940,500	541,400	2,481,900
Materials and Supplies	918,558	638,500	1,557,058
Incidental Expenses	102,693	5,300	107,993
Professional/Technical Services	1,001,943	-	1,001,943
Equipment Use	43,155	-	43,155
Contracts	10,262,651	-	10,262,651
Remaining Budget	1,665,771 **	204,500	1,870,271
Total	\$ 23,119,000	\$ 1,920,000	\$ 25,039,000

Funding Request

Program Name:	Diemer Improvements Program – Phase II		
Source of Funds:	Revenue Bonds, Replacement and Refurbishment or General Funds		
Appropriation No.:	15436	Board Action No.:	14
Requested Amount:	\$ 1,920,000	Capital Program No.:	15436-I
Total Appropriated Amount:	\$ 25,039,000	Capital Program Page No.:	283
Total Program Estimate:	\$ 155,182,000	Program Goal:	I- Infrastructure Reliability

* The total amount expended to date on the Diemer Water Sampling System Improvements project is approximately \$65,000. This action is the initial appropriation for the other three projects: Filter Process Control Instrument Replacement, Installation of Overflow Monitoring System for Residual Solids and Wastewater, and Supernatant Pump Station Improvements.

** The preliminary design phase budget of \$17,000 for the Diemer Sample Pump Automation project will be transferred from Approp. 15380 to Approp. 15436 upon approval of this action. The remaining work will be completed under the Diemer Water Sampling System Improvements project for improved efficiency.

Robert B. Diemer Water Treatment Plant

