



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

3/8/2011 Board Meeting

**7-3**

**Subject**

Appropriate \$660,000; and authorize final design of chemical feed system improvements at the Diemer plant (Approp. 15436)

**Description**

This action authorizes final design to improve chemical feed systems at the Robert B. Diemer Water Treatment Plant. The chemical feed systems are used to control the application of chemicals in the water treatment process.

**Timing and Urgency**

The chemical feed pumps and flow meters at the Diemer plant which handle alum/ferric chloride, sodium hydroxide, liquid polymer, dry polymer and ammonia are over 20 years old and have reached the end of their service life. These chemical feed systems have become unreliable, and spare parts are no longer available from their manufacturers. Repeated age-related failures have occurred recently, resulting in unscheduled switchovers to backup systems and costly maintenance. Failure of the feed equipment for water treatment chemicals could potentially disrupt plant operations and impair regulatory compliance. Upgrades to these feed systems are needed to improve system reliability and for compliance with water quality regulations.

This project has been reviewed with Metropolitan's updated Capital Investment Plan (CIP) prioritization criteria. The chemical feed system improvements is categorized as an Infrastructure Refurbishment project, and is budgeted within Metropolitan's CIP for fiscal year 2010/11.

**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 a 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.

Water treatment chemicals are added throughout the treatment process. At the Diemer plant, conventional treatment processes are employed including disinfection, coagulation, flocculation, sedimentation, and filtration. The raw water entering the plant is presently disinfected with chlorine. Afterward, chemical coagulants (either alum or ferric chloride, plus liquid polymer) are injected and mixed with the water. The water enters the flocculation basins, where large mechanical mixers gently agitate the water, to allow the larger suspended particles in the water to bind together and form "floc." The floc, which is heavier than water, settles to the bottom of the sedimentation basins and is removed. Settled water from the sedimentation basins is then chlorinated again before entering the filters. Following filtration, chlorine and ammonia are added to the water to maintain a disinfectant residual within the distribution system. Caustic soda is also added to adjust the pH of the treated water to minimize corrosion, while dry polymer is used as filter aid and coagulant for the washwater reclamation and solids handling processes.

In February 2010, Metropolitan's Board authorized preliminary design phase activities for upgrades to the Diemer plant's chemical feed systems. Preliminary design has been completed, and staff recommends moving forward with final design at this time.

### **Chemical Feed System Improvements – Final Design Phase (\$660,000)**

Chemical feed equipment including pumps, motors and drives, control valves, and flow meters are used to add proper doses of chemicals to treat the water at the Diemer plant. The equipment for feeding alum/ferric chloride, sodium hydroxide, liquid polymer, dry polymer and ammonia has been in continuous use for over 20 years. Despite receiving regular maintenance, its reliability has declined over the years due to wear-and-tear and corrosion. Some of the feed equipment has experienced repeated failures, resulting in unscheduled shutdowns and costly maintenance. Failure of the feed equipment for water treatment chemicals could result in loss of chemical feed completely or inadequate feed capacity, which would disrupt plant operations and could impair water quality regulatory compliance. Due to the age of the equipment, repair kits and spare parts are no longer available from the original suppliers and are difficult to obtain from after-market vendors.

The existing ammonia feed piping area is congested, which makes access difficult for routine operational access and maintenance. Further, the current piping configuration requires that ammonia strainers be bypassed during normal air-padding operation. When the strainers are bypassed, there is increased risk for downstream control valves to be plugged by corrosion scale and foreign materials.

Staff recommends replacing the worn-out feed equipment to improve chemical feed system reliability. The new chemical feed equipment will be sized and configured to meet up-to-date water treatment criteria. A total of 26 pumps, 29 flow meters, 14 control valves, and other piping appurtenances will be installed for these chemical feed systems. All new equipment will be located within the existing chemical tank farms. The existing motor drives for the pumps will be upgraded to improve the accuracy of flow control and to expand the controllable range of operation. In addition, staff recommends improving the ammonia feed piping and strainer layout. The new layout will provide greatly improved access for maintenance.

This action appropriates \$660,000 and authorizes final design phase activities for the Diemer Chemical Feed System Improvements project. The scope of work includes code review, preparation of drawings and specifications for the final system configuration as well as temporary systems so that the chemical feeds may remain in service during construction, shutdown planning, development of a construction cost estimate, and all other activities in advance of construction. In order to minimize impacts to plant operations while the upgrades take place, all final design and construction activities will be performed by Metropolitan staff. Requested funds include \$512,200 for final design; \$68,800 for hazardous material testing, permitting, and project management; and \$79,000 for remaining budget. The cost of final design is approximately 12 percent of the estimated construction cost. Engineering Services' goal for design of projects with construction cost greater than \$3 million is 9 to 12 percent. The construction cost for this project is anticipated to range from \$4 million to \$4.4 million. When the final design is completed, staff will return to the Board for authorization to commence construction.

This project has been evaluated and recommended by Metropolitan's CIP Evaluation Team, and funds have been included in the fiscal year 2010/11 capital budget. See [Attachment 1](#) for the Financial Statement and [Attachment 2](#) for the Location Map.

This project is 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 Hatch Covers Replacement project and the Lower Maintenance Road Rehabilitation. With the present action for the Diemer Chemical Feed System Improvements, the total funding for Appropriation No. 15436 will increase from \$17,129,000 to \$17,789,000.

This project is consistent with Metropolitan's goals for sustainability by enhancing the reliability of the existing treatment system, in order to maintain reliable water deliveries in the future.

### ***Project Milestone***

April 2012 – Completion of final design

## Policy

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Metropolitan Water District Administrative Code Section 5108: Appropriations

### California Environmental Quality Act (CEQA)

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CEQA determination for Option #1:

The proposed action is categorically exempt under the provisions of CEQA and the State CEQA Guidelines. The overall activities involve the funding, design, minor alterations and replacement of existing public facilities with negligible or no expansion of use and no possibility of significantly impacting the physical environment. Accordingly, the proposed action qualifies under Class 1 and Class 2 Categorical Exemptions (Sections 15301 and 15302 of the State CEQA Guidelines).

The CEQA determination is: Pursuant to CEQA, the proposed action qualifies under two Categorical Exemptions (Class 1, Section 15301 and Class 2, Section 15302 of the State CEQA Guidelines).

CEQA determination for Option #2:

None required

## Board Options

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### Option #1

Adopt the CEQA determination and

- a. Appropriate \$660,000; and
- b. Authorize final design of the Diemer Chemical Feed System Improvements.

**Fiscal Impact:** \$660,000 in budgeted funds under Approp. 15436

**Business Analysis:** This option will improve the reliability of chemical feed systems for alum/ferric chloride, sodium hydroxide, liquid polymer, dry polymer, and ammonia, and will reduce the risk of chemical equipment failure. Failure of the equipment for feeding water treatment chemicals could disrupt plant operations and impair regulatory compliance.

### Option #2

Do not proceed with final design of the Diemer Chemical Feed System Improvements.

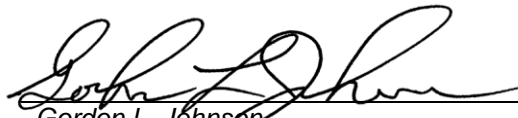
**Fiscal Impact:** None

**Business Analysis:** Under this option, improvements to the existing chemical feed systems would not be performed at this time. Staff would continue to operate and maintain the aged chemical feed equipment. The increasing failure rate for these systems would result in increased maintenance cost and increased downtime.

## Staff Recommendation

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Option #1

  
 Gordon L. Johnson  
 Manager/Chief Engineer, Engineering  
 Services

2/15/2011  
Date

  
 Jeffrey Kichtlinger  
 General Manager

2/23/2011  
Date

[Attachment 1 – Financial Statement](#)

[Attachment 2 – Location Map](#)

## Financial Statement for Diemer Improvements Program – Phase II

A breakdown of Board Action No. 11 for Appropriation No. 15436 for the Diemer Chemical Feed System Improvements project\* is as follows:

	<b>Previous Total Appropriated Amount (Mar. 2011)</b>	<b>Current Board Action No. 11 (Mar. 2011)</b>	<b>New Total Appropriated Amount</b>
Labor			
Studies and Investigations	\$ 653,300	\$ -	\$ 653,300
Final Design	1,877,100	512,200	2,389,300
Owner Costs (Program mgmt., permitting, haz. material testing)	1,756,438	66,400	1,822,838
Submittals Review	344,400	-	344,400
Construction Inspection & Support	1,135,191	-	1,135,191
Metropolitan Force Construction	1,717,900	-	1,717,900
Materials and Supplies	871,258	-	871,258
Incidental Expenses	96,793	2,400	99,193
Professional/Technical Services	850,943	-	850,943
Equipment Use	23,155	-	23,155
Contracts	6,663,366	-	6,663,366
Remaining Budget	1,139,156	79,000	1,218,156
<b>Total</b>	<b>\$ 17,129,000</b>	<b>\$ 660,000</b>	<b>\$ 17,789,000</b>

### Funding Request

<b>Program Name:</b>	Diemer Improvements Program – Phase II		
<b>Source of Funds:</b>	Revenue Bonds, Replacement and Refurbishment or General Funds		
<b>Appropriation No.:</b>	15436	<b>Board Action No.:</b>	11
<b>Requested Amount:</b>	\$ 660,000	<b>Capital Program No.:</b>	15436-I
<b>Total Appropriated Amount:</b>	\$ 17,789,000	<b>Capital Program Page No.:</b>	283
<b>Total Program Estimate:</b>	\$ 155,182,000	<b>Program Goal:</b>	I- Infrastructure Reliability

\* The total amount expended to date on the Diemer Chemical Feed System Improvements project is approximately \$164,000.

# Robert B. Diemer Water Treatment Plant

