



- Board of Directors  
*Engineering and Operations Committee*

8/16/2011 Board Meeting

7-1

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**Subject**

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Appropriate \$1.82 million; and authorize final design of seismic upgrades for the Weymouth Filter Buildings (Approp. 15369)

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**Description**

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This action authorizes final design of seismic upgrades for the filter control buildings and filter basins at the F. E. Weymouth Water Treatment Plant. These critical structures, which house the plant's filtration process, could potentially be damaged in the event of a major earthquake. The planned upgrades will reduce the risk of interruption to treated water deliveries.

**Timing and Urgency**

Metropolitan has an ongoing program to evaluate the seismic stability of its facilities in order to maintain reliable operation and to meet current seismic design practices and code requirements. Although Metropolitan facilities have always been designed to meet up-to-date codes that were in place at the time of their construction, industry practices and code requirements are periodically updated, particularly following a major earthquake.

Staff conducted a seismic assessment of the Weymouth Filter Buildings and concluded that these structures are vulnerable to damage in the event of a significant earthquake. Due to the critical nature of these facilities in delivering treated water, staff recommends proceeding with final design of upgrades at this time.

This project has been reviewed with Metropolitan's updated Capital Investment Plan (CIP) prioritization criteria and is categorized as an Infrastructure Reliability project. This project is budgeted within Metropolitan's CIP for fiscal year 2011/12.

**Background**

The Weymouth plant was placed into service in 1941 with an initial capacity of 100 million gallons per day (mgd), and was expanded twice to its present 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 Weymouth plant is located in the city of La Verne, approximately 1.5 miles from the Sierra Madre Fault. At the time the Weymouth plant was constructed, it was designed to meet the then current building codes of the early 1940s. Since that time, knowledge of earthquakes and seismic design has greatly improved, which has resulted in more stringent building codes.

Staff initiated a seismic assessment of the Weymouth plant in 2003. Through this effort, several buildings were identified to be in need of structural upgrade. The resulting projects have been prioritized and their schedules coordinated with other work planned at the Weymouth plant. The seismic assessment identified that a 7.0 magnitude earthquake on the Sierra Madre Fault could cause significant damage to the filter control buildings and filter basins. Extensive repairs could be required, which would be difficult and time-consuming due to limited access inside the filter structures. Following the seismic assessment, Metropolitan's Board authorized preliminary design of structural upgrades to the Weymouth Filter Buildings. The preliminary design used

up-to-date geotechnical information for the Weymouth site, along with current seismic codes, and developed methods for upgrading the filter structures. Preliminary design has now been completed, and staff recommends moving forward with final design at this time.

**Weymouth Filter Buildings Seismic Upgrades - Final Design Phase (\$1.82 million)**

The Weymouth plant has 48 filters, which are divided equally between two filter modules. The west half of the West Filter Control Building and its underlying filters, which are part of Module No. 1, were completed in 1941 during the original plant construction. The east half of Module No. 1 was added in 1962 with the first plant expansion. The East Filter Control Building and its underlying filters, which are part of Module No. 2, were added in 1969. The east and west filter basins consist of two perforated reinforced concrete shear-wall structures, each of which is 171 feet wide by 425 feet long and 19 feet deep, consisting of pipe galleries, box conduits, multimedia filters, troughs, and filtration appurtenances. The two filter control buildings are reinforced concrete superstructures atop the operating deck of the filters. Each is 24 feet wide and 12 feet high, and extends the full length of the filter structure (425 feet). The two filter control buildings house process control equipment necessary to operate the filters.

The filter basins are supported by concrete walls and piers which rest on a concrete foundation. Below the filters is an open sump which collects used filter backwash water. The seismic evaluation identified that the wall piers located in this difficult-to-access sump would likely be damaged in a major earthquake. Each filter control building would also be damaged at the end and interior walls. The planned structural upgrades to the filter buildings will consist of installing new concrete frames in each filter control building, reinforcing the shear walls, enlarging or adding new piers inside the filters, and filling in openings within the perforated concrete shear-wall system. Some existing mechanical and electrical equipment may need to be relocated during the seismic upgrades. Retrofit work will be staged to avoid limiting the Weymouth plant's water production capability.

Final design phase activities will include conducting a hydraulic flow study to evaluate the optimal configuration of structural elements in order to minimize impacts to flow patterns; detailed engineering analyses; preparation of drawings and specifications; development of a construction cost estimate; advertisement and receipt of bids; and all other activities in advance of award of a construction contract. Comprehensive testing to evaluate the existing structural concrete and reinforcement steel strength will also be conducted based on guidelines specified by the American Society of Civil Engineers, as concrete may deteriorate and reinforcing steel may corrode over time. Obtaining the concrete and steel samples will be labor-intensive due to the confined nature of the normally submerged sump area beneath the filters. Staff will return to the Board at a later date for award of the construction contract.

This action appropriates \$1.82 million and authorizes final design phase activities for seismic upgrades to the Weymouth filter control buildings and filter basins. Requested funds include \$1.47 million for final design; \$185,000 for receipt of bids, shutdown planning, and project management; \$88,000 for materials testing and hydraulic modeling; \$35,000 for value engineering; and \$42,000 for remaining budget. The cost of final design is approximately 11.7 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 \$13 million to \$14 million. All final design activities will be performed by Metropolitan staff.

This project has 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.

The Weymouth Filter Buildings Seismic Upgrades is included within capital Appropriation No. 15369, the Weymouth Improvements Program, which was initiated in fiscal year 2001/02. Appropriation No. 15369 also includes projects such as the Rapid Mix Facility, Electrical Upgrades, and Coagulant Tank Farm Upgrades. With the present action, the total funding for Appropriation No. 15369 will increase from \$159,628,000 to \$161,448,000.

This project is consistent with Metropolitan’s goals for sustainability by enhancing the reliability of the Weymouth plant in order to maintain reliable water deliveries in the future.

#### **Project Milestones**

January 2013 – Completion of final design

July 2015 – Completion of construction of seismic upgrades

#### **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 environmental effects from the construction and operation of the original project were evaluated in the F. E. Weymouth Filtration Plant Ozonation Facilities and Site Improvements Program Final Environmental Impact Report (Final EIR), which was certified by the Board on April 12, 2005. The Board also approved the Findings of Fact (findings), the Statement of Overriding Considerations (SOC), the Mitigation Monitoring and Reporting Program (MMRP), and the project itself. The current board action is solely based on the final design of seismic upgrades at Weymouth and not on any changes to the approved project itself. Hence, the previous environmental documentation acted on by the Board in conjunction with the proposed action fully complies with CEQA and the State CEQA Guidelines. Accordingly, no further CEQA documentation is necessary at this time for the Board to act on the proposed action. The Board will review and consider subsequent action (i.e., award of contract) and additional CEQA documentation, as required.

The CEQA determination is: Determine that the proposed action has been previously addressed in the certified 2005 Final EIR, findings, SOC, and MMRP and that no further environmental analysis or documentation is required at this time for authority to move forward with final design.

CEQA determination for Option #2:

None required

#### **Board Options**

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##### **Option #1**

Adopt the CEQA determination and

- a. Appropriate \$1.82 million; and
- b. Authorize final design of seismic upgrades for the Weymouth Filter Buildings.

**Fiscal Impact:** \$1.82 million of budgeted funds under Approp. 15369

**Business Analysis:** This project will protect Metropolitan’s assets, enhance reliability of deliveries to member agencies, and reduce the risk of costly emergency repairs.

##### **Option #2**

Do not proceed with the seismic upgrades at this time.

**Fiscal Impact:** None

**Business Analysis:** This option would forego an opportunity to enhance reliability of the Weymouth plant.

**Staff Recommendation**

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Option #1

	<u>7/21/2011</u>
Gordon Johnson Manager/Chief Engineer, Engineering Services	Date

	<u>7/29/2011</u>
Jeffrey Kightlinger General Manager	Date

[Attachment 1 – Financial Statement](#)

[Attachment 2 – Location Map](#)

Ref# es12612211

**Financial Statement for Weymouth Improvements Program**

A breakdown of Board Action No. 35 for the Weymouth Filter Buildings Seismic Upgrades\* is as follows:

	Previous Total Appropriated Amount (Feb. 2011)	Current Board Action No. 35 (Aug. 2011)	New Total Appropriated Amount
Labor			
Studies & Investigations	\$ 1,999,477	\$ 88,000	\$ 2,087,477
Final Design	7,265,641	1,470,000	8,735,641
Owner Costs (Project mgmt, bidding process, shutdown planning)	6,993,924	212,000	7,205,924
Submittals Review, Record Drwgs	2,722,723	-	2,722,723
Construction Inspection & Support	1,498,704	-	1,498,704
Metropolitan Force Construction	6,906,280	-	6,906,280
Materials and Supplies	3,425,848	-	3,425,848
Incidental Expenses	365,400	8,000	373,400
Professional/Technical Services	12,401,032	-	12,401,032
Contracts	98,684,945	-	98,684,945
Remaining Budget	7,364,026	42,000	7,406,026
<b>Total</b>	<b>\$ 159,628,000</b>	<b>\$ 1,820,000</b>	<b>\$ 161,448,000</b>

**Funding Request**

<b>Program Name:</b>	Weymouth Improvements Program		
<b>Source of Funds:</b>	Revenue Bonds, Replacement and Refurbishment, or General Funds		
<b>Appropriation No.:</b>	15369	<b>Board Action No.:</b>	35
<b>Requested Amount:</b>	\$ 1,820,000	<b>Capital Program No.:</b>	15369-I
<b>Total Appropriated Amount:</b>	\$ 161,448,000	<b>Capital Program Page No.:</b>	323
<b>Total Program Estimate:</b>	\$ 272,390,000	<b>Program Goal:</b>	I-Infrastructure & Reliability

\* The total amount expended to date on the Weymouth Filter Buildings Seismic Upgrades is approximately \$380,000.

# F.E. Weymouth Water Treatment Plant

