



- Board of Directors
Engineering and Operations Committee

9/13/2011 Board Meeting

7-3

Subject

Appropriate \$570,000; and authorize two rehabilitation projects at the F. E. Weymouth Water Treatment Plant (Approps. 15369 and 15440)

Description

This action authorizes two projects at the F. E. Weymouth Water Treatment Plant: (1) Final design of seismic upgrades for the plant's washwater storage tanks; and (2) Preliminary design to refurbish Treatment Basins Nos. 5-8.

Timing and Urgency

The Weymouth plant's two washwater tanks are used to store filtered water for use in backwashing the plant filters. Backwashing is an essential step in the filtration process to cleanse the filter media. Structural analyses have identified that both tanks require upgrades to withstand a significant seismic event.

Reliable operation of the flocculation and solids removal processes in Treatment Basins Nos. 5-8 is required to comply with water quality regulations and to effectively meet Metropolitan's treated water goals. Components of these basins have deteriorated from 50 years of use and need to be refurbished to prevent further deterioration, which could impact plant operations.

Each project has been reviewed with Metropolitan's updated Capital Investment Plan (CIP) prioritization criteria. Both projects are categorized as Infrastructure Rehabilitation projects and are 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 current capacity of 520 mgd. The plant delivers a blend of waters from the Colorado River Aqueduct and State Water Project to Metropolitan's Central Pool portion of the distribution system.

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.

The Sierra Madre Fault, which is located less than 1.5 miles from the Weymouth plant, has the capability of generating a 7.0 magnitude earthquake.

The Weymouth plant has eight treatment basins. Basins Nos. 1 and 2 were constructed in 1940 as part of the original plant construction, Basins Nos. 3 and 4 were added in 1949 during the first plant expansion, and Basins Nos. 5-8 were added in 1962 during the second expansion. Basins Nos. 3 and 4 were refurbished in 2005 and are presently in good operating condition. Basins Nos. 1, 2, and 5-8 have shown signs of deterioration, as may be expected from 50 to 70 years of operation. Metropolitan staff has prioritized their refurbishment and will stage the work, in conjunction with other planned improvements at the Weymouth plant.

While recent treated water deliveries from the Weymouth plant have been below the plant's rated capacity, and are projected to remain flat over the next several years, it is important that refurbishment of the treatment basins move forward. Reliable operation is needed to maintain system flexibility for seasonal peak demands, to accommodate scheduled shutdowns of the Jensen and Diemer plants, and to be able to treat source waters of varying quality and availability. Since Basins Nos. 5-8 require fewer, less-complex upgrades than the original Basins Nos. 1 and 2, staff recommends proceeding with refurbishment of Basins Nos. 5-8 at this time. The more extensive upgrades required at Basins Nos. 1 and 2 will follow at a later date.

These rehabilitation projects will enhance plant reliability, help sustain water deliveries in the event of a significant earthquake, minimize impacts on plant operation from aging critical equipment, and aid in compliance with water quality regulations.

Project No. 1 – Washwater Tanks Seismic Upgrades – Final Design Phase (\$384,000)

The Weymouth plant utilizes two aboveground welded steel tanks to store filtered water for use in backwashing the plant filters. Backwashing cleanses the filters after they have been on-line for 20 to 80 hours in active filtration service. A small portion of the filtered water is pumped into and stored in the plant's washwater tanks, from which it is released by gravity to backwash dirty filters when needed.

The Weymouth washwater tanks are located in the northern portion of the plant, with storage capacities of 1 million and 1.3 million gallons. The western tank measures 48 feet in diameter by 71 feet high and was placed into service in 1941. The eastern tank measures 60 feet in diameter by 63 feet high and was erected in the early 1960s. Both tanks were designed and constructed in accordance with applicable codes of their time.

As part of Metropolitan's seismic assessment program, staff conducted a detailed evaluation of the two washwater tanks. Analysis of each tank was performed in accordance with current seismic codes and updated site-specific geotechnical information, and was based on procedures from the American Water Works Association (AWWA) Standard for Welded Carbon Steel Tanks. The results of the analyses indicated that both tanks require structural upgrades to withstand a significant seismic event.

In May 2010, Metropolitan's Board authorized preliminary design of seismic upgrades for the two washwater tanks. Preliminary design is now complete and staff recommends proceeding with final design of structural upgrades. Recommended upgrades include: installing a new anchorage system for each tank; extending the existing concrete mat foundation which supports the west tank; installing a supplemental foundation system composed of concrete piles and a grade beam around the perimeter of the east tank; relocating electrical equipment to allow extension of tank foundations; and installing flexible couplings on the 42-inch diameter outlet pipes which connect to each tank.

This action appropriates \$384,000 and authorizes final design phase activities for the Washwater Tanks Seismic Upgrades. Final design activities include: engineering design and preparation of drawings and specifications; detailed computer modeling; development of a construction cost estimate; 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 \$256,000 for final design; \$78,500 for owner's costs including advertisement and receipt of bids, and project management; and \$49,500 for remaining budget. The anticipated cost of final design is approximately 14.5 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 \$1.7 million to \$2 million.

Project No. 2 – Treatment Basins Nos. 5-8 Refurbishment – Preliminary Design Phase (\$186,000)

The Weymouth Treatment Basins Nos. 5-8 consist of four 500-foot-long by 100-foot-wide basins, which are each divided into a 100-foot-long flocculation section and a 400-foot-long sedimentation section.

The flocculation section is used to gently mix coagulant chemicals with the incoming untreated water. The chemicals adhere to the water's suspended solids and form large particles called floc. The sedimentation section allows these particles to settle on the basin floor, where they are collected and removed by rotating mechanical

arms (scrapers), which sweep the settled solids to a center hopper. Settled residual solids are then pumped to the solids thickeners, while the clarified water flows to the filters.

The flocculation section in each basin is divided by a series of four wooden baffle walls into five cells. Water flows over and under the 13-foot-high baffle walls to promote gentle mixing. Each baffle wall is composed of stacked 2-inch by 10-inch wooden boards, which are held in place by steel guides embedded in the concrete floor. Each flocculation section contains a total of 288 boards.

The sedimentation section is divided into four cells. The first three cells are each spanned by a 3-foot-wide by 50-foot-long catwalk, which provides access to elevated motors, electrical panels, and the equipment that scrapes residual solids from the basin floor. The fourth cell contains the launder troughs, which collect and remove clarified water.

Inspections conducted by Metropolitan staff have identified that the wooden baffle walls have deteriorated after repeated wet and dry cycles. The boards have begun to buckle, fail, and dislodge from their connections, and have shown a propensity to support algae and microbial growth. The steel guides are also corroded. In the sedimentation section, the scrapers do not reach the corners of the cells, allowing residual solids to accumulate on the floor along the wall. Staff has installed underwater spargers that spray the solids to reduce the build-up. However, they do not prevent all of the deposits, must be operated manually, and require additional maintenance by plant staff. Over time, the 12 catwalks that span the sedimentation section have begun to show significant signs of corrosion, which will weaken the steel members. If left unchecked, the basins would need to be removed from service.

Staff recommends that Treatment Basins Nos. 5-8 be refurbished to restore them to reliable operating condition. Planned work for the flocculation section includes repairing the steel guides and replacing the existing wooden boards. Recommended work for the sedimentation section includes filling the interior corners of each cell with sloping concrete fillets to direct residual solids into the path of the rotating scrapers, and refurbishing and recoating the existing structural members of the catwalks. Preliminary design activities will include: materials sampling and testing; investigating alternative long-life/low-maintenance board materials consistent with current industry practice; evaluating sandblasting and recoating alternatives that provide long-term, cost-effective corrosion protection; assessing materials and metallurgy; developing final design criteria; and preparing a cost estimate for the refurbishment.

This action appropriates \$186,000 and authorizes preliminary design phase activities for the Treatment Basins Nos. 5-8 Refurbishment project. All work will be performed by Metropolitan staff. Requested funds include \$121,000 for the materials investigation, technical analyses, and preparation of a preliminary design report; \$42,500 for owner's costs including preparation of environmental documentation and project management; and \$22,500 for remaining budget.

Summary

This action appropriates \$570,000 and authorizes final design of the Weymouth Washwater Tanks Seismic Upgrades and preliminary design to refurbish Treatment Basins Nos. 5-8. Both 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 Statements and [Attachment 2](#) for the Location Map.

The Washwater Tanks Seismic Upgrades project 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 Coagulant Tank Farm Modifications; Junction Structure Seismic Upgrades; new Rapid Mix System; and Electrical Upgrades. With the present action, the total funding for Appropriation No. 15369 will increase from \$161,448,000 to \$161,832,000.

The Basins Nos. 5-8 Refurbishment project is included within capital Appropriation No. 15440, the Weymouth Improvements Program Phase II, which was initiated in fiscal year 2006/07. Appropriation No. 15440 also includes projects such as the Filter Outlet Chemical Trench; Filter Outlet Conduit Repairs; and Filter Rehabilitation. With the present action, the total funding for Appropriation No. 15440 will increase from \$7,196,000 to \$7,382,000.

These two rehabilitation projects are 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

May 2012 – Completion of preliminary design to refurbish Basins Nos. 5-8

August 2012 – Completion of final design of seismic upgrades for the two washwater tanks

Policy

Metropolitan Water District Administrative Code Section 5108: Appropriations

California Environmental Quality Act (CEQA)

Project No. 1 – Washwater Tanks Seismic Upgrades – Final Design Phase

CEQA determination for Options #1 and #2:

The environmental effects of the Weymouth Washwater Tanks Seismic Upgrades Project (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 adopted the Findings of Fact (Findings), the Statement of Overriding Considerations (SOC), and the Mitigation Monitoring and Reporting Program (MMRP), along with approving the overall Program (including the Project). The current board action is solely based on appropriating funding for final design and not on any changes to the approved Project. 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 for the Board to act on the proposed action.

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.

Project No. 2 – Treatment Basins Nos. 5-8 Refurbishment – Preliminary Design Phase

CEQA determination for Option #1:

The proposed action consists of preliminary design for the Weymouth Treatment Basins Nos. 5-8 Refurbishment Project, and is categorically exempt under the provisions of CEQA and the State CEQA Guidelines. 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 as a Class 6 Categorical Exemption (Section 15306 of the State CEQA Guidelines).

The CEQA determination is: Determine that pursuant to CEQA, the proposed action qualifies under a Categorical Exemption (Class 6, Section 15306 of the State CEQA Guidelines).

CEQA determination for Option #2:

None required

Board Options

Option #1

Adopt the CEQA determinations and

- a. Appropriate \$570,000;
- b. Authorize final design of the Weymouth Washwater Tanks Seismic Upgrades; and
- c. Authorize preliminary design to refurbish Weymouth Treatment Basins Nos. 5-8.

Fiscal Impact:

\$384,000 of budgeted funds under Approp.15369

\$186,000 of budgeted funds under Approp. 15440

Business Analysis: This option will enhance reliability and continued operation of the Weymouth plant.

Option #2

Adopt the CEQA determinations and

- a. Appropriate \$384,000;
- b. Authorize final design of the Weymouth Washwater Tanks Seismic Upgrades; and
- c. Do not authorize preliminary design to refurbish Weymouth Treatment Basins Nos. 5-8 at this time.

Fiscal Impact: \$384,000 of budgeted funds under Approp. 15369

Business Analysis: This option will provide seismic upgrades to maintain continued operation of the Weymouth plant in the event of a significant earthquake. This option will forego an opportunity to minimize impacts on plant operation resulting from deterioration of aged critical equipment.

Staff Recommendation

Option #1


 _____ 8/22/2011
 Gordon Johnson Date
 Manager/Chief Engineer,
 Engineering Services


 _____ 8/25/2011
 Jeffrey Wightlinger Date
 General Manager

[Attachment 1 – Financial Statements](#)

[Attachment 2 – Location Map](#)

Financial Statement for Weymouth Improvements Program

A breakdown of Board Action No. 36 for Appropriation No. 15369 for the Weymouth Washwater Tanks Seismic Upgrades project* is as follows:

| | Previous Total Appropriated Amount (Aug. 2011) | Current Board Action No. 36 (Sept. 2011) | New Total Appropriated Amount |
|-----------------------------------|---|---|--|
| Labor | | | |
| Studies & Investigations | \$ 2,087,477 | \$ - | \$ 2,087,477 |
| Final Design | 8,735,641 | 254,500 | 8,990,141 |
| Owner Costs | 7,205,924 | 78,500 | 7,284,424 |
| Submittals Review, Record Drwgs | 2,722,723 | - | 2,722,723 |
| Construction Inspection & Support | 11,498,704 | - | 11,498,704 |
| Metropolitan Force Construction | 6,906,280 | - | 6,906,280 |
| Materials & Supplies | 3,425,848 | - | 3,425,848 |
| Incidental Expenses | 373,400 | 1,500 | 374,900 |
| Professional/Technical Services | 12,401,032 | - | 12,401,032 |
| Contracts | 98,684,945 | - | 98,684,945 |
| Remaining Budget | 7,406,026 | 49,500 | 7,455,526 |
| Total | \$ 161,448,000 | \$ 384,000 | \$ 161,832,000 |

Funding Request

| | | | |
|-----------------------------------|--|----------------------------------|--------------------------------|
| Program Name: | Weymouth Improvements Program | | |
| Source of Funds: | Revenue Bonds, Replacement and Refurbishment, or General Funds | | |
| Appropriation No.: | 15369 | Board Action No.: | 36 |
| Requested Amount: | \$ 384,000 | Capital Program No.: | 15369-I |
| Total Appropriated Amount: | \$ 161,832,000 | Capital Program Page No.: | 329 |
| Total Program Estimate: | \$ 237,725,000 | Program Goal: | I-Infrastructure & Reliability |

* The total amount expended to date on the Weymouth Washwater Tanks Seismic Upgrades project is approximately \$245,000.

Financial Statement for Weymouth Improvements Program – Phase II

A breakdown of Board Action No. 12 for Appropriation No. 15440 for the Weymouth Treatment Basins Nos. 5-8 Refurbishment project* is as follows:

| | Previous Total Appropriated Amount (Dec. 2010) | Current Board Action No. 12 (Sept. 2011) | New Total Appropriated Amount |
|-----------------------------------|---|---|--|
| Labor | | | |
| Preliminary Design | \$ 735,500 | \$ 120,000 | \$ 855,500 |
| Owner Costs (Program mgmt) | 976,000 | 42,500 | 1,018,500 |
| Submittals Review, Record Drwgs | 794,500 | - | 794,500 |
| Construction Inspection & Support | 359,300 | - | 359,300 |
| Metropolitan Force Construction | 361,700 | - | 361,700 |
| Materials & Supplies | 463,000 | - | 463,000 |
| Incidental Expenses | 49,800 | 1,000 | 50,800 |
| Professional/Technical Services | 889,000 | - | 889,000 |
| Equipment Use | 2,500 | - | 2,500 |
| Contracts | 2,015,691 | - | 2,015,691 |
| Remaining Budget | 549,009 | 22,500 | 571,509 |
| Total | \$ 7,196,000 | \$ 186,000 | \$ 7,382,000 |

Funding Request

| | | | |
|-----------------------------------|---|----------------------------------|--------------------------------|
| Program Name: | Weymouth Improvements Program - Phase II | | |
| Source of Funds: | Revenue Bonds, Replacement and Refurbishment or General Funds | | |
| Appropriation No.: | 15440 | Board Action No.: | 12 |
| Requested Amount: | \$ 186,000 | Capital Program No.: | 15440-I |
| Total Appropriated Amount: | \$ 7,382,000 | Capital Program Page No.: | 330 |
| Total Program Estimate: | \$ 139,772,000 | Program Goal: | I-Infrastructure & Reliability |

* This action is the initial appropriation for the Weymouth Treatment Basins Nos. 5-8 Refurbishment project.

F.E. Weymouth Water Treatment Plant

