Proposed Capital Investment Plan Appendix

Fiscal Years 2020/21 and 2021/22

Uniquely Metropolitan: Maintaining Regional Reliability
Summary

The primary focus of the CIP Appendix is to provide information on all capital programs and projects that have been proposed, evaluated, and included in the budget forecast to begin or continue during and after FY 2020/21 and FY 2021/22. Scope, accomplishments, objectives and financial projections are provided for each capital program. Every project with work planned for the two budget years and beyond is listed under the Individual Program Summaries.

The total planned capital spending for FY 2020/21 and FY 2021/22 of approximately $500 million includes all anticipated costs for labor including administrative overhead, construction and professional services contract costs, right of way, materials, operating equipment, and incidental expenses.

Annual planned capital spending for FY 2020/21 and FY 2021/22 is estimated to be approximately $250 million and is planned to be funded by a combination of current operating revenues (i.e., PAYGO) and debt.

<table>
<thead>
<tr>
<th>Capital Program</th>
<th>FY 2020/21</th>
<th>FY 2021/22</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorado River Aqueduct Reliability</td>
<td>$ 55,000,000</td>
<td>$ 52,370,000</td>
<td>$ 107,370,000</td>
</tr>
<tr>
<td>Cost Efficiency &amp; Productivity</td>
<td>$ 6,705,000</td>
<td>$ 8,800,000</td>
<td>$ 15,505,000</td>
</tr>
<tr>
<td>Dams &amp; Reservoirs Improvements</td>
<td>$ 5,100,000</td>
<td>$ 13,100,000</td>
<td>$ 18,200,000</td>
</tr>
<tr>
<td>Distribution System Reliability</td>
<td>$ 37,200,000</td>
<td>$ 29,900,000</td>
<td>$ 67,100,000</td>
</tr>
<tr>
<td>District Housing &amp; Property Improvements</td>
<td>$ 3,500,000</td>
<td>$ 7,500,000</td>
<td>$ 11,000,000</td>
</tr>
<tr>
<td>Minor Capital Projects</td>
<td>$ 3,800,000</td>
<td>$ 5,400,000</td>
<td>$ 9,200,000</td>
</tr>
<tr>
<td>Prestressed Concrete Cylinder Pipe Rehabilitation</td>
<td>$ 30,260,000</td>
<td>$ 23,600,000</td>
<td>$ 53,860,000</td>
</tr>
<tr>
<td>Regional Recycled Water</td>
<td>$ 210,000</td>
<td>$ —</td>
<td>$ 210,000</td>
</tr>
<tr>
<td>Right of Way &amp; Infrastructure Protection</td>
<td>$ 2,415,000</td>
<td>$ 5,700,000</td>
<td>$ 8,115,000</td>
</tr>
<tr>
<td>System Flexibility/Supply Reliability</td>
<td>$ 13,600,000</td>
<td>$ 24,800,000</td>
<td>$ 38,400,000</td>
</tr>
<tr>
<td>System Reliability</td>
<td>$ 44,900,000</td>
<td>$ 52,500,000</td>
<td>$ 97,400,000</td>
</tr>
<tr>
<td>Treatment Plant Reliability</td>
<td>$ 48,550,000</td>
<td>$ 27,610,000</td>
<td>$ 76,160,000</td>
</tr>
<tr>
<td>Water Quality/Oxidation Retrofit</td>
<td>$ 18,500</td>
<td>$ —</td>
<td>$ 18,500</td>
</tr>
<tr>
<td>Total</td>
<td>$ 251,258,500</td>
<td>$ 251,280,000</td>
<td>$ 502,538,500</td>
</tr>
</tbody>
</table>
Capital Investment Plan Organization

CIP Structure

The CIP has been restructured for clearer planning and reporting into the following format:

1. PROGRAM
2. PROJECT GROUP
3. PROJECT

The highest level of the CIP structure is Program. Programs are comprised of one or more Project Groups. There are 13 capital programs described in Table 1.

Table 1 - Capital Programs

<table>
<thead>
<tr>
<th>Program</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorado River Aqueduct (CRA) Reliability</td>
<td>Projects under this program will replace or refurbish facilities and components on the CRA system in order to reliably convey water from the Colorado River to Southern California.</td>
</tr>
<tr>
<td>Cost Efficiency &amp; Productivity</td>
<td>Projects under this program will upgrade, replace, or provide new facilities, software applications, or technology that will provide economic savings that outweigh project costs through enhanced business and operating processes.</td>
</tr>
<tr>
<td>Dams &amp; Reservoirs Improvements</td>
<td>Projects under this program will upgrade or refurbish Metropolitan’s dams, reservoirs, and appurtenant facilities in order to reliably meet water storage needs and regulatory compliance.</td>
</tr>
<tr>
<td>Distribution System Reliability</td>
<td>Projects under this program will replace or refurbish existing facilities within Metropolitan’s distribution system including pressure control structures, hydroelectric power plants, and pipelines in order to reliably meet water demands.</td>
</tr>
<tr>
<td>District Housing &amp; Property Improvements</td>
<td>Projects under this program will refurbish or upgrade Metropolitan workforce housing to enhance living conditions and attract and retain skilled employees.</td>
</tr>
<tr>
<td>Minor Capital Projects</td>
<td>This program will execute refurbishments, replacements, or upgrades at Metropolitan facilities that cost less than $400,000 each, and which projects will be identified after adoption of the budget.</td>
</tr>
<tr>
<td>Prestressed Concrete Cylinder Pipe (PCCP) Reliability</td>
<td>Projects under this program will refurbish or upgrade Metropolitan’s PCCP feeders to maintain reliable water deliveries without unplanned shutdowns.</td>
</tr>
<tr>
<td>Regional Recycled Water</td>
<td>Projects under this Program are planned to demonstrate the feasibility of recycling wastewater for recharge of groundwater basins, and provide a new, sustainable and drought resistant source of supply for Southern California.</td>
</tr>
<tr>
<td>Right-of-Way and Infrastructure Protection</td>
<td>Projects under this program will refurbish or upgrade above-ground facilities and rights-of-way along Metropolitan’s pipelines in order to address access limitations, erosion-related work, and security needs.</td>
</tr>
<tr>
<td>System Flexibility/Supply Reliability</td>
<td>Projects under this program will enhance the flexibility and/or increase the capacity of Metropolitan’s water supply and delivery infrastructure to meet current and projected service demands.</td>
</tr>
<tr>
<td>Program</td>
<td>Definition</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>System Reliability</td>
<td>Projects under this program will improve or modify facilities throughout Metropolitan's service area in order to utilize new processes and/or technologies, and to improve facility safety and overall reliability. These include projects related to Metropolitan's Supervisory Control and Data Acquisition (SCADA) system and other Information Technology projects.</td>
</tr>
<tr>
<td>Treatment Plant Reliability:</td>
<td>Projects under this program will replace or refurbish facilities and components at Metropolitan's five water treatment plants in order to continue to reliably meet treated water demands.</td>
</tr>
<tr>
<td>• Diemer Plant</td>
<td></td>
</tr>
<tr>
<td>• Jensen Plant</td>
<td></td>
</tr>
<tr>
<td>• Mills Plant</td>
<td></td>
</tr>
<tr>
<td>• Skinner Plant</td>
<td></td>
</tr>
<tr>
<td>• Weymouth Plant</td>
<td></td>
</tr>
<tr>
<td>Water Quality/Oxidation</td>
<td>Projects under this program will add or upgrade facilities to ensure compliance with water quality regulations for treated water at Metropolitan's treatment plants and throughout the distribution system.</td>
</tr>
<tr>
<td>Retrofit</td>
<td></td>
</tr>
</tbody>
</table>
Capital Investment Plan Development

Background
The projects that comprise the proposed CIP have been identified from many Metropolitan studies of projected water needs as well as ongoing monitoring and inspections, condition assessments, and focused vulnerability studies. Staff continues to study operational demands on aging facilities and has made recommendations for capital projects that will maintain infrastructure reliability and ensure compliance with all applicable water quality regulations, and building, fire, and safety codes. Staff has also studied business and operations processes and proposed projects that will improve efficiency and provide future cost savings. Additionally, several projects have been identified and prioritized to provide flexibility in system operations to address uncertain supply conditions from the Colorado River and the State Water Project.

CIP Development Process
The CIP is structured to reflect Metropolitan's strategic goals of providing a reliable supply of high-quality water at the lowest cost possible. As part of the CIP development process, all new and existing projects are evaluated against an objective set of criteria to ensure existing and future capital investments are aligned with Metropolitan's priorities for water supply reliability, water quality, and public safety.

This rigorous evaluation process has resulted in a thorough review and assessment of all proposed capital projects by staff and managers prior to inclusion in the CIP budget. Staff continues to conduct comprehensive field investigations that identify critical replacement and refurbishment projects and a variety of necessary facility upgrades related to infrastructure reliability as well as regulatory compliance. Project schedules are evaluated regularly in order to plan for necessary capital investments in infrastructure reliability and to accommodate the urgency of each project. Additionally, current demand projections that account for ongoing conservation, planned increased local supply production, and the economy, have been evaluated to ensure that demand and growth-related projects are appropriately scheduled.

Project Proposals
Sponsors are required to submit proposals for all projects that have not yet been authorized for construction or approved to proceed with final design to be considered for inclusion into the CIP. For newly proposed projects, proposals must include scope, justification, alternatives, impacts of re-scheduling work for a later time, impact on operations and maintenance costs, and an estimate of total project cost. For existing projects, staff must also provide justification for continuing the project, explain any changes since the proposal was last evaluated, and describe critical phases for the upcoming years.

The projects are evaluated, rated, and prioritized based on the contents of the proposals. The guidelines provided to the project sponsors are summarized in Table 2.
<table>
<thead>
<tr>
<th>Section</th>
<th>Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appropriation No., CIP Index No., Project No. (if existing) and Project Title</td>
<td>If a proposed project has been previously authorized by the Board, provide the Appropriation and CIP Index numbers along with the project title and project number if one has been assigned. If not previously authorized, provide a project title only.</td>
</tr>
<tr>
<td>Estimated Total Project Cost</td>
<td>Show the total estimate of cost from inception to completion of a project, including administrative overhead and contingency, as applicable.</td>
</tr>
<tr>
<td>GM Business Plan</td>
<td>Indicate the strategic priorities under GM’s Business Plan the project best supports.</td>
</tr>
<tr>
<td>Current Project Phase</td>
<td>Indicate the phase (Study, Preliminary Design, etc.) as of the date proposal submitted.</td>
</tr>
<tr>
<td>Current Phase % Complete</td>
<td>Current phase percent complete as of the date proposal submitted.</td>
</tr>
<tr>
<td>Project Description</td>
<td>Describe the project scope of work.</td>
</tr>
<tr>
<td>Changes to Existing Project</td>
<td>For an existing project, describe any changes to the project scope, budget, or schedule over the past two years.</td>
</tr>
<tr>
<td>Justification</td>
<td>Describe the nature of the issue to be addressed by the project. What is the problem? What is the function of the facility/component being addressed by the project? Why is it important? Consider issues such as:  * Operational flexibility  * New facility expansion  * New water supply  * Aging infrastructure deterioration/failure  * Process improvement/failure  * Maintenance capability  * Seismic vulnerability  * Obsolescence (vendor support, parts, technology, etc.)  * Security  * Regulatory Compliance (water quality, environmental, health and safety, etc.)  * Cost savings  * Revenue generation  * Energy savings  * Productivity  Include an explanation of how the project addresses any of the above issues and provide documentation, when applicable, to substantiate the need for the project.</td>
</tr>
<tr>
<td>Section</td>
<td>Guideline</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Directive</td>
<td><strong>Regulatory/Legal Settlement</strong>: Indicate if this is related to a written citation or directive, verbal/written directive, or in-house identification (includes environmental mitigation mandated by an MND or EIR). <strong>Special Initiative/Directive</strong>: Indicate if the project is specifically identified in one of the core or strategic initiatives; identified via Area Study, System Overview Study, etc; and/or what phase(s) of the project have been authorized such as study, preliminary design, or final design.</td>
</tr>
<tr>
<td>Service Disruption</td>
<td>Describe how Metropolitan's day-to-day operations could be impacted if the project is not approved. Consider business, as well as water system operations, including maintenance activities.</td>
</tr>
<tr>
<td>Cost/ Productivity/ Sustainability</td>
<td>Describe potential cost, water, and/or energy savings, waste reduction, revenue/energy generation, better customer service, etc., that justify the project. Include a pay-back period.</td>
</tr>
<tr>
<td>Alternatives</td>
<td>Provide a brief description of any potential project scope alternatives, including any opportunities to “stage” the work. Include if it is possible to only perform a portion of a project to meet foreseeable customer needs. Consider the possibility of new technology, changing demands, as well as environmental impacts and economies of scale. Describe any reasonable projects, processes, or other initiatives available as alternatives to the project. Discuss both positive and negative aspects of each alternative. If possible, explain what other similar agencies are doing about this or similar issue.</td>
</tr>
<tr>
<td>Additional Background Information</td>
<td>Provide any other supplemental information (e.g. detailed history of a problem, supporting technical information, shutdown constraints, etc.) that will help in evaluating the project. This can also be attached to the proposal.</td>
</tr>
<tr>
<td>Schedule</td>
<td>Indicate the proposed beginning and end dates for all appropriate phases.</td>
</tr>
<tr>
<td>Detailed Project Cost Estimate</td>
<td>Include an itemized list of all costs for the project, as follows: 1) Direct Labor with additives at the indicated rate 2) Equipment and Materials 3) Incidental Expenses 4) Professional/Technical Services (e.g., consultants) 5) Right-of-Way and Land Purchases (e.g., easements, fee title, escrow fees) 6) Operating Equipment Use and Rental 7) Contract Payments (e.g., construction contracts) 8) Administrative Overhead at the indicated rate 9) Contingency All new project proposals and existing projects must include this estimate.</td>
</tr>
<tr>
<td>Post-Implementation O&amp;M Impacts</td>
<td>To the extent available/known, provide a description of the impacts, costs, and/or benefits this capital project is anticipated to have on Metropolitan's current and future O&amp;M expenses and services upon completion (e.g. labor, maintenance, and equipment costs; enhanced reliability; improved water quality, etc. For example, “Ozone generators will substantially increase electrical consumption by approximately $1 million annually and the number of new pieces of equipment will require periodic maintenance per the manufacturer's recommendations beginning in FY 2015/16. PDR and future studies will provide additional detail on the overall lifecycle costs”). This is required for projects greater than $2 million and whose planned implementation date is within the next five fiscal years.</td>
</tr>
<tr>
<td>Approvals</td>
<td>1) Person preparing and submitting the proposed project - Type name only 2) Team manager sponsoring the project 3) Unit manager sponsoring the project 4) Section manager sponsoring the project (e.g., all new and existing projects) 5) Group manager sponsoring the project (e.g., all new projects) 6) Project manager signs in concurrence. (e.g., Engineering and IT organizations)</td>
</tr>
</tbody>
</table>
Evaluation Criteria

The evaluation criteria cover four characteristics or objectives for capital projects: Project Justification, Directive, Service Disruption, and Cost/Productivity/Sustainability. In addition, a multiplier is applied to a project rating to factor in a risk assessment. Table 3 provides a description of the criteria and multiplier.

Table 3 - Evaluation Criteria and Multiplier

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Justification</td>
<td>Assessment of the overall importance of a project. Criterion looks at whether or not a project supports the following:</td>
</tr>
<tr>
<td></td>
<td>- Supply reliability</td>
</tr>
<tr>
<td></td>
<td>- Infrastructure reliability</td>
</tr>
<tr>
<td></td>
<td>- Regulatory compliance</td>
</tr>
<tr>
<td></td>
<td>- Other goals (e.g., cost savings, revenue generation, energy savings, and increased productivity)</td>
</tr>
<tr>
<td>Directive</td>
<td>Assessment of whether or not a project is specifically identified in one of the core or strategic initiatives, if any permitting agency such as the California State Department of Safety of Dams has issued a directive or citation to take corrective actions, the current authorized scope of work, and/or support the GM Business Plan:</td>
</tr>
<tr>
<td></td>
<td>- Regulatory/Legal Settlement</td>
</tr>
<tr>
<td></td>
<td>- Special Initiative/Directive</td>
</tr>
<tr>
<td></td>
<td>- Board authorization</td>
</tr>
<tr>
<td></td>
<td>- GM Business Plan</td>
</tr>
<tr>
<td>Service Disruption</td>
<td>Assessment of not doing a project. Criterion evaluates the following:</td>
</tr>
<tr>
<td></td>
<td>- Impact to Metropolitan’s business operations</td>
</tr>
<tr>
<td></td>
<td>- Impact to water system operations (e.g., system delivery and/or reliability, cascading impact on system due to failure, etc.)</td>
</tr>
<tr>
<td>Cost/Sustainability/Customer Service</td>
<td>Assessment of whether or not a project improves the following:</td>
</tr>
<tr>
<td></td>
<td>- Cost efficiency</td>
</tr>
<tr>
<td></td>
<td>- Sustainability</td>
</tr>
<tr>
<td></td>
<td>- Customer service</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Multiplier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Assessment</td>
<td>Assessment of the probability of:</td>
</tr>
<tr>
<td></td>
<td>- Facility/component/process failure</td>
</tr>
<tr>
<td></td>
<td>- Workplace health and safety</td>
</tr>
<tr>
<td></td>
<td>- Water quality or environmental impact</td>
</tr>
<tr>
<td></td>
<td>- Missed opportunity (e.g., available resources, shutdown, revenue generation, cost savings, supply)</td>
</tr>
<tr>
<td></td>
<td>- Not meeting service demands</td>
</tr>
</tbody>
</table>
Project Evaluation

A CIP Evaluation Team comprised of staff from Water System Operations, Water Resource Management, Real Property, Engineering Services, Finance, Information Technology, Environmental Planning, and External Affairs evaluate and rate all project proposals. The evaluation criterion is designed to prioritize projects that directly support reliability, quality, and safety for inclusion in Metropolitan's proposed CIP.

An iterative process is employed to first score and rank every new and existing project, and then solicit feedback from project sponsors, customers, and resource providers in order to establish schedules and cash flow requirements. Those schedules, along with analyses of facility shutdown requirements, environmental permitting timeframes, and contracting process requirements, also enable resource managers to identify staffing needs. The final schedule and implementation plan for FY 2020/21 and FY 2021/22 are reflected in the budget and objectives summarized under each of the Individual Programs Summaries that appear later in this document.
Capital Investment Plan for Fiscal Years 2020/21 and FY 2021/22

Process Improvements
In October 2018, Metropolitan’s Board amended the Administrative Code to allow for an appropriation of the total amount of planned biennial CIP spending following the approval of the biennial budget and authorize work on all capital projects identified in the CIP subject to the requirements of CEQA and limits on the General Manager’s authority; and delegate responsibility to the General Manager to determine whether a project is exempt from CEQA. In order to be considered a planned project, the project must be included and described in the Capital Investment Plan Appendix for the two-year budget cycle. Consistent with this action, all requests to allocate funds and proceed with planned capital projects are reviewed and approved by the Chief Engineer acting under the General Manager’s authority. Upon approval, such requested funds are then transferred to the pertinent capital project. These transfers are based on both board actions and/or management decisions to initiate capital projects and/or proceed to the next phase of planned work.

Additions
Projects not described in the CIP Appendix are considered unplanned and are not included in the planned biennial spending. Unplanned projects require specific Board authorization in order to initiate the work. Eight unplanned projects totaling $9.2 million were added to the FY 2018/19 and FY 19/20 budget as authorized by the Board. These projects were identified after adoption of the budget and included projects such as Filter Influent Valve Gear Box Replacement at the Skinner plant, Employee Village Enhancements Program, and Wadsworth Pumping Plant Sleeve Valve Refurbishment.

New Projects
This year, a total of 67 new projects, including unplanned projects that have been authorized by the Board but excluding Minor Capital projects, have been recommended by the CIP Evaluation Team to either proceed as proposed, or be staged to perform only a portion of the work in the biennial budget period, and have been incorporated into the capital programs.

Major Objectives
Below, grouped by CIP Program, are descriptions of some of the capital project major activities anticipated to be underway or completed over the next two fiscal years.

Colorado River Aqueduct Reliability
Complete construction of the 6.9 kV Power Cables Replacement, Main Pumping Plants Discharge Line Isolation Bulkhead Couplings, Pump Plant Sump System Rehabilitation, and Pumping Plants Crane Improvements projects. Complete the demonstration unit pilot project for the Main Pump, Motor, Discharge Valve and Auxiliary System Refurbishment Project. Complete the preliminary design for the Main Transformer Refurbishment Project.

Cost Efficiency and Productivity
Deploy the new Budget System Replacement and WINS Water Billing System Upgrade projects. Complete the Project Controls Reporting System project. Complete the MWDH2o.com redesign. Start the Payroll-Timekeeping Reimplementation project.
Dams & Reservoirs Improvements
Complete Diamond Valley Lake Dam Monitoring System Upgrades project. Start design of the Mills and Jensen finished water reservoir floating cover replacement projects. Complete assessment of the Lake Mathews and Lake Skinner spillways.

Distribution System Reliability
Complete the designs and start construction for the Casa Loma Siphon Barrel No. 1 Replacement and Santa Monica Feeder Cast Iron Pipe Rehabilitation Projects. Complete construction of the Orange County C&D Team Support Facility. Begin the design of the Lake Mathews Forebay Pressure Control Structure and Bypass project.

District Housing and Property Improvements Program
Complete assessments of District housing, and master planning of the villages at Hinds, Eagle Mountain, Iron Mountain, and Gene.

Prestressed Concrete Cylinder Pipe Reliability
Continue pipe procurement, valve procurement, and construction to rehabilitate the remaining PCCP portions of the Second Lower Feeder. Continue preliminary design to rehabilitate the PCCP portions of the Allen-McColloch Pipeline, Calabasas Feeder, Rialto Pipeline, and Sepulveda Feeder. Continue annual electromagnetic inspections of all PCCP pipelines.

Right of Way and Infrastructure Protection
Start construction of pipeline protection and access improvements in the Orange County Region. Continue effort to develop and certify programmatic EIRs for the western San Bernardino, Los Angeles, Riverside and San Diego County regions. Begin similar effort for the CRA.

System Flexibility/Supply Reliability
Complete construction of the Greg Avenue PCS - Pump Modifications and New Control Building project. Complete the preliminary design for modifications to the Perris Pumpback, Bypass, and Hydroelectric Plant facilities. Complete Construction of the Perris Valley Pipeline tunnel project.

System Reliability

Treatment Plant Reliability
Complete construction of the Diemer west filter and basin rehabilitation projects; Jensen Modules 2 and 3 Flocculator Rehabilitation project; and Weymouth Chlorine System Upgrades projects. Complete Jensen travelling bridge and basin improvements; and Weymouth administration and control building seismic upgrades.

Water Quality/Oxidation Retrofit
Complete Weymouth Hypochlorite Feed Facilities project and Weymouth ORP completion activities. Complete the design for the Mills Bromate Control project.
Financial Projections

Planned capital spending for FY 2020/21 and FY 2021/22 is estimated to be $250 million and $250 million, respectively, and are planned to be funded by a combination of current operating revenues (R&R and PAYGO) and debt. Considerations for timing of nearby projects and facility shutdowns, urgency, aging infrastructure, updated service demand projections, and regulatory requirements are taken into account. Estimated capital spending is updated on a regular basis as new projects are added, other projects are completed, construction cost estimates are refined, or contracts awarded. From time to time, projects that have been undertaken are delayed, redesigned or deferred for various reasons and no assurance can be given that a project in the CIP will be completed in accordance with its original schedule.

The total planned spending for the FY 2020/21 and FY 2021/22 biennium is approximately $500 million as shown in Figure 1 by Program. Planned spending has been estimated based on anticipated project progress and estimated costs for all ongoing and planned work for the new biennium budget period.

Figure 1 - Capital Investment Plan for FY 2020/21 and FY 2021/22 by Program
Figure 2 depicts the planned capital spending profile, including actual and projected cash flow, for the 10-year period from FY 2015/16 through FY 2024/25 and Table 4 provides a more detailed three-year outlook.

Figure 2 - CIP 10-year Window by Program FY 2015/16 through FY 2024/25
Table 4 - Three-Year Outlook

<table>
<thead>
<tr>
<th>Capital Program and Project Groups</th>
<th>FY 2020/21</th>
<th>FY 2021/22</th>
<th>FY 2022/23</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorado River Aqueduct Reliability</td>
<td>$55,000,000</td>
<td>$52,370,000</td>
<td>$49,700,000</td>
</tr>
<tr>
<td>CRA - Conveyance</td>
<td>$5,000,000</td>
<td>$4,970,000</td>
<td>$6,700,000</td>
</tr>
<tr>
<td>CRA - Electrical Systems</td>
<td>$2,500,000</td>
<td>$6,500,000</td>
<td>$14,800,000</td>
</tr>
<tr>
<td>CRA - Pumping Plants</td>
<td>$39,500,000</td>
<td>$28,400,000</td>
<td>$16,000,000</td>
</tr>
<tr>
<td>CRA - Other</td>
<td>$8,000,000</td>
<td>$12,500,000</td>
<td>$12,200,000</td>
</tr>
<tr>
<td><strong>Cost Efficiency &amp; Productivity</strong></td>
<td>$6,705,000</td>
<td>$8,800,000</td>
<td>$4,020,000</td>
</tr>
<tr>
<td>Diamond Valley Lake Recreation - New/Improvements</td>
<td>$925,000</td>
<td>$1,800,000</td>
<td>$3,500,000</td>
</tr>
<tr>
<td>Diamond Valley Lake Recreation - Refurbishment &amp; Replacement</td>
<td>$250,000</td>
<td>$3,000,000</td>
<td>—</td>
</tr>
<tr>
<td>IT - Business Support</td>
<td>$5,500,000</td>
<td>$4,000,000</td>
<td>$520,000</td>
</tr>
<tr>
<td>Cost Efficiency &amp; Productivity - Other</td>
<td>$30,000</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>Dams &amp; Reservoirs Improvements</strong></td>
<td>$5,100,000</td>
<td>$13,100,000</td>
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</tr>
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<td>Dams &amp; Reservoirs - All</td>
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<td><strong>Distribution System Reliability</strong></td>
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</tr>
<tr>
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<td>FY 2022/23</td>
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</table>
Potential Changes to the Proposed CIP

The program described below will require specific Board decisions prior to funding and authorization to proceed. Descriptions for proposed projects are included in the Individual Program Summaries section of this Appendix.

Regional Recycled Water Program (RRWP)

Construction of the Advanced Water Treatment Demonstration Plant (demo plant) was completed during the 2018/19-2019/20 biennium. The initial testing and operation of the plant to confirm treatment costs and provide the basis for regulatory approval of the proposed treatment processes and technical recommendations concerning design, operation, and optimization of the full-scale RRWP will be completed in late-2020 to early-2021. The demo plant has the flexibility to be modified in the future to test treatment processes for implementation of Direct Potable Reuse (DPR) through raw water augmentation (RWA). Funding for modifications to the demo plant to support DPR testing are not currently in the CIP and will be brought to the Board at a future date. Upon approval by the Board to modify the demo plant, the CIP will be updated accordingly.

Additional board presentations to establish a basis for a decision to proceed with the RRWP are planned during fiscal year 2019/20. Since a determination by the Board on the status of the full-scale program is still pending, the proposed biennial budget does not include any expenditures on the full-scale RRWP. In addition to potentially beginning implementation of the demo plant modifications for DPR, there are multiple scenarios for proceeding with the overall full-scale regional program over the coming biennium. Scenarios for the next two years could range from preparation of a Programmatic Environmental Impact Report (PEIR) along with its associated engineering support for CEQA documentation of the full RRWP, to initiating detailed studies and preparing the basis of design for a 20-mgd early-start treatment plant and distribution system in conjunction with the PEIR activities. Upon a decision by the Board as to how to proceed with the full-scale program, the CIP will be updated accordingly.

If approved, preparation of the PEIR and preliminary engineering would commence in fiscal year 2020/21, with a duration of approximately two years. The estimated cost for this effort is $30 million, with approximately $15 million expended each year and is not currently included in the CIP for FY 2020/21 and FY 2021/22. The $30 million biennial planning budget for the RRWP is included in the Biennial Budget under O&M. Project descriptions for the RRWP are provided in the Individual Program Summaries section.
Capital Investment Plan Detail

The core of this section is the Individual Program Summaries, which provide information for each capital project that has been proposed, evaluated, and included in the budget forecast to begin or continue during and after FY 2020/21 and FY 2021/22. Scope, accomplishments, objectives and financial projections are provided for each capital program. Every project with work planned for the two budget years and beyond is listed under the appropriate Program Summary by Project Group. The information provided reflects project details current as of the time of publication and is subject to change. The Individual Program Summaries are ordered alphabetically by Program title. The information contained in the Individual Program Summaries is described in further detail below.

Key Information

For each Program, key information is highlighted at the top of the Individual Program Summary page and includes the FY 2020/21 and FY 2021/22 biennial estimate. Table 5 provides an explanation of each item.

Table 5 - Key Program Information

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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<tbody>
<tr>
<td>Program Description</td>
<td>A brief explanation of the types of projects included in the Program</td>
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<tr>
<td>Fiscal Year 2020/21 Estimate</td>
<td>Estimate of planned spending from July 2020 through June 2021. It does not include a contingency amount.</td>
</tr>
<tr>
<td>Fiscal Year 2021/22 Estimate</td>
<td>Estimate of planned spending from July 2021 through June 2022. It does not include a contingency amount.</td>
</tr>
<tr>
<td>Accomplishments for FY 2018/19 and FY 2019/20</td>
<td>Listing of new projects initiated and major milestones achieved during the last biennium</td>
</tr>
<tr>
<td>Objectives for FY 2020/21 and FY 2021/22</td>
<td>Listing of projects with major milestones planned during the budget biennium with the total project estimate, estimated project completion, and the planned milestone</td>
</tr>
</tbody>
</table>

Narratives

Each Individual Program Summary also contains a narrative portion that includes a description of each project planned to be underway during the two-year budget period and beyond.

Table 6 - Program Summary Index

<table>
<thead>
<tr>
<th>Program Title</th>
<th>Page No.</th>
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</thead>
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<td>Colorado River Aqueduct Reliability</td>
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<tr>
<td>Cost Efficiency &amp; Productivity</td>
<td>29</td>
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<tr>
<td>Dams &amp; Reservoirs</td>
<td>34</td>
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<td>Distribution System Reliability</td>
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<td>District Housing &amp; Property Improvements</td>
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<tr>
<td>Minor Capital Projects</td>
<td>62</td>
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<tr>
<td>PCCP Reliability</td>
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<td>Regional Recycled Water</td>
<td>66</td>
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<tr>
<td>Right of Way &amp; Infrastructure Protection</td>
<td>68</td>
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<td>System Reliability</td>
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<td>Treatment Plant Reliability</td>
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<td>Water Quality/ORP</td>
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</table>
Individual Program Summaries

Colorado River Aqueduct (CRA) Reliability Program

Fiscal Year 2020/21 Estimate: $55 million          Fiscal Year 2021/22 Estimate: $52.4 million

Program Information: The CRA Reliability Program is composed of projects to replace or refurbish facilities and components of the CRA system in order to reliably convey water from the Colorado River to Southern California.

Accomplishments for FY 2018/19 and FY 2019/20

- New projects initiated during the last biennium:
  - Whitewater Siphon Erosion Protection Refurbishment
  - Hinds Pumping Plant Discharge Valve Platform Replacement
  - Iron Mountain-Eagle Mountain 230 kV Transmission Line Pilot Relay Replacement
  - CRA Physical Security Improvements
  - CRA Pumping Plant Delivery Line Rehabilitation

- Major milestones achieved during the last biennium:
  - Construction completed:
    - CRA UPS Replacement
    - Intake Pumping Plant 2.4 kV Power Line Replacement
    - CRA and Iron Mountain Reservoir Panel Replacement
    - CRA Switch House Building Seismic Upgrades
    - Eagle Mountain Radial Gate Replacement
    - CRA Surge Chamber Slide Gates for Delivery Line Bypass Pipelines
  - Construction contract awarded:
    - Gene Wash Reservoir Discharge Valve Rehabilitation
    - CRA Radial Gates Rehabilitation
    - CRA Pumping Plant Sump System Rehabilitation
    - Eagle Mountain Utility Improvements
    - CRA Pumping Plants Discharge Line Isolation Bulkhead Couplings
    - CRA 6.9 kV Power Cable Replacement
### Objectives for FYs 2020/21 and 2021/22

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<th>Major Milestones</th>
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</tr>
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<td>CRA Pumping Plant Storage Buildings at Hinds, Eagle Mountain and Iron Mountain</td>
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<td>Mile 12 Flow and Chlorine Monitoring Station Upgrades</td>
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<td>Complete construction</td>
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### CRA - Conveyance Project Group

**Cabazon Radial Gate Facility Improvements**

The Cabazon Radial Gate facility is located on the CRA in the city of Cabazon within Riverside County and approximately one mile upstream of the San Jacinto Tunnel. The Cabazon Radial Gate facility was constructed in 1936 and consists of a 17-foot-wide by 16-foot-tall radial gate controlled by an electric motor actuator. The facility was designed to protect the downstream conduits and tunnels from becoming over-pressurized in the event of a blockage by diverting water into an 800-foot long, concrete-lined channel which flows into the San Gorgonio Wash. The existing radial gate, motor, and controls have reached the end of their service life and are no longer reliable.

This project will replace the discharge radial gate with a concrete weir structure. The weir system is a passive overflow system which will reject water above a set hydraulic grade and thereby prevent downstream over-pressurization. A portion of the approximately 800-foot-long discharge channel will be widened to accommodate the weir structure.
CRA Conduit Structural Protection

The CRA has 55 miles of cut-and-cover conduits where vehicles and storm water flows can cross over the aqueduct. These conduits are unreinforced concrete horseshoe-shaped structures placed upon an invert slab. At some locations, these conduits are subject to heavy vehicle loading. Few locations include existing dirt roads that cross the aqueduct with insufficient soil cover over the conduit; including locations where heavy equipment must be placed over or near the conduit for access into tunnels or siphons. This project will install new protective structures such as reinforced concrete slabs that span over the unreinforced conduits at specific locations. The slabs will protect the conduits from damage by distributing the equipment loading to the surrounding soil. Design was authorized by the Board in January 2016.

CRA Radial Gates Rehabilitation

There are a total of 14 hydraulic radial gates located along the CRA. The gates are needed to dewater and isolate various reaches of the CRA for maintenance and repairs. Inspections have identified that eight gates are corroded and require refurbishment or replacement. Protective coatings on various components of the gates have begun to fail. The existing motor actuators used to open and close the gates have also deteriorated from 70 years of use in the harsh desert environment. This project will involve refurbishment or replacement of eight radial gates. The motor actuators and the gates’ electrical and control equipment will also be replaced. In addition, the concrete walls and floors within the diversion channels will be repaired. Design was authorized by the Board in May 2014. A construction contract was awarded by the Board in August 2019.

CRA Tunnels - Seismic Resilience Upgrades

The CRA is a 242-mile-long conveyance system that transports water from the Colorado River to Lake Mathews in Riverside County, including 124 miles of tunnels which were constructed in the late 1930s and was placed into service in 1941. While the CRA was constructed in accordance with current seismic codes of that time, recent seismic risk assessments of the CRA identified that some tunnels are vulnerable to damage from a strong earthquake on the southern San Andreas Fault. The scope of this project includes detailed seismic evaluations and completion of upgrades to strengthen vulnerable tunnel sections.

Eagle Lift & Eagle West Siphons Seismic Improvements

The CRA was placed into service in 1941. As the aqueduct traverses the desert, it must cross numerous drainage channels, ravines, and other natural depressions. At each crossing, the aqueduct's open channel transitions into a buried conduit (an inverted siphon) which drops below ground and passes beneath the natural surface feature. At the downstream end of the siphon, water re-emerges into the open aqueduct. Typically, siphons are cast-in-place reinforced concrete conduits, which vary in length from 150 feet to 5 miles. An initial assessment of the Eagle Lift and Eagle West Siphons identified potential slope failure of the soil covering the siphons as a result of a strong seismic event. This project will perform a detailed slope stability analysis and evaluate and implement mitigation options.

Iron Mountain Tunnel Rehabilitation

The Iron Mountain Tunnel was constructed between 1933 and 1938 as part of the CRA system. The tunnel is located downstream of the Iron Mountain pumping plant, and is eight miles long. The tunnel's cross-section is horseshoe-shaped, with overall dimensions of 16 feet high by 16 feet wide. Longitudinal and transverse cracks up to 1 inch wide have developed along a 2,500-foot-long stretch of the tunnel. This project will mitigate the cracks with focus on tunnel strengthening and corrosion protection. Preliminary design was authorized by the Board in October 2010.
Mile 12 Flow and Chlorine Monitoring Station Upgrades

One of the CRA's critical points for monitoring flow rates and chlorine levels is located at Mile Marker 12 (Mile 12) along the aqueduct. Monitoring equipment includes a set of flowmeters with instrumentation, chlorine analyzers, communication equipment, solar panels, and batteries. Although the equipment has performed well, it has exceeded its life span and is beginning to fail. This project will replace the existing deteriorated flow meters with new ultrasonic models that are compatible with other meters in use throughout the CRA; relocate the data and communications equipment from the underground manhole to a new aboveground monitoring station with air-conditioned cabinets to enable stable operation; and construct a reliable power source. Construction was authorized by the Board in August 2010.

Whitewater Tunnel No. 2 Seismic Upgrades

The CRA consists of five pumping plants, 124 miles of tunnels, 63 miles of canals, and 55 miles of conduits, siphons, and reservoirs. One of the tunnels, CRA Whitewater Tunnel No. 2, is a 1.5-mile long; 16-feet-high by 16-feet-wide horseshoe-shaped tunnel that parallels closely to the southern San Andreas Fault and crosses a splay of the fault approximately one-third mile from its west portal. A recent seismic risk assessment of the CRA identified that this tunnel is vulnerable to major damage from a strong earthquake on the southern San Andreas Fault. This project will perform near-term upgrades to strengthen vulnerable tunnel sections at the east and west portals of this tunnel and will improve access at the west portal. Furthermore, in order to expedite post-earthquake repairs of damaged tunnel sections, the design of a new bypass tunnel will be prepared in advance, steel sets will be procured and stockpiled, and tunnel repair contractors will be prequalified so that specialized equipment and crews may mobilize rapidly. Preliminary design was authorized by the board in December 2017.

CRA - Electrical Systems Project Group

Standby Diesel Engine Generator Replacements

Back-up power for critical auxiliary systems at the Iron Mountain, Gene, and Intake pumping plants is provided by stand-by diesel generators. The standby generators are over 50 years old, require frequent repairs, and have reached the end of their service lives. In addition, upgrades to the generators’ ancillary equipment are planned to meet current fire codes and environmental regulations. This project will improve the reliability of emergency power for critical auxiliary systems at the pumping plants. The scope of the project includes relocation and installation of new generators. The replacement generator will include alarms, valves, meters, and a control system capable of automatic start-up upon loss of primary power, automatic transfer back to primary power once the normal source is reestablished, and remote status monitoring. Preliminary design for all three pumping plants’ standby generators was authorized by the Board in April 2008; and final design and equipment procurement for Iron Mountain standby generator was authorized by the Board in March 2012.

Electrical Power Distribution Upgrades - Gene, Iron Mountain, Eagle Mountain and Hinds Pumping Plants

The 2.4 kV electrical power distribution system at all five Desert pumping plant facilities conveys power from the MWD-owned 2.4 kV switchyard to all areas within the property confines, including the operations and maintenance (O&M) areas and the villages. The power is stepped down from 2.4 kV, typically by a pole-mounted transformer, to the required voltage based on the end-user's requirements, usually 120 V for houses and buildings, or 480 V for workshops. The existing breakers are no longer common in the power industry, and spare parts are difficult to obtain.

This project will replace the existing electrical power distribution systems at Gene, Iron Mountain, Eagle Mountain and Hinds Pumping Plants with new distribution systems. The work will include replacing existing 2.4 kV breakers with 4160 V breakers, and replacing associated cables, conduits, feeders, risers, wooden poles and transformers. Underground power distribution will be used when feasible. This project will improve the reliability of water deliveries and will optimize maintenance.
Black Metal Mountain 2.4 kV Electrical Power Upgrade

Black Metal Mountain (Black Metal) Site No. 1 and Site No. 2 are two of Metropolitan's communication sites, located in the San Bernardino Mountains. The sites are situated on top of a mountain and provide line-of-sight propagation to subsequent communication sites. Given their prime location, the communication sites on Black Metal Mountain house communication equipment for Metropolitan, several state and local government agencies, and local radio stations and cellular service providers. The existing power line that serves the two communication sites is aging and deteriorated, and is located in rocky, mountainous terrain, with some poles on the edge of 600-foot cliffs. This project will design and construct the replacement of the existing 2.4 kV power line that serves MWD's Black Metal Mountain communication sites. The work will include installation of new power poles, larger conductors to increase the available power to the sites, and service roads where feasible, to allow access for maintenance.

CRA 230 kV Transmission Line Improvements

The CRA has an extensive 230 kV transmission system that originates from Hoover Dam and supplies power to all five pumping plants. This 305-mile long transmission system was installed in the 1930s and consists of approximately 75-foot-high steel towers with concrete and wood footings, aluminum and copper conductors and supports to attach the conductors and insulators to the towers. Spans between the towers average 1,200 feet with varying ground elevations. Vertical clearances between the lowest conductor and the ground in a span can vary with temperature, wind speeds, and power loads. Over the years, operating under maximum power loads and extreme desert temperatures has led to insufficient vertical clearances as required by the current electrical standards. This project will assess ground clearances of the conductor spans and increase clearances, as needed, by raising the heights of existing towers and/or adding new towers between spans, and construct tower refurbishment or replacement.

This project will also rehabilitate and improve substations, switching stations, and control rooms related to the CRA's 230 kV transmission system in order to comply with NERC (North American Electric Reliability Corporation) standards, increase system reliability, and reduce the risk of unplanned CRA outages. Rehabilitations and upgrades include new relays at Eagle Mountain Pumping Plant to mitigate potential cascading power outages from a stuck breaker scenario at Eagle and installation of physical security systems at Gene and Eagle Mountain pumping plants control rooms and switch yards (NERC requirements); replacement of outdated bank protection relays at Intake, Gene, Iron Mountain and Hinds pumping plants; replacement of outdated 230 kV disconnect switches at Camino Switching Station and at the Gene and Iron Mountain 230 kV transfer buses; installation of a new 230 kV circuit breaker at Iron Mountain to enable isolation of the Iron-Eagle 230 kV transmission line without disruption of CRA water deliveries; and, purchase of SCE circuit breakers which are integrated with the CRA's 230 kV system at Gene and Eagle Mountain pumping plants in order to give MWD greater flexibility without having to rely on SCE.

CRA 6.9 kV Power Cable Replacement

There are a total of 45 primary pumps and motors at the five CRA pumping plants. Power is transmitted to the motors via 3-inch-diameter cables which run through a tunnel that connects each switch house to each pump house. The quantity of cables varies from nine to 27 per plant. These cables were installed in four phases from 1939 through 1959. After 55 to 75 years of continuous service, the power cables have deteriorated and need to be replaced. Oil has begun to leak through cracks in the lead jacket, at the cable connection joints, and at the cable termination points. Frequent repairs are required to address the leaks and maintain the cables’ insulating capacity. This project includes the replacement of the deteriorated main power cables at each of the five CRA pumping plants. The Board awarded a construction contract in February 2019.
CRA Auxiliary Power Systems

All five CRA pumping plants have medium and low voltage systems that were constructed to the design standards of the 1930s-1950s. They provide power for general lighting, cranes, computers, shop equipment, and critical equipment such as the pumping plant sump pumps and lubrication oil pumps. Over the years, numerous additional electrical loads have been added to the auxiliary power systems. As a result, the distribution panel capacity limits have been exhausted, and some wiring is now undersized. The scope of this project includes upsizing the distribution panels to allow additional capacity and space for future loads and replacing the cables and conduits to comply with current National Electrical Code and safety standards. Preliminary investigations were authorized by the Board in March 2016 for all five pumping plants. Preliminary design for Iron Mountain Pumping Plants was authorized by the Board in May 2018.

CRA Main Transformer Rehabilitation

Seven transformers provide electrical power to each CRA pumping plant to maintain continuous operation. All existing transformer units are original equipment, with many dating from the 1940s. Recent inspections revealed oil leakage and other signs of aging for some of the transformers. Failure of an existing transformer would disrupt power supply to a pumping plant and interrupt water delivery. The scope of the project includes rehabilitation of existing transformers, replacement of transformers, or the addition of spare transformers along with spill containment structures. This work also includes replacement of leaky circulating oil pumps that are used to cool the transformers and construction of secondary spill containment for the transformer banks. Preliminary design was authorized by the Board in May 2020.

CRA Pump Plants 2.3 kV and 480 V Switch Rack Rehabilitation

All five CRA Pumping Plants have a 2.3 kV and 480 V switch racks that are the central power distribution for the 2.3 kV, 480 V and 120 V that feed multiple medium and low voltage critical equipment within the pumping plants. These switch racks have been in service since the original construction of the CRA. The equipment is old, obsolete and replacement parts are difficult to obtain. This project will rehabilitate the 2.3 kV and the 480V switch racks at all five CRA pumping plants to ensure the equipment meets the current safety and electrical codes and provides a reliable power supply to the plants.

CRA - Pumping Plants Project Group

CRA Main Pump, Motor & Discharge Valve Refurbishment

Each of the five CRA pumping plants has nine main pumps that lift the water to the required elevation necessary to continue flow down the aqueduct. The 45 main pumps rely on multiple auxiliary systems including lubricating oil systems, circulating water systems, controls and instrumentation systems, discharge valves, electrical and control panels, and individual equipment components. In the mid-1980s, a major rehabilitation project was undertaken on the 45 main pumps. As a result, the 45 main pumps have performed well over the nearly 30 years since the rehabilitation work was completed. However, the pumps are now showing signs of deterioration caused by continuous operation over that length of time. While that project successfully extended the service life of the pumps and increased their hydraulic capacity, the pump auxiliary systems were not addressed at that time. The pump auxiliary systems are from the original CRA construction and are now deteriorating and need to be replaced. An assessment of the main pumps, motors, and their auxiliary systems at all five CRA pumping plants will capture current operating conditions, create updated baseline documents of all existing equipment and systems, and provide replacement or rehabilitation recommendations for all pump and auxiliary system components. Preliminary investigations were authorized by the Board in October 2016, and an agreement to provide condition assessments for the main pump motors was authorized by the Board in December 2019. This project will refurbish the 45 main pumps and their auxiliary systems, including lubricating oil systems, circulating water systems, controls and instrumentation systems, discharge valves, electrical and control panels, and individual equipment components, as deemed appropriate by the assessment.
CRA Main Pumping Plants Discharge Line Isolation Bulkhead Couplings

Each of the nine main pumps at the five CRA pumping plants discharges the water into an individual 6-foot diameter discharge line. The nine discharge lines then merge into three 10-foot diameter pipelines that convey flow to the top of the lift and discharge into a headgate structure which empties the water into the next section of the aqueduct. Isolation of a single pump or its discharge valve, currently requires a lengthy flow reduction where three pumps have to be removed from service while cutting and welding activities are performed to install a steel bulkhead in one pump’s 6-foot discharge line. This operation is labor-intensive and requires more than 72 hours to complete the isolation and removal of the isolation bulkhead. This project will install isolation couplings in the 6-foot discharge lines downstream of each main pump discharge valve. The discharge line couplings will allow individual pump units and discharge valves to be isolated significantly faster by eliminating the current cutting and welding process required to isolate a unit; thus, minimizing impacts to overall pumping capacity. A construction contract was awarded by the Board in August 2019.

CRA Main Pumping Plants Sand Removal System

At each of the five CRA pumping plants, water is withdrawn from the CRA, filtered to remove large debris and sand, and then pumped through a circulating water system. The circulating water system feeds the pump house service water system, the cooling system at each pump unit, the fire water system, the irrigation water system, and the domestic water treatment system. The existing filtration system is not designed to strain out fine silts. Consequently, the fine silt has built up as sediment in the circulating water systems leading to excessive wear and failure of equipment such as pump packing, cooling water piping, and heat exchangers. This project will upgrade the filtration system to remove fine silt and eliminate sediment build up and refurbish any identified damaged components.

CRA Main Pumping Plant Unit Coolers and Heat Exchangers

Each of the five CRA pumping plants has nine main pumps. Each main pump has a cooling system to cool various components of the pump system. At each pump house, water is pumped through a circulating water system, which feeds multiple unit coolers and heat exchangers for each individual main pump unit. Over the years, the unit coolers have developed many leaks. Lack of sufficient cooling water could cause equipment overheating, and the leaks could damage nearby electrical equipment. This project will replace, refurbish, or upgrade the cooling system at each pump unit.

CRA Pump Plant Flow Meter Replacement

Acoustic flow meters are installed at each of the five CRA pumping plants on each 10-foot-diameter delivery lines. Flow measurements are used to adjust pumping rates and balance the flows from plant to plant. The existing meter units have begun to deteriorate due to their age and exposure to harsh desert conditions. Continued loss of accuracy could lead to incorrect flow adjustments or unsynchronized pumping rates, which could cause flooding at the plants or overtopping of the aqueduct. This project will install new acoustic flow meters on the delivery lines which will connect to nearby flow meter consoles housed inside new pre-fabricated equipment enclosures. Construction was authorized by the Board in June 2013.

CRA Pump Plant Sump System Rehabilitation

Each of the five CRA pumping plants has two independent main sumps that collect water leakage from the main pumps and discharge valves. Each main sump is approximately 9 feet wide, 20 feet long, and 35 feet deep, and can hold up to 48,000 gallons, or approximately one day’s worth of leakage water. The sump system pumps this water back to the pumping plant’s main intake manifold or to its forebay, depending on the plant. The 70-year-old sump piping systems and support structures are deteriorating and have exceeded their service lives. Failure of the sump piping systems has the potential to cause extensive flooding and damage to valves and pumps within the pumping plants. This project will rehabilitate the pumping plant sump systems, including replacement of corroded sump mechanical equipment, piping, and access structures at all five CRA pumping plants. Access features will be upgraded by replacing corroded catwalks, ladders and handrails within the sumps. This project will also rehabilitate circulating water equipment and piping systems, which are in the sump area. A construction contract was authorized by the Board in December 2018.
CRA Pump Plants Circulation Water Systems

Each of the five CRA pumping plants has nine main pumps. Each of these pump units use cooling equipment to cool various components of the pump system that feeds from the plant’s circulating water system. This system has a loop with branch connections and an isolation valve at each unit. The piping and the valves that supply the circulating water systems run through the entire length of the plants and are all from the original CRA construction. The piping and the valves are now showing signs of deterioration. They are clogged, corroded and leaking. This project will replace and upgrade the circulation water systems for each pumping unit.

CRA Pumping Plants Crane Improvements

All five CRA Pumping Plants have a single overhead bridge crane which spans the motor room floor and a portable bridge crane for the individual pump bay below the motor room floor. These overhead cranes were installed in the pumping plants during the original CRA construction and have been in operation since 1939. The cranes are used to raise, shift, and lower main pump components and motors for maintenance and replacement. These cranes were rehabilitated in the late 1980s. They have now reached the end of their service life where spare parts for the original crane components are difficult to obtain or no longer available. Parts which were replaced in the 1980s are outdated and the electronic features are no longer supported by vendors. This project will replace all the overhead bridge cranes on the motor room floor and the portable pump-bay cranes below the motor room floor at all five pumping plants. The replacement includes the bridges, trolleys, hoists, drive trains and the system controls.

CRA Pumping Plants Delivery Line Rehabilitation

Each of the nine main pumps at the five CRA pumping plants discharges the water into individual six-foot diameter discharge lines. The nine discharge lines then merge and transition into three 10-foot diameter pipelines, Delivery Line Nos. 1, 2 and 3, that convey flow to the top of the lift and then discharge into a headgate structure which empties the water into the next section of the aqueduct. These delivery lines vary in length from 500 feet to 1,400 feet up steep and rocky slopes. The five Delivery Line No. 1s were constructed in the 1930s and were lined with coal tar enamel to protect the interior of the pipe from corrosion. After 80 years of service, the existing coal tar enamel lining on Delivery Line No. 1 at each plant is cracking, flaking, and the steel is starting to corrode. The mortar linings for Delivery Line Nos. 2 and 3 are still in good condition and do not require repair.

Additionally, depending on the length of each delivery line there are a total of three or four expansion joints located along the line. These expansion joints are deteriorated and showing signs of corrosion. This project provides a comprehensive rehabilitation of the delivery lines at each of the five CRA pumping plants, including replacement of the coal tar enamel with a cement mortar lining, expansion joints, and minor coating repairs. Under the General Manager’s authority, preliminary investigations were authorized in June 2019.

CRA Pumping Plants Water Treatment Systems Replacement

All five of Metropolitan’s Pumping Plants are located in remote areas of Riverside and San Bernardino Counties where municipal water treatment systems are not available. Each plant is instead served by a community on-site water treatment system. These on-site treatment systems are skid-mounted membrane filtration units that include a strainer, a pair of activated carbon vessels, and a domestic water storage tank. These systems have been in continuous operation for 25 years and now suffer from frequent membrane and pipe failures. This project will replace the skid-mounted water treatment systems in its entirety. Design was authorized by the board in July 2018.
**CRA Pump Plant Reservoir Spillway Auto Rejection - Iron Mountain and Eagle Mountain**

The Iron Mountain and Eagle Mountain Reservoirs are located on the upstream side of the Iron Mountain and Eagle Mountain pumping plants, respectively. The reservoirs dampen fluctuations in flow between the five pumping plants. Each reservoir contains a spillway which allows discharge of water to the desert in the event of a power outage of the main pumps. The two spillways were designed in the 1930s to safely reject up to approximately 1,200 cubic feet per second (cfs). The pumping plants were expanded in the 1950s and the aqueduct can now operate up to approximately 1,750 cfs. Rejection of flows greater than 1,200 cfs would cause uncontrolled release of water at these two reservoirs, which could damage nearby facilities and public roads or property. This project will modify the reservoir spillways to allow safe rejection of up to 1,750 cfs of water in the event of a power outage of the main pumps.

**Erosion and Drainage Control Protection for CRA Switchracks and Ancillary Structures**

The five CRA pumping plants are located in remote areas of the California desert which are periodically subjected to flash floods that carry high volumes of water, silt, and debris. During major storm events, the pumping plants’ pump houses and support facilities are susceptible to flooding and deposition of silt and debris. In recent years, at several of the plants, debris flows have affected various critical electrical facilities. This project will include site grading, addition of perimeter drainage channels to intercept offsite flows, upsizing of storm drain culverts and extension of patrol roads to access the new storm drain facilities for maintenance. Design was authorized by the Board in January 2016.

**Gene and Intake Pumping Plant Outlet Structure Gate Rehabilitation**

Each of the five CRA pumping plants has nine main pumps that lift water from the pump house through a series of converging delivery lines that convey water from the pump house to a headgate structure located at the top of a hill. These structures then convey water to the downstream portion of the aqueduct. Flow from each headgate structure is regulated by three nine-foot square steel gates. Recent inspections at the Intake and Gene pumping plants have revealed that the protective coatings on various components of the gates have begun to crack and peel. This project will recoat the six headgate structure outlet gates at the Intake and Gene pumping plants in order to prevent metal loss due to corrosion.

**Hinds Pumping Plant Discharge Valve Pit Platform Replacement**

At each of the CRA pumping plants water is pumped from the plants’ intake manifold, through the main pumps and out of the discharge valves. From the discharge valves, water travels through the delivery lines and into the aqueduct. The discharge valves are located in small concrete pits below the pump plant floor room. At the Hinds Pumping Plant, the concrete pit is equipped with a raised platform due to the deep pit. The platform is necessary to maintain the discharge valve’s ancillary equipment. After over 75 years of service in a humid environment created mainly from the pump cooling water discharge, the metal platform has corroded significantly and needs to be replaced. This project will replace the discharge valve platform and relocate cooling water discharge piping in all nine discharge pits at the Hinds Pumping Plant. Under the General Manager’s authority, preliminary design was authorized in November 2018.

**Iron Mountain, Hinds & Eagle Mountain Hazardous Waste Containment**

Hazardous wastes such as chemicals, oil, paint, paint thinners and antifreeze are generated through routine operations at the Iron Mountain Pumping Plant. Hazardous wastes are collected and placed into either metal or plastic drums ranging in size from five to 55 gallons. The existing hazardous wastes are then stored in a fenced temporary storage area. This project will replace the existing hazardous waste storage facility with a prefabricated, code-compliant, hazardous waste storage container.
Seismic Upgrades of CRA Support Facilities

A recent initial seismic risk assessment has revealed that several CRA support structures may be vulnerable from a major seismic event. These support structures include office and maintenance buildings, guest lodges, and dining and recreation halls located at Hinds, Eagle Mountain, Iron Mountain and Gene Pumping Plants. This project will perform detailed seismic assessments and retrofit the support structures if necessary.

CRA - Other Project Group

Copper Basin Reservoir Discharge Valve Rehabilitation & Meter Replacement

The Copper Basin Reservoir provides critical storage that enables flowrates along the CRA to be stabilized and controlled. If the reservoir needed to be drained rapidly in the event of an emergency, the discharge valves located at the base of the dam would be opened to safely release the water. Following 70 years of continuous service, the valves have begun to leak and need to be replaced. The dam is under the jurisdiction of the California Division of Safety of Dams (DSOD), which requires that the discharge valves be fully operational at all times. The project scope includes replacement of the fixed cone valves at the base of the dams; upgrade of the electrical systems; and access improvements to safely enable construction personnel, materials, and equipment to reach the work site. Design was authorized by the Board in February 2015.

In order to determine how much water is released to downstream pumping facilities, flow out of the Copper Basin Reservoir is measured at the entrance to Whipple Mountain Tunnel. Flow meters were installed at this location to collect information that is used to adjust the flow rate through the Copper Basin Reservoir outlet gate and the flow rates at each pumping plant, and to determine the amount of chlorine injected into the CRA to control quagga mussels. The existing flow transducers and meters were installed in 2007 and must be replaced to ensure reliable CRA water deliveries. This project will replace the flow meters, transducers, and cabling in the CRA's Whipple Mountain Tunnel.

CRA Desert Region Security Improvements

CRA facilities are critical components of Metropolitan’s water delivery system. These facilities include five pumping plants and the El Camino Electrical Substation. These facilities have inadequate perimeter fencing. This project will install physical security improvements such as fencing, cameras, motion detectors, remote speakers, card readers, and lighting at Metropolitan’s CRA pumping plants and at the El Camino Electrical Substation. This project will also include road improvements at the main entrances to the pumping plants and integration of security devices with Metropolitan’s security system.

CRA Erosion Protection

The CRA is comprised of 55 miles of cut-and-cover conduits. The cut-and-cover conduits are arch or horseshoe shape, unreinforced, cast-in-place concrete. In most locations along the CRA, the overlying soil protects the cut-and-cover conduits from rock and debris flows. However, at narrow ravine crossings, heavy storm events often erode the soil and expose the conduits making them vulnerable to structural damage from the rock and debris flows. This project will provide erosion protection features such as gabion structures or concrete slabs; including grading of the eroded areas to protect the conduit. In addition, diversion berms or concrete swales will be constructed to divert storm flows over the concrete slabs. Preliminary Design was authorized by the Board in January 2016.
CRA Pumping Plant Storage Buildings at Hinds, Eagle Mountain and Iron Mountain

Between 1950 and 1955, several metal-sided buildings with timber frames were built at the CRA pumping plants to store equipment, spare parts, and maintenance supplies. Two of these buildings have been replaced at the Gene Pumping Plant; however, four original buildings still remain in service. These buildings have deteriorated after 65 years of service in the harsh desert environment and no longer seal properly to prevent rain and dust from entering the interiors. This project will replace the four remaining deteriorated storage buildings. As part of the design considerations, an assessment will be conducted to determine space requirements for storage of equipment and parts to support ongoing maintenance activities and upcoming capital rehabilitation work at the pumping plants. Preliminary design was authorized by the board in August 2016.

CRA Village Water, Sewer & Asphalt Replacement

All five of Metropolitan's pumping plants are located in remote areas of Riverside and San Bernardino Counties where municipal water distribution systems are not available. Each plant is instead served by a community on-site water treatment system. Water from the CRA is treated and conveyed to each village house and to the industrial portions of the pumping plants through a gravity-fed water distribution system which consists of distribution piping, isolation valves and valve boxes. Recent inspections of the distribution systems have found blockages, leaks, taste and odor problems, and root intrusion. This project will replace the domestic water distribution systems at all five CRA pumping plants which include the main line pipes, building laterals, new backflow prevention devices, valves, meters and remote water quality analyzers. Final design was authorized by the board in December 2017.

Municipal wastewater collection and treatment facilities are not available where the pumping plants are located. The pumping plants are served by community on-site wastewater systems. These on-site systems collect, treat, and dispose of domestic wastewater generated from bathrooms, kitchen facilities, maintenance buildings, guest lodges, and staff residences at the plants. The on-site systems consist of three primary components: community septic tanks and leach fields; collector lines located throughout the pumping plants which convey wastewater to the septic tanks; and sewer laterals which convey wastewater from individual buildings to the collector lines. The existing wastewater systems at the plants have deteriorated through continual use and need to be replaced. This project will replace the wastewater systems at the pumping plants. The systems will include new main-line pipes, building laterals, septic tanks and leach fields. Design was authorized by the Board in December 2012 for Gene and Iron pumping plants, while preliminary design was authorized by the Board for Intake Pumping Plant in January 2012.

The asphalt roadways at the pumping plants provide access between buildings and the villages for Metropolitan staff, residents, and visitors. There is a total of approximately 30 acres of asphalt-paved roadways and surfaces at all five pumping plants, and these asphalt surfaces are over 30 years old. Due to the harsh desert conditions and deterioration of the subgrade over time, potholes and cracks have developed throughout the villages. The planned upgrades to the roadway pavement include placement of a new layer of asphalt on less distressed areas throughout the CRA villages; removal and replacement of more heavily damaged roadways; and grading and installation of culverts to improve drainage. Design was authorized by the board in July 2018.

Gene Wash Reservoir Discharge Valve Rehabilitation

The Gene Wash Reservoir provides critical storage that enables flowrates along the CRA to be stabilized and controlled. If the reservoir needed to be drained rapidly in the event of an emergency, the discharge valves located at the base of each dam would be opened to safely release the water. Following 70 years of continuous service, the valves have begun to leak and need to be replaced. The dam is under the jurisdiction of the California Division of Safety of Dams (DSOD), which requires that the discharge valves be fully operational at all times. The project scope includes replacement of the fixed cone valves at the base of the dam; upgrade of the electrical systems; and access improvements to safely enable construction personnel, materials, and equipment to reach the work site. Design was authorized by the Board in February 2015. Metropolitan's Board awarded a construction contract in December 2019.
Intake Pump Plant Road Improvements

The 1.75-mile long asphalt access road into the Intake Pumping Plant travels between a large hill and Lake Havasu. At approximately the midpoint of the access road, it crosses a culvert that drains storm runoff from the hillside into the lake. This culvert is undersized, has partially collapsed, and fills with debris from an unlined wash during rain events. After rain events, Metropolitan staff must clear debris from the culvert in order to prevent rain water from overtopping the culvert and eroding the access road. This project will replace the existing culvert with a new culvert and deteriorated portions of the asphalt road.
Cost Efficiency and Productivity Program

Fiscal Year 2020/21 Estimate: $6.7 million  Fiscal Year 2021/22 Estimate: $8.8 million

**Program Information:** The Cost Efficiency and Productivity Program is comprised of projects to upgrade, replace, or provide new facilities, software applications, or technology, which will provide economic savings that outweigh project costs through enhanced business and operating processes.

Accomplishments for FY 2018/19 and FY 2019/20

- New projects initiated during the last biennium:
  - Learning Management System
  - MWDH2O.com Redesign
  - Budget System Replacement

- Major milestones achieved during the last biennium:
  - Implemented the new Learning Management System
  - Enterprise Content Management (ECM) substantially completed restructuring and consolidation of data on Metropolitan's shared drives and eliminated redundant, obsolete and trivial content.

Objectives for FYs 2020/21 and 2021/22

<table>
<thead>
<tr>
<th>Project</th>
<th>Total Project Estimate</th>
<th>Estimated Completion</th>
<th>Major Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diamond Valley Lake Wave Attenuator Replacement</td>
<td>$ 3,500,000</td>
<td>2022</td>
<td>Complete design</td>
</tr>
<tr>
<td>Budget System Replacement</td>
<td>$ 1,800,000</td>
<td>2021</td>
<td>Complete deployment</td>
</tr>
<tr>
<td>Diamond Valley East Marina, Trails, and Visitor Center</td>
<td>$ 16,850,000</td>
<td>2021</td>
<td>Begin studies</td>
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<tr>
<td>MWDH2o.com Redesign</td>
<td>$ 2,040,000</td>
<td>2023</td>
<td>Complete redesign</td>
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<tr>
<td>Payroll-Timekeeping Reimplementation</td>
<td>$ 1,300,000</td>
<td>2022</td>
<td>Begin project</td>
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<tr>
<td>Project Controls and Reporting System</td>
<td>$ 5,800,000</td>
<td>2020</td>
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</tr>
<tr>
<td>WINS Water Billing System Upgrade</td>
<td>$ 3,500,000</td>
<td>2022</td>
<td>Complete deployment</td>
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<tr>
<td>Supplier Portal Implementation</td>
<td>$ 600,000</td>
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<tr>
<td>Services Procurement Application</td>
<td>$ 800,000</td>
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<tr>
<td>Digital Assets Optimization</td>
<td>$ 1,340,000</td>
<td>2022</td>
<td>Complete implementation</td>
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</table>
Cost Efficiency & Productivity - Other Project Group

Yorba Linda Power Plant Modifications

This project will modify the Yorba Linda Power Plant to accommodate the new hydraulic conditions brought on by construction of ozonation facilities. The scope of work includes: 1) replace the existing Pelton-type impulse turbine with new Francis-type turbine capable of operating under a pressurized discharge condition; 2) modify power plant structure and intake/discharge conduits; 3) modify I&C and SCADA systems for the new power plant; 4) modify Diemer power metering to use the output from the plant to feed Diemer's power; and 5) negotiate new utility power sale agreements.

DVL Recreation - New/Improvements Project Group

Diamond Valley Lake East Marina Utilities

Diamond Valley Lake (DVL) offers recreational opportunities to the region including boating, fishing, hiking, and biking. The facility supports 4,500 acres of on-water activity, 28 miles of trails, and 13,500 acres of protected open space. This project will extend the existing water, sewer, gas, and communication facilities from the intersection of Searle Parkway and Angler Avenue to the DVL East Marina to support existing operations and future development. The construction of the new infrastructure will replace existing failing tanks which are filled with trucked-in water to service the Marina store, enhance utility service reliability, and serve to comply with flows and pressures required to develop the Marina into a self-sustainable recreational facility.

Diamond Valley Lake Visitor Experience Improvement

This project will enhance the visitor experience at DVL. Multiple projects will be studied, planned and implemented to expand recreational and educational outreach enhancing Metropolitan's resource protection and conservation message. An initial study on the recreation and educational opportunities at the DVL properties will be used to document and prioritize the various investment options. There are various outreach opportunities to be evaluated including updated signage at the lake and trails; outdoor classrooms; augmented reality kiosks to introduce watersheds and protected open space; and facility and exhibit improvements to the DVL Visitor Center, formerly known as "The Center for Water Education."

Diamond Valley Lake-Lake Skinner Trails

This project will create a regional network of trails connecting DVL and Lake Skinner as identified in the DVL Memorandum of Intent. The Lakeview Trail and North Hills Trail at DVL and certain trails at Lake Skinner already exist. Metropolitan jointly funded a trails study with Riverside County Regional Park and Open-Space District to investigate trail alignments connection feasibility through a Consultant agreement. The proposed trail alignments minimize impacts to the Southwestern Riverside County Multi-Species Reserve and link DVL and Lake Skinner using existing roads to the greatest extent possible. Trail uses under consideration include hiking, bicycling, and horseback riding.
DVL Recreation - Refurbishment & Replacement Project Group

Diamond Valley Lake Floating Wave Attenuator

The existing floating wave attenuator (FWA) has been operational since 2006 as part of a two-phase approach. Phase 1 was completed by installing one 800-foot FWA. Phase 2 was to provide an additional attenuation system but was not implemented. Water levels at Diamond Valley Lake have fluctuated with severity and frequency for the last several years due to draw-down activities during drought conditions, then rebounding during the rainy seasons. Due to age and changing conditions, the concrete sections of the FWA have significantly degraded and the reinforcing bars are exposed to the elements which have accelerated corrosion of the existing FWA system. Under the General Manager's authority, preliminary investigations were authorized in August 2019.

IT - Business Support Project Group

Access Applications Upgrade

Microsoft Access (MS Access) is the database platform currently used by Metropolitan for smaller departmental applications used by Administrative Services, Human Resources, External Affairs, WSO, and Executive Management. Several applications require enhancements, such as mobile capabilities and a greater database capacity, that are not available through MS Access. This project will migrate selected applications from MS Access to Azure ("the cloud") to securely implement mobile access.

AP Imaging Replacement

Metropolitan's existing Accounts Payable Imaging Solution is not performing as needed and needs to be replaced with a functioning system. This project will implement the following: scanning of vendor invoices; validation of invoice data per business process rules; retention of invoice images on-line and uploading of the validated data (POETA) to Oracle Financials Accounts Payable application. Current technology will be used to "read" the incoming invoices as they are scanned, and create the data values to update the Oracle A/P system. The process improvements will increase staff efficiency and productivity and will eliminate the need for filing and storage of hardcopy invoices.

Budget System Replacement

This project delivers a replacement system for the 12-year-old budgeting system, which produces the capital and O&M budgets.

Digital Asset Optimization

The Digital Asset Optimization project will remove redundant, obsolete and trivial (ROT) information from files on Metropolitan's network files shares (NFS). This work is being performed to allow for more effective and efficient searching and collection of information as it pertains to public requests, legal holds and other Metropolitan needs for information. Additionally, the data will be categorized, and metadata captured for easier retrieval capabilities.
**Enterprise Content Management**

The Enterprise Content Management (ECM) application will classify and manage electronic documents and other media to allow for easy retrieval, review, and destruction of information in accordance with Metropolitan's records retention schedule. In addition, the new ECM application will allow Metropolitan to more effectively and efficiently manage its digital asset needs for business needs to respond to requests under the California Public Records Act (CPRA), and for eDiscovery purposes, and will automate compliance with records retention policies. This project includes designing a taxonomy for storing unstructured data and the development of a thesaurus to support the implementation of Metropolitan's ECM application. Phase I was authorized by the Board in July 2017. Phase II of this project completes the design and delivers the initial deployment of the enterprise content management software into the Metropolitan environment. The system will allow for the organization, collaborations and automated enforcement of records retentions policies to non-structured electronic media. The final phase III will deliver the balance of the deployment of the enterprise content management software throughout Metropolitan.

**MWDH2O.com Redesign**

The existing website will be replaced with a new site offering more functionality and capability to spread Metropolitan’s mission of providing water to Southern California.

**Payroll-Timekeeping Reimplementation**

This project will re-implement PeopleSoft payroll and will replace the current timekeeping software with a package that provides better integration with the payroll software and a better user interface. The current payroll and timekeeping applications both have deficiencies that have caused significant compensation issues for employees and have resulted in the need for excessive manual corrections by payroll staff. This project will enhance workforce productivity by simplifying access to business information and will maintain sound business practices and fiscal integrity.

**Project Controls and Reporting System**

The Project Controls and Reporting System (PCRS) will replace Metropolitan’s existing project control system that is now functionally obsolete. The PCRS will integrate data from multiple components of Metropolitan’s financial and CIP scheduling systems and integrate this data in a new data warehouse. The PCRS will create standardized reports and dashboards and produce forecasts and resource requirement reports. This data warehouse will be an enterprise-wide tool that will also support other future corporate reporting applications. Deployment of the PCRS was authorized by the Board in October 2017.

**Real Property Group Business System Replacement**

This project will select and implement new software for the Real Property Group (RPG). The software will streamline planning, tracking, execution, and compliance management of Real Property business processes for both the Planning and Acquisition, and Land Management Unit(s). RPG’s goal is to centralize the disparate, stand-alone applications and processes, and migrate existing data into one integrated system to increase productivity and improve business processes.

**Services Procurement Implementation**

In the current Oracle Business Suite (EBS), it is difficult to automate and record certain transactions such as retention payments, Stop Notices, and Liquidated Damages. These transactions are tracked separately by Finance and Engineering. The Oracle on-premise Service Procurement Module is part of the Oracle E-Business Suite. The module automates retention transactions at the time of payment, and can, through customization, accommodate the need to hold other payments as liabilities in the General Ledger (GL).

This project will implement the Oracle Service Procurement Module, as part of the Oracle E-Business Suite, to automate retention or other withholdings required as liabilities in the GL.
Supplier Portal Implementation

This project will implement Oracle’s web-based Supplier Portal, which provides self-service capabilities to Metropolitan’s supplier community. Suppliers have access to a secure area that provides complete visibility to transactions, including purchase orders, payments and planned payments, offers collaboration with Metropolitan staff, and allows the electronic submission of invoices. The implementation of the portal will reduce repetitive inquiries from vendors, saving staff time and reducing vendor frustration.

WINS Water Billing System Upgrade

The Water Information System (WINS) bills Metropolitan’s member agencies, on a monthly basis, for approximately $75 million. WINS is known as Metropolitan’s “cash register”. The custom application is 10 years old and needs to be updated. The billing logic is complicated and “hard-coded” into the application, requiring assistance from Metropolitan’s Information Technology to make even minor modifications, such as adding new meters or programs. Member agencies have also requested additional functionality. This project will rewrite the WINS to add needed enhancements to the system to add functionality for both Metropolitan and member agencies.

Incident Reporting System

This project delivers a replacement for the 17+ year-old Incident Reporting System. This system reports and tracks incidents that occur on Metropolitan property. Incidents include safety, security, environmental, and workers compensation related events.
Dams and Reservoirs Improvements Program

Fiscal Year 2020/21 Estimate: $5.1 million  Fiscal Year 2021/22 Estimate: $13.1 million

Program Information: The Dams & Reservoirs Improvements Program is comprised of projects to upgrade or refurbish Metropolitan’s dams, reservoirs, and appurtenant facilities in order to reliably meet water storage needs and regulatory compliance.

Accomplishments for FY 2018/19 and FY 2019/20

- New projects initiated during the last biennium:
  - Garvey Reservoir Cover and Liner Replacement
  - Dam Monitoring System Upgrades and Spillway Assessments at Lake Mathews and Lake Skinner

- Major milestones achieved during the last biennium:
  - Construction completed:
    - Palos Verdes Reservoir Improvements
    - Diamond Valley Lake Dam Monitoring Systems Upgrades Stages 1 and 2

Objectives for FYs 2020/21 and 2021/22

<table>
<thead>
<tr>
<th>Project</th>
<th>Total Project Estimate</th>
<th>Estimated Completion</th>
<th>Major Milestones</th>
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<td>Mills Finished Water Reservoir Rehabilitation</td>
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</table>
Dams & Reservoirs - All Project Group

Diamond Valley Lake Dam Monitoring System Upgrades

The three rock-fill dams which form Diamond Valley Lake (DVL) are monitored continuously by the facility’s geodetic deformation monitoring system, which transmits real-time displacement data to Metropolitan’s Headquarters at Union Station and to the Operations Control Center at Eagle Rock. This data is collected to provide early indication of a potential problem within the dam embankments or foundations, and to prepare mandatory reports on the dams’ performance for submission to DSOD. After 17 years of continuous operation, the existing monitoring equipment has deteriorated and needs to be replaced. The planned upgrades will maintain the capability to continuously monitor dam performance in compliance with the DSOD operating permit.

Upgrades to the dam monitoring network at DVL will be accomplished in three stages. The Stage 1 - procurement and installation of the weir level sensors and strong motion accelerographs; Stage 2 - design and preparation of procurement documents for the geodetic deformation monitoring system; and Stage 3 - design and procurement of automated data acquisition system and upgrades to the communication network. Stage 2 construction was authorized by the Board in September 2017.

Jensen Finished Water Reservoirs Refurbishment

The Jensen plant has two 50-MG finished water reservoirs. Reservoir No. 1 is a concrete structure with a concrete roof that was completed in 1972. The concrete roof of Reservoir No. 1 has a bituminous built-up roofing system and lightweight concrete cap made of perlite. Portions of the perlite cap have deteriorated over time due to weathering. Any further deterioration may result in ponded rainwater leaking into the reservoir, leading to the reservoir being removed from service in order to maintain treated water quality. The rehabilitation work will replace the damaged perlite with a thin concrete layer, which will extend the cover life for approximately 20 years. Design was authorized by the Board in April 2017.

Reservoir No. 2 has a polypropylene floating cover that was installed in 1997. The floating cover at Reservoir No. 2 is showing significant signs of wear and needs to be replaced. In addition, modifications to the Reservoir No. 2 inlet are needed, as turbulent flow at the inlet has torn holes in the floating cover on several occasions near the corners of the fixed metal air vents. The rehabilitation work will include installation of a new finished water reservoir liner and floating cover with a rainwater removal system and improvement of the existing inlet configuration. Design was authorized by the Board in April 2017.

Within both reservoirs, inadequate mixing contributes to chloramine decay, which in turn increases the nitrite levels within the reservoirs and downstream distribution system. In accordance with the Water Quality Action Response Guidelines, elevated nitrite levels will require additional monitoring, as they may result in bacterial regrowth, and may require operational changes to mitigate chlorine decay. This project will conduct a study of the mixing characteristics of Reservoirs Nos. 1 and 2 and will test and implement solutions for mixing improvements, including installation of stationary mixers equipped with chlorine injection inside the reservoirs to enhance mixing and reduce the occurrence of nitrification within the reservoirs. The project will also install needed mixing improvements.

Dam Monitoring System Upgrades at Lake Mathews and Lake Skinner

Metropolitan relies on extensive instrumentation and regular inspections as a cornerstone of its dam monitoring program. The instrumentation provides warning signs of dam distress and provides real-time monitoring of the embankments and foundations. Extensive monitoring equipment has been installed at Lake Skinner and Lake Mathews over the last 44 years and 79 years, respectively. Recent inspections have noted that several of the piezometers and weirs at these facilities no longer function reliably and require rehabilitation or replacement.

Field surveys and condition assessments will be conducted at both dams to develop a staged replacement schedule. Based on the results of the assessments, installation of automated dam monitoring systems at each dam may be required. Design was authorized by the Board in December 2017.
**Etiwanda Reservoir Rehabilitation**

The Etiwanda Reservoir has been in operation for 26 years. The liner and appurtenances are in need of refurbishing to maintain their integrity and prevent excessive seepage as noted during periodic inspections. This project will rehabilitate the reservoir by replacing the reservoir liner with a geomembrane liner, replacing the sub-drain sump pump system, and installing new electronic monitoring instrumentation and equipment to better monitor operational status of the sump pump system. The project scope will also include inspection and evaluation of: (1) the asphalt pavement for the reservoir perimeter roads and parking lot for rehabilitation as needed; and (2) the isolation drop gates, emergency discharge slide gate, effluent gate, and reservoir sleeve valves.

**Garvey Reservoir Cover and Liner Replacement**

Garvey Reservoir was placed into operation in 1954. It is located at the junction of the Middle Feeder and the Garvey-Ascot Cross Feeder in the city of Monterey Park. Garvey Reservoir provides hydraulic grade stabilization, pressure relief, and operational and emergency storage for the Central Pool portion of the distribution system. A flexible membrane liner and reservoir floating cover were installed in 1999. The service life of a reservoir floating cover is approximately 20 years. The existing floating cover at Garvey Reservoir has become increasingly difficult to repair and needs replacement.

This project will replace the reservoir’s aging floating cover and flexible membrane liner. In addition, the existing inlet/outlet tower will be retrofitted; circulation piping will be modified; the inlet and outlet control valves will be replaced as required; the standby generator and electrical system will be upgraded, and the on-site water quality laboratory will be relocated and refurbished.

**Lake Skinner Outlet Tower Seismic Upgrade**

Lake Skinner was constructed in the 1970s and is located in the city of Temecula, in Riverside County. Water is delivered from the lake through its outlet tower to the Skinner Water Treatment Plant. If the lake needed to be drained rapidly in the event of an emergency, the outlet tower would be used to safely release the water. The outlet tower is under the jurisdiction of the California Division of Safety of Dams which requires that the tower meet current seismic codes.

Metropolitan has an ongoing program to evaluate the seismic stability of its facilities in order to maintain reliable water deliveries and to meet current design practices and building codes. Under Metropolitan’s seismic assessment program, staff conducted an initial assessment of the Lake Skinner Outlet tower. Seismic analyses of the Lake Skinner Outlet Tower have identified that the tower may be damaged during a major earthquake. The Board authorized preliminary investigations to evaluate the outlet tower to identify potential risk, vulnerabilities, and develop seismic upgrade option in December 2017.
Live Oak Reservoir Rehabilitation

The Live Oak Reservoir has a 2,500-acre-foot capacity and is located in the city of La Verne. The main purpose of the reservoir is to allow peaking of the Devil Canyon Power Plant and to provide for outages. The reservoir water surface controls the upstream hydraulic gradient for the San Dimas Hydroelectric Power Plant. An inspection identified the following: (1) several valves that are leaking; (2) the reservoir liner is damaged in several areas; (2) the emergency backup generator is no longer manufactured and parts are obsolete; (3) the existing HVAC system including the ductwork for the control room has exceeded its expected service life; (4) improvements to provide access control, intrusion alarm, and surveillance are needed; and (5) improvements to the grading, surface drainage, and paved roads adjacent to the Live Oak Reservoir are also needed. This project will replace three leaking butterfly valves, spot repair the existing asphalt concrete (AC) liner, replace the existing Emergency Standby Generator, replace the existing Heating, Ventilation, and Air Conditioning (HVAC) system, improve erosion controls for the facility, identify and restore all electrical components to new condition, including electrical, panel boards and grounding, sump pumps, and associated instrumentation, and conduct a security assessment of the facility to reinforce or upgrade physical features and protect infrastructure. This includes replacement of the inner fencing for the reservoir with security type fencing.

This project will also improve the emergency dewatering system for Live Oak Reservoir. The project scope will include the design and construction of appurtenant structures such as gantry cranes for lifting spillway drop gates, an emergency generator to back up the crane power source, automation of valves, modification of blow-off structures, or addition of secondary discharge lines to provide a more direct, reliable, and efficient means to dewater Live Oak Reservoir in the event of an emergency.

Mills Finished Water Reservoir Rehabilitation

The Mills plant relies on two finished water reservoirs with floating covers and geomembrane liners to provide storage for the downstream distribution system. Their capacity is approximately 25 million gallons (MG) each. The Hypalon cover on Reservoir No. 1 was installed in 1997, while the polypropylene cover on Reservoir No. 2 was installed in 1996. Over the past three years, an increasing number of rips and pinhole leaks in the covers were discovered and repaired. Due to their deterioration, the floating covers and geomembrane liners at both reservoirs need to be replaced. The rehabilitation work will include installation of new finished water reservoir liners and floating covers with a rain removal system, refurbishment or replacement of existing reservoir gates, installation of a new drop gate, and installation of enhanced security features and appurtenances for both reservoirs. Design was authorized by the Board in April 2017.

Palos Verdes Reservoir Cover Replacement

Palos Verdes Reservoir was constructed in 1939 to provide operational storage and hydraulic flexibility within the distribution system. Metropolitan installed a geomembrane floating cover in 1988 to preserve water quality and reduce evaporative losses from the reservoir. Following a detailed inspection of that facility in 2011, the reservoir was removed from service because of damage to its floating cover. Due to its age and deteriorated condition, the synthetic rubber could not be repaired. The scope of the project includes removal of the reservoir’s existing concrete lining; regrading of the clay sub-liner; modification of the existing spillway structure, inlet/outlet tower, and secondary inlet and outlet structures; installation of a new sub-drain system, asphalt concrete lining, geomembrane liner, and geomembrane floating cover; modification of the existing 480-volt electrical service, sodium hypochlorite feed system, rainwater removal system, and drainage piping; installation of a new valve and flowmeter upstream of the reservoir; addition of a precast concrete instrumentation and water quality structure. Construction was authorized by the Board in November 2015.

Palos Verdes Reservoir Groundwater Management

This project will address long-term groundwater management at the Palos Verdes Reservoir. The project will evaluate monitoring and disposal options for groundwater seepage, install monitoring instrumentation, develop groundwater and stormwater handling systems, if needed, and provide a connection to the sewer.
Spillway Upgrades - Lake Mathews and Lake Skinner

Following the recent incidents at Oroville Dam, the California Division of Safety of Dams (DSOD) is now requiring that dam owners in California assess the condition of dam spillways to confirm that they meet minimum safety standards. In July 2017, DSOD issued an initial list of 93 dams requiring comprehensive spillway assessments to evaluate hydraulic capacity, geotechnical stability, structural integrity, and potential erosion from dam releases. Of the 20 Metropolitan facilities that are permitted by DSOD, two have been directed to undergo the comprehensive assessments: Lake Mathews and Lake Skinner.

Metropolitan submitted the required work plans for re-evaluation of the spillways at Lake Mathews and Lake Skinner and received approval of those plans in September 2017. For each dam, a comprehensive spillway assessment report will be prepared and submitted to DSOD for review. As part of these comprehensive assessments, re-evaluation of the outlet tower and conduit at Lake Skinner is recommended to identify potential risks and vulnerabilities of lowering the reservoir pool after a major seismic event. Due to its integral role in withdrawing water from the reservoir, the spillway work plan will be expanded to include the Lake Skinner outlet tower and conduit. The assessments were authorized by the Board in December 2017.

Weymouth Finished Water Reservoir Rehabilitation

The Weymouth plant’s 50-million-gallon finished water reservoir was built in 1964. Because the finished water reservoir’s concrete roof was constructed with no expansion joints, numerous cracks in the roof slab continue to open and close with the expansion/contraction cycles caused by daily fluctuation in temperature. Repair is required to protect the concrete and to prevent corrosion of the exposed reinforcing steel.

This project will repair cracked and spalling concrete on the underside of the finished water reservoir roof slab, support beam connections, and entry staircase. The project will concurrently perform any needed seismic retrofit to meet the latest Division of Safety of Dams (DSOD) standards.
Program Information: The Distribution System Reliability Program is comprised of projects to replace or refurbish existing facilities within Metropolitan’s distribution system, including reservoirs, pressure control structures, hydroelectric power plants, and pipelines, in order to reliably meet water demands.

Accomplishments for FY 2018/19 and FY 2019/20

- New projects initiated during the last biennium:
  - East Lake Skinner Bypass and Bypass No. 2 Screening Structure Upgrade
  - Electrical Upgrades at Structures in the Orange County Region (Stage 2)
  - Flow Meter Replacement
  - Foothill Feeder - Castaic Valley Blow-off Valves Replacement
  - Hollywood Tunnel North Portal Equipment Upgrades
  - Lake Mathews Above Ground Storage Tank Replacement
  - San Diego Pipeline No. 1 Joint Repair
  - San Jacinto Diversion Structure Slide Gate (V-03) Rehabilitation
  - Santa Monica Feeder Cast Iron Pipe Rehabilitation
  - Sepulveda Feeder/East Valley Feeder Interconnection Electrical Upgrades
  - Sepulveda-West Basin Interconnection Valve Replacement
  - Service Connection LA-17 Rehabilitation
  - Service Connections WB-2A & WB-2B Equipment Relocation
  - Wadsworth Pumping Plant Sleeve Valve Refurbishment

- Major milestones achieved during the last biennium:
  - Construction completed:
    - Orange County Feeder Relining Reach 2
    - Santa Ana Bridge Expansion Joint Replacement
    - Garvey Reservoir Erosion & Drainage Control Improvements - Zones 1 - 5
    - Fairplex and Walnut Pressure Control Valves Replacement
    - Wadsworth Pumping Plant Yard Piping Lining Repairs
    - Lake Mathews Forebay Outlet Tower Improvements
    - Foothill Feeder - Castaic Valley Blow-off Valves Replacement
    - Valley View Hydroelectric Plant Generator Refurbishment
    - Rialto Pipeline Service Connections CB-12 & CB-16 Valve Replacement
    - DVL Inlet/Outlet Tower Fish Screen Replacement
    - San Diego Pipeline No. 1 Joint Repair

Fiscal Year 2020/21 Estimate: $37.2 million   Fiscal Year 2021/22 Estimate: $29.9 million
Five projects completed design:

- Orange County Feeder Blow-off Structure and Access Road Repair
- East Orange County Feeder No. 2 Service Connection A-6 Rehabilitation
- Casa Loma Siphon Barrel No. 1 - Pipe Procurement for Siphon Replacement
- Electrical Upgrades at 15 Structures in Orange County Region
- Orange County Feeder Cathodic Protection

### Objectives for FYs 2020/21 and 2021/22

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<td>Casa Loma Siphon Barrel No. 1 - Replacement</td>
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<td>Orange County Feeder Lining Repair - Reach 3</td>
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<td>$5,000,000</td>
<td>2020</td>
<td>Complete construction of DeSoto valve structure improvements</td>
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### PCSs/HEPs/Service Connections/Valves & Gates Project Group

**108th Street Pressure Control Structure Valve Replacement**

The 108th Street Pressure Control Structure (PCS) located on the Palos Verdes Feeder was constructed in 1941. The pipeline has a design capacity of 80 CFS in this area and provides the flexibility to deliver water through the Inglewood Lateral and Culver City Feeders to member agencies, including the city of Los Angeles, Central Basin Municipal Water District, and West Basin Municipal Water District. This project will replace two failing valves at the 108th Street PCS. The work will include replacing a corroded ladder, catwalk grating, restoring electrical components to new condition, and adding security features. Electrical components consist of electrical panel boards and grounding, sump pumps, and associated instrumentation.
Appian Way Valve Replacement

The Appian Way Sectionalizing Valve Structure on the Palos Verdes Feeder was constructed in 1937. The pipeline has a design capacity of 60 CFS in this area and delivers water to Metropolitan's member agencies, Central Basin Municipal Water District, and the city of Los Angeles. The sectionalizing valve provides Metropolitan the flexibility to isolate flows on the Palos Verdes Feeder between the Long Beach Lateral Turnout Structure and Appian Way Sectionalizing Valve Structure to perform preventive maintenance, planned shutdowns, and emergency activities if required. This operational reliability allows for continued delivery of water to Metropolitan's central pool. The failing sectionalizing valve is 80 years old. Over the past few years, the 24-inch valve has been rebuilt several times to extend its service life. This valve can no longer be rebuilt and has become extremely difficult to operate as it gets stuck and does not fully open or close. The body and cone have eroded, which prevents the valve from properly sealing. This project will replace two failing valves, dresser couplings, corroded pipe spools, and install a new precast concrete roof slab at the Appian Way Sectionalizing Valve Structure. Additionally, the project would identify and restore all electrical components, and provide for SCADA control of the valve. Electrical components include electrical panel boards and grounding system, sump pumps, and associated instrumentation.

Conveyance and Distribution System Electrical Structures Rehabilitation

Metropolitan’s distribution system includes over 1,000 structures which house equipment used to measure pipeline flow, control pipeline flow and/or pressure, relieve pressure or vacuum, and isolate or sectionalize a pipeline. The conduits and electrical equipment inside the structures have corroded and no longer provide adequate grounding. In addition, the wiring inside the conduits may be compromised. These electrical components have been in continuous service in a damp, underground environment for over 50 years, and need to be upgraded. The rehabilitation for the Conveyance and Distribution System Electrical Structures has been prioritized and will be completed in five stages. The Stage 1 upgrades will upgrade 15 highest priority service connection structures within Orange County. Stage 2 improvements will upgrade remaining 244 structures within Orange County. Stage 3 improvements will upgrade 258 structures in northern Los Angeles County. Stage 4 improvements will upgrade 258 structures in southern Los Angeles County. Stage 5 improvements will upgrade 301 structures in Riverside, San Diego, and San Bernardino Counties. The precise number of structures to be improved may vary depending on condition assessments. The planned work includes replacing the existing service panels, conduits, wiring lights, and receptacles; and providing new grounding systems, sump pumps, exhaust fans, and remotely monitored flood alarms at each structure.

Coyote Creek Hydroelectric Plant/PCS Emergency Standby Generator Replacement

The existing emergency stand-by generator was installed when the Hydroelectric Plant/Pressure Control Structure (HEP/PCS) was constructed in 1982. The emergency generator is 37 years old and has deteriorated with age. This project will replace the existing emergency generator with a new 150 kW, 3-phase 480-volt, diesel engine driven generator and construct an additional manual transfer switch outside the stationary generator room to provide for a secondary portable generator hookup. The project scope will include electrical and mechanical system upgrades to the generator building to meet current emission and fire code regulations under the Environmental Protection Agency’s Tier 3 Emission and Fuel Standards Program.

Eagle Rock Tower Distribution System Upgrades

Eagle Rock Tower diverts the flow of water from the Weymouth plant into the Palos Verdes Feeder, Santa Monica Feeder, and the Eagle Rock Lateral. The tower is also used to maintain the required hydraulic grade to the service connections upstream of the tower. This project will perform needed rehabilitation of various components of the Eagle Rock Tower distribution system. The project will include the following: (1) replace the leaking control and isolation valves at the interconnections to the Palos Verdes and Santa Monica Feeders, (2) replace corroded slide gate and cover, and repair slide gate rails and associated components, (3) fabricate and install new drop gate at inlet side of Eagle Rock Tower to improve isolation capability, (4) extend Santa Monica Feeder interconnection blow-off structure and install isolation valves to improve maintenance flexibility, (5) install stairs from access road to facilitate safe access to blow-off structure, and (6) replace corroded work platforms and ladders in interconnection structures to improve worker safety.
**East Orange County Feeder No. 2 Service Connection A-6 Rehabilitation**

The A-06 Valve and Meter structure is a service connection for the City of Anaheim and is located on the East Orange County Feeder #2. The meter is a 24-inch venturi meter with a design capacity of 40 CFS. The meter was first put into service in August of 1964. During routine maintenance, staff noticed a leak from a weld-o-let near the bottom of the venturi meter. The Materials and Metallurgy Team inspected the meter in June 2014 and recommend replacement the venturi meter. The scope of work is to replace the A-06 Venturi meter, valve, steel grating, and adjacent piping that is deteriorated. The work will also include replacing the sump pump and identifying and restoring all electrical components to like new condition. A construction contract was awarded by the Board in October 2019.

**East Orange County Feeder No. 2 Service Connection OC-44A Valve Replacement**

The East Orange County Feeder #2 is a 25-mile-long pipeline which delivers treated water from the Diemer plant to the cities of Anaheim, Orange, Santa Ana, and Irvine. Service Connection OC-44A, which is located in Newport Beach, was constructed in 1967 and delivers water to the Municipal Water District of Orange County. Gradual corrosion and wear from over 50 years of operation has led to the deterioration of the 16-inch plug valve. The valve is currently leaking and needs to be replaced. The plug valve shaft was installed in the horizontal position to allow placement of the valve within the vault. This unconventional position may have accelerated the deterioration of the valve. This project will replace a 16-inch-diameter plug valve, flowmeter, and appurtenant piping as required in the Service Connection OC-44A Structure. The work will also identify and restore all electrical components to new condition. Electrical components consist of electrical panel boards and grounding system, sump pump, and associated instrumentation.

**Flow Meter Replacement Project**

Metropolitan has over 500 flowmeters used for water revenue metering at service connections, operation of the conveyance and distributions, and for process control. Many flowmeters have been in operation over 50 years. Some of these meters are exhibiting signs of deterioration. Spare parts for older meters are increasingly difficult to procure.

This project will be conducted in three stages. Under Stage 1, a comprehensive evaluation of the flowmeters will be conducted to assess their current condition and availability of spare parts. Under Stage 2, deteriorating meters in critical services will be replaced. Under Stage 3, a comprehensive, risk-based approach will be implemented to replace the remaining flowmeters. Under the General Managers authority, preliminary investigations were authorized in March 2019.

**Foothill Feeder PCS Valve Replacement**

Foothill Pressure Control Facility (PCF) is located at Castaic Lake Dam in northern Los Angeles County. The structure takes untreated water from the west branch of the State Water Project system and controls all untreated water flows into the Jensen plant. Foothill PCS consists of two turbines, two 60-inch inline sleeve valves, and three parallel trains of conical plug valves. Each plug valve train consists of three 48-inch conical plug valves in series, that are throttled to dissipate pressure. Although the conical plug valves are currently used to control flow, these types of valves are not well-suited for this application. In addition, recent valve inspections have identified leaks, cracks, and corrosion. This project will replace the conical valves with valves that are better-suited for flow control and will replace all other valves that are at the end of their service life and other facility improvements.
Foothill Hydroelectric Plant Refurbishment

The Foothill Hydroelectric Plant was constructed in 1981. The electrical and mechanical systems are exhibiting signs of normal wear and tear after 30 years of service. The scope of work is to refurbish control and electrical protection systems, mechanical piping for the generator cooling water systems, and add a Programmable Logic Controller. This project will install an on-line data acquisition and monitoring instrumentation and refurbish or replace other deficient equipment. Design was authorized by the Board in September 2018.

An assessment has identified that the facility is seismically vulnerable and should be upgraded. The scope of work also includes reinforcing the roof, replacing a cracked beam, and installing connectors and seismic restraints to the roof, columns, and walls. Retrofit work will also include upgrades for non-structural components such as equipment anchors, pipe/conduit supports, and crane rail bracing. Design was authorized by the Board in December 2014.

In addition, the electrical and mechanical systems are exhibiting signs of normal wear and tear after 30 years of service. The scope of work is to refurbish electrical protection relays, control relays, mechanical piping for the generator cooling water systems, and add a Programmable Logic Controller. This project will install on-line data acquisition and monitoring and will refurbish or replace other deficient equipment. Design was authorized by the Board in March 2012.

Hollywood Tunnel North Portal Equipment Upgrades

Built as part of the Santa Monica Feeder in 1937, the North Portal of the Hollywood Tunnel is one of three control points along the feeder, which delivers water to the cities of Burbank, Beverly Hills, Los Angeles, and Santa Monica. The valves and mechanical control system at the North Portal of the Hollywood Tunnel are obsolete. Repair parts are not available and must be fabricated at a machine shop. This project will replace the existing sleeve valves and hydraulic actuators at the North Portal of the Hollywood Tunnel with new control valves with electric actuators. The upgrade includes replacing the mechanical controls with electronic, PLC/SCADA controls, which will allow the facility to be monitored and controlled from the Eagle Rock Operations Control Center.

Hydroelectric Plant Rehabilitation

Metropolitan owns and operates 15 hydroelectric power plants with a total installed capacity of 130 megawatts. Approximately 10% of Metropolitan's income is derived from these power plants. The first plant to be commissioned was the Greg Avenue Power Plant in 1979, and the last was the Wadsworth Hydroelectric Power Plant in 2002. Many of these plants have been in operation over 35 years and have not undergone refurbishment or upgrade. Several plants are beginning to show signs of deterioration and several have already been refurbished. A comprehensive approach to rehabilitation of the other hydroelectric plants is needed to protect Metropolitan assets and fortify infrastructure reliability.

This project will assess and evaluate Metropolitan's hydroelectric plants, determine the rehabilitation requirements for each plant, identify needed pilot efforts, prioritize the needed rehabilitation, and develop a multi-phase plan to complete the rehabilitation. New facilities or those that have already undergone rehabilitation will not be included in the evaluation. For the included hydroelectric plants, the assessment will evaluate the following equipment and systems: turbine, generator, power equipment and switchyard, control system, protection system, auxiliary systems such as lube oil and cooling water, and the overall facility.
Lake Mathews Forebay Pressure Control Structure and Bypass

Lake Mathews is the terminus of Metropolitan’s CRA and was constructed in the 1930’s. Untreated water stored in the reservoir is withdrawn through the lake’s forebay and hydroelectric plant and is then conveyed through the Upper Feeder and Lower Feeder to the Weymouth and Diemer plants, respectively. The Lake Mathews forebay discharge valves and outlet tower have gradually deteriorated over 75 years of operation. Portions of the facilities need to be replaced to maintain reliable deliveries from Lake Mathews into the Central Pool. The ten 32-inch-diameter Howell-Bunger valves that are used to withdraw water from the lake have gradually deteriorated through continuous use. The frequency of repairs is increasing, while replacement parts are difficult to obtain. These 60- to 75-year-old valves need to be replaced.

Upgraded facilities may include a bypass system which includes new headworks regulating valves, upgraded outlet tower gates, and a new overflow spillway structure. The system is expected to provide full-service capacity and deliver water to the Upper and Lower Feeders year-round. The Board authorized preliminary design in February 2014.

Lake Mathews Junction Shaft Gate Hydraulic Power Unit Study - Outlet Tower No. 2 Isolation

The roller gates at the Lake Mathews junction shaft do not operate consistently and reliably. The large isolation gates utilize hydraulic power units to operate under normal conditions and store energy for use in emergency conditions when electric power is not available. Although maintained in accordance with the manufacturer’s recommendations, the gates no longer function as designed. This project will evaluate the two roller gate operators at the Lake Mathews junction structure that provide isolation for Outlet Tower No. 2. The study will focus on the condition of hydraulic power unit equipment, safety elements related to pressurized hydraulic reservoirs/tanks, and operating procedures/practices.

Lake Mathews Outlet Tower No. 2 Valve Rehabilitation

The outlet tower valves operate intermittently do not open and close completely. Without proper operation of the valves, tier selection and flow rates are impacted which may adversely affect system operations including raw water quality, water treatment processes at the downstream Weymouth and Diemer plants, and secure isolation of the tower from the lake needed for maintenance and inspection work. This project will complete a comprehensive study and implement recommendations on replacement or refurbishment of the butterfly valves on the Lake Mathews Outlet Tower No. 2.

OC-88 Pumping Plant Upgrades

The OC-88 Pumping Plant, consisting of the OC-88 and OC-88A pump stations, was constructed in 1990 and is located in the city of Lake Forest. Treated water from the Diemer plant is conveyed through the Allen McColloch Pipeline (AMP) to the OC-88 Pumping Plant, which in turn pumps water directly into the Municipal Water District of Orange County’s (MWDOC’s) South County Pipeline. The surge tank system protects the AMP and the South County Pipeline from pressure surges. Two new surge tanks were added when the OC-88 Pumping Plant modifications were completed in 2005. However, the air compressor was not upgraded at that time. A recently completed high-flow test at the OC-88 Pumping Plant identified that a second air compressor should be installed to adequately protect the AMP and the South County Pipeline. This project will upgrade the OC-88 Pumping Plant’s surge tank system, install a second air compressor, replace flow meters and pumps, perform overhead crane improvements, upgrade the surge tank, fire protection, and HVAC systems; and perform other associated facility improvements. Preliminary design was authorized by the Board in August 2013.

The OC-88 and OC-88A pump stations feed directly off the Allen-McColloch Pipeline (AMP) and deliver water into the South County Pipeline to supply the Santa Margarita Water District, a member agency of the Municipal Water District of Orange County. Southern California Edison performed an efficiency test on the three existing pump motors located at the OC-88A pump station and found that improvements in motor efficiency could result in annual savings of approximately $25,000 in electricity costs, and an estimated 235 tons of CO2 emissions. This project will also replace the three pumps at the OC-88A pump station with pumps that have high-efficiency motors equipped with variable frequency drives.
Olinda Pressure Control Structure Valve Replacement

The Olinda Pressure Control Structure was constructed in 1969 to provide regulation of flows in the Lower Feeder between the Santiago Control Tower and Diemer Filtration Plant. This project will replace two conical plug valves to increase efficiency, reliability, and mitigate the vibrations caused by operating the valves. The structure's electrical components will also be evaluated and refurbished or replaced. Replacing the existing 49-year-old valves will improve operational control of the Lower Feeder between the Santiago Control Tower and the Diemer plant. If cost effective, relocation of the PCS will also be considered.

Orange and Riverside/San Diego County Operating Regions Valve Replacement

Metropolitan’s distribution system includes over 830 miles of pipelines and 5,400 individual structures that require regular maintenance and monitoring. The system is comprised of four regions: the Los Angeles County, Orange County, Riverside/San Diego County, and Western San Bernardino County regions. The subject project will replace valves within the Orange and Riverside/San Diego County operating regions. Replacement of these valves is a priority due to the age of the feeders and the number of critical valves that need to be replaced.

The valves on the Second Lower Feeder, Orange County Feeder, East Orange County Feeder, Lower Feeder, Santiago Lateral, and the Allen-McColloch Pipeline have been in service up to 50 years and have reached the end of their useful and expected service life. Failure of these valves or their associated components may result in an unplanned emergency shutdown of one of these pipelines impacting delivery to our member agencies. The scope of work is to replace approximately 70 deteriorated valves ranging in size from 1 to 12 inches in diameter on various pipelines in the Orange County Distribution System. Construction was authorized by the Board in September 2017.

The Riverside/San Diego County operating region serves Eastern Municipal Water District, Western Municipal Water District of Riverside County, and the San Diego County Water Authority. In this region, the valves to be replaced are located on the Lake Skinner Outlet Conduit and San Diego Pipelines Nos. 3, 4 and 5. These lines commenced operation between 1959 and 1972. The valves to be replaced include air release/vacuum valves that are installed at high points in the lines to exhaust or admit air during pipeline filling or dewatering operations, and small globe, plug, and butterfly valves. The latter valves are used for isolation of air release/vacuum valve assemblies, blow-off structures, and pressure control structures. Closing these isolation valves allows inspection and maintenance activities to proceed without requiring a shutdown of the feeder. The Board authorized design and procurement in April 2018.

Palos Verdes Feeder - Long Beach Lateral Turnout Structure Sta. 1442+15 Valve Replacements

The Palos Verdes Feeder - Long Beach Lateral turnout structure, located in the County of Los Angeles, was constructed in 1938. The Long Beach Lateral turnout structure consists of seven valves that allows Metropolitan to continue delivering water upstream and downstream to member agencies during preventive maintenance, shutdowns, and emergencies. This project will replace the seven valves on the Palos Verdes Feeder/Long Beach Lateral Turnout Structure that are 80 years old. The structure will also be refurbished and include replacing the existing catwalk grating, a new precast concrete roof slab, lifting mechanism, security type entry hatches, and identify and restore all electrical components to like new condition. Electrical components consist of electrical panel boards and grounding system, sump pump and associated instrumentation.
**Rio Hondo Pressure Control Structure Valve Replacements**

The Rio Hondo Pressure Control Structure (PCS) on the Middle Feeder pipeline was constructed in 1983. Construction of the Rio Hondo PCS incorporated an existing valve structure, so the valves at this location have been in operation since 1953 as part of the original underground valve structure. The existing valves have been in continuous service for approximately 65 years, and over time have required frequent repairs/rebuilding.

The Eagle Rock Operations Control Center utilizes the Rio Hondo PCS to maintain the lower pressure zone on the southern half of the Middle Feeder, and to assure deliveries to member agency water demands in the southwestern service area. This project will replace failing valves at the Rio Hondo PCS. The work will include replacing dresser couplings, pipe spools, and pipe supports; providing adequate ventilation for the structure; rehabilitating the existing wastewater system; and identifying and restoring all electrical components to new condition. Electrical components consist of electrical panel boards and grounding system, sump pumps, and associated instrumentation.

**San Diego Canal Radial Gates Rehabilitation (V-06 & V-08)**

The protective coatings on the radial gate at the San Diego Canal and the operating components of the gates have begun to fail, and significant metal loss has occurred. In addition, the performance of the existing motor actuators used to open and close the gates has diminished. Should this gate fail, there would be loss of control to regulate flow into Lake Skinner from the San Diego Canal, along with loss of control in surface elevation that regulates flows through the Lake Skinner Bypass screening structures. The bypass structures supply the Skinner area raw water pipelines and the Skinner plant when Lake Skinner is being bypassed, typically due to a taste and odor issue in the lake. This project will rehabilitate or replace the San Diego Canal Radial Gates V-06 and V-08. The rehabilitation may include strengthening or replacing steel members as needed, replacing the radial gate actuator and controls, and preparing and coating steel surfaces with an approved coating, such as a galvanic metalized coating.

**San Diego Pipelines 3 & 5 Vacuum Valve Replacement**

This project will remove and replace 72 existing vacuum valves on San Diego Pipeline No. 3 (SDPL3) and San Diego Pipeline No. 5 (SDPL5). The existing valves on SDPL3 have been in service for almost 60 years, while those on SDPL5 have been in use for almost 40 years. All the valves have reached the end of their services lives, and the majority are not in a condition to be rehabilitated. All valves will be replaced in-kind. This project will lower corrective maintenance costs, and the risks of valve failures resulting in property or pipeline damage or unscheduled pipeline outages.

**San Dimas and Red Mountain Power Plants Standby Diesel/Engine Generator Replacements**

The emergency generator at Red Mountain Hydroelectric plant was installed during the original plant construction in 1983. The generator at the San Dimas Hydro Electric Power Plant was installed during original Pressure Control Structure construction in 1975. These generators are necessary to ensure all operating equipment performs the required flow transfers between the Hydroelectric Power Plant (HEP) and the Pressure Control Structure (PCS) during unscheduled HEP interruptions and SDGE station-power failures. The scope of work is to design, procure, and construct two standby diesel engine generators, one each at the San Dimas and Red Mountain Power Plants. The project scope includes removal of the existing generators and fuel tanks, construction of a new unloading facility with spill containment, steel overhead canopies, and electrical and mechanical system upgrades to the replacement generator to meet current emission and fire code. Design was authorized by the Board in February 2016.

**San Dimas Hydroelectric Plant Rehabilitation**

The San Dimas Hydroelectric Plant was constructed in 1981, and the electrical and mechanical systems are exhibiting signs of normal wear and tear after 30 years of service. The scope of work is to rehabilitate the turbine, generator, and switchgear and to provide associated controls, seismic and other facility upgrades. Design was authorized by the Board in March 2013.
San Jacinto Diversion Structure Slide Gates Rehabilitation

The San Jacinto Diversion Structure, located at the base of the San Jacinto Mountains, was completed in 1939. The diversion structure divides incoming flow from the CRA to three different outlets, using slide gates to control each flow. Although the existing gates were originally designed for open/close operation only, they had historically also been used for throttling the flow, which had caused substantial damage to the gates. This project will replace the existing V-01 and V-02 cast iron slide gates and appurtenances at the San Jacinto Diversion Structure with a single stainless-steel slide gate designed for throttling. This project will increase the operational reliability of the structure and the connection to the Casa Loma Siphon No. 1 and CRA.

The V-03 gate was designed to shut off flow to the San Jacinto pipeline. The slide gate does not fully close to provide isolation when needed or provide flow regulation. This project will replace or rehabilitate and modify the existing V-03 cast iron slide gate and its appurtenances at the diversion structure. Under the General Manager’s authority, design, procurement was authorized in February 2019.

Santa Monica Feeder and Calabasas Feeder Bypass for Sectionalizing Valves

The lack of a bypass line at the Santa Monica Feeder and Calabasas Feeder creates the potential for damage to the valves and their operators due to the inability to equalize pressure across the valves before operating. Further operation of these valves, without installing a bypass, will continue to place the valves and pipeline at risk for damage and potentially emergency or unplanned shutdown. This project will design, fabricate, and install bypass lines at three sectionalizing valve locations that currently do not have a bypass line.

Santiago Lateral Station 216+40 Butterfly Valve Replacement

The Santiago Lateral is a pre-cast concrete pipeline, ranging in size from 60-inch to 72-inch, and was constructed in 1955. It extends southerly from the Santiago Control Tower in the Anaheim Hills approximately 7.4 miles to Irvine Lake. The pre-cast concrete pipeline provides raw CRA water to Anaheim, IRWD and Irvine Lake. The 42-inch sectionalizing valve currently leaks resulting in unwanted flows to the south portion of the Santiago Lateral. This project will replace the valve and construct a bypass line to handle lower flow rates. The Board authorized preliminary design in August 2013.

Sepulveda Canyon Control Facility Electrical and Mechanical Rehabilitation & Seismic Upgrades

The Sepulveda Canyon Facility consists of a pressure control structure, hydroelectric plant, and two water storage tanks. The pressure control structure was constructed in the early 1970s to reduce pressure in the 9-foot-diameter Sepulveda Feeder as it conveys treated water from the Jensen Plant. The two water tanks have a combined capacity of 18 million gallons of water and are used to regulate flows through the pipeline. The hydroelectric plant, which was constructed in 1982, takes advantage of excess pressure in the Sepulveda Feeder to generate up to 8.6 megawatts of electricity with its single turbine. The facility is located on top of a large pad that was constructed by filling a steeply sloped V-shaped ravine. The pad is approximately 120 feet above the toe of the slope. The site is located within one mile of the Santa Monica Fault, which is capable of generating a 6.8 magnitude earthquake. Preliminary slope analyses indicate that the fill could slide down the slope during a major earthquake, causing significant damage to the pressure control structure, the water tanks, and the hydroelectric plant. This project will consolidate all seismic upgrade efforts for the entire Sepulveda Canyon Control Facility and seismically upgrade the facility. Design was authorized by the Board in March 2013.

The Sepulveda Canyon Hydroelectric Plant was constructed in 1982, and the electrical and mechanical systems are exhibiting signs of normal wear and tear after 30 years of service. The scope of work is to rehabilitate the electrical and mechanical components including the turbine/generator and upgrades to the protection and control systems. The project also includes rehabilitation and structural improvements to the switchyard. Design was authorized by the Board in March 2013.
Sepulveda Feeder/East Valley Feeder Interconnection Electrical Upgrades

The East Valley valve structure is located on the north sidewalk of the Rinaldi Street and Hayvenhurst Avenue intersection in Granada Hills. During the wet season, this structure receives intrusive storm water leakage causing the junction boxes, electrical enclosures, and conduits to corrode and short circuit. The extent of damage has accelerated, and storm water now enters the structure. This project will install new wiring and control panels for operation of the existing valve, remove the existing aboveground disconnect switch and install a new power distribution panel, install new duct banks and conduits to supply power to each of the critical structures, install additional bollards around the distribution panel to minimize damage from vehicles, repair damaged sidewalk, and assess potentially relocating the existing metering structures. Design was authorized by the Board in October 2018.

Sepulveda-West Basin Interconnection Valve Replacements

The Sepulveda-West Basin Interconnection was constructed in 1970. The interconnection allows Metropolitan's Sepulveda Feeder pipeline the flexibility to convey supplemental flow to the West Basin Feeder. The structure includes two 16-inch lines with sleeve valves and one 12-inch line with a globe valve. Each line may be isolated at the either end with plug valves. This project will replace three failing valves at the Sepulveda-West Basin Interconnection structure. The work will include replacing associated dresser couplings, pipe spools, and pipe supports. Additionally, work on the structure will include installing a new precast concrete roof slab, providing adequate ventilation for the structure, replacing a sump pump, structure modifications to address algae accumulation on adjacent sidewalk due to frequent water discharge from the sump pump, and identifying and restoring all electrical components to new condition. Electrical components will consist of electrical panel boards and grounding, sump pumps, and associated instrumentation. Design was authorized by the Board in October 2018.

Service Connection LA-17 Rehabilitation

Service Connection LA-17 is located in the city of Los Angeles at the terminus of the Eagle Rock Lateral. It includes three lines: (1) 17A is a 24-inch line with a capacity of 30 cfs, (2) 17B is a 48-inch line with a capacity of 100 cfs, and (3) 17C is an 85-inch line with a capacity of 310 cfs. Three venturi tubes at the LA-17 service connection have been in service for more than 60 years and require significant rehabilitation or replacement.

Significant coating deterioration and metal loss with extensive pitting and corrosion were identified on the bottom side of the 48-inch venturi tube. The wall thickness of this venturi tube is approximately 30% of its original thickness. Failure to replace this venturi tube will lead to eventual leakage, flooding the structure, and impacting water deliveries to the member agency. This project will replace the deteriorating LA-17B welded steel venturi tube located at the Service Connection LA-17 structure. The work will also recoat the LA-17A and LA-17C venturi tubes within this structure. Additionally, work will include replacing the sump pump and identifying and restoring all electrical components to new condition. Electrical components will consist of electrical panel boards and grounding, and associated instrumentation. Under the General Manager's authority, design was authorized in June 2019.

Upper Newport Bay Blow-off Structure Rehabilitation

The existing blow-off structure on the Orange County Feeder enables the pipeline to be dewatered in the event of an emergency and provides access for routine maintenance and inspection. Following 73 years of continuous operation in a moist environment near Upper Newport Bay, the blow-off valves and piping inside the structure have corroded and need to be replaced. In addition, due to ongoing erosion, the only road available to access the blow-off structure has been damaged and requires repairs. This project will restore access to the structure and replace its internal valves and piping. The planned repairs include regrading of the existing access road and reinforcement of crossings where the road intersects drainage channels; strengthening of the existing turn-around area adjacent to the blow-off structure, which will allow maintenance vehicles to set up for repair activities; installation of new valves and replacement of corroded piping; and modification of piping to ensure continued compliance with current California Division of Drinking Water regulations to prevent potential cross connections. In June 2019, the Board authorized entering into two agreements for the performance of mitigation to support rehabilitation this blow-off structure.
Venice Hydroelectric Plant Rehabilitation

The Venice Hydroelectric Plant (HEP) was constructed in 1982, and the electrical and mechanical systems are exhibiting signs of normal wear and tear after 30 years of service. The scope of work is to rehabilitate the electrical and mechanical components including the turbine generator and the protection and control systems. The project also includes rehabilitation and structural improvements to the switchyard. Design was authorized by the Board in March 2013.

Venice PCS Valve and Security Upgrades

Venice Pressure Control Structure (PCS) is the second of two pressure control structures located along the Sepulveda Feeder. Venice PCS performs the critical operational functions of reducing grade and controlling flows in the Sepulveda Feeder. The PCS consists of multiple control valves and associated piping. The valves are almost 47 years old and have been experiencing increased failures over the last 10 years. This project will refurbish several valves and will install multi-hazard security features for facility infrastructure protection.

Wadsworth Pumping Plant Sleeve Valve Refurbishment

Recent inspections have identified numerous deteriorated sleeve valves at the Wadsworth Pumping Plant. The sleeve valves originally installed in 1999 control the flow of water from DVL to the San Diego Canal. While operation of the pumping plant has not yet been impacted, failure of the valves could lead to an unplanned shutdown and interruption of water delivery to member agencies. This project will refurbish seven 66-inch by 42-inch sleeve valves at the Wadsworth Pumping Plant at DVL.

Washington Street Pressure Control Structure Valve Replacement & Security Upgrades

The Washington Street Pressure Control Structure (PCS) located on the Palos Verdes Feeder was constructed in conjunction with the Palos Verdes Feeder pipeline in 1941. The pipeline has a design capacity of 100 CFS in this area. This project will replace two failing hydraulically operated globe valves at the Washington Street PCS. The work will include identifying and restoring all electrical components to new condition. Electrical components consist of electrical panel boards and grounding, sump pump, and associated instrumentation. Additionally, a security assessment of the facility will be conducted to determine the need to reinforce or upgrade physical features for enhanced infrastructure protection.

West Orange County Feeder OC-09 Rehabilitation

The West Orange County Feeder was constructed in 1956 as a component of the Lower Feeder system. It delivers treated water from the Robert B. Diemer Water Treatment Plant in Yorba Linda to the northwestern portion of Orange County. Service Connection OC-09 on the West Orange County Feeder consists of a turnout tee, a venturi meter, and a shutoff valve. The turnout tee is encased in concrete and is located beneath the traffic lanes of Katella Avenue in the city of Garden Grove, adjacent to the boundary line with the city of Stanton. The meter vault is located below Dale Street. This structure contains a 14-inch conical plug valve, a venturi meter, and associated piping and electrical systems. Gradual corrosion from over 60 years of operation in a damp underground environment has led to deterioration of the equipment within the vault. This equipment needs to be replaced to maintain reliable deliveries from the service connection. Preliminary Design Phase was authorized by the Board in October 2017.
West Orange County Feeder Valve Replacement

The West Orange County Feeder was constructed in 1956 as a component of the Lower Feeder system. It delivers treated water from the Diemer plant in Yorba Linda to the northwestern portion of Orange County. A recent condition assessment identified that 13 structures require rehabilitation, including the replacement of air release/vacuum valve assemblies and adjacent plug valves. These valves were installed during the original construction of the feeder and have been in service for over 60 years. Six of the air release/vacuum valves will also be relocated from a manhole to an above ground cabinet within the street-side parkway zone to prevent the potential of treated water in the distribution system becoming exposed to contaminants under certain operating conditions. Relocation is needed to comply with California State Water Resources Control Board requirements. Design and valve procurement were authorized by the Board in October 2017.

West Valley Feeder No. 1 - Access Road & Valve Structure Improvements

In 2001, a condition assessment of West Valley Feeder No. 1 identified that most of the blow-off valves, air release/vacuum valves, and sectionalizing valves were deteriorating and needed to be replaced. The existing valves were installed when the line was constructed in 1962 and no longer seal properly. Furthermore, several of the valves were directly buried and cannot be accessed without excavating the pipeline. This project will replace deteriorated valves, add valve structures, and improve access for maintenance and repairs. The work was prioritized and divided into three stages over multiple shutdown seasons to minimize the duration of pipeline outages. The first stage, which addressed 42 structures over four shutdown seasons, was completed in 2006. The second stage, which addressed 14 structures over two shutdown seasons, was completed in 2012. The third stage of work, which includes urgent improvements to the DeSoto Valve Structure in the city of Chatsworth, will add new valve structures in Chatsworth Park and replace valves located near Rinaldi Avenue. Design was authorized by the Board in October 2017.

Willits Street Pressure Control Structure

The Willits Street Pressure Control Structure (PCS), located in the city of Santa Ana, was built in 1944. This pressure control structure located on the Orange County feeder regulates pressure and conveys treated water to the Irvine Regulating Structure. This PCS is an underground structure consisting of three parallel trains of pressure control valves. At full capacity, two trains are in operation while the third train acts as a stand-by. The existing structure is congested and does not provide suitable access for maintenance, repairs or the replacement of valves. The maintenance access was impacted during street widening that required the size of the structure to be reduced. The modified structure configuration does not have a lifting mechanism to remove or transport these valves out of the structure for replacement or repairs. Additionally, the existing catwalk does not have adequate coverage. This project will construct a new pressure control structure to replace the existing Willits street PCS located on the Orange County Feeder. The work includes a new concrete substructure, relocating and replacing the control and isolation valves, new sampling connections for water quality and all necessary electrical and ventilation equipment. Once the new structure is complete, the older structure will be abandoned, and the pipeline will be attached to the new structure during a brief outage.

Yorba Linda Power Plant Enclosure & Control System Improvements

The Yorba Linda Power Plant is located on the Yorba Linda Feeder at the inlet to the Diemer plant and can generate up to 5 megawatts. Installation of a new turbine generator was authorized in November 2013. This project will provide for needed equipment features and enhancements not included in the scope of original generator replacement project. Design was authorized by the board in September of 2018. The features will increase the plant's reliability and longevity and address future maintenance and repair aspects of the Yorba Linda Power Plant. The scope of work includes design and construction of the following improvements: enclosure modifications to protect the generator unit and equipment from water intrusion; emergency shutdown, alarm, and public address system improvements; upgrades to the Human Machine Interface (HMI) panel; and procurement of critical spare parts. A construction contract for installation of the enclosure was authorized by the board in July 2019.
Pipelines, Tunnels, Canals Project Group

Casa Loma Siphon Barrel No. 1 - Improvements

In November 2016, leaks were detected on Barrel No. 1 of the Casa Loma Siphon. It was determined that the pipe had had significant horizontal and vertical movements. The leaks do not immediately jeopardize the structural integrity of the aqueduct but if repairs are not performed, the continued leakage over time could erode soil, undermine the siphon, and cause damage to the siphon structures. The Casa Loma Siphon Barrel No. 1 is vital to Metropolitan’s conveyance system moving water from the desert pumping plants to Lake Mathews. The work is conducted in two stages. Under Project 1, internal seals were installed on 13 joints as an interim measure to address the leaks. These repairs were completed in February 2017, during a planned shutdown of the CRA. Project 2 will develop options to permanently repair the pipe joints within the siphon. The potential repairs may include installation or replacement of the existing sleeve-type couplings along with installation of recently developed earthquake-resistant pipe joints. Final design was authorized by the Board for Project No. 2 in May 2018. Further in December 2019 the Board awarded a pipe procurement contract for Project No. 2.

Casa Loma Siphon No. 1 and San Jacinto Pipeline Protection

The Casa Loma Siphon No. 1 and the San Jacinto Pipeline cross the San Jacinto River in Hemet, CA. The river experiences periodic high flows during severe storms, exposing the pipelines at the river crossing to damage due to exposure, undermining, or flotation. The scope of the project is to construct a weighted protective cover system, consisting of cable-connected articulated concrete blocks, spanning approximately 200 feet in length over Casa Loma Siphon No. 1 and the San Jacinto Pipeline. This project will enhance infrastructure safety, security, and resiliency, and will improve the reliability of water deliveries.

Etiwanda Pipeline (South) Protection - Sta. 332+00 to 349+00

The City of Rancho Cucamonga is planning to construct a grade separation on Etiwanda Avenue where the Etiwanda Pipeline is located, south of the Etiwanda Reservoir near the tie-in point to the Upper Feeder. Metropolitan is required to either relocate or protect its pipeline, at its own expense, to allow for improvements by the City. This project will protect or relocate the impacted portion of the Etiwanda Pipeline. Under the General Manager’s Authority, a study to identify the scope and budget for design and construction was authorized in June 2019.

Etiwanda Pipeline Lining Replacement

The Etiwanda Pipeline was constructed in 1993 to convey untreated water from the Rialto Pipeline to the Upper Feeder. This 6.4-mile-long welded steel pipeline is 144 inches in diameter. The northern portion of the pipeline, which is 5.4 miles long, conveys high-pressure water to the Etiwanda Power Plant. From that facility, the southern portion of the pipeline continues for one mile to an interconnection with the Upper Feeder. During an internal inspection, staff discovered that approximately 37 percent of the northern portion of the line has missing or delaminated mortar lining. At the present time, the structural integrity of the pipeline remains sound. Over time, however, the loss of mortar lining will expose the pipeline to accelerated rates of corrosion and eventual leakage. This project will remove existing and failing cement mortar lining and install a flexible polyurethane lining system. Stages 1 and 2 of this three-stage project have been completed, and rehabilitation of the remaining 5.5 miles of the middle reach of the feeder will be completed under Stage 3. The Board authorized design of lining repairs in June 2016.
Lake Perris Bypass Pipeline Relining

The Lake Perris Bypass Pipeline is a 2.44-mile-long, 120-inch diameter prestressed concrete cylinder pipeline constructed in 1981 that extends from the Department of Water Resources (DWR)'s Santa Ana Valley Pipeline to Metropolitan's Lake Perris Pressure Control Facility. The majority of the Lake Perris Bypass Pipeline was constructed in fee property that is owned by DWR. In 1982, DWR granted MWD an easement for the pipeline within a specified alignment. Under the terms of the easement, Metropolitan is required to either relocate or protect its pipeline, at its own expense, to allow for improvements by DWR. DWR has been evaluating the need for improvements to the Lake Perris emergency release facility over the last several years. In early 2019, DWR notified Metropolitan that the planned improvements at Lake Perris would impact the bypass pipeline.

Following staff's evaluation of pipeline protection options, it was determined that lining approximately 1,200 feet of the Lake Perris Bypass Pipeline with a steel liner is the most effective method to protect the pipeline. Design was authorized by the Board in November 2019.

Lakeview Pipeline Relining

The Lakeview Pipeline was constructed in 1973 to provide water from the East Branch of the State Water Project (SWP) to the Skinner area. Since it was completed, the Lakeview Pipeline has been shut down on numerous occasions to repair leaking joints. The line has experienced significant deformation which has caused leaks at pipe joints and loss of mortar lining. Due to the significant potential for corrosion of the pipeline, and the lack of structural integrity in many locations, permanent repairs should proceed expeditiously. In March 2015, in response to the ongoing state-wide drought, the Stage 1 repairs were completed. This work included lining a one-mile portion of the Lakeview Pipeline known as the Bernasconi Tunnel with a steel liner. In conjunction with the recently completed Lakeview Pipeline/Inland Feeder intertie, this improvement enables up to 200 cubic feet per second (cfs) of water stored in Diamond Valley Lake to be delivered to the Mills plant. The Stage 2 work includes lining 3.7 miles of the Lakeview Pipeline between the Inland Feeder's PC-1 control structure and the Perris Control Facility, along with installation of a 1,000-foot-long reach of 9.5-foot-diameter pipe to bypass the Perris Control Facility. Upon completion of the Stage 2 work, the Lakeview Pipeline will be capable of delivering up to 340 cfs from Devil Canyon through the Inland Feeder to the Mills plant, providing an alternate delivery route to the plant as backup to the Santa Ana Valley Pipeline. The future Stage 3 repairs will include lining the remaining 6.7 miles of the Lakeview Pipeline that extends from PC-1 to the San Diego/Casa Loma Canal junction structure. Stage 2 final design was authorized in December 2015.

Orange County Feeder Relining

The Orange County Feeder conveys treated water from the F. E. Weymouth Water Treatment Plant in La Verne to six member agencies in Los Angeles and Orange Counties. Recent internal inspections of the feeder have identified significant deterioration of the existing coal-tar enamel lining, which is 75 years old. While the pipeline’s structural integrity remains sound at present, the interior lining displays blistering and disbonding, which expose the pipeline to accelerated rates of corrosion and eventual leakage. The lining needs to be repaired in order to maintain long-term reliability of the pipeline.

This project repairs the lining on the 11-mile-long Feeder, which is being accomplished in three stages. Stage 1 of this three-stage project has been completed, Stage 2 is under construction, and rehabilitation of the remaining four miles of the middle reach of the feeder will be completed under Stage 3. The stage 3 work includes replacement of the lining, welding of corroded pipe joints, and also replacement of deteriorated valves along the feeder. Design was authorized by the Board in November 2014, the valve procurement was authorized by the Board in September 2017, and construction of Stage 2 was authorized in June 2019.
Rehabilitation of Metallic and Concrete Pipelines Phase 1 - Select High Priority Feeders

Metropolitan’s water delivery system consists of 830 miles of pipelines, of which 670 miles are comprised of reinforced concrete, welded steel, and cast-iron pipe. The majority of Metropolitan’s non-PCCP lines were installed over 50 years ago. Experience has shown that degradation from corrosion of reinforced concrete and metallic pipelines can often develop undetected. Some of these pipelines are also showing signs of deterioration, as evidenced by several recent lining and joint repair projects (e.g., Etiwanda Pipeline, Orange County Feeder, and Lakeview Pipeline).

Phase 1 for high priority pipelines, including Santa Monica Feeder, Upper Feeder, Lower Feeder, and Middle Feeder, will include a complete risk assessment and prioritization of pipeline inspections, condition assessment of these high priority pipelines using prequalified inspection technologies, and recommendations for inspection technologies to be used for future condition assessments.

San Diego and Auld Valley Canals Concrete Repairs

The scope of this project is a comprehensive repair of damaged concrete liner within the San Diego and Auld Valley Canals. The repair work will need to be performed during an extended shutdown of the two canals, to the extent that demands, and storage can be accommodated. An extended outage of approximately 30 days will facilitate repair to priority areas and reaches of the canals, will shorten the overall repair timeline, and will reduce the risk of further deterioration. Failure of the liner in either canal will interrupt or reduce raw water deliveries to the Skinner plant and to various downstream member agencies and sub-agencies. The canals are the sole conveyance route for Colorado River water and State Project water to the Skinner plant.

San Diego Pipelines 1 and 2/Rainbow Tunnel Improvements

The San Diego Pipelines 1 and 2 were built in the 1940’s and have multiple diameters and pipe materials consisting of steel, precast concrete cylinder pipe, and precast non-cylinder pipe. Some of the steel section have cement mortar lining, the remaining sections all have coal tar lining. The Rainbow Tunnel has an approximate 72-inch diameter, and is horseshoe shaped. A recent inspection identified sections where the lining needs replacement. Several valves at turnout structures have reached the end of their service lives and require replacement. This project will perform a detailed evaluation of the pipelines and tunnel and appurtenant structures and replace the damaged lining and refurbish or replace other and components as needed.

Santa Monica Feeder Cast Iron Pipe Rehabilitation

The Santa Monica Feeder was constructed in 1941 as part of Metropolitan’s original distribution system. The feeder is approximately 25 miles long, with a diameter ranging from 28 inches to 120 inches. The feeder has various reaches comprised of cast iron, welded steel, and reinforced concrete pipe. The Santa Monica Feeder delivers treated water from the Eagle Rock Control Facility in the city of Los Angeles to four member agency service connections before reaching its terminus in the city of Santa Monica. This project will assess the condition of the cast iron portion of the Santa Monica Feeder using emerging inspection technologies. The cast iron portion of the pipeline is eight miles in length and located between the Hollywood Tunnel North Portal to the Santa Monica Feeder terminus near the Santa Monica Service Connection SMN-01. This is the last section of cast iron pipe in Metropolitan’s distribution system. The assessment is anticipated to include leak detection, pipe wall thickness inspection, and internal seal installation by contractor for joint repairs as needed. Following the condition assessment, a long-term plan will be prepared to monitor, and replace and/or rehabilitate the Santa Monica Feeder cast iron pipe. In anticipation of potential prolonged outages, various operational modes will be investigated and designed to maintain reliable flow to service connections. Also, hydraulic and structural analyses will be performed on the pipeline with design recommendations to address various operational conditions and scenarios such as, seismic events and pressure surge episodes.

Upper Feeder - Lining Replacement at the Santa Ana River Bridge

The Upper Feeder was constructed between 1933 and 1941 with a 116-inch-diameter steel pipe and lined with coal tar enamel liner (CTE). This portion of the Upper Feeder is located above ground and crosses the river bed via a bridge. Exposure to the sun subjects the pipeline to a thermal cycle that is continuous heating and cooling.
of the pipe material. Over the past five years, staff have performed inspections on this segment of the Upper Feeder and determined that approximately 90% of the pipe's internal lining has failed. Mild to moderate pitting on the interior of the pipe indicate rust tuberculation and corrosion. This project will reline approximately 1,000 feet of the 116-inch diameter pipeline with an approved liner material.

Distribution System - Other Project Group

Chloramine Booster Station at Three Locations within the Treated Water Distribution Systems

Metropolitan uses chloramines, formed by combining chlorine and ammonia, as a disinfectant in our distribution systems. Internal research has determined the most effective chloramine concentration to prevent microbial growth at low flow conditions. Addition of chlorine and LAS in the treated water distribution systems will allow the total chlorine residual within the distribution system to be maintained at or above 1.8 mg/L, especially during low demand periods. LAS is recommended instead of aqueous ammonia because LAS has fewer regulatory requirements, as well as lower construction and operating costs. The project will determine the three optimum locations to install: (1) sodium hypochlorite and LAS tanks, (2) feed pumps and appurtenances, (3) piping, and (4) instrumentation and control systems to ensure the safety and reliability of the feed systems.

Diamond Valley Lake Crane Rehabilitation

The scope of the project is repair and rehabilitation of the 25-ton gantry crane at the Diamond Valley Lake Inlet/Outlet Tower. The project will also include a study to evaluate the possibility of increasing the crane capacity to enable it to be used as an alternative lifting device for the emergency drop gate in the event of a failure of the drop gate's normal hydraulic lifting system. This project will enhance infrastructure safety, security, and resiliency, and will enhance the reliability of water deliveries.

Diamond Valley Lake Oxygenation System

This project will construct a liquid oxygen (LOX) storage and feed system at Diamond Valley Lake to improve water quality, reduce impacts of cyanobacterial blooms, and maintain operational flexibility to ensure reliable and high-quality water deliveries under drought and emergency conditions. The LOX system will maintain oxygenated conditions in the deeper waters of DVL and prevent the formation of reduced compounds (sulfides, metals) that interfere with water treatment processes. This will allow for high-quality water to be released from the reservoir year-round. The system consists of: (1) a LOX tank; (2) evaporators to convert LOX to gas; (3) supply lines to deliver oxygen; (4) diffusers to mix the oxygen; (5) and a control system to regulate oxygen flow.

Diamond Valley Lake Forebay Concrete Joint Seal Replacement

The concrete joint seals in the Diamond Valley Lake (DVL) Forebay have been in service for over 20 years and have far exceeded the typical service life of two to five years. Division of Safety of Dams (DSOD) had previously directed Metropolitan to address seal replacement at the DVL Spillway; that replacement was completed in 2018. Based on a Metropolitan inspection in July 2018, the Forebay seals are in similar condition to the Spillway seals. Non-compliance with DSOD's policy may result in issuance of written citations, limits on the reservoir's operating water surface level, or revocation of the dam's certified status. This project will remove deteriorated and de-bonded joint seals at the DVL Forebay (approximately 150,000 linear feet), and replace with a new, cost-effective and high-performance MWD-approved sealant.

East Lake Skinner Bypass & Bypass No. 2 Screening Structure Upgrade

The East Lake Skinner Bypass Slide Gates were built 50 years ago in 1967 and are in need of rehabilitation. The gates are binding during operation which is rendering them inoperable. In addition, the East Lake Skinner Bypass Afterbay Trash Rack needs to be replaced with a new stainless-steel rack to minimize the corrosion which caused the existing galvanized material to collapse under the weight of a severe algae bloom during bypass operations. The scope of work consists of reconditioning three of the East Lake Skinner Bypass Slide
Gates, and to replace the East Lake Skinner Bypass Afterbay trash rack which is severely corroded and partially collapsed. In addition, this project will modify the East Lake Skinner Bypass Algae Screening Mechanisms Discharge Piping to bypass the Algae Shakers and upgrade the Lake Skinner Bypass No. 2 Forebay Trash Rack Lifting Mechanisms.

**East Orange County Feeder No. 2 Seismic Retrofit at Diemer Water Treatment Plant**

A recent assessment identified a slope near the south western pad at the Diemer plant as having the potential to damage the East Orange County Feeder No. 2 pipeline during a significant earthquake. The pipeline may no longer meet current seismic codes and regulations. This structure requires further analysis to ensure that it meets Metropolitan's current structural standards and the facility is reliable in the event of seismic activity. This project will assess, design, and complete seismic retrofit construction near the south western pad at the Diemer plant.

**Garvey Reservoir Ammonia Feed System**

This project will involve the design, procurement, and installation of liquid ammonium sulfate (LAS) storage feed systems at Garvey Reservoir. Addition of LAS at Garvey Reservoir influent and effluent will allow total chloramine residual within the distribution system to be maintained at or above 1.8 mg/L, especially during low demand periods. LAS is recommended instead of aqueous ammonia since LAS has fewer regulatory requirements and lower construction and operating costs. This project will include the installation of LAS tanks, feed pumps and appurtenances, piping, and instrumentation and control systems to ensure the safety and reliability of the feed system.

**Garvey Reservoir Drainage & Erosion Control Improvements**

Garvey Reservoir was constructed in 1954 as a component of the Middle Feeder system. The reservoir receives treated water from the Weymouth plant and has a maximum storage volume of 1,600 acre-feet. The reservoir is located within the city of Monterey Park on a hill that is surrounded on the west and south by residential properties that are lower in elevation. During significant storm events, surface runoff collects and flows downhill through improved drainage systems and natural drainage courses to Metropolitan's property boundaries. Connecting off-site drainage systems that were constructed by developers more than 50 years ago do not meet current minimum design standards and have deteriorated over time. Recognizing the mutual benefit of addressing runoff issues from the reservoir, Metropolitan entered into an agreement with the city of Monterey Park to implement drainage and erosion control improvements both within Metropolitan's property, and improvements to drainage in city streets. There are 11 geographically defined drainage zones at Garvey Reservoir to be mitigated. In October 2016, Metropolitan's Board authorized design for 8 of the 11 zones. Construction for five drainage zones has been completed.

**Garvey Reservoir Sodium Hypochlorite Feed System Upgrades**

Upgrades to the sodium hypochlorite feed system at Garvey Reservoir are needed to maintain treated water quality within the Central Pool portion of Metropolitan's distribution system. The existing hypochlorite system has exceeded its expected service life and has deteriorated over time, requiring frequent repairs. Failure of the chemical feed system would negatively affect water quality within the distribution system by not maintaining minimum chlorine residual. This project will replace the current hypochlorite system with new valves, piping, electrical systems, and instrumentation and updated controls that will allow both automated and remote control of the chemical feed system. Design was authorized by the Board in June 2013.
Lake Mathews Aboveground Storage Tank Replacement

The Lake Mathews existing diesel aboveground storage tank does not conform to current regulations and needs to be removed from service. In its present condition the tank cannot be operated in a safe manner. The Lake Mathews Spill Prevention Countermeasure and Control Plan cannot be certified as long as the diesel aboveground storage tank remains in service. This project will replace the existing 10,000-gallon diesel fuel aboveground storage tank (AST) with its associated containment dike, venting, fill system, level monitoring, fuel dispensing system, catwalk, and continuous release detection system with a new 6,000-gallon AST system, and design and construct a roof over the storage tank containment and unloading area. Under the General Manager's authority, design, procurement and construction was authorized in March 2019.

Lake Mathews Electrical Reliability

The existing electrical distribution system at Lake Mathews constructed during the 1930s needs to be upgraded for reliability. This system has been in service for over 75 years and serves the lake's outlet towers and junction shaft, hydroelectric plant, forebay, chlorination system, administrative offices, and maintenance and repair shops. The electrical distribution system is outdated, has experienced numerous overloads, and lacks capacity for planned additional equipment. The system needs to be upgraded to maintain reliability and meet future power demands. Planned upgrades include replacing the underground and overhead distribution lines; replacing the existing unit power centers and adding additional unit power centers where needed; and integrating the new electrical system with Metropolitan's system-wide supervisory control and data acquisition system. Preliminary design was authorized by the Board in March 2017.

Lake Mathews Perimeter Fencing Upgrade

Lake Mathews is the terminus of the CRA. Water is stored in Lake Mathews Reservoir, withdrawn through the lake's main outlet towers into the forebay, and is then conveyed through the Upper Feeder and Lower Feeder to the Weymouth and Diemer plants, respectively. The existing chain link fencing along the approximately 15-mile perimeter of the Lake Mathews facility has deteriorated and is ineffective at preventing intrusions. The fencing can be easily cut, resulting in an increase in break-ins and illegal dumping through the fencing. This project will replace the existing five-foot tall chain link fencing with eight-foot tall, anti-cut, anti-climb security fencing, constructed of steel or wrought iron. This project will enhance infrastructure safety, security, and resiliency, and will improve security and emergency response.

Lake Mathews Sodium Hypochlorite Injection System

Update and redesign the Lake Mathews sodium hypochlorite injection system to relocate the injection point to a location that will minimize the impacts of chlorine injection on the forebay and appurtenant structures. The design will also consider effective Quagga Mussel control, enhancing safety and reliability of the injection system, and adherence to water quality goals and requirements. The project will develop options to replace the existing interim sodium hypochlorite system at the Lake Mathews Forebay with a system at Lake Mathews Outlet Tower No. 1 and Outlet Tower No. 2, and to provide continuous chemical injections from the towers through the Lake Mathews Forebay, Power Plant, and into the Upper and Lower Feeders.

Lake Skinner West Bypass Screening Structure Rehabilitation

The San Diego Canal West Bypass Screening Structure is located at the terminus of the San Diego Canal and is the starting point for water which bypasses Lake Skinner to downstream users. The bypass screening structure is fitted with an electrically powered revolving screen extending across the channel, which dips into the channel to intercept and collect algae mats and other floating debris. This system prevents algae mats and other debris from entering the treatment plant or member agency water systems via the bypass pipelines. The screening equipment was installed in the 1960s and has reached the end of its useful life. The screens’ rotating components are currently inoperable, so they function as stationary screens; material collects on the screens until the debris is manually removed. Clogged screens may reduce deliveries to downstream users. Preliminary design was authorized by the Board in September 2007.
Live Oak Reservoir Bypass Pipeline Cathodic Protection

Constructed in 1973, the Live Oak Reservoir Bypass (LORB), Inlet, and Outlet Pipelines are dielectrically coated welded steel pipelines with a diameter of 97 inches and are approximately 0.6 miles long. The 24-inch dielectrically coated Desilting pipeline ties in to the Outlet pipeline, crosses the Bypass pipeline and is approximately 800 feet long. The LORB connects the prestressed reached of the Rialto Pipeline to the east and the west. The pipeline is one of the few reaches of welded steel pipe that is not yet cathodically protected. A failure of the Live Oak Reservoir Bypass would inhibit Metropolitan's ability to convey water through its system and potentially disrupt Metropolitan's ability to deliver water to several member agencies. The scope of work is to design and install a comprehensive cathodic protection system in the Live Oak Reservoir Bypass. Design was authorized by Metropolitan’s Board in April 2018.

Orange County C&D Team Support Facility

O&M support functions for the 700-square-mile Orange County region of the distribution system are being performed from temporary trailers, shipping containers, and an aging warehouse. A permanent service center is required and will provide local storage of materials and equipment, house staff, and contain shops for minor repairs. A permanent facility will provide a safer and more efficient workplace to support shutdowns, routine maintenance activities, and urgent repairs. The scope of the construction contract includes: (1) site development work which includes: vehicle parking; perimeter lighting; storm water system; utility extensions including potable water, sewer, natural gas, and electrical service; and hazardous material storage; and (2) building construction which includes: offices and workspace for approximately 24 staff; a welding/fabrication shop with specialized equipment including a drill press, band saw, grinder, welder, parts cleaner, welding hood, and 3-ton bridge crane; a pipe and conduit-bending area; work bench and parts cleaning areas; and tool crib and storage areas for fabrication and welding supplies. Construction was authorized by the Board in March 2018.

Orange County Feeder Cathodic Protection System Rehabilitation

The Orange County Feeder conveys treated water from the F. E. Weymouth Water Treatment Plant in La Verne to its terminus at service connection CM-1 in Newport Beach. The feeder is approximately 41 miles long and was installed in 1942. The feeder consists of approximately 21 miles of welded and un-bonded steel pipe, 19 miles of precast concrete pipe, and one mile of prestressed concrete cylinder pipe. Previously, cathodic protection could not be effectively applied to the subject reach; however, recent pipeline rehabilitation has made cathodic protection a viable option to prevent external corrosion and thus prevent future pipe leaks. This project will install a new cathodic protection system on the Orange County feeder to protect approximately 11.2 miles of feeder. The scope of work includes design and installation of the anodes and rectifier system.

Palos Verdes Reservoir Sodium Hypochlorite and Liquid Ammonia Sulfate Storage and Chemical Feed System and Security Upgrades

This project will replace the 12,000-gallon fiber-reinforced plastic (FRP) sodium hypochlorite (NaOCl) storage tank and appurtenant fittings at the Palos Verdes Reservoir (PVR). The existing FRP tank, manufactured in 1992, is well past its recommended service life of 6-10 years. The FRP tank will be replaced with two 6,000-gallon titanium tanks, which are designed to last 50-70 years and do not corrode in the presence of sodium hypochlorite. Further, modifications to the tank farm feed systems are required to meet revised minimum flow and dosage requirements recently directed by Water Quality and Member Agency demands. Lastly, security cameras will also be added around the PVR facility in order to provide increased security monitoring.

Platform Replacement at Various C&D Structures

Platforms at various Conveyance and Distribution (C&D) structures are deteriorating due to age and damp environment. The steel platforms and support frames were installed almost 50 years ago, and do not meet current OSHA standards. This project will replace older steel platforms and support frame systems at various Western Region facilities, encompassing an area from Foothill Pressure Control Structure in Castaic to Yorba Linda Feeder in La Verne, as well as facilities in between. Approximately 2,700 square feet of steel platforms
have been identified for replacement with fiberglass reinforced plastic grating.

**San Gabriel Tower and Spillway Improvements**

The San Gabriel Tower (SGT), 86-foot-tall free-standing with a 24-foot by 14-foot rectangular base, was constructed in 1936, north of the city of Azusa. It sits at the base of the steep and weathered San Gabriel Mountains, between the west portal of Monrovia Tunnel No. 1 and the east portal of Monrovia Tunnel No. 2. The tower is surrounded by Angeles National Forest and is adjacent to Morris Reservoir. The function of the SGT is to regulate and isolate flows from the Weymouth plant via the Upper Feeder pipeline to the Eagle Rock Control Facility located in the city of Los Angeles. It is situated between two active faults, the Sawpit and the Sierra Madre faults, which are both capable of generating a magnitude 6.5 earthquake. While the tower was designed and constructed to the codes and standards in place during the 1930s, significant advancements have been made since that time in predicting the response and performance of structures as a result of seismic ground shaking. Planned upgrades to the San Gabriel Tower include: (1) reducing the height of the tower to increase its structural stability; (2) capping the tower with a protective slab designed to withstand a potential debris slide or rockfall; (3) adding new vacuum relief valves for surge protection; (4) replacing the slide gates and actuators to restore isolation capability for the Upper Feeder; (5) improving access to the tower and spillway, including the river crossing; (6) repairing the spillway’s concrete; and (7) stabilizing the adjacent rocky slope. Preliminary design was authorized in March 2018.

**Santa Monica Feeder Cathodic Protection**

The Santa Monica Feeder is a mortar coated welded steel pipeline with a diameter of 49-inches and is approximately 4.25 miles long. The pipeline is one of the few reaches of welded steel pipe that is not yet cathodically protected. A failure of the Santa Monica Feeder would inhibit Metropolitan’s ability to convey water through its system and potentially disrupt Metropolitan’s ability to deliver water to several member agencies. The scope of work is to design and install a comprehensive cathodic protection system in the Santa Monica Feeder. Design was authorized by Metropolitan’s Board in April 2018.

**Santiago Control Tower Seismic Improvements**

The Santiago Control Tower acts as a control and diversion facility for water supplied to the Santiago Lateral pipeline, the Santiago Lateral Spillway Discharge Pipeline, and the Lower Feeder pipeline. This project will evaluate the Santiago Control Tower’s ability to resist expected seismic forces based on the latest geotechnical and geological considerations. A detailed geotechnical analysis is required to determine the structure’s interaction with surrounding soil and analyze the soil stability of the structure. The structure is located in close proximity to the Whittier Fault on a raised area adjacent to a slope.

**Skinner Bypass Pipelines Cathodic Protection**

The Lake Skinner Bypass Pipeline # 1 (97-inch diameter), Lake Skinner Bypass Pipeline #3 (49-inch diameter), and Skinner Plant effluent Conduit # 1 (7-inch diameter) alignments have portions traversing inside and outside of the Skinner Treatment Plant property. The three pipelines are dielectrically coated steel pipelines. The original impressed current cathodic protection system was installed in 1980. The system was turned off as concerns emerged about exposing prestressed pipelines to cathodic protection. In addition, several modifications to the pipelines made the existing system unsuitable for the present pipeline configurations. The existing cathodic protection system requires full rehabilitation to adequately protect the pipeline from corrosion. A failure of the Feeders would inhibit Metropolitan’s ability to convey water through its system and potentially disrupt Metropolitan’s ability to deliver water to several member agencies. The scope of work is to design and install a comprehensive cathodic protection system in the feeders. Design was authorized by Metropolitan’s Board in April 2018.
**Soto St. Facility - Security & HVAC Replacement**

The Soto Street Facility serves as the main headquarters for staff and equipment that support the Western Region Unit (WRU) Conveyance and Distribution System. The WRU Incident Command Post, located in the Administration Building, also serves as the backup Emergency Operations Center for the Eagle Rock Operations Center. The Soto Street Facility currently has two layers of access control protection during business hours: a single card reader at the outer vehicle gate, and a single contracted security guard. During periodic foot patrols of the facility, the access gate is left unmanned. In addition, the alarm system is currently inoperable, and there are no access card readers on any of the exterior building doors, which remain unlocked during business hours. There have been recent multiple security events at this facility. Finally, the existing air handling unit that serves the Soto Street Administration Building has been in service since the 1960s, when the building had a different configuration. The current HVAC system does not provide adequate airflow to all parts of the building.

This project will improve the security of the Soto Street Facility by adding access card readers and security cameras, providing security lamination to glass doors and windows, replacing the alarm system, and upgrading the HVAC system for the Administration Building.

**Upper Feeder Blow Off Structure Replacement**

Blow-off structures provide a means to completely drain a pipeline for emergencies, inspections, repairs, and general maintenance. The Upper Feeder Blow-Off Structure, located in the city of Sierra Madre, discharges the Upper Feeder directly into the Little Santa Anita Wash. The valves and piping in this structure have been in service for almost 80 years, and have reached the end of their service life. One valve is stuck in the closed position, and another is experiencing leakage. In addition to a variety of different sizes and configurations of pipe within the structure, the structure itself does not comply with some of the safety and design features of more modern structures. This project will replace and enhance the Upper Feeder Blow-Off Structure in order to ensure reliable dewatering capability and comply with OSHA standards.

**Wadsworth Pumping Plant Stop Logs**

The Wadsworth Pumping Plant was built with 12 pump/generation units. Units 1, 5, and 9 were decommissioned to allow DVL generation to be certified as "renewable energy" by the California Energy Commission. Hydroelectric plants are required to have a nameplate capacity of 30 MW or less to be certified. At 3.3MW per unit, the nine remaining units provide a generation capacity of 29.7MW. Generated energy must be certified renewable for electric utilities to meet the requirement that 33% of their energy come from renewable resources by 2020. The stop logs would provide a means to isolate the three decommissioned pumps from the DVL forebay keeping them out of the water and dry. Isolating the pumps from water contact reduces corrosion damage to the pumps and provides flexibility in the event pump/generation units need to be re-commissioned or repaired. This project will fabricate three sets of stop logs to isolate three decommissioned Wadsworth plant generation/pumping units from the forebay. Each set of stop logs consists of three stop log sections, for a total of nine sections of stop logs to isolate three pump units.

**Wadsworth Pumping Plant Fire Protection System Upgrades**

The Wadsworth Pumping Plant is located near Hemet at Metropolitan's Diamond Valley Lake (DVL). The pumping plant includes 12 vertical turbine pumps that are used to pump water into DVL or to generate electricity when water flows out of DVL into the forebay/San Diego Canal. Each pump/generator has a dedicated CO2 fire suppression system to prevent fires from spreading from one unit to another. However, the system is designed so that if the fire suppression system is inactive, the pump/generator will not operate. Some components of the current fire suppression system and control panels have been in service for almost 20 years and need to be replaced. In addition, the fire alarm system for the Wadsworth building is antiquated, and replacement parts are no longer available. This project will upgrade Wadsworth’s fire suppression system by: (1) replacing the existing individual CO2 fire suppression systems for the operational vertical turbine pumps, and (2) upgrading the Wadsworth building fire alarm system.
West Orange County Feeder Cathodic Protection

The West Orange County Feeder (WOCF) was constructed in 1956, and is mortar and dielectrically coated welded steel pipeline with a diameter of 43-inches and 55-inches. The pipeline is approximately 13 miles long. The WOCF connects to the cathodically protected Orange County Feeder (OCF), prestressed and steel reaches of the Second Lower Feeder (SLF), and the cathodically protected Lower Feeder (LF). The pipeline is one of the few reaches of welded steel pipe that is not yet cathodically protected. A failure of the WOCF would inhibit Metropolitan’s ability to convey water through its system and potentially disrupt Metropolitan’s ability to deliver water. The scope of work is to design and install a comprehensive cathodic protection system in the WOCF. Design was authorized by Metropolitan’s Board in April 2018.
District Housing and Property Improvements Program

Fiscal Year 2020/21 Estimate: $3.5 million  
Fiscal Year 2021/22 Estimate: $7.5 million

Program Information: The District Housing & Property Improvements Program is comprised of projects to refurbish or upgrade workforce housing at Metropolitan to enhance living conditions to attract and retain skilled employees.

Accomplishments for FY 2018/19 and FY 2019/20
- Two new projects initiated during the last biennium:
  - District Housing Property Improvements
  - Employee Village Enhancement
- Major milestones achieved during the last biennium:
  - District Housing Property Improvements - began property assessments
  - Employee Village Enhancement - began master planning

Objectives for FYs 2020/21 and 2021/22

<table>
<thead>
<tr>
<th>Project</th>
<th>Total Project Estimate</th>
<th>Estimated Completion</th>
<th>Major Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td>District Housing Improvements</td>
<td>$ 71,000,000</td>
<td>2026</td>
<td>Complete assessments</td>
</tr>
<tr>
<td>Employee Village Enhancement</td>
<td>$ 26,000,000</td>
<td>2028</td>
<td>Complete master planning</td>
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Housing & Property Improvements Project Group

District Housing Improvements
Metropolitan owns 89 houses throughout the five CRA pumping plants and rents to employees involved in operation and maintenance of the CRA. Renovation of up to 89 houses was authorized by the Board in May 2017. A Pilot renovation project of 11 out of the 89 was completed in 2018. Another 9 will be renovated to complete the pilot effort, equaling a remaining total of 69 houses left to be renovated or replaced. Overview Assessment Report was completed in November 2019.

Employee Village Enhancement
Perform comprehensive master planning for four Colorado Pumping Plant Villages. The initial goal and objective are to develop a proof of conceptual master plan for Eagle Mountain Village that would focus on building a vibrant, healthy, and sustainable community for Metropolitan’s staff. The conceptual master plan will also incorporate comments made the Board in December 2015, and feedback received from residents in 2019. When the conceptual master plan is approved, the scope of this project will extend to include the three other villages (Hinds, Iron, and Gene).
Minor Capital Projects Program

**Program Information:** The Minor Capital Projects (Minor Cap) Program is comprised of projects, with an estimated cost of less than $400,000, that require rapid response to address unanticipated failures, safety or regulatory compliance concerns, or to take advantage of shutdown opportunities. The Minor Cap Program authorizes the General Manager to execute projects that meet defined criteria without seeking additional Board approval.

**Accomplishments for FY 2018/19 and FY 2019/20**
- New projects initiated during the last biennium thru December 2019:
  - Thirty-five projects were initiated during the last biennium
- Major milestones achieved during the last biennium thru December 2019:
  - Twenty-eight projects were completed during the last biennium

**Objectives for FYs 2020/21 and 2021/22**

<table>
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<tr>
<th>Project</th>
<th>Total Project Estimate</th>
<th>Estimated Completion</th>
<th>Major Milestones</th>
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<tr>
<td>Various projects costing less than the Board approved maximum project cost *</td>
<td>$50,000,000 for projects in open and new Minor Cap Appropriations</td>
<td>2025</td>
<td>Complete all projects within 3 years of initiation</td>
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</table>

*Prior to Fiscal Year 2018/19 - $250,000
Currently - $400,000

Fiscal Year 2020/21 Estimate: $3.8 million
Fiscal Year 2021/22 Estimate: $5.4 million

Fiscal Year 2020/21 Estimate: $3.8 million
Fiscal Year 2021/22 Estimate: $5.4 million
**Prestressed Concrete Cylinder Pipe (PCCP) Reliability Program**

**Fiscal Year 2020/21 Estimate:** $30.3 million  
**Fiscal Year 2021/22 Estimate:** $23.6 million

**Program Information:** The PCCP Reliability Program is composed of projects to refurbish or upgrade Metropolitan’s PCCP feeders to maintain water deliveries without unplanned shutdowns.

**Accomplishments for FY 2018/19 and FY 2019/20**

- New projects initiated during the last biennium:
  - Second Lower Feeder PCCP Rehabilitation - Reach 9
  - Sepulveda Feeder PCCP Del Amo Blvd. Urgent Relining

- Major milestones achieved during the last biennium:
  - Three projects completed construction
    - Second Lower Feeder Reach 1
    - Second Lower Feeder Reach 4
    - Sepulveda Feeder PCCP Del Amo Blvd. Urgent Relining
  - Awarded procurement of large sectionalizing valves and over 200 smaller shut-off valves
  - One project completed design
    - Second Lower Feeder Reach 2

**Objectives for FYs 2020/21 and 2021/22**

<table>
<thead>
<tr>
<th>Project</th>
<th>Total Project Estimate</th>
<th>Estimated Completion</th>
<th>Major Milestones</th>
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<tr>
<td>Electromagnetic Inspections of PCCP Lines</td>
<td>$12,000,000</td>
<td>Ongoing</td>
<td>Continue inspections in conjunction with pipeline shutdowns</td>
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<tr>
<td>Second Lower Feeder PCCP Rehabilitation - Reach 2</td>
<td>$65,000,000</td>
<td>2020</td>
<td>Complete construction</td>
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<tr>
<td>Second Lower Feeder PCCP Rehabilitation - Reach 3</td>
<td>$77,000,000</td>
<td>2024</td>
<td>Complete design and begin construction</td>
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<tr>
<td>Second Lower Feeder PCCP Rehabilitation - Reach 8</td>
<td>$35,000,000</td>
<td>2022</td>
<td>Complete design and construction</td>
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Allen McColloch Pipeline Project Group

Allen-McColloch Pipeline PCCP Rehabilitation

The planned rehabilitation work involves lining the existing PCCP segments with steel liner pipe designed as a stand-alone pipeline which can accommodate full internal and external pressures on the line and replacing any identified damaged lining in non-PCCP segments. The project includes restoring the (Allen McColloch, Rialto Pipeline, Calabasas, Sepulveda, Second Lower) pipeline/feeder to “As Like New Conditions” as possible. This would include relocation of all air release and vacuum valves (AR/VV) that have not already been relocated above ground and evaluating and possible replacement of sectionalizing, service connection turnout, pumpwell, AR/VV, shutoff, and blowoff valves, etc. In addition, the project includes procurement of any needed permanent or temporary right of way and evaluation and possible replacement or modification of all master meters and meter structures.

Calabasas Feeder Project Group

Calabasas Feeder PCCP Rehabilitation

The planned rehabilitation work involves lining the existing PCCP segments with steel liner pipe designed as a stand-alone pipeline which can accommodate full internal and external pressures on the line and replacing any identified damaged lining in non-PCCP segments. The project includes restoring the (Allen McColloch, Rialto Pipeline, Calabasas, Sepulveda, Second Lower) pipeline/feeder to “As Like New Conditions” as possible. This would include relocation of all air release and vacuum valves (AR/VV) that have not already been relocated above ground and evaluating and possible replacement of sectionalizing, service connection turnout, pumpwell, AR/VV, shutoff, and blowoff valves, etc. In addition, the project includes procurement of any needed permanent or temporary right of way and evaluation and possible replacement or modification of all master meters and meter structures.

Rialto Feeder Project Group

Rialto Pipeline PCCP Rehabilitation

The planned rehabilitation work involves lining the existing PCCP segments with steel liner pipe designed as a stand-alone pipeline which can accommodate full internal and external pressures on the line and replacing any identified damaged lining in non-PCCP segments. The project includes restoring the (Allen McColloch, Rialto Pipeline, Calabasas, Sepulveda, Second Lower) pipeline/feeder to “As Like New Conditions” as possible. This would include relocation of all air release and vacuum valves (AR/VV) that have not already been relocated above ground and evaluating and possible replacement of sectionalizing, service connection turnout, pumpwell, AR/VV, shutoff, and blowoff valves, etc. In addition, the project includes procurement of any needed permanent or temporary right of way and evaluation and possible replacement or modification of all master meters and meter structures.
Second Lower Feeder Project Group

Second Lower Feeder PCCP Rehabilitation

The planned rehabilitation work involves lining the existing PCCP segments with steel liner pipe designed as a stand-alone pipeline which can accommodate full internal and external pressures on the line and replacing any identified damaged lining in non-PCCP segments. The project includes restoring the (Allen McCulloch, Rialto Pipeline, Calabasas, Sepulveda, Second Lower) pipeline/feeder to “As Like New Conditions” as possible. This would include relocation of all air release and vacuum valves (AR/VV) that have not already been relocated above ground and evaluating and possible replacement of sectionalizing, service connection turnout, pumpwell, AR/VV, shutoff, and blowoff valves, etc. In addition, the project includes procurement of any needed permanent or temporary right of way and evaluation and possible replacement or modification of all master meters and meter structures.

Sepulveda Feeder Project Group

Sepulveda Pipeline PCCP Rehabilitation

The planned rehabilitation work involves lining the existing PCCP segments with steel liner pipe designed as a stand-alone pipeline which can accommodate full internal and external pressures on the line and replacing any identified damaged lining in non-PCCP segments. The project includes restoring the (Allen McCulloch, Rialto Pipeline, Calabasas, Sepulveda, Second Lower) pipeline/feeder to “As Like New Conditions” as possible. This would include relocation of all air release and vacuum valves (AR/VV) that have not already been relocated above ground and evaluating and possible replacement of sectionalizing, service connection turnout, pumpwell, AR/VV, shutoff, and blowoff valves, etc. In addition, the project includes procurement of any needed permanent or temporary right of way and evaluation and possible replacement or modification of all master meters and meter structures.

PCCP - Other Project Group

Electromagnetic Inspections of PCCP Lines

All PCCP lines within the distribution system are inspected every three to seven years. The frequency is based on the condition and history of repairs for each feeder. Three cycles of electromagnetic testing have been completed to date on Metropolitan’s PCCP feeders. This project will perform the fourth cycle of inspections over the next five years. Planned activities for the inspections include: scheduling and coordination of shutdowns; conducting the electromagnetic inspections; conducting internal visual inspections; shutting down and dewatering the feeders and returning them to service; analyzing the inspection results; and preparing comprehensive inspection reports.
Regional Recycled Water Program

Fiscal Year 2020/21 Estimate: $0.2 million *  
Fiscal Year 2020/21 Estimate: $0 million *

* Planned spending is only for completion activities for the Advanced Water Treatment Demonstration Plant and continuance of advance planning pending Board approval of an action plan.

Program Information: The Regional Recycled Water Program includes the design and construction of the Advanced Water Treatment Demonstration Plant, which represents the initial step in development of a potential regional recycled water system for recharge of groundwater basins within Southern California. The biennial budget separately includes $15 million per year for RRWP planning and design costs.

Accomplishments for FY 2018/19 and FY 2019/20

- Major milestones achieved during the last biennium:
  - Completed construction of a 0.5 mgd Advanced Water Treatment Demonstration Plant project

Objectives for FYs 2020/21 and 2021/22

<table>
<thead>
<tr>
<th>Project</th>
<th>Total Project Estimate</th>
<th>Estimated Completion</th>
<th>Major Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Water Treatment Facility</td>
<td>$21,000,000</td>
<td>2022</td>
<td>Complete record drawings</td>
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</table>

Regional Recycled Water - All Project Group

Advanced Water Treatment (AWT) Plant

The Advanced Water Treatment Plant (AWT) will be located at Los Angeles County Sanitation District (LACSD)’s Joint Water Pollution Control Plant (JWPCP) in Carson. The 150 mgd AWT will treat water for Indirect Potable Reuse (IPR) and in the future for Direct Potable Reuse (DPR) purposes. The AWT will use membrane bioreactors (MBR), reverse osmosis, and Ultraviolet advanced oxidation processes (UV-AOP) to produce purified water that will be conveyed to recharge facilities for groundwater augmentation. The project will include engineering studies, preliminary and final design, bidding, construction, and construction management. Consideration of the Regional Recycled Water Program (RRWP) AWT by the Board of Directors is anticipated after 2022 after completion of the environmental documentation (PEIR), with construction to be completed by approximately 2031.

Regional Recycled Water - Conveyance Facilities

The conveyance facilities for the RRWP will convey purified water from the new Advanced Water Treatment Plant (AWT) located at LACSD’s JWPCP in Carson to various recharge facilities along the backbone pipeline to the Santa Fe Dam area in Irwindale, CA, approximately 36 miles away. The RRWP will have a capacity of 150 mgd. The purified water will be used for IPR and in the future for DPR purposes. The conveyance project will include engineering studies, preliminary and final design, bidding, construction, and construction management. Consideration of the RRWP conveyance pipeline by the Board of Directors is anticipated after 2022 after completion of the environmental documentation (PEIR), with construction to be complete by approximately 2034.
Regional Recycled Water - Programmatic EIR/Technical Assistance

For large multi-year, multi-phase infrastructure programs like the RRWP, CEQA allows a tiered approach for environmental review. The environmental process will begin with an overall Programmatic Environmental Impact Report (PEIR). The PEIR will analyze the discernable effects of the entire program. Where data is not initially available to fully analyze the impacts, the analyses of these areas will be deferred, and a project-specific environmental analysis will be conducted. The PEIR will be supported with technical assistance and public outreach efforts as necessary.

Advanced Water Treatment Demonstration Plant

The Regional Recycled Advanced Purification Center (APC) is located at LACSD’s JWPCP in Carson. The 0.5 mgd APC demonstration plant is testing the effectiveness of various advanced water treatment processes. Construction of the APC was completed in October 2019, with Phase 1 testing for tertiary MBR being performed through 2020. The demonstration plant will establish design criteria and confirm treatment costs for the full-scale facility, and will support the program's public outreach effort. Construction of the Demonstration Plant was authorized by the Board in July 2017.

Demonstration Plant Direct Potable Reuse (DPR) Modifications

Phase 1 operation and testing of Tertiary MBR started October 2019 and will continue through the end of 2020. Phase 2 operation and testing of Secondary MBR will begin in 2021 and will continue through 2022. To implement Direct Potable Reuse (DPR) into the RRWP, additional testing will be needed to establish new design criteria and to confirm treatment costs for a full-scale facility with the ability to treat recycled water for DPR. To perform this testing, additional treatment processes be required to be constructed at the existing APC. The additional testing will also support the program's outreach effort and provide information for the regulators on the viability of using membrane bioreactors for DPR.
Program Information: The Right of Way Infrastructure Protection Program (RWIPP) is comprised of projects to refurbish or upgrade above-ground facilities and right-of-way along Metropolitan’s pipelines in order to address access limitations, erosion-related issues, and security needs.

Accomplishments for FY 2018/19 and FY 2019/20

- Major milestones achieved during the last biennium:
  - One project completed design:
    - Orange County Region - Stage 1 Improvements
  - Two projects completed preliminary design
    - Western San Bernardino Region Improvements
    - Orange County Region - Stages 1 & 2 Improvements

Objectives for FYs 2020/21 and 2021/22

<table>
<thead>
<tr>
<th>Project</th>
<th>Total Project Estimate</th>
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<tr>
<td>Programmatic Environmental Documentation for the Western San Bernardino County Operating Region</td>
<td>$2,600,000</td>
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<td>Complete PEIR</td>
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<tr>
<td>Right of Way Infrastructure Protection Program - Orange County Operating Region</td>
<td>$23,000,000</td>
<td>2025</td>
<td>Complete Stage 1 construction</td>
</tr>
</tbody>
</table>

Los Angeles Region Project Group

Right of Way & Infrastructure Protection - Los Angeles County Region

This project identifies and addresses right-of-way and security issues; identifies and executes needed improvements within the Los Angeles County Operating Region; prepares environmental documentation; acquires regional programmatic environmental permits; and monitors and reports to permitting agencies for ten years following completion of construction.

Orange County Region Project Group

Right of Way & Infrastructure Protection - Orange County Region

This project identifies and addresses right-of-way and security issues; identifies and executes needed improvements within the Orange County Operating Region; prepares environmental documentation; acquires regional programmatic environmental permits; and monitors and reports to permitting agencies for ten years following completion of construction.
Riverside/San Diego Region Project Group

Right of Way & Infrastructure Protection Program - Riverside and San Diego County Region

This project identifies and addresses right-of-way and security issues; identifies and executes needed improvements within the Riverside and San Diego County Operating Region; prepares environmental documentation; acquires regional programmatic environmental permits; and monitors and reports to permitting agencies for ten years following completion of construction.

Western San Bernardino Region Project Group

Right of Way & Infrastructure Protection Program - Western San Bernardino County Region

This project identifies and addresses right-of-way and security issues; identifies and executes needed improvements within the Western San Bernardino County Operating Region; prepares environmental documentation; acquires regional programmatic environmental permits; and monitors and reports to permitting agencies for ten years following completion of construction.

ROWIPP - Other Project Group

Right of Way & Infrastructure Protection Program - Property Acquisition and Regulatory Compliance

The scope of this project includes preparing and executing agreements with environmental regulatory agencies to assist in development; review and approval of environmental documentation; and issuance of applicable permits. These activities were authorized by the Board in April 2013.

This project will also include procurement of right-of-way or property to support access or needed repairs to pipelines and facilities; provide surveying and mapping services needed to identify right-of-way issues, prepare pre-appraisal documentation for acquisition of easements and right-of-way; conduct field surveys and topographic mapping; and ordering and reviewing title reports and supporting recorded documents. Activities include developing conceptual solutions, layout drawings, and final design criteria of needed improvements; preparing pre-appraisal documentation for acquisition of easements and right-of-way; conducting field surveys and topographic mapping; ordering and reviewing title reports and supporting recorded documents; initiating consultations with permitting agencies for required permits; preparing legal descriptions, exhibit maps, and other exhibits as needed for acquisition planning, permits, and real estate negotiations; completing right-of-way mapping and preparing Record of Survey maps to be filed with the county of origin; and setting monuments and witness posts.

Right of Way Infrastructure Protection Program - Colorado River Aqueduct

The Right of Way Infrastructure Protection Program (RWIPP) identifies, prioritizes, and executes site improvements throughout Metropolitan's service area. This project encompasses site improvements along the CRA and addresses access limitations, erosion-related improvement work, and security needs along the surface of the CRA's rights-of-way. Under the initial stage of the program, site improvements needed along the CRA will be identified, a comprehensive regional compliance and permitting program will be developed, and a programmatic environmental document will be prepared to secure environmental approval for multiple projects along the CRA rather than pursuing individual approvals on a project-by-project basis. This project will add the CRA to the RWIPP, which already includes the Orange County, Western San Bernardino, Riverside/San Diego, and Los Angeles operating regions.
System Flexibility/Supply Reliability Program

Fiscal Year 2020/21 Estimate: $13.6 million  Fiscal Year 2021/22 Estimate: $24.8 million

**Program Information:** The System Flexibility/Supply Reliability Program is comprised of projects to increase the capacity and flexibility of Metropolitan’s water supply and delivery infrastructure to meet service demands.

**Accomplishments for FY 2018/19 and FY 2019/20**

- Major milestones achieved during the last biennium:
  - One project completed construction:
    - Inland Feeder and Lakeview Pipeline Intertie - Valve Installation
  - One project completed design
    - Greg Avenue Pump Station Rehabilitation

**Objectives for FYs 2020/21 and 2021/22**

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<tbody>
<tr>
<td>Greg Avenue Pump Station Rehabilitation</td>
<td>$ 32,000,000</td>
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<td>Complete construction</td>
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<tr>
<td>Perris Valley Pipeline - Tunnels</td>
<td>$ 65,000,000</td>
<td>2022</td>
<td>Complete design and begin construction</td>
</tr>
</tbody>
</table>

**System Flexibility/Supply Reliability - All Project Group**

**Delta Properties Infrastructure Improvements**

Recent legislation (SB 88) requires monitoring and reporting of certain diversions within the Delta. Metropolitan’s Delta properties will need to comply. This project will investigate existing diversion points, identify permanent meter locations, coordinate with the Delta Watermaster, and install approximately 40 meters.

**Greg Avenue PCS - Pump Modifications and New Control Building**

The Greg Avenue Pump Station was originally constructed in the early 1960s to pump treated CRA water from the Weymouth plant into the West Valley area, and was then modified in the mid-1970s to include hydroelectric power generation capability to generate up to one megawatt by replacing one of the pumps with a pump/turbine. Since that time, the remaining original pump at this facility was operated intermittently during operational tests or when the Jensen plant was out of service. Over the past year, cracks have developed on the pump’s mounting brackets and at the support gussets. These pumps need to be replaced, the inlet and outlet pipe manifolds need to be reconfigured, the electrical and control systems need upgrading, and the surge tanks need to be replaced.

In addition to rehabilitating the mechanical, electrical, and control components of the pump station to improve reliability of the facility, this project includes construction of a new control building is proposed to replace the existing control building that houses mechanical and electrical equipment, and maintenance shop, which is seismically vulnerable. A construction contract was authorized by the Board in February 2019.
Lake Perris Seepage Water Conveyance Pipeline

Metropolitan and DWR have partnered to design and construct facilities to capture and convey Lake Perris leakage water to the CRA. DWR will design and construct a seepage collection wellfield near the foot of the Lake Perris Dam, and this project will design and construct a conveyance pipeline extending from the DWR wellfield to the CRA. Metropolitan’s Board authorized preliminary design in April 2017.

Perris Control Facility & Hydroelectric Plant Upgrades

The Lake Perris Control Facility (LPCF) includes a pressure control structure, pump back system with four electric and two diesel pumps, and a hydroelectric plant. This facility controls flows from delivered from the Department of Water Resources Silverwood Reservoir located at Devil’s Canyon, and Lake Perris to the Lakeview Pipeline. To improve Mills Plant reliability, water from Diamond Valley Lake and Inland Feeder can be delivered to Mills Plant by gravity flow but would require some modifications to the Lake Perris Control Facility’s pressure control structure and HEP. The project will upgrade the LPCF systems to handle the maximum head of 1934 feet (from the Inland Feeder) by upgrading components of the pressure control structure and replacement of the hydroelectric plant.

Perris Valley Pipeline - Tunnels

The objective of the Perris Valley Pipeline is to supply additional water deliveries from Mills plant to EMWD and WMWD per their request. Construction of this 6.5-mile-long pipeline was initiated in 2007, to be implemented under two contracts: the North Reach consisting of 2.7 miles of pipeline and two service connections (WR-24 and EM-23), and the South Reach consisting of 3.8 miles of pipeline and two additional service connections (WR-35 and EM-24). In 2009, the North Reach was completed and placed in service. In 2010, 3.3 miles of the South Reach were completed. The Perris Valley Pipeline Interstate 215 Crossing project will complete a remaining half-mile-long section approximately midway along the South Reach and enable placing the South Reach in service. This project consists of construction of an approximate 1,700-foot-long tunnel and tie-ins to the previously constructed reaches. Design of this portion of the Perris Valley Pipeline was authorized by the Board in 2006.
System Reliability Program

Fiscal Year 2020/21 Estimate: $44.9 million  Fiscal Year 2021/22 Estimate: $52.5 million

Program Information: The System Reliability Program is comprised of projects to improve or modify facilities located throughout Metropolitan’s service area in order to utilize new processes and/or technologies and improve facility safety and overall reliability. These include projects related to Metropolitan’s Supervisory Control and Data Acquisition (SCADA) system and other Information Technology projects.

Accomplishments for FY 2018/19 and FY 2019/20

New projects initiated during the last biennium:
- Automatic Meter Reading Remote Terminal Unit Replacements and Radio Modem Upgrade
- Asset Monitoring and Management System
- Data Center Modernization Upgrade Phase II
- Desert Microwave Tower Site Upgrades
- GIS Infrastructure Upgrade
- Fuel Management System Upgrade
- Headquarters Building Automation System Upgrades
- Headquarters Cafeteria Refrigeration System Upgrades
- HQ Fire Sprinkler Level P1 Replacement
- Maximo Mobile Computing Upgrade
- MWD HQ Boardroom Technology Upgrade
- New La Verne Warehouse
- Security Operations Center

Major milestones achieved during the last biennium:
- MWD HQ Boardroom Technology Upgrade - Started final design
- GIS Infrastructure Upgrade - Completed deployment
- Union Station Headquarters Building Improvements - Completed design
- 11 District Employee Houses at the Eagle, Gene, Iron, and Hinds Pumping Plants - Completed renovations
- Headquarters Security Upgrade - Completed Stage 2 final design
- SCADA RTU CPU and Operating System Upgrade - Completed deployment
## Objectives for FYs 2020/21 and 2021/22

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<tr>
<th>Project</th>
<th>Total Project Estimate</th>
<th>Estimated Completion</th>
<th>Major Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Quality Monitoring &amp; Planning System</td>
<td>$3,600,000</td>
<td>2023</td>
<td>Begin design</td>
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<tr>
<td>Control System Upgrade</td>
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<td>La Verne Shops Improvements - Equipment Installation and Completion</td>
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<td>Wadsworth Pumping Plant Control &amp; Protection</td>
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<td>2021</td>
<td>Complete deployment</td>
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<tr>
<td>Business Systems Disaster Recovery Upgrade</td>
<td>$2,800,000</td>
<td>2021</td>
<td>Complete deployment</td>
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<tr>
<td>IT Network Reliability Upgrades</td>
<td>$7,200,000</td>
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<td>Complete deployment</td>
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<tr>
<td>Maximo Upgrade</td>
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<td>Complete deployment</td>
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<td>Maximo Mobile Upgrade</td>
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<td>Complete deployment</td>
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<tr>
<td>Data Center Modernization Upgrade</td>
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<tr>
<td>Asset Monitoring and Management System</td>
<td>$500,000</td>
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<tr>
<td>Desert Microwave Tower Site Upgrades</td>
<td>$3,910,000</td>
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<td>Complete design and begin construction</td>
</tr>
<tr>
<td>Security Operation Center</td>
<td>$8,600,000</td>
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<td>Complete construction</td>
</tr>
<tr>
<td>WiFi Upgrade</td>
<td>$3,600,000</td>
<td>2021</td>
<td>Complete deployment at Headquarters</td>
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<td>MWD Boardroom Technology Upgrade</td>
<td>$7,800,000</td>
<td>2020</td>
<td>Complete design and begin construction</td>
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<tr>
<td>Water Ordering and Energy Scheduling System</td>
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<td>Complete deployment</td>
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<tr>
<td>Union Station Headquarters Improvements</td>
<td>$65,000,000</td>
<td>2022</td>
<td>Complete construction</td>
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### IT/SCADA - Infrastructure Project Group

**AMR System RTUs and Radio Modem Upgrade Project**

The Automatic Meter Reading (AMR) system is a critical component for transmitting meter information to allow for billing of member agency water deliveries and analysis of official meter instrumentation. The current system was mostly installed between 2008 and 2009. Portions of the AMR System must be updated because of equipment obsolescence and diminishing vendor support, as they are approaching their end of life. This project is planned to be completed in two phases. The first phase will consist of replacement of the radio modems and radio master stations, including procurement, configuration, installation, project management, and internal labor to support implementation. The second phase will consist of replacement of the AMR RTUs. It is anticipated that the Control System Upgrade Conceptual Design project (Phase 2 of the Control System Upgrade) will recommend that the technology used in the AMR system be made consistent with the technology used in the SCADA (Supervisory Control and Data Acquisition) system. Thus, the second phase (AMR RTUs) will be started after the Control System Upgrade Phase 3 (procurement) is completed. The second phase of the AMR project will consist of replacement of RTUs, operator interface terminals, digital displays, configuration laptops, battery chargers, networking equipment, along with associated configuration, installation, and implementation.
Applications-Servers Upgrade from Old Windows OS

A significant number of Metropolitan’s systems, including a number of critical enterprise-level business and water applications, are currently running on outdated Microsoft Windows platforms (Windows 2003, 2007, and 2008). These platforms are either already no longer being supported or will shortly cease to be supported by the Microsoft Corporation. Microsoft’s support includes software updates and security-related patches to fix technical issues and mitigate potential new security risks. Losing these software and security updates will increase cyber-security risks for the unsupported platforms. This project will upgrade all older application environments to Windows 2016. Phase 1 of the project will identify and document required changes, and will group applications into four deployment waves. Phase 2 will deploy the upgrades on each of the four groups identified in Phase 1.

Arc Flash Software Model Development

An arc flash is the light and heat produced from an electric arc supplied with enough electrical energy to cause substantial damage, harm, fire, or injury. Arc flash risk analysis is required per National Fire Protection Association (NFPA), National Electrical Code (NEC), and Occupational Safety and Health Administration (OSHA) standards. Metropolitan currently uses a generic tabular approach to quantify the arc flash hazard; this approach is no longer in compliance with the latest NFPA 70E standards. Comprehensive modeling that considers the effects of the surrounding equipment and accurately identifies the arc flash hazards is now required. This project will develop software models for Metropolitan facilities that are susceptible to arc flash hazards. The models will provide complete and consistent information that will identify equipment improvements to improve safety and to meet regulatory compliance.

Asset Monitoring and Management System

This project will establish the foundation for leveraging data already maintained by Metropolitan (under multiple different software platforms) into a common framework in order to efficiently conduct future infrastructure reliability projects and assessments across Metropolitan. This project is needed to support a common condition monitoring framework across Engineering Services (ESG) and Water System Operations (WSO) groups, as well as to support condition-based maintenance initiatives as part of General Manager’s initiatives and WSO’s business plan.

This project includes building software tools to access and aggregate ESG, WSO, and other asset-related data, such as data from finance, to facilitate infrastructure reliability investigations on one class of assets (revenue meters). Eventually, the software tools developed as a part of this project will be used for future condition assessments in ESG and WSO.

Business Systems Disaster Recovery Upgrade

Upgrade the Disaster Recovery Facility with additional servers, storage, Oracle database licenses, and needed equipment to meet, or exceed, the 2017 Business Impact Analysis (BIA) business system recovery requirements. Upgrade compatible DBMS applications for a high availability 24x7 infrastructure for identified mission critical applications. The Board authorized the upgrades in December 2017.
Control System Upgrade

Metropolitan’s control system spans the CRA, Metropolitan’s five water treatment plants, and the entire conveyance and distribution system. The system-wide control system upgrade is planned to be implemented in a phased approach through the following projects to upgrade hardware, software, and a communications network. Currently, the phases are planned to consist of the following projects:

- Phase 1 - Preliminary investigations
- Phase 2 - Conceptual design of the new control system
- Phase 3 - Selection and demonstration testing
- Phase 4 - Final Design of Mills Area
- Phase 5 - Implementation Mills Area
- Phase 6 - Final Design of Skinner Area
- Phase 7 and later - Continued final design and installation/construction of the new control system in multiple staged contracts

Data Center Backup Infrastructure Upgrade

Critical business and water applications rely on backup processes to restore the applications as soon as possible in an emergency. As Metropolitan’s data volume progressively increases, so does the duration of the processes to backup, restore, and recover operations. Metropolitan’s current backup software was deployed 15 years ago and uses magnetic tape as the storage medium. This project will replace the backup infrastructure with newer and faster technology and will redesign the backup/restore processes and procedures using the latest components of the backup software.

Data Center Modernization Upgrade

The purpose of this project is to assess, redesign, and upgrade the MWD Headquarters and Lake Mathews data centers to provide sufficient computing power and modernize the data centers to meet current and future capacity and reliability needs. This project will conduct a detail assessment, final design, and funding estimate to relocate the HQ and Lake Mathews data centers to improve their long-term reliability from Tier-1 to Tier-3.

Desert Microwave Tower Site Upgrades

This two-phase project will improve the reliability, performance, and capacity to Metropolitan’s microwave radio wide-area-networks (WANs). Phase 1 involves $3.91M out of the $12M total project budget to address the most critical components that need to be replaced or upgraded in the Desert Region microwave tower sites. Phase 1 will upgrade the most critical Desert sites and Phase 2 will upgrade LA Basin sites, plus remaining Desert sites. Lessons learned from the Diamond Valley Lake (DVL) microwave proof-of-concept will be used in this project. The microwave network uses wireless transmission over radio frequency energy in the 6-18 Giga Hertz range.

Engineering Information System Upgrade

The goal of this project is to upgrade ProjectWise (Engineering’s Information System) to the latest version, install and configure additional ProjectWise modules, and integrate ProjectWise with other Metropolitan systems such as Geographic Information System (GIS), Outlook, SharePoint, and Deliverables Management to implement additional functionalities in ProjectWise. The intent is to streamline the workflow in Engineering design and improve access to information and documents in ProjectWise.
Enterprise Data Analytics

Building an Enterprise Data Warehouse & Analytics to answer both operational and strategic questions facing Metropolitan. The Data Warehouse will be built of individual data marts modeling a specific business area providing integrated reporting through Extract/Transform/Load (ETL) procedures and common dimensions. This Enterprise Data Warehouse will contain both business and operational data. It will be designed to combine these two data types in order to provide a financial dimension to operational data. By linking data like EBS (Financial), SCADA, GIS and Water Supply/Demand, Staff can model different scenarios to answer questions and to discover trends and anomalies previously not visible due to isolated reporting.

Enterprise GIS Disaster Recovery

This project will add the Enterprise GIS (EGIS) infrastructure to the Metropolitan IT Disaster Recovery Facility (DRF) in Riverside County. This includes the purchase, installation, and configuration of new hardware and software to meet Business Impact Analysis (BIA) study requirements for the EGIS infrastructure. The current recovery time for EGIS infrastructure is estimated at greater than a week. The BIA Recovery Time Objective (RTO) for the EGIS infrastructure is less than 72 hours, meaning that the EGIS infrastructure should be functional within 72 hours after an outage. This project will reduce the RTO for the EGIS infrastructure from 72 hours to 1 hour, so that EGIS data could potentially be used to assist in emergency operations.

Fuel Management System Upgrade

This project’s objective is to upgrade the ten-year-old Fuel Management System (FMS), which is no longer supported by manufacturer. The FMS provides essential management controls over fuel inventories, dispensing, and security. It identifies and authorizes the dispensing of fuel and records fuel transactions and fuel tank data in a centralized database. This project will replace the necessary hardware and software to upgrade the FMS and to integrate it with Metropolitan's Computerized Maintenance Management System (CMMS), Maximo.

WiFi Upgrade

This WiFi Upgrade project will improve the reliability, performance, and capacity to Metropolitan’s wireless access point (WAP) local-area-networks (LANs) at Headquarters and various field facilities. It will also provide a secure, reliable and robust WiFi System to support increasing business demands and reliance on Metropolitan’s wireless infrastructure. The scope for this project includes (1) migration and implementation design plan, (2) removal of obsolete access points and controllers, (3) installation of cable in building ceiling for access points, (4) installation of new access points, and (5) configuration and installation of new controllers.

Hydraulic Modeling Analysis Toolkit and Water Quality Calibration

Metropolitan’s Engineering Services Group completed development of a system-wide hydraulic model in January 2017 after a multi-year development effort. Even while model development was still underway, many uses for the hydraulic model were identified. This project includes developing tools to support hydraulic model analysis to increase efficiency and enhance productivity while using the hydraulic model for analysis. The project also includes development and calibration of water quality modeling capabilities.

Information Technology Service Management System

Metropolitan’s Information Technology Group (ITG) currently uses several different systems for managing Information Technology incidents (e.g., a computer not turning on) and work requests (e.g., new software needing to be installed). While this approach works well in meeting each team’s specific needs, one of the major disadvantages is that gathering metrics for management is a tedious process involving coordination with multiple teams, learning multiple software packages, and manual correlation and data gathering. This project will implement a service management system to track and manage service requests, incidents, change requests, IT asset management, and other related functions. As an added benefit, this will allow the expedited future implementation of self-service capabilities for several of the more common ITG service requests (e.g., automatic software installs for commonly used software packages) and provide future integration capability with various monitoring tools currently in use.
Information Technology System - Communication Infrastructure Reliability Upgrade

This project addresses the need to replace Metropolitan’s Siemens/Rolm 9751PBX-based telephone system. The current telephone switches are over 18 years old and are at the end of service life. The scope of this project is to develop a request for proposals, select the VoIP vendor, complete the technical design, work side-by-side with the telephone technicians while installing the new equipment, test the new system, and perform project management; a professional services agreement for consulting services to design and build the new telephone system; upgraded equipment and software for the new system and related IT unified communications components; training and incidental costs. The Board approved this project in February 2008.

IT Network Reliability Upgrades

Metropolitan’s communication network hardware is aging, which has led to increased maintenance. Based on the rise in failure rates of older equipment, staff has determined that existing network hardware and associated network room support systems need to be upgraded to support ongoing projects, maintain reliability, and meet future needs. The Board authorized final design of electrical, cooling, and backup power system upgrades for network rooms located on each floor of Metropolitan’s Headquarters Building. It also authorized preliminary design and field assessments of network equipment. The Board authorized a contract to upgrade the network rooms at Headquarters in August 2015.

Lake Mathews IT Disaster Recovery Facility Upgrades

The Lake Mathews DRF was expanded as part of the Business Systems Data Recovery project funded by the Board in April 2004. The original DRF structure was a communications room that was not designed to be an IT data center. The scope includes equipping the IT Lake Mathews Disaster Recovery Facility (DRF) with needed data center environmental system upgrades such as Air Conditioning (HVAC), uninterruptible electrical power supplies (UPS), fire suppression system, emergency generator, and remote monitoring capabilities. Also, seismic upgrades will be conducted due to recently identified seismic deficiencies.

Maximo Mobile Upgrade

The goal of this project is to replace existing mobile devices used in WSO with latest tablet technology and deploy additional devices to Engineering. The project will enable the use of capabilities of the existing mobile software system that are not available on the existing hardware devices. The project includes an initial pilot evaluation with a purchase of 30 units to evaluate different models and test features. The overall goal will be to purchase 290 devices following the completion of the pilot evaluation. The new devices will eliminate or reduce the need for desktop computers at field sites and vastly increase the functionality of the existing Maximo mobile devices.

Maximo Upgrade

This project will upgrade the Maximo system, Metropolitan’s enterprise-wide asset management program that is used for planning, scheduling, and reporting required maintenance of equipment deployed throughout the treatment plants and conveyance & distribution system. This project includes software upgrades and new hardware to accommodate this upgrade. This project was authorized by the Board in July 2017.

MWD Headquarters Boardroom Technology Upgrade

The existing equipment in the board and committee rooms is over nine years old and several components are reaching the end of useful life. The Board of Directors and external organizations use the board and committee rooms on a regular basis and the technology supporting these meetings must be reliable and the sound and video must be of high quality. This project will upgrade audio visual (AV) and information technology-related equipment in the main Board room and committee rooms in Metropolitan’s headquarters building at Union Station.
Security Operations Center

This is the second phase of the Cyber Security Upgrades project. The first phase concluded that additional cyber projects were needed to mitigate evolving threats. This phase will assess and remediate exposures and cyber security threats throughout Metropolitan with special emphasis on the business and SCADA networks. Maintaining a secure computing infrastructure requires application of ongoing cyber countermeasures to protect against new cyber threats that are identified on a continual basis. The scope of this project includes engaging a security consultant to perform an independent assessment of MWD’s IT infrastructure and environment to identify potential vulnerabilities and make recommendations for strengthening our cyber security.

Standby Generator Relocation at Six WAN Sites

Metropolitan’s Wide Area Network (WAN) provides a critical communication and data link between facilities across the distribution system. The Standby generators at six WAN sites must be relocated for consistency with the current fire codes and to enhance safety. These generators are needed to provide backup power in the event of loss of primary power. The planned improvements will reduce the risk of damage to communication equipment and the buildings in the event of a fuel leak. Metropolitan will relocate the standby generators at six WAN sites to reduce the risk of fire damage to Metropolitan’s communication systems. The standby generators will be moved to new locations in separate outdoor enclosures, consistent with current fire codes. Relocation was authorized by the Board in August 2016. The project is currently in progress.

Two-Way Radio System Upgrade

Metropolitan’s current Two-Way Radio system is approaching the end of its service life, and both vendor and after-market support will cease in the next few years. The existing Two-Way Radio system is Metropolitan’s essential communication system for public/employee safety, and for communications when Metropolitan performs tasks involving member agencies. This project will upgrade specific components of the Two-Way Radio system, reusing the majority of the infrastructure; replace some unsupported radios; and will provide improvements to address poor reception at some locations. The upgraded Two-Way Radio system will include features anticipated to provide higher capacity, higher levels of cybersecurity, additional management and monitoring features, and multi-level resiliency.

Water Ordering & Energy Scheduling System

The Water Ordering and Energy Scheduling System will have the capability of meeting several OCC scheduling needs in a single system. The water flow scheduler portion of the project consists of the development of a software tool allowing member agencies to efficiently submit flow changes and schedule requests via a secure web page. The current process requires that an OCC system operator manually record flow change requests via telephone and take handwritten notes in order to then make control adjustments to hydraulically accommodate the flow requests. Providing a self-service portal for member agencies to submit flow change requests online will allow system operators to focus on the monitoring and controlling of the distribution and conveyance system, reducing interruptions and more effectively managing member agency flow change requests. Additionally, the Water Ordering and Energy Scheduling System will include the capability of forwarding power production schedules directly to the PUC as required for hydroelectric plant operation. A unified solution will reduce the number of separate applications Metropolitan currently maintains with the added benefit of incorporating current and secure best practices. Furthermore, developing a single system under a combined project will be easier to maintain and operate, allowing for more simplified upgrades in the future.
Water Quality Monitoring and Planning System (WQ MaPS)

Existing distribution system online water quality analyzers, installed in 2002-03, are obsolete and in need of replacement. Instrumentation measures total chlorine, conductivity, pH, turbidity, ultraviolet absorption, and total ammonia. Data from analyzers is monitored by the Operations Control Center through the SCADA system and by Water Quality through a contaminant warning system. The WQ MaPS project will enable Metropolitan’s continued use of online data to quickly identify water quality anomalies resulting from normal operations or emergency situations to minimize risk of water quality issues and potential compliance violations. This project will implement the action items identified in the WQ MaPS action plan to improve data reliability and increase customer access to data. This project will upgrade obsolete water quality analyzers at 21 locations and install analyzers at 14 additional locations, incorporate output from the existing water quality event detection system into an innovative GIS dashboard, integrate output from the ESG’s hydraulic model into the GIS dashboard, and provide a self-service portal for internal and external customers to access approved water quality data.

Water Quality Laboratory Instrumentation Modernization and Data Acquisition Automation

Metropolitan’s La Verne Water Quality Laboratory houses a significant number of analytical and water sampling instruments that support many of Metropolitan’s business functions, including demonstrating regulatory compliance with drinking water standards and water treatment optimization. Historically, Metropolitan has approached replacement of obsolete instrumentation through individual purchases. This strategy has limited the rate of upgrades or replacement. In addition, many of the laboratory’s instruments include vendor-provided dedicated computer workstations, loaded with software that is sometimes maintained by the vendor, and sometimes by Metropolitan’s IT staff. This has resulted in cybersecurity vulnerability, as well as multiple non-standard computer images, operating systems, and software versions. Finally, the diversity of instrumentation in the laboratory has made it difficult to acquire data from the various instrumentation systems. This project will upgrade laboratory instrumentation to accommodate cybersecurity issues, prevent obsolescence of laboratory instrumentation, and allow integration of data acquisition efforts.

Operations Support Project Group

CRA Housing Improvement - Renovation of 9 Houses

Metropolitan owns and rents 89 houses throughout the five CRA pumping plants to employees involved in operation and maintenance of the CRA. Due to the remoteness of the CRA facilities, on-site housing is provided to staff to ensure an appropriate response time in the event of an emergency that could jeopardize aqueduct flows, damage equipment, or present a safety risk to employees or the general public. The aging houses are deteriorated and in need of repairs and renovations. The planned renovations for the 89 desert houses may include: upgrading electrical and plumbing systems; installing new doors and windows; installing new cabinetry and countertops for kitchens and bathrooms; replacing roofs and HVAC units; repairing structural components such as roof joists and floor foundations; replacing and upgrading flooring; interior and exterior painting; and abatement of hazardous materials, as needed. The extent of renovations will depend on the condition and needs of each house. Renovation of up to 89 houses was authorized by the Board in May 2017. This project will complete renovation of a total of 20 houses out of the 89 houses as originally planned. The construction of the eleven houses is completed and this project will be closed. The design and construction of the remaining nine houses will continue under this appropriation but with a new project number. The remaining 69 houses will be completed under Appropriation No. 15513.
CRA Housing Improvements - Renovation of Short-Term Accommodations at Eagle Mountain and Iron Mountain Pumping Plants

Eagle Mountain and Iron Mountain Pumping Plants have kitchens and guest lodges that are used by staff during shutdowns and construction projects, and during extended periods of condition assessments and design of rehabilitation work. These facilities will be used frequently over the next decade as the planned rehabilitation of the 45 main CRA pumps moves forward.

The kitchen at Iron Mountain Pumping Plant has been in service for decades and while still functioning, its equipment is deteriorated and obsolete. The kitchen at Eagle Mountain Pumping Plant does not currently meet San Bernardino County Health Services’ requirements for large-scale food storage, refrigeration, or handling. As a result, it has been removed from service. The 10-room guest lodge at Eagle Mountain Pumping Plant and the 16-room guest lodge at Iron Mountain Pumping Plant have both deteriorated after more than 40 years of service and require frequent short-term repairs. The planned kitchen renovations include replacement and refurbishment of existing floor and wall coverings, shelving, plumbing, electrical components, sinks, ranges, freezers, and walk-in refrigerators. At the guest lodges, the needed improvements include electrical, plumbing, and HVAC improvements and roof replacement. Design was authorized by the Board in May 2017. Prior to beginning design, a study was conducted by a consultant in April 2018. Preliminary Assessment was initiated by a consultant in August 2019. Results from Preliminary Assessment propose a replacement alternative for Kitchens & Lodges.

Eagle Rock Security Project

The Eagle Rock Operations Control Center (OCC) was built in 1995 in the City of Pasadena. The OCC coordinates and controls Metropolitan’s water conveyance and distribution system throughout its entire service area. As the main hub of this system, the OCC is pivotal for the management of water deliveries through Metropolitan facilities. The site currently consists of (1) a two-story building that houses the OCC, the Emergency Operations Center, and several staff offices, (2) a two-story older structure that holds the Business Incident Command Post, Security Water Center, several offices, and a Control Systems shop, and (3) several concrete structures used for transporting water. A vulnerability assessment of the OCC site was conducted in 2017. This assessment identified several security issues of concern as a result of trespassing onto the property. A security assessment identified the site’s use by hikers in the area, site accessibility by individuals who have established homeless encampments in the area, and illegal dumping. Proposed site improvements include replacement of the main gate, additional security cameras, lighting fixtures, flood lights with motion detectors, signage, and other related security features.

Electrification of Fleet Vehicles & Expansion of Existing EV Charging Stations

Identifying new ways to reduce greenhouse gas (GHG) emissions and reduce Metropolitan’s carbon footprint is essential to the development of Metropolitan’s Climate Action Plan. This project will install electric vehicle (EV) infrastructure across the district to incorporate electric vehicles into Metropolitan’s fleet, as well as expand existing EV infrastructure for passenger vehicles. This project would be implemented in phases, starting with a comprehensive study to determine project priorities, potential GHG reduction based on projected use, provide a cost analysis, and develop a roadmap for subsequent phases.
HVAC System Assessments & Upgrades - Field Facilities

Metropolitan’s facilities include nearly 700 structures with over 2,000 pieces of heating, ventilation, and air conditioning (HVAC) equipment. Approximately 80% of the HVAC equipment used by Metropolitan supports process systems that are required to treat or distribute water, and for regulatory compliance. The majority of Metropolitan’s HVAC equipment is over 30 years old, requiring more corrective maintenance to remain operational, and consuming more electricity than newer, more energy efficient units. This project consists of a five-year, phased replacement of outdated HVAC infrastructure with certified energy efficient equipment, and will address regulatory changes in EPA guidelines, which are phasing out the refrigerants currently used in most of MWD’s HVAC systems. The project will also modernize HVAC controllers into a cohesive building automation network to allow Metropolitan staff to more efficiently respond to HVAC interruptions, more quickly troubleshoot problems, provide early detection of problems before catastrophic failures, and ensure optimal performance of the HVAC systems.

La Verne Shops Improvements

The La Verne Shops are located on the grounds of the F. E. Weymouth Water Treatment Plant and have been in service since 1941. The shops were expanded in the 1960s, and were expanded again in the 1980s to support a major rehabilitation of the pumps along the CRA.

A shop modernization program was started in 2002, and included building expansions and upgrades, and shop equipment replacement or refurbishment. Most of the shop equipment is 25 to 35 years old, with a few pieces close to 45 years old, and a 20-year-plan to replace and refurbish the shop equipment has been developed. The building expansions and upgrades included expanding the existing shop buildings, upgrading portions of the existing buildings, and replacing and refurbishing shop equipment. This project also focuses on design and procurement of shop equipment which will be installed under the Stage 4 Building completion contract. This equipment includes a hydraulic shear, hydraulic press brake, waterjet cutting system, and vertical milling. In January 2018, the Board awarded procurement contracts for three of these machines. Procurement of a vertical milling center will be the subject of a future board action. The Stage 4 building completion scope of work includes water line extensions, a new electrical circuit and unit power center, an air compressor and air lines, shop heaters, and safety enhancements including walkways and roof access ladders. In addition to the building work, the scope includes procurement and installation of a horizontal and vertical band saw, plasma cutter, and floor mill and blast booth refurbishment. The Board authorized design in December 2015.

Five additional pieces of shop equipment need to be replaced and refurbished to maintain Metropolitan’s ability to respond to emergencies and perform planned maintenance. This is the final project to complete a 20-year shop modernization program. The following equipment has been identified for replacement or refurbishment: One medium and one large lathe to replace two existing lathes, one new medium sized floor mill to replace a non-functioning floor mill, a new large floor mill to work on Metropolitan’s largest hydraulic machinery, like the pumps on the CRA system, and refurbishment of the large existing floor mill.

La Verne Field Engineering Building Replacement

This project provides a new Field Engineering Building to replace the existing one, which does not meet Metropolitan’s current seismic building standards, and is limited in function due to HVAC deficiencies and work space constraints. The Field Engineering Building, located at Metropolitan’s La Verne Facility, was designed and built over 50 years ago in accordance with building codes current at that time.

This project will include a detailed value engineering study to confirm the recommended approach to construct a new building in lieu of retrofits to the existing structure. This project will also include a comprehensive siting study to ensure that the proposed footprint of the new building does not interfere with the current and future requirements of Metropolitan’s La Verne Facility. This project will enhance infrastructure safety, security, and resiliency.
Lake Mathews Wastewater System Replacement

The wastewater system at Lake Mathews has been in operation for nearly 80 years and is no longer reliable. Despite receiving regular maintenance, the system is exhibiting signs of failure including plumbing and septic tank backups, clogged leach fields, and slow-draining collection pipes. On-site treatment of the wastewater via septic tanks will be discontinued, and new collector lines will be connected to the local sewer system that was installed in the early 2000s. Western Municipal Water District has a nearby sewer main that includes a connection point specifically installed for Metropolitan's future use. This connection can accept wastewater by gravity from the entire on-site system. Staff recommends replacing the on-site wastewater system to reduce the risk of costly unplanned repairs and to maintain system reliability. The Board authorized design in May 2018.

Meter Accuracy and Hydraulic Testing Facility

Metropolitan had previously used its Yorba Linda Facility to evaluate and equipment, test operational concepts and qualify equipment. The water used for testing was obtained from the Santiago Lateral and discharged into the Santa Ana River. Environmental constraints on the discharge of water made the facility’s use impractical, and the test facility was shutdown. This project constructs a new test facility at Etiwanda Reservoir in order to test new emerging technologies, emerging regulations related to metering, and to validate non-standard service connections. Specifically, a new facility would allow staff to test equipment such as valves, meters, coatings, and other treatment and distribution devices; conduct expedited test to maintain a pre-approved equipment list for low bid procurement; simulate problematic flow meter installations and low flow conditions; and test the accuracy of existing flow meter installations.

New La Verne Warehouse

The Central Stores Warehouse at La Verne is Metropolitan’s main warehouse for storing materials, supplies and equipment used by field personnel to support Metropolitan’s operations. A recently completed seismic evaluation found that the building may be damaged from a maximum credible earthquake. The cost to retrofit the building is cost prohibitive. In addition, the warehouse lacks the storage space necessary to house Metropolitan’s materials, supplies and equipment. The warehouse also lacks equipment to handle large assets like the large diameter valves that are being procured for projects like the Prestressed Concrete Cylinder Pipe (PCCP) Rehabilitation Program. The new warehouse will support Metropolitan’s PCCP Rehabilitation Program, existing operations and maintenance, and future infrastructure upgrades.

System-wide Paving & Roof Replacements

Similar to infrastructure throughout the Metropolitan, pavements and roofs deteriorate over time due to wear and tear from use, weathering and precipitation. The planned pavement and roofing rehabilitation projects will encompass water treatment plants, pumping plants, various maintenance facilities and access roads within Metropolitan’s service areas. These projects will also improve the subgrade and drainage systems as required. This project will allow various paving and roof replacements throughout Metropolitan’s facilities to be authorized by the General Manager similar to the Minor Capital Projects Program. Establishing a project to fund a limited amount of paving and roof replacement on an annual basis will allow these needed replacement projects to proceed expeditiously.
Water Quality Laboratory Building Seismic & HVAC Upgrades

This project addresses seismic upgrades and other building improvements for the Water Quality Laboratory. The Water Quality Lab was constructed in accordance with the building codes at the time of construction and is treated as an essential facility. However, industry knowledge of earthquakes and seismic design has greatly improved over the years, leading to the development of more stringent, modern seismic codes for this type of facility. To minimize the risk of damage to the plant during a major earthquake, seismic upgrades are recommended. Also, new regulatory requirements associated with Quagga Mussels, per- and polyfluoroalkyl substances (PFAS), and other water quality concerns will be addressed.

In addition to the seismic upgrades, functional layout improvements such as laboratory and office space reconfiguration, lab equipment replacements, accessibility, HVAC improvements, roof repair and other related building improvements will also be included.

System Reliability - Other Project Group

Building Automation System Upgrades

The building automation system controls all lighting, carbon monoxide monitoring system, HVAC, and associated mechanical equipment in Metropolitan's Headquarters Building. The system is required to operate the building in an energy efficient manner, consistent with Title 24 energy efficiency standards. In the event of a building automation system failure, thermal control within the data center would be lost and garage exhaust fans within the parking garage would become inoperable, resulting in damage to critical facilities and unsafe conditions, respectively. The existing building automation system is obsolete and is no longer supported by the manufacturer.

This project will replace the existing building automation system with a new nonproprietary system and will support integration of the new fire and smoke control systems that will be installed under the Headquarters improvements project. In October 2019, the Board authorized an amendment to an engineering services agreement for design of this project.

Headquarters Improvements

Analysis has confirmed that the Headquarters Building does not meet current building code criteria for an Essential Facility. While the building remains safe to occupy, seismic strengthening to meet updated code levels is recommended in order for operations and business functions to continue following a major earthquake. This upgrade will increase the Headquarters Building’s level of seismic performance and safety to that of an existing state-owned building and will reduce the risk of significant damage and resulting business interruption due to a major earthquake.

Construction of the seismic upgrades poses logistical challenges associated with the major retrofit of a high-rise building while the facility remains operational. During the anticipated three-year duration of construction, two to three floors of the high-rise tower will be vacated sequentially to allow a contractor to execute the repairs. Metropolitan staff will be relocated in stages to the five-story wing of the building.

Seismic upgrade work provides an opportunity to complete improvements to specific building systems in a cost-effective manner, while the floors are unoccupied and building finishes are removed. The Headquarters Building is over 20 years old, and some of its features need to be upgraded or replaced. These features include the fire/life safety systems including existing fire sprinkler piping at the parking garage, some of the kitchen equipment and ceiling/wall finishes, HVAC system equipment including cooling towers and air handler units, and restroom facilities on several floors. The Board awarded a construction contract in November 2018.
Headquarters Security Improvements

The comprehensive security upgrades for Metropolitan’s Union Station Headquarters have been prioritized and staged to minimize rework and impacts to operations. The Stage 1 work, currently in construction, enhances perimeter windows and doors by providing needed blast protection. Stage 2 improvements, currently in design, will provide security system upgrades inside the building with entry validation, surveillance and intrusion protection, and additional security features in the board room, executive dining lounge, and security control room. Stage 3 improvements will provide security system upgrades outside the building with bollards and gates.

Security System Upgrade

The electronic security system is the backbone of Metropolitan’s physical security system. Studies indicate that replacement of the 15-year-old system is not yet required; however, incremental upgrades are needed to extend the life of the system. Work includes hardware and software upgrades to network controllers, computer servers, card readers, and the video management system. Design and installation was authorized by the Board in May 2017.

Wadsworth/DVL Control & Protection System Upgrade

This project is the final phase of the Wadsworth Pumping Plant/DVL control system upgrade and includes replacement of the entire Diamond Valley Lake (DVL) control and communications systems, the protection relay system, UPS, vibration monitoring system, and pump/turbine drive controls. This phase of the project was authorized by the Board in April 2017.
Treatment Plant Reliability Program

Fiscal Year 2020/21 Estimate: $48.6 million  Fiscal Year 2021/22 Estimate: $27.6 million

Program Information: The Treatment Plant Reliability Program is comprised of projects to replace or refurbish facilities and components of Metropolitan’s five water treatment plants in order to continue to reliably meet treated water demands.

Accomplishments for FY 2018/19 and FY 2019/20

Diemer Plant

New Projects Initiated Last Period:

- Diemer Filter Valves Actuator Refurbishment
- Diemer Ozone Generator Open Loop Cooling Water System Improvements
- Diemer Slope Erosion Control Improvements

Major Milestones Achieved Last Period:

- Diemer Basin Rehabilitation - Started construction of the west basins
- Diemer Filter Outlet Conduit Seismic Upgrades - Completed construction
- Diemer Administration Building Seismic Upgrades - Completed construction
- Diemer Filter Building Seismic Upgrades - Started construction of seismic upgrades for the west filter building
- Diemer Filter Valve Replacement - Completed procurement of the actuators and started construction of valve replacement for the west filters
- Diemer Water Sampling System Improvements - Started construction
- Diemer Ozone Generator Open Loop Cooling Water System Improvements - Started construction
Jensen Plant

New Projects Initiated Last Period:
- Jensen Ozone PSU and Critical Component Upgrades
- Jensen Site Security Upgrades

Major Milestones Achieved Last Period:
- Jensen Module No. 2 & 3 Traveling Bridge and Basin Rehabilitation - Completed preliminary design of traveling bridges
- Jensen Plant Electrical Upgrades
  - Stage 1 - Completed construction
  - Stage 2 - Completed design and started construction
- Jensen Modules 2 and 3 Flocculator Rehabilitation - Completed design and started construction
- Jensen Fluoride Tank Replacement - Completed construction
- Jensen Filter Backwash Biological Control System - Completed construction
- Jensen Inlet Water Quality Instrumentation Upgrades - Completed construction
- Jensen Ozone System PLC Control & Communication Equipment Upgrade - Completed construction
- Jensen Ozone PSU and Critical Component Upgrades - Started procurement
- Jensen Site Security Upgrade - Completed preliminary design

Mills Plant

New Projects Initiated Last Period:
- No projects were initiated during the last biennium.

Major Milestones Achieved Last Period:
- Mills Electrical Upgrades - Started construction of Stage 1
- Mills Modules 3 & 4 Flash Mix Chemical Containment Upgrades - Completed design and started construction
- Mills Plant Perimeter Security and Erosion Control Improvements - Started design
Skinner Plant

New Projects Initiated Last Period:
- Skinner Module 7 Filter Inlet Valve Gearbox Replacement
- Skinner Finished Water Reservoir Slide Gate Rehabilitation
- Skinner Ozone Generator PLC Control & Communication Equipment Upgrade

Major Milestones Achieved Last Period:
- Skinner Plant - Replacement of Plant 1 Filter Gate Stems and Nuts - Completed construction

Weymouth Plant

New Projects Initiated Last Period:
- Weymouth Hazardous Waste Staging and Containment

Major Milestones Achieved Last Period:
- Weymouth Washwater Tank Seismic Upgrades - Completed construction of the west tank
- Weymouth Basins 5-8 and Inlet Channel Refurbishment - Completed preliminary design
- Weymouth Water Quality Instrumentation Improvements - Started construction
- Weymouth Hazardous Waste Staging and Containment - Completed preliminary design

Objectives for FYs 2020/21 and 2021/22

<table>
<thead>
<tr>
<th>Project</th>
<th>Total Project Estimate</th>
<th>Estimated Completion</th>
<th>Major Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diemer Basin Rehabilitation</td>
<td>$63,500,000</td>
<td>2021</td>
<td>Complete construction of the west basins</td>
</tr>
<tr>
<td>Diemer Filter Building Seismic Upgrades</td>
<td>$32,500,000</td>
<td>2021</td>
<td>Complete construction of west filter building</td>
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<td>Diemer Filter Valve Replacement</td>
<td>$13,400,000</td>
<td>2021</td>
<td>Complete construction of west filters</td>
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<td>Jensen Control Room HVAC</td>
<td>$600,000</td>
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<td>Complete design</td>
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<td>Jensen Modules 2 and 3 Floculator Rehabilitation</td>
<td>$7,907,000</td>
<td>2021</td>
<td>Complete construction</td>
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<tr>
<td>Jensen Ozone PSU and Critical Component Upgrade</td>
<td>$3,590,000</td>
<td>2023</td>
<td>Begin construction</td>
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<tr>
<td>Jensen Plant Electrical Upgrades</td>
<td>$69,616,000</td>
<td>2023</td>
<td>Complete Stage 2 construction</td>
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<td>Jensen Site Security Upgrade</td>
<td>$1,800,000</td>
<td>2022</td>
<td>Complete design</td>
</tr>
<tr>
<td>Jensen Chemical Feed Improvements</td>
<td>$800,000</td>
<td>2021</td>
<td>Complete design and construction</td>
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### Project Summary

<table>
<thead>
<tr>
<th>Project</th>
<th>Total Project Estimate</th>
<th>Estimated Completion</th>
<th>Major Milestones</th>
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<tr>
<td>Mills Fluorosilicic Acid Tank Replacement</td>
<td>$ 1,600,000</td>
<td>2020</td>
<td>Complete design and start construction of sulfuric acid tanks rehabilitation</td>
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<td>Mills Modules 3 &amp; 4 Flash Mix Chemical</td>
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<td>2020</td>
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<td>Containment Upgrades</td>
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<td>Mills Plant Electrical Upgrades</td>
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<td>Complete design of Stage 2</td>
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<td>Weymouth Administration and Control</td>
<td>$ 13,838,000</td>
<td>2024</td>
<td>Complete design</td>
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<td>Buildings Seismic Upgrades</td>
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<tr>
<td>Weymouth Basin 5-8 and Inlet Channel</td>
<td>$ 48,512,000</td>
<td>2023</td>
<td>Complete design</td>
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<td>Refurbishment</td>
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<td>Weymouth Chlorine System Upgrades</td>
<td>$ 9,237,000</td>
<td>2020</td>
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<td>Weymouth Filter Valve Replacement</td>
<td>$ 24,500,000</td>
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<td>Complete design of Filter Bldg. No. 2</td>
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<td>Weymouth Hazardous Waste Staging and</td>
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<td>Containment</td>
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<tr>
<td>Weymouth Water Quality Instrumentation</td>
<td>$ 2,538,000</td>
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<td>Complete construction</td>
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<td>Improvements</td>
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### Diemer Project Group

**Diemer Administration Building HVAC Replacement**

The existing HVAC system in the Diemer plant's Administration Building consists of two 20-ton, chilled and hot water coiled air-handling units, which maintain multi-zone work-space environments on both floors. The 55-year-old units are beyond their expected operating life and have caused issues with regular maintenance activities. This project will replace the existing HVAC units with new energy efficient units and upgrade the temperature control system for the building. Seismic anchorage of the equipment will be incorporated to meet the current building code.

**Diemer AMP Gate Replacement**

One of the components of the Diemer plant's Finished Water Reservoir (FWR) is a 14-ft by 20-ft outlet roller gate, intended to throttle the flow or isolate the reservoir from the downstream Allen-McColloch Pipeline (AMP). This gate recently failed due to previously undetected corrosion and coating failure. This project will replace the AMP outlet gate, gate guides, and actuation system. The planned upgrade work requires a total plant shutdown and includes replacing components located inside the reservoir (rolling gate and guides) and on top of the reservoir (the actuation system). The new gate and actuator will enhance operational reliability and safety during a seismic event.
Diemer Basin and Filter Building Rehabilitation

The mechanical, structural, and electrical components of the basins at the Diemer plant have deteriorated from over 50 years of continuous use. They need to be rehabilitated and seismically reinforced in order to maintain reliable treated water deliveries.

Key components to be upgraded include basin inlet gates; flocculator drives and shafting; baffle boards and supports; turntable assemblies, rakes, and catwalks; launders; and structural supports for the equipment. The electrical systems also need to be modified for compliance with current code. In addition, the flexible joint sealant and its adjacent concrete within the basins will be removed and replaced to comply with federal Toxic Substances Control Act (CSCA) regulations. The work will be completed in two phases in order to minimize operational impacts on the plant. Final design was authorized by the Board in February 2013; construction to rehabilitate the east basins has been completed; and construction to rehabilitate the west basins was awarded in October 2018.

The filter valve bodies exhibit corrosion and the rubber seats are worn. This project will replace the obsolete filter valves in the west and east modules of the plant with new valves that conform to American Water Works Association (AWWA) standards. In addition, the existing valve actuators in the west filters will be replaced. The actuators removed from the west filter valves will be refurbished and re-installed on the recently replaced east filter valves. Procurement of the valve actuators was authorized by the Board in September 2017. Installation of the west filter valves was awarded by the Board in October 2018.

Lastly, structural evaluations of the two filter buildings at the Diemer plant concluded that the filter buildings are seismically vulnerable and should be upgraded to reduce the risk of damage from a major seismic event. This project will upgrade the Diemer plant’s Filter Buildings to provide operational reliability. This project will reinforce concrete columns in each filter control building, reinforce each clerestory at the roof line, and add new concrete piers within the sump area below the filters. As part of the filter upgrades, some existing mechanical and electrical equipment in the filter control buildings will be relocated. Construction of the east filter upgrades was authorized by the Board in February 2015 and has been completed. Construction of the west filter upgrades was awarded by the Board in October 2018.

Diemer Chemical Feed System Improvements

The chemical feed equipment for ammonia, alum/ferric chloride, sodium hydroxide, liquid polymer, and dry polymer at the Diemer plant has aged and its reliability has deteriorated over the years. Most equipment is over 20 years old and has experienced failures. Some of the repair parts are no longer manufactured and are difficult to obtain. Loss of chemical feed or inadequate feeding capacity could disrupt plant operations. In addition, design criteria for some of the chemicals have changed and the existing equipment is unable to cover the required range for chemical feed. This project will replace the worn-out feed equipment and optimize the system design to improve system reliability and to protect treated water quality. Design was authorized by the Board in March 2011.

A canopy over the caustic soda tank farm and a new fluoride tank farm is needed to improve operations at the Diemer plant. Heat tracing around caustic feed lines is required to feed 50% caustic soda during the winter months. However, rainwater trapped within the chemical containment area could submerge the heat tracing wires. A canopy will minimize rainwater accumulation within the containment area and eliminate electrical hazards. The plant’s fluoride tanks have reached the end of their service life and lack access for inspection and maintenance. This project will install a canopy over the existing caustic soda feed equipment; and replace the two fluoride storage tanks, associated feed equipment, and the roof over the fluoride tank farm. Preliminary design was authorized by the Board in August 2012.
Diemer Electrical Improvements

Power and distribution panels that were installed during the original Diemer plant construction, are more than 55 years old. These panels, circuit breakers, and feeder conductors (wires that feed the panels) have exceeded their normal life span and have deteriorated. This project will upgrade the aged electrical equipment to meet the current electrical code and enhance the plant’s reliability. The improvements will allow the electrical equipment to be taken out of service for preventive maintenance, replacement, and testing in a safe working condition.

Diemer Emergency Ozone Backup Disinfection

The Diemer plant’s existing ozone backup disinfection system was designed to use a low concentration sodium hypochlorite solution to be added at the plant inlet in the event of an unplanned ozone system shutdown. However, the existing sodium hypochlorite storage is only sufficient to provide three hours of back-up disinfection. Manually switching to the liquid chlorine feed system is required after the three hours to meet the disinfection requirement. The sodium hypochlorite system has also proven susceptible to vapor locking. This project will modify the existing plant chlorine system to be used as backup disinfection system in the event of an ozone system shutdown. Construction has been initiated under the General Manager’s authority.

Diemer Erosion Control Improvements

The Diemer plant is located on the top of a hill in the city of Yorba Linda and consists of numerous fill slopes. Due to the large water-bearing structures at the Diemer plant, some of these slopes are within the State of California Department of Water Resources Division of Safety of Dams (DSOD)’s jurisdiction. Some slopes within the Diemer plant have eroded and are in need of rehabilitation. This project will provide site improvements for grading, drainage, and erosion/sediment control to erosion-damaged slopes at the plant site. The board authorized geotechnical investigations in September 2018.

Diemer Filter Rehabilitation

The Diemer plant has 48 independent filter units that are normally operated from the main control room, although they also have the capability to be operated locally if needed. Over the life of the Diemer plant, staff has performed regular maintenance on the filters to support reliable plant operation. However, as regulations and source water conditions have changed, filter performance reliability has decreased. Metropolitan’s Water Quality recently developed recommendations for the rehabilitation of all Weymouth filters, including reconfiguration of underdrains, media, troughs and surface wash systems. Due to the similarities between the filters at Diemer and Weymouth, staff recommends implementing the same filter modifications at the Diemer plant.

This project will rehabilitate all of the Diemer plant's filters to improve their performance and enhance treatment plant reliability. The planned rehabilitation work includes replacing the filter media with optimized size and depth specifications; replacing the surface wash system with larger piping and improved flow configuration; replacing the underdrains; modifying flow distribution flumes; and raising and replacing the existing troughs to accommodate a higher depth of filter media. This project will enhance infrastructure safety, security, and resiliency; improve the reliability of water deliveries; ensure water quality compliance, worker safety, and environmental protection; and will optimize water treatment and distribution.
Diemer Washwater Reclamation Facilities Reliability Improvement

Approximately 40 percent of Diemer plant’s existing Washwater Reclamation Plant (WWRP) is constructed on long slender piles and earthen fill, which form a level surface at the top of a slope. Seismic rehabilitation is required to ensure reliability of the WWRP facility. In addition, submerged WWRP equipment is continually subjected to abrasive and corrosive operating conditions caused by the solids in the used filter backwash water. The WWRP’s two identical treatment trains share a common influent channel and both must be removed from service during maintenance. This project will install seismic stabilization facilities and retrofit the WWRP with reliability improvements, including a new coal grit removal facility and new headworks to allow independent shut-down of each individual process trains. This project will consider the use of plate settlers to reduce the footprint and cost of the facility while improving seismic resiliency and meeting water quality and operational objectives. The project also includes modifications to the existing chemical feed system, sludge line, and utilities at the west slope. Final design was authorized by the Board in May 2006.

Diemer Water Sampling System Improvements

The existing sample lines at the Diemer plant do not meet the 10-minute turnover rate requirement from sample point to laboratory sample taps due to long sample lines and pressure limit for the existing polypropylene tubing used to transport the samples. This project will upgrade the existing sample lines and all sample pumps to allow higher operational pressure to shorten the transport time. In addition, new chlorine analyzers, turbidimeters, and pH analyzers will be installed closer to the sample locations to eliminate variable analytical results caused by algae growth, solids deposition, temperature variation, and excessive detention time in the sample lines. These local analyzers will reduce distances from sample point to analyzer to better represent actual conditions in the process stream. Construction was authorized by the Board in October 2018.

Jensen Project Group

Jensen Bull Creek Repair

The Bull Creek channel located on the east side of the Jensen plant has suffered significant erosion from continued stormwater flow during the past wet seasons. This project will rehabilitate approximately 800 feet of the Bull Creek channel to prevent erosion. The work includes: installation of rip rap and slurry backfill along the channel; repairing damaged concrete liner on the channel sides, and restoration of the broken apron next to the railroad bridge. In addition, a catch basin will be constructed along the San Fernando service road to the Jensen plant, to mitigate excessive erosion on the north bank of the Bull Creek.

Jensen Chemical Feed Improvements

This project will improve several chemical feed systems at the Jensen plant, including replacing two fluorosilicic acid (fluoride) tanks, rehabilitation of sulfuric acid tanks, construction of a new caustic soda tank farm near the filtered water line, and containment upgrades for the liquid polymer system.

The Jensen plant relies on two 9,000-gallon cross-linked high-density polyethylene (HDPE) tanks for the storage of fluorosilicic acid. Internal inspections have identified cracks in the two fluorosilicic acid tanks. This project will replace the fluoride tanks with tanks of the same capacity and improved mechanical properties to provide an expected service life of 20 years. Design was authorized by the Board in April 2017.

A recent internal inspection of one of two sulfuric acid tanks at the Jensen plant identified corrosion in the tank wall material and welds. Reconfiguration of the transfer piping and basket strainer is needed to minimize clogging and facilitate chemical transfer between the tanks. This project will rehabilitate Jensen’s two sulfuric acid storage tanks, apply new protective coating to the sulfuric acid tank farm, and complete minor modifications to the sulfuric acid feed system piping within the acid tank farm.
The Jensen plant’s existing caustic soda tank farm was installed in 1970, and needs to be replaced. Caustic soda is used to increase the pH for corrosion control. The caustic soda dosage varies based on source water quality and the amount of other chemicals (e.g., sulfuric acid and alum) applied during the treatment process. Currently at the Jensen plant, sulfuric acid is added to suppress the pH and control bromate formation and then caustic soda is added to reduce corrosion in the distribution system. This project allows the Jensen plant to meet current water quality design criteria for bromate control with the addition of ammonia and chlorine added upstream of the ozone contactor. This approach would significantly reduce the plant’s usage of both sulfuric acid and caustic and reduce overall chemical costs. With the ammonia-chlorine process to control bromate, caustic soda would only need to be added to the filtered water. This allows the new caustic soda tank farm to be sized, designed, and built specifically for adding caustic soda to the filtered water. This project will replace the existing tank farm with a new facility located near the filtered water line.

In addition, the liquid polymer unloading facility does not have a permanent spill containment system. This project will provide a permanent single concrete unloading facility for both chlorine neutralizing caustic soda and liquid polymer chemicals, equipped with a new sump and discharge piping to provide secondary containment. In addition, the ferric chloride handling facility and the Liquid Polymer Building will be removed. Final design was authorized by the Board in May 2013.

**Jensen Control Room HVAC**

The Jensen plant was placed into service in 1972. During recent wildfire events, it was observed that existing HVAC systems do not meet the objective of reliably maintaining air quality in the control rooms that must be staffed at all times. This project will provide improved air quality in the Jensen control rooms to ensure that the plant can be reliably operated during periods of poor outdoor air quality. This project will: (1) install dedicated high-efficiency heating, ventilating, and air conditioning (HVAC) system for the main plant control room in the administration building and the secondary plant control room in the ozone generator building, and (2) seal the two control rooms from other portions of the building to reduce smoke or other air quality contaminants from entering the control room.

**Jensen Entrance Improvements**

Both main Jensen plant gates at San Fernando and Balboa entrances need to be redesigned to improve security and traffic flow consistent with Metropolitan’s other Treatment Plants. This project will enhance security of the Jensen plant’s entrances. Project scope includes replacement of security gates; installation of traffic control devices to improve security at the entrance points of the Jensen plant; and installation of fire-resistant plants and irrigation along the west side of the plant. Final design was authorized by the Board in December 2006.

**Jensen Hazardous Waste Containment Facility**

The Jensen plant currently stores its hazardous waste in a storage area that was repurposed from a general equipment storage area. The existing site has inadequate storage space for the facilities’ needs. In addition, the waste containment area roof covering does not provide adequate protection from the rain and sun. This project will replace and relocate the Jensen plant Hazardous Waste Consolidation Site (commonly known as 90-day storage).
Jensen Inlet Water Quality Instrumentation Upgrades

The Jensen plant’s inlet flow meter, water quality analyzers, and flow meter for service connection LA-35 are used to control the chemical addition and to balance water flows throughout the plant. Both of the flow meters need to be replaced. The existing models are obsolete, the manufacturer no longer supports the flow meter consoles, and spare parts are difficult to obtain. Furthermore, the water quality analyzers and plant inlet flow meter consoles are wall-mounted on the exterior of the plant inlet structure, where they are exposed to harsh ambient conditions, resulting in accelerated wear. The flow meter console for service connection LA-35 is located in a deep, confined vault. Two trained personnel with safety equipment are required to perform any maintenance within the vault. The environmentally-controlled enclosure will house the water quality instrumentation, the plant inlet flow meter console, the service connection LA-35 flow meter console, and related electrical equipment including a motor control center, power panel, and communication cabinet. Design was authorized by the Board in August 2014.

Jensen Module 1 and Washwater Pump Rehabilitation

Washwater pumps are used to pump water from the combined filter effluent to the washwater tanks. The tank water is then used to back wash filters. If washwater pumps are unavailable, the plant cannot perform filter backwashes that are necessary to maintain operation of the filtration process. Jensen’s Module No. 1 washwater (WW) lift pumps were installed with the original plant construction and have been in service for 50 years. Inspection and testing has revealed significant corrosion in the pumps’ housings, and diminished pump output. The pumps have reached the end of their useful life and should be rehabilitated. This project will rehabilitate the Module No. 1 vertical turbine washwater lift pumps, modify the piping for the Module No. 1 service water and washwater lift pumps, and will replace the open motors with closed motors.

Jensen Modules 2 and 3 Flocculator Rehabilitation

Module Nos. 2 and 3 flocculators have been in continuous service since their original installation in the early 1990s. The shafts have become misaligned and the metallic components have gradually deteriorated due to corrosion. This project will rehabilitate the flocculators in Jensen Module Nos. 2 and 3 by refurbishing the intermediate shafts, paddle arms, and paddle wheel hubs; replacing existing stub shafts and through shafts with stainless steel shafts; and replacing the basin pillow block housings and bushings. Improvements also include new FRP paddle blades, new stainless-steel lock collars, new couplings, and new stuffing box assemblies. The dry well bearing housing will also be refurbished and new bronze bushings will be provided in kind. Construction was authorized by the Board in May 2019.

Jensen Modules 2 and 3 Traveling Bridge and Basin Rehabilitation

This project will rehabilitate Modules Nos. 2 and 3 traveling bridges and sedimentation basins at the Jensen plant to enhance solids removal efficiency. Planned work includes replacing the existing traveling bridge end-truck structure, drive system, rails, and racks; retrofitting the suction piping, hoses and launder gates; upgrading the bridges control system and power supply; replacing the 48-existing basin inlet gate actuators; recoating bridge trusses; and replacing basin guardrails. Preliminary design for the traveling bridge repair was authorized by the Board in March 2014.

Jensen Ozone PSU and Critical Component Upgrade

Ozone is used as the primary disinfectant at Metropolitan’s treatment plants. However, the critical systems associated with ozone generation have deteriorated or have become obsolete after 15 years of operation and need to be upgraded. This project will upgrade the units that provide power to the Jensen plant’s ozone generators and will replace outdated components of other critical systems associated with the plant’s ozone generation, which have reached the end of their service life, and are no longer supported by the original equipment manufacturer. The systems to be upgraded include the following areas: (1) power supply unit; (2) nitrogen supply system; (3) ozone destruct units; (4) dissolved ozone; (5) cooling water loop; (6) ozone generator dielectrics; (7) liquid oxygen vaporizers; and (8) other components of the ozone system.
Jensen Plant Electrical Upgrades

The Jensen plant’s electrical system was designed to meet then-current electrical codes when the plant was constructed over 40 years ago. The aging electrical equipment has deteriorated through long-term continuous use, lacks redundancy, and is difficult to maintain and repair. Much of the equipment is underrated by current standards and does not have adequate short-circuit interrupting capability, which results in an elevated risk of unplanned outages and equipment damage. This project will replace aging equipment and provide needed redundancy for critical components of the plant’s electrical system. To expedite completion of the most critical electrical upgrades while minimizing impacts to plant operations, the upgrade work has been prioritized and staged. The Stage 1 work improved the medium voltage switchgear on the western portion of the plant and provided electrical infrastructure for the Jensen Solar Power Plant. Stage 2 improvements upgrade UPC-7, UPC-9, and their associated motor control centers to support critical process equipment such as the washwater pumps, service water pumps, washwater return pumps, filters, thickeners, sludge pumps, and ammonia facilities. Stage 3 improvements will upgrade the remaining components of the electrical system on the eastern portion of the plant. Construction of Stage 1 is complete, and construction of Stage 2 was authorized by the Board in July 2019.

Jensen Reservoir Bypass Gate Refurbishment

The Jensen plant’s existing reservoir bypass gates were installed in 1972 and allow the reservoirs to be isolated in case of water quality issues. The bypass gates are corroded and are currently inoperable because portions of the bronze bearings are degraded and missing. This project will enhance infrastructure safety, security, and resiliency, and will improve the reliability of water deliveries by replacing the reservoir bypass gates.

Jensen Site Security Upgrade

The outdated Jensen plant’s security system needs an upgrade to minimize risk of an intrusion. The existing camera system is undersized and aged. Planned upgrade includes installation of additional card readers in sensitive areas; upgrade to existing aging security cameras with high resolution cameras; addition of new cameras to monitor the perimeter of the plant; replacement of security signage to meet current code; security upgrades of first floor windows; addition of horizontal structural support to strengthen the existing gates; and addition of new defensive barrier plants and trees to screen the west side of the Jensen plant.

Jensen Solids Handling System Upgrades

Efficient recovery of water from residual solids is critical for the operation and efficiency of the Jensen plant, the current system consisting of solids thickeners on the Jensen site, and solids lagoons located at the adjacent Los Angeles Department of Water and Power (LADWP) site.

The solids thickeners play a key role in the recovery of water from the residual solids. During thickener operation, operators rotate valves daily to divert flow of residual solids to different thickeners. These valves leak and are difficult to access. This project will reconfigure Solids Pump Station No. 2 to allow better access to the valves; and upgrade the solids splitter vault to facilitate remote operation.

Metropolitan has an ongoing lagoon use agreement with LADWP, which allows for Metropolitan's use of four of the lagoons located at the Los Angeles Aqueduct Filtration Plant (LAAFP) to process solids generated and conveyed from the Jensen plant. Under this agreement, two of the lagoons can be used until October 1, 2062, and the other two until October 1, 2022. To reliably support the Jensen plant operation and provide operational flexibility during unfavorable source-water quality or higher water demand, two new lagoons need to be constructed to replace the two existing lagoons that must be returned to LADWP. This project will design and construct two new lagoons, consisting of an earthen floor with rip-rap banks and reinforced concrete access ramps. The project will include piezometers with data loggers to monitor groundwater under the lagoons, manholes with pumps to convey overflow, decant, and underdrain water to the lagoon inlet distribution system, and electrical & control systems. Lagoon Nos. 9 & 10 will be located on the LAAFP site. In addition, modifications to the groundwater control system may also be considered in advance of the return of two lagoons to LADWP.
Mills Project Group

Mills Basin Solids Removal Improvements

Currently, the Mills plant removes solids from each sedimentation basin using a bridge-mounted siphon system and discharges the solids to the retention basins. However, the siphon flow cannot be adequately controlled. As a result, excessive amounts of water are often siphoned to the retention basins, causing increased solids drying time and reduced retention basin capacity. This project will upgrade the traveling bridges’ solids removal equipment and controls to improve the solids removal process at the Mills plant’s Modules Nos. 3 and 4. The new equipment and controls will allow the plant to optimize its solids removal process by simultaneously reducing the amount of water removed from the basin and reducing excessive solids build-up in the basins. Preliminary design was authorized by the Board in June 2005.

Mills Fluorosilicic Acid Tank Replacement

The Mills plant relies on two 6,250-gallon cross-linked high-density polyethylene (HDPE) tanks for the storage of fluorosilicic acid. These tanks have a recommended service life of 10 years and have been in service since 2007. Recent inspections have identified leakage at the bolted connections of both tanks. This project will replace the fluorosilicic acid storage tanks with capacity of 7,000-gallon and improved mechanical properties to provide an expected service life of 20 years. The project will also replace coating in the containment area as necessary. Design was authorized by the Board in April 2017.

Mills Plant Electrical Upgrades

The electrical system at the Mills plant has deteriorated through long-term use, is difficult to maintain and repair, and needs improved backup capability. Failure of a single electrical device could impact the treatment process. The electrical upgrades at the Mills plant will be completed in three stages. Stage 1 upgrades will address the highest priority work, including replacement of obsolete circuit breakers, expansion of the electrical building for UPC-9, installation of new air conditioning system, installation of MCCs and distribution of power feed to chemical feeds systems, wastewater return pumps, modules 3 and 4 filter surface wash pumps, and improvement of power reliability for key process equipment. Stage 2 upgrades will add a second incoming 12 kV service from Riverside Public Utilities and upgrade the plant’s main switchgear and standby generator switchgear. Stage 3 upgrades will modify electrical manholes, replace digital metering modules for all motor control centers, and add fiber optic cabling. Construction of Stage 1 project was authorized by the Board in August 2017.

Mills Modules 3 and 4 Flash Mix Chemical Containment Upgrades

The existing flash mix areas at Mills Plant Modules 3 and 4 contain chemical feed equipment for ammonia, polymer, caustic, alum, sodium hypochlorite and chlorine. The equipment is contained within a low concrete curb. To reduce the risk of chemical releases, improved containment is needed. This project will replace the chemical piping in the area with double-walled piping with a leak detection system, replace flow meters and valves, relocate control panels, and install flow meter display units in a weatherproof enclosure outside of the containment areas. Final design was authorized by the Board in October 2016.

Mills Ozone PLC Control and Communication Equipment Upgrade

The Mills plant ozonation equipment utilizes a type of Programmable Logic Controller (PLC) that was introduced to the commercial market in 1988. Computer hardware from that era is now outdated, and the PLC manufacturer has announced that it will no longer produce or support this equipment. Inventories of spare parts will no longer be maintained once exhausted. Failure of a PLC and/or its communication module could cause a disruption in the ozone control system. This project will replace the equipment and modify the software to operate with the new equipment for the Mills ozone control system. The upgraded system will feature Metropolitan-standardized PLCs in an open-architecture approach that staff will be able to maintain and upgrade in the future. In addition, the ozone power supply unit and dielectric will be upgraded, as these components have reached the end of their service life and are no longer supported by the original equipment manufacturer.
Mills Plant Perimeter Security and Erosion Control Improvements

The Mills plant has approximately 14,500 linear feet of perimeter fencing that is primarily a chain link with a height of six to eight feet. The fencing and several of the entry gates are deteriorating and may be vulnerable to security breaches. In addition, stormwater runoff has eroded an area on the southern boundary of the plant. This project will replace 7,700 feet of the existing fence with security fencing along the plant’s southern, northern and western boundaries, and replace three existing gates with taller security gates with surveillance cameras. Grading and erosion control improvements, such as installation of v-ditches and flow re-direction, will also be performed to prevent sediment from leaving the site. All improvements will be consistent with Mills plant’s architectural design guidelines, and with Metropolitan’s approach to facility security. Preliminary design was authorized by the Board in October 2017.

Skinner Project Group

Skinner Finished Water Reservoir Slide Gates Rehabilitation

The three operational slide gates (Inlet, Outlet, and Bypass) that control the inlet and outlet flows from the Skinner Finished Water Reservoir have been exposed to a corrosive and wet environment since 1991. Visual inspections identified leaking gates and continuing deterioration of the slide gates’ exterior coatings. These gates have been in service for 26 years and have not been blasted or recoated. This project will rehabilitate the three Skinner Finished Water Reservoir slide gates. The gates will be removed from the gate frames, thoroughly inspected for carbon steel material loss, blasted and recoated to extend their service life. In addition, the rejection structure will be modified to separate the stormwater and rejection water pipelines and prevent potential stormwater from flowing into the finished water reservoir.

Skinner Fluorosilicic Acid Tank Replacement

Fluorosilicic acid tanks will be removed and replaced with two 8,200-gallon aboveground (Fluoride) tanks at the Skinner Plant. New extrusion-molded linear HOPE tanks will be installed. To minimize changes in the tank farm, the new tanks will match the dimensions and capacity of the existing tanks. Scope will include modification to the tank farm to provide access during construction and associated piping work to connect the new storage tanks to the existing chemically compatible PVDF tank farm piping. The new tanks will be mounted on the existing tank pads.

Skinner Module 7 Filter Inlet Valve Gearbox Replacement

Replace existing sixteen (16) units of discontinued and failing filter inlet valve gearboxes on Module 7 East and West Filter basins with new gearboxes to maintain a reliable filter operation at Skinner Plant. Removal of existing gearboxes and installation of new units will be undertaken by Skinner District Forces with the assistance of Engineering. Scheduling of the equipment replacement will be in accordance with Skinner Plant’s water treatment operational requirements and with the water demand and supply conditions within the Skinner service area. Minor field adjustments will be done to align the existing actuators and vertical valve extension stems with the new valve and gearbox assemblies at the bottom of the filter influent channel.

Skinner Ozone Contactor Roof Elastomeric Coating

Leakage through cracks in Skinner plant’s ozone roof deck was found in 2010. Cracks in the concrete roof deck can allow rain and nuisance water to be drawn down into the contactors which then mixes with the freshly ozonated water, creating a potential cross-connection. The water and air penetrating through the existing concrete roof decks exposes the rebar and structural steel in the decks, creating the potential of eventual structural failure to the roof decks. In addition, in order to keep the constant vacuum in the contactors, the Ozone Destruct Units have to work excessively which consumes additional electricity and affects the Destruct Units reliability and long-term life span. This project will abrasive blast, apply primer, and coat 61,000 square-feet of the Ozone Contactor Building concrete roof deck with an elastomeric coating to reduce potential structural damage and operational impact.
Skinner Ozone Contactors 1-2 and Influent Channel Concrete Refurbishment

Ozone gas and ozonated water are extremely corrosive oxidizers and can penetrate concrete walls to cause significant corrosion of structural steel and equipment. This project will inject chemical grout into the existing concrete walls of the Skinner Ozone Contactor Nos. 1 and 2 and the influent channel, in order to prevent ozone gas and ozonated water from penetrating the concrete walls.

Skinner Ozone Generator PLC Control & Communication Equipment Upgrade

The Skinner plant ozonation equipment utilizes a type of Programmable Logic Controller (PLC) that was introduced to the commercial market in 1988. Computer hardware from that era is now outdated, and the PLC manufacturer has announced that it will no longer produce or support this equipment. In addition, inventories of spare parts will no longer be maintained once exhausted. Failure of a PLC and/or its communication module could cause a disruption in the ozone control system. This project will replace the equipment and modify the software to operate with the new equipment for the Skinner ozone control system. The upgraded system will feature Metropolitan-standardized PLC's in a new code format to enable future maintenance and modifications as may be operationally necessary.

Skinner Plant 1 - Concrete Joint Sealant Replacement

Concrete joint sealant throughout Skinner Plant 1 is cracked, delaminating, degraded, or missing as it has exceeded its service life. The degradation has allowed vegetation growth and moisture, sediment, and other outside contaminants to enter and penetrate into the concrete joints. This project will remove severely degraded concrete joint sealant throughout Plant 1, prepare and primer the existing joints, and replace with new concrete joint sealant.

Skinner Plant 1 - Modules 1, 2, and 3 Filter Weir Rehabilitation

Filter weirs at the Skinner Plant 1 (Modules Nos. 1, 2, and 3) maintain water levels within the Module's filter weir forebays for appropriate backwash head pressure. Adjustment to the weirs heights is required as water temperatures change throughout the year and as the volume of water being treated changes. All 24 weirs in three modules are adjusted together to maintain a balanced flow from Plant 1. Weir heights need to be carefully adjusted to prevent frequent backwashes or loss of filter media. The current design only allows safe adjustment while the Module is at zero flow or is shut down for service. This project will rehabilitate Modules 1, 2, and 3 filter weirs (24 total) from stackable wooden 2x4s to mechanically operated weirs. The existing concrete weir openings will be modified to accept a stainless-steel weir gate guide and a double panel weir gate. A double panel weir gate will be installed with one panel stationary and one panel adjustable that allows flow adjustments. The weir gate is to be mechanically operated by tandem pedestal lifts mounted above the gate on the existing concrete deck.

Skinner WTP Service Building 1 Rehabilitation

Service Building 1 Rehabilitation will replace the sanitation facilities and roofing system and improve the staff work/meeting/lunch areas of the building. The scope includes the following: replace the roofing system; replace/upgrade all MEP and HVAC systems (mechanical; electrical; plumbing, heating, and air conditioning) to current building codes; upgrade IT requirements; comply with ADA requirements; improve employees shared facilities and offices (bathroom, locker rooms, break rooms, meeting rooms, cubicles); and abate all hazardous materials.
Weymouth Project Group

Weymouth Basin 5 - 8 and Inlet Channel Refurbishment

The basin inlet channels deliver water to each of the Weymouth plant’s eight flocculation/sedimentation basins. The inlet channel serving Basins Nos. 1-4 is a concrete box culvert constructed in 1940, while the inlet channel serving Basins Nos. 5-8 was constructed in 1962. A structural assessment of the basin inlet channels has found that they should be upgraded to reduce the risk of damage from a major seismic event. Inspections have also identified that wooden baffle walls have deteriorated after repeated wet and dry cycles and have shown a propensity to support algae and microbial growth.

For the inlet channel serving Basins Nos. 1-4, this project will strengthen the conduit and will reconfigure the channel to provide additional flexibility. For the Basins Nos. 5-8 inlet channel, the project includes repairing the steel guides; replacing the drive and paddle shaft assemblies; replacing the baffle boards, supports, and paddle wheel boards in the flocculation section. The project also includes filling the interior corners of each cell with sloping concrete fillets to direct residual solids into the path of the rotating scrapers; refurbishing the structural members of the catwalks; refurbishing the sedimentation Basins Nos. 5-8 sludge collectors; and replacing launders in the sedimentation section. Additionally, the coal tar-coated rotating steel sludge rakes will be replaced with stainless steel rakes. Basin inlet gates and inlet channel structural improvements are also part of this project.

Weymouth Administration and Control Building Seismic Upgrades

The Weymouth Administration Building has been in service since 1941 and houses the plant’s control room and administrative staff. The building needs to be seismically upgraded to current standards since this building is over 75 years old and is a critical facility to the operation of the water treatment plant. The project includes reinforcement of the walls for the plant’s filter outlet channel and abandoned inlet channel.

In conjunction with the seismic upgrades, the California Building Code (CBC) requires the installation of a fire sprinkler system and accessibility improvements. Electrical, mechanical, and plumbing components impacted by the upgrades will also be reconfigured. The Weymouth plant’s water quality sampling laboratory and office space will also be updated and optimized where required. The existing laboratory has been in continuous service for nearly 30 years. The Board authorized final design of the building upgrades in January 2018.

Weymouth Basin Gates Improvements

Influent gates for the Weymouth plant’s eight sedimentation basins are between 55 to 77 years old and at the end of their service lives. The existing coal tar coating on each gate has deteriorated resulting in corrosion and leaking. The inability to provide a water-tight seal when isolating basins requires the use of sandbags and pumping to keep nuisance water out of the basins in order to perform maintenance. Additionally, the local controls used for the basin gates make it time-consuming to open or close the gates. This makes it difficult to respond to sudden changes in plant flow. This project will replace the deteriorated inlet gates in Basins Nos. 1-4 with stainless steel slide gates, install new gate actuators capable of SCADA monitoring and control from the plant control room, and construct a new influent conduit to Basins 3 & 4. Preliminary design was authorized by the Board in July 2012.
Weymouth Basins 1 & 2 Rehabilitation

Basins Nos. 1 & 2 were built in 1939 as part of the original Weymouth plant construction. Each basin has a treatment capacity of 57.5 million gallons per day. These basins were originally designed to treat Colorado River Water (CRW). With the addition of State Project Water (SPW), the plant periodically requires higher coagulant dosages than CRW. As a result, the basins operated at a higher solids loading rate than the rate for which the basins were originally designed. This situation has dramatically increased run time on the basins’ circular sludge rakes, which remove sludge from the basins. As originally designed, the sludge rakes only operated 1 to 2 hours every 4-7 days. Under current conditions, the sludge rakes are operated 6 to 12 hrs each day which results in more frequent maintenance. These basins also have had issues with low solids-settling rates within the basins and high particle loading to the filters, or short-circuiting. The project includes the rehabilitation of the flocculation basins, settling basins, sludge collection equipment, baffling, and edge weirs. Study and preliminary design were authorized by the Board in September 2004.

Weymouth Chlorine System Upgrade

The chlorine feed system must be operational at all times to meet State Division of Drinking Water requirements. Chlorine is added downstream of the filters to form a chloramine residual and maintain disinfection in the distribution system. In addition, chlorine serves as the back-up primary disinfectant for the plant. There is insufficient chlorine capacity to meet these needs. In addition, maintenance of the feed equipment can only be performed during low-flow periods.

This project will upgrade the chlorine evaporator system at the Weymouth plant to enhance reliability, safety and meet water quality design criteria. The upgrade includes constructing six additional evaporators housed in a new structure adjacent to the existing chlorine containment building. The six new evaporators would serve as the second chlorine process train. Two additional chlorinators will also be installed to provide additional capacity redundancy and improve reliability. Construction was authorized by the Board in December 2018.

Weymouth Combined Filter Effluent Mixing Improvement

At the Weymouth plant, the combined filter outlet splits into two concrete channels upstream of the finished water reservoir. One channel, which is 140 inches wide, and continues to the east, the other channel, which is 120 inches wide, continues south. Proper mixing of caustic soda, ammonia, and chlorine occurs only when all of the plant’s filter outlet flow is directed either to the 140-inch or the 120-inch channel. However, when the plant flow exceeds 300 million gallons per day (MGD), flow is divided between the two channels which results in poor mixing due to the proximity of the chemical injection points to the intersection of the 140-inch and 120-inch channels.

This project will evaluate mixing in the filter outlet channel, perform hydraulic studies, and assess options to improve mixing in the channels. These options may include operational changes, rehabilitation or replacement of valves and gates, structural modifications, and relocation of chemical injection points.

Weymouth Dry Polymer System

Cationic polymers are used as a coagulant aid for the washwater reclamation plant, and nonionic polymers are needed to meet filter performance regulations when treating high State Project Water (SPW) blends. Depending on the quality of the source water, both dry polymers may need to be applied simultaneously. However, the current dry polymer system only has one mixing train available. Since these feed systems share a common polymer mixer, it is difficult to operate both systems at the same time. Additionally, the existing dry polymer mixer uses a type of batch mixer that can only make a single batch at a time and frequently clogs. The mixer is housed in a metal structure that does not meet current seismic codes.

The project includes installation of a dry polymer mixing system to allow simultaneous mixing and feeding of cationic and nonionic polymers, independently; construction of a new building designed to current seismic standards to house the dry polymer mixing system; and construction of a covered containment area to house feed equipment and new polymer storage tanks. Final design was authorized by the Board in September 2014.
Weymouth Filter Sump Corner Filled Rehabilitation

The sump well located at the Weymouth plant’s Filter Building No. 1 and 2 is experiencing sludge formation in the corners of the sump. This build-up of coal and sand in the corners of the sump is inhibiting the operation of the sparger during transfer of media to the coal removal structure. This project will rehabilitate the sparger and associated piping and will evaluate the effectiveness of in-filling the sump corners and building sloped concrete “angle of repose” structures to prevent build-up.

Weymouth Filter Valve Replacement

The original filter valves in Building No. 1 were installed in two stages in 1941 and 1949, and were replaced in the early 1970s with similar valves. These valves are not consistent with modern American Water Works Association (AWWA) standards. The filter valves in Building No. 2 were installed during the second plant expansion in 1962 and are similar in dimension to the valves in Building No. 1. The existing filter valve bodies exhibit corrosion, the rubber seats are worn, and many valves leak after 45 to 55 years of continuous operation. In addition, the frequency of repairs to the actuators is increasing and spare parts are difficult to obtain. This project will replace all filter valves and actuators in both Filter Building Nos. 1 and 2 with Metropolitan furnished AWWA-standard valves and current industry-standard actuators. Award of the procurement contract was authorized by the Board in November 2017.

Weymouth Hazardous Waste Staging and Containment

The existing hazardous waste storage area requires a number of upgrades to enhance compliance with current codes and to provide enhanced safety measures, such as providing spill containment, eyewashes and safety shower, a canopy, leak detection, and sump. These utilities are all available at the existing sulfuric acid tank farm, which is no longer utilized. As the existing hazardous waste storage area does not provide containment to capture spills or leaks there is potential for hazardous waste to runoff to the storm drain system as well as exposure to plant personnel.

This project will relocate the existing Hazardous Waste Staging and Containment Facility to the existing sulfuric acid tank farm in order to account for deficiencies at the existing facility. The existing sulfuric acid tank farm, located approximately 100 feet from the existing hazardous waste area, is a 30’ x 30’ containment area with a roof, sump, SCADA controls, eyewash station, power, and potable water that can be cost effectively utilized to relocate the hazardous waste facility.

Weymouth Solids Handling Rehabilitation

Residual solids generated during the water treatment process are sent to the gravity thickeners to separate water from the solids before being sent to belt presses in the solids handling facility for further dewatering. Dewatered solids are then pumped to elevated hoppers for storage prior to offsite disposal. Mechanical equipment at the solids handling facility has experienced frequent failures, and the facility itself requires full-time staffing to operate. Regular failures occur with the system’s bridge breakers, which break apart dewatered solids so that they can be pumped to the hoppers. The facility also experiences frequent issues with the hoppers. After the belt presses dewater the solids, polymer solution is added to the discharge side of the cake pumps to facilitate pumping. This produces a cake-like material that often sticks to the hoppers’ mechanical components and impedes opening and closing of the hopper gates. Rehabilitation of the solids handling facility is necessary to maintain its long-term function, reduce maintenance and operational labor costs, and reduce chemical costs.

This project will identify and implement the most feasible rehabilitation of the facility and to evaluate the capacity of the facility’s decant lines. Options for rehabilitation include: (1) eliminating the existing cake pumps and installing a conveyor belt system to transfer the dewatered solids to the hopper system without the addition of liquid polymer; and (2) transferring solids to a separate storage area where the solids are held prior to being hauled offsite. This project will also evaluate modifications within the building that would facilitate future equipment repairs and replacement.
**Weymouth Wastewater Pumpback Improvements**

When ozone is used as the plant's primary disinfectant, the ozone generators will produce the amount of ozone needed based on flow into the plant. The plant inlet flow can experience fluctuations when the washwater return pumps that send flow back to the head of the plant, cycle on and off. Ideally, the flow to the ozone contactors would be consistent. However, the existing pump station has a small forebay as compared to the capacity of the washwater pumps. The forebay receives flow from both the Washwater Reclamation Plant and the Oxidation Demonstration Plant (ODP) clearwell. Significant changes in flow from these two facilities may increase fluctuation in ozone dose requirements.

This project will modify the ODP clearwell pumps with variable speed pumps; improve washwater pump station pump programming to moderate changes in pump speed; reconfigure the ODP clearwell pumps so that one pump is dedicated for backwash, one pump is dedicated for pumpback, and one pump as a spare for either of the two pumps; and relocate the ODP clearwell pump discharge point to a point downstream of the forebay. Preliminary design was authorized by the Board in May 2014.

**Weymouth Water Quality Instrumentation Improvements**

Existing instrumentation used for process control of Title 22 regulatory monitored constituents, including turbidity, fluoride, chlorine, ammonia, pH, conductivity, dissolved oxygen, and temperature is currently located in the basement of the Weymouth Administration Building. This location is subject to flooding in the event that existing sump pumps fail and is over 500 feet from the sampling locations, which can cause inaccurate water quality results and a delay in receiving accurate data. A new instrumentation enclosure will be constructed to provide redundancy and isolation for maintenance purposes and will be in close proximity to the sample locations. Shorter sample lines to online analytical instrumentation would minimize the potential for interference of continuous measurements due to biological growth within the sample lines and provide more accurate results.

This project will construct a new water quality instrumentation enclosure closer to the sample points at the Finished Water Reservoir, purchase and install new sample pumps at the Reservoir Inlet, relocate the Reservoir Inlet sample points closer to the inlet gates to provide a more representative sample, and purchase and install new water quality monitoring instrumentation to provide reliable real time water quality monitoring of the Reservoir Inlet, Orange County Feeder, and the Upper Feeder. Final design was authorized by the Board in May 2014.

**Wheeler Gates Security Improvements**

Construction vehicles and chemical delivery trucks access the Weymouth plant through the Wheeler entrance gate. This project will provide security improvements to the Weymouth plant's Wheeler gate, including construction of a new guard enclosure; and improved lighting and communication features. This project is the third phase of the Weymouth plant's perimeter improvements. Final design was authorized by the Board in November 2006. Phases 1 and 2 are complete.

**Treatment - General Project Group**

**CUF Dechlorination System Upgrade**

The chlorine unloading facility (CUF) is used to transfer liquid chlorine from rail cars to cargo trailers for delivery to Metropolitan facilities. The goal of this project is to enhance compliance with discharge regulations and allow the transfer of liquid chlorine from rail cars to cargo trailers to occur over a wide range of operating conditions. This project will evaluate available technologies; perform a pilot study, if needed, to determine the most feasible technology; and will explore methods and technologies of neutralizing chlorine in order to improve chlorine transloading ability throughout the year. This project will upgrade the existing system that neutralizes chlorine at CUF.
Water Quality/Oxidation Retrofit Program

Fiscal Year 2020/21 Estimate: $0.02 million  
Fiscal Year 2021/22 Estimate: $0 million

Program Information: The Water Quality/Oxidation Retrofit Program (ORP) is comprised of projects to add new facilities to ensure compliance with water quality regulations for treated water, located at Metropolitan’s treatment plants and throughout the distribution system.

Accomplishments for FY 2018/19 and FY 2019/20

- No new projects initiated during the last biennium.

- Major milestones achieved during the last biennium:
  ◦ Weymouth Hypochlorite Feed System - Completed construction, start-up and commissioning

Objectives for FYs 2020/21 and 2021/22

<table>
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<tr>
<th>Project</th>
<th>Total Project Estimate</th>
<th>Estimated Completion</th>
<th>Major Milestones</th>
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<tr>
<td>Weymouth Hypochlorite Feed Facilities</td>
<td>$14,000,000</td>
<td>2020</td>
<td>Complete project</td>
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<tr>
<td>Weymouth ORP - Ozonation Facilities Construction, and Completion Activities</td>
<td>$162,700,000</td>
<td>2020</td>
<td>Complete project</td>
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<tr>
<td>Mills Enhanced Bromate Control</td>
<td>$2,100,000</td>
<td>2020</td>
<td>Complete final design</td>
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WQ/ORP - All Project Group

Mills Enhanced Bromate Control Facilities

The Mills plant is currently using a temporary system built for bromate reduction. This system has been running successfully and has proven the effective use of chloramines in bromate control and the reduced operational costs over a wider range of influent water quality conditions. This project will replace the temporary feed, metering, monitoring, and injection (chlorine and ammonia) system with a permanent system which will incorporate new doubled walled piping, double wall containment, new flow metering, new chlorinators, new analyzers, and new ammonia feed tank. The full implementation of this project will significantly reduce the current operational costs of bromate control as well as provide greater control of bromate formation over a wide range of influent water quality conditions. The project also includes replacement of two existing chlorinators with new units for lower chlorine dosage control flexibility. Final design was authorized by the Board in February 2013.