



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

4/12/2022 Board Meeting

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**7-5**

**Subject**

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Appropriate \$600 million for projects identified in the Capital Investment Plan for Fiscal Years 2022/23 and 2023/24 and authorize the General Manager to initiate or proceed with work on capital projects identified in the Capital Investment Plan for Fiscal Years 2022/23 and 2023/24 and Minor Capital Projects to be identified during the biennial period, subject to any limits on the General Manager's authority and CEQA requirements; the General Manager has determined that the proposed actions are exempt or otherwise not subject to CEQA

**Executive Summary**

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This action enables the General Manager to manage capital projects in an efficient manner by following the streamlined board authorization and appropriation process that was approved by the Board in October 2018. Specifically, staff recommends that the Board:

1. Appropriate a total of \$600 million for projects identified in the Capital Investment Plan (CIP) for Fiscal Years (FYs) 2022/23 and 2023/24.
2. Authorize the General Manager, subject to both CEQA requirements and the General Manager's authority as addressed in Metropolitan's Administrative Code, to initiate or proceed with work on capital projects identified in the CIP for FYs 2022/23 and 2023/24, including Minor Capital Projects.

The CIP planned spending for the biennial period totals approximately \$600 million. This action to appropriate funds and authorizes work will allow staff to implement projects identified in the CIP Appendix for FYs 2022/23 and 2023/24.

**Details**

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**Background**

As part of Metropolitan's biennial budget process, staff develops a recommended two-year budget and expenditure plan for the CIP. The budget and expenditure plan for the CIP are reflected in the CIP Appendix and included in Metropolitan's overall two-year budget and associated budget documents. With the approval of the biennial budget, the Board also takes an action to appropriate the entirety of the funds necessary to fund the CIP in the upcoming biennium. In addition, the Board authorizes the General Manager to initiate or proceed with work on capital projects identified in the CIP Appendix (**Attachment 1**), subject to the requirement of CEQA and the limits of the General Manager's authority. This approach to appropriating funds for the CIP and authorizing the General Manager to conduct work has been in effect since October 2018. Since that time, staff has utilized the streamlined approach to efficiently conduct work on the CIP, which in turn has resulted in a higher percentage of planned CIP work being conducted in a biennium when compared to the prior authorization practices.

For the past 10 years, Metropolitan's Board has authorized planned expenditures on the CIP which have averaged \$250 million per year. With the proposed budget for FYs 2022/23 and 2023/24, staff is recommending that the planned CIP expenditures be increased to \$300 million per year. Staff is recommending this increase so that core work on rehabilitation and replacement work can continue while simultaneously advancing work on key additional initiatives like drought resiliency and flexibility, battery energy storage systems for energy sustainability, and desert housing and village enhancements. The proposed two-year CIP budget does not include

funding for the full-scale Regional Recycled Water Program (RRWP). A separate board action will be required to include the full-scale RRWP in the CIP for FYs 2022/23 and 2023/24.

Staff anticipates that this need to fund the CIP at \$300 million per year will extend through the current 10-year budget forecast and will be increased by three percent per year to account for inflationary trends starting after the next biennium. For this proposed budget preparation, approximately \$3.2 billion of capital work has been identified in the 10-year budget window, of which \$2.9 billion is planned for refurbishment and replacement projects.

In February 2022, staff delivered the proposed CIP Appendix to the Board as Attachment 4 to the Proposed Biennial Budget for FYs 2022/23 and 2023/24 (Board Item 9-2). The CIP Appendix includes a description of the capital project evaluation and prioritization process, a summary by program and project group of planned biennial expenditures, a 2-year and 10-year expenditure projection by program, planned major objectives under each program, and a description of each planned capital project. The only program that does not include individual project descriptions is the Minor Capital Projects Program. Projects within the Minor Capital Projects Program are identified on an ongoing basis during the 2-year budget cycle, and consist of individual projects valued at \$400,000 or less. The anticipated expenditures on this program for the next two years are estimated to be approximately \$16.7 million.

To develop the proposed 2-year budget and 10-year expenditure plan, Metropolitan used an extensive evaluation process that includes a risk analysis to identify and prioritize projects for implementation. The resulting CIP for the upcoming biennium includes a mix of projects that supports Metropolitan's strategic plan and financial targets. The plan takes into account budget and staffing constraints, and the data collected for preparation of the budget indicates that it will take more than ten years to complete the current list of priority projects. This estimate does not take into account additional priority projects that will be identified in future budget cycles. The proposed budget of \$300 million per year for the next two years fits the proposed rate model and reasonably equates to Metropolitan's capacity to work on capital projects at this time. Expenditures of less than the proposed budget would defer priority rehabilitation work needed to maintain system reliability, which in turn would increase the likelihood of unplanned system outages and/or service disruptions.

The CIP Appendix provides the breakdown of planned biennial expenditures totaling approximately \$600 million. Some of the major objectives planned over the next two years are summarized below:

#### Colorado River Aqueduct Reliability Program

- Complete construction of the Eagle Mountain Pumping Plant Village Utilities and Paving Replacement and Overhead Crane Improvements at all five pumping plants.
- Begin procurement for the Main Bank Transformers Replacement.

#### Distribution System Reliability Program

- Complete construction of the Casa Loma Siphon Barrel No. 1 Seismic Retrofit, Orange County Feeder Relining - Stage 3, and Etiwanda Pipeline Lining Replacement – Stage 3.
- Begin design of the Lake Mathews Forebay Pressure Control Structure and Bypass.

#### District Housing and Property Improvements Program

- Complete final design and begin construction of District Housing Improvements and Employee Village Enhancement at Hinds, Eagle Mountain, Iron Mountain, and Gene pumping plants.

#### Prestressed Concrete Cylinder Pipe (PCCP) Rehabilitation Program

- Continue 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.
- Complete construction of the Second Lower Feeder Reach 3A project as well as the PCCP Valve and Equipment Storage building project.

#### Regional Recycled Water Program

- Complete design and initiate construction of Demonstration Plant Direct Potable Reuse Modifications.
- Complete environmental planning process for the full-scale program including board certification of Program Environmental Impact Report (PEIR). This work effort is currently being conducted with O&M funding.

#### System Flexibility/Supply Reliability Program

- Complete construction of drought-related projects such as Inland Feeder-Rialto Pipeline Intertie and Wadsworth Pumping Plant Bypass Pipeline.
- Begin construction of the Perris Valley Pipeline Tunnel.
- Continue design of the Inland Feeder-Foothill Pump Station Intertie.
- Begin design of West Area drought-related projects.

#### System Reliability Program

- Complete construction of the La Verne Shops Improvements-Equipment Installation and Building Completion.
- Complete deployment of Maximo Mobile Upgrade, Wifi Upgrade at La Verne, and Fuel Management System Upgrade.

#### Treatment Plant Reliability Program

- Complete construction of the Jensen Electrical Upgrades – Stage 2 and Mills Electrical Upgrades - Stage 2.
- Substantially complete construction of Weymouth Basins 5-8 and Inlet Channel Refurbishment. Complete design of the Diemer Filter Rehabilitation project.

#### Summary

This action appropriates \$600 million for projects identified in the CIP Appendix for FYs 2022/23 and 2023/24. This action also authorizes the General Manager to initiate or continue with work on the capital projects described in the CIP Appendix for FYs 2022/23 and 2023/24, initiate new minor capital projects to be identified during the biennial period, and continue work on existing minor capital projects, subject to any limits on the General Manager's authority and CEQA requirements. The General Manager will allocate the appropriated funds to existing and new capital projects as needed in accordance with project schedules and progress. Actions taken by the General Manager per this authority will continue to be reported to the Board in the CIP Quarterly Reports.

#### Policy

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Metropolitan Water District Administrative Code Section 2431: Engineering and Operations Committee Duties and Functions

Metropolitan Water District Administrative Code Section 5108: Appropriations

Metropolitan Water District Administrative Code Section 11104: Delegation of Responsibilities

#### California Environmental Quality Act (CEQA)

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##### CEQA determination for Option #1:

The proposed action to appropriate CIP funds and authorize work to proceed under the CIP is not defined as a project under CEQA because it involves continuing administrative activities, such as general policy and procedure making (Section 15378(b)(2) of the State CEQA Guidelines). In addition, the proposed action is not subject to CEQA because it involves other government fiscal activities, which do not involve any commitment to any specific project which may result in a potentially significant physical impact on the environment (Section 15378(b)(4) of the State CEQA Guidelines).

Metropolitan, as the Lead Agency, will be responsible for complying with the requirements of CEQA and the State CEQA Guidelines for each project that meets the CIP criteria prior to final approval of that project. As preliminary work and design on CIP projects proceeds, Metropolitan staff will conduct any necessary CEQA review and prepare the appropriate environmental documentation for consideration and approval by the Board or the General Manager, as appropriate.

**CEQA determination for Option #2:**

None required

**Board Options**

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**Option #1**

- a. Appropriate \$600 million for projects identified in the CIP appendix for FYs 2022/23 and 2023/24.
- b. Authorize the General Manager to initiate or continue work on the capital projects described in the CIP Appendix for FYs 2022/23 and 2023/24 and Minor Capital Projects to be identified during the biennial period, subject to any limits on the General Manager's authority and CEQA requirements.

**Fiscal Impact:** Appropriation of \$600 million under Appropriation No. 15525

**Business Analysis:** This option will enable the continued efficient management of the CIP.

**Option #2**

Do not appropriate funds and seek appropriations and board authorizations for each project individually.


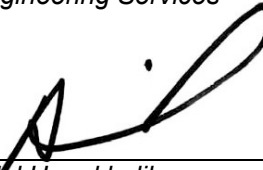
**Fiscal Impact:** Due to additional administrative effort and time required to prepare monthly funding requests for capital projects, it is anticipated that annual capital expenditures will be less than planned under Option #1.

**Business Analysis:** Appropriation of funds and authorization to execute capital projects individually will increase board paperwork and may result in increased project costs while hindering staff's ability to efficiently manage the CIP.

**Staff Recommendation**

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**Option #1**

 _____ John V. Bednarski Manager/Chief Engineer Engineering Services	3/24/2022 _____ Date
 _____ Adel Hagekhalil General Manager	3/30/2022 _____ Date

**Attachment 1 – Capital Investment Plan Appendix for Fiscal Years 2022/23 and 2023/24**

Ref# es12685484





# Capital Investment Plan Appendix

Fiscal Years  
2022/23 and 2023/24



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# CAPITAL INVESTMENT PLAN

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## CAPITAL INVESTMENT PLAN

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### 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 fiscal year (FY) 2022/23 and FY 2023/24. Projects included in this document are referred to as “planned” and upon appropriation of the CIP budget for FY 2022/23 and FY 2023/24 are authorized to proceed by the Chief Engineer’s approval under the authority of the General Manager.

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. However, projects in the post-construction phase are not included but will proceed to completion and closeout.

The total planned capital spending for FY 2022/23 and FY 2023/24 of approximately \$600 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 2022/23 and FY 2023/24 is estimated to be approximately \$300 million and \$300 million, respectively, and is planned to be funded by a combination of current operating revenues (i.e., PAYGO) and debt. Engineering Services tracks actual spending against the plan and adjusts priorities and staff assignments to manage spending consistent with the overall CIP budget.

Capital Program	FY 2022/23	FY 2023/24	Total
Colorado River Aqueduct Reliability	\$ 39,270,000	\$ 36,900,000	\$ 76,170,000
Cost Efficiency & Productivity	\$ 15,610,000	\$ 12,630,000	\$ 28,240,000
Dams & Reservoirs Improvements	\$ 5,300,000	\$ 44,700,000	\$ 50,000,000
Distribution System Reliability	\$ 51,250,000	\$ 12,790,000	\$ 64,040,000
District Housing & Property Improvements	\$ 12,000,000	\$ 15,700,000	\$ 27,700,000
Minor Capital Projects	\$ 8,700,000	\$ 8,000,000	\$ 16,700,000
Prestressed Concrete Cylinder Pipe Rehabilitation	\$ 51,210,000	\$ 53,180,000	\$ 104,390,000
Regional Recycled Water	\$ 3,860,000	\$ 16,030,000	\$ 19,890,000
Right-of-Way & Infrastructure Protection	\$ 7,770,000	\$ 3,790,000	\$ 11,560,000
System Flexibility/Supply Reliability	\$ 31,590,000	\$ 40,610,000	\$ 72,200,000
System Reliability	\$ 48,500,000	\$ 37,700,000	\$ 86,200,000
Treatment Plant Reliability	\$ 24,940,000	\$ 17,170,000	\$ 42,110,000
Water Quality	\$ —	\$ 800,000	\$ 800,000
<b>Total</b>	<b>\$ 300,000,000</b>	<b>\$ 300,000,000</b>	<b>\$ 600,000,000</b>

## Capital Investment Plan Organization

### CIP Structure

The CIP is structured into three levels 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**

<b>Program</b>	<b>Definition</b>
Colorado River Aqueduct (CRA) Reliability	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.
Cost Efficiency & Productivity	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. Projects that address climate change in addition to providing the economic savings are also included.
Dams & Reservoirs Improvements	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.
Distribution System Reliability	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.
District Housing & Property Improvements	Projects under this program will refurbish or upgrade Metropolitan workforce housing to enhance living conditions and attract and retain skilled employees.
Minor Capital Projects	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.
Prestressed Concrete Cylinder Pipe (PCCP) Rehabilitation	Projects under this program will refurbish or upgrade Metropolitan's PCCP feeders to maintain reliable water deliveries without unplanned shutdowns.
Regional Recycled Water	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.
Right-of-Way and Infrastructure Protection	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.
System Flexibility/Supply Reliability	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. Projects under this program address climate change affecting water supply, regional drought, and alternative water sources for areas dependent on State Project Water.



<b>Program</b>	<b>Definition</b>
System Reliability	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.
Treatment Plant Reliability: <ul style="list-style-type: none"><li>• Diemer Plant</li><li>• Jensen Plant</li><li>• Mills Plant</li><li>• Skinner Plant</li><li>• Weymouth Plant</li></ul>	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.
Water Quality	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.

## 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 through the completion of the project 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 2 - Project Proposal Guidelines

Section	Guideline
Appropriation No., CIP Index No., Project No., (if existing) and Project Title	If a proposed project has been previously included in the CIP and has been assigned a CIP index number, provide the appropriation and CIP index number along with the project title and project number if one has been assigned. If not previously included in the CIP, provide a project title only.
Sponsoring Group	Indicate the Group sponsoring the project, as follows: 1) Office of General Manager 2) Water System Operations 3) Water Resource Management 4) Engineering Services 5) Information Technology 6) Real Property 7) Human Resources 8) External Affairs 9) General Counsel Department 10) General Auditor Department 11) Ethics Office 12) Environmental Planning
Project Manager and Proposal Preparer	Enter the name of the project manager if one was assigned and enter the name of proposal preparer.
Estimated Total Project Cost	Show the total estimate of cost from inception to completion of a project, including administrative overhead and contingency, as applicable.
GM Business Plan	Indicate the strategic priorities under GM's Business Plan the project best supports.
Current Project Phase	Indicate the phase (Study, Preliminary Design, etc.) as of the date proposal submitted.
Current Phase % Complete	Current phase percent complete as of the date proposal submitted.
Project Description	Describe the project scope of work.
Changes to Existing Project	For an existing project, describe any changes to the project scope, budget, or schedule over the past two years.
Justification	<p>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 the project needed? Why can't the project be postponed?</p> <p>Consider issues such as:</p> <ul style="list-style-type: none"> <li>• Operational flexibility</li> <li>• New facility expansion</li> <li>• New water supply</li> <li>• Aging infrastructure deterioration/failure</li> <li>• Process improvement/failure</li> <li>• Maintenance capability</li> <li>• Seismic vulnerability</li> <li>• Obsolescence (vendor support, parts, technology, etc.)</li> <li>• Security</li> <li>• Regulatory Compliance (water quality, environmental, health and safety, etc.)</li> <li>• Cost savings</li> <li>• Revenue generation</li> <li>• Energy savings</li> <li>• Productivity</li> </ul> <p>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.</p>

Section	Guideline
Directive	<p><b>Regulatory/Legal Settlement:</b> 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).</p> <p><b>Special Initiative/Directive:</b> 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.</p>
Service Disruption	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.
Cost/Productivity/Sustainability	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.
Alternatives	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.
Additional Background Information	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.
Schedule	Indicate the proposed beginning and end dates for all appropriate phases.
Detailed Project Cost Estimate	<p>Include an itemized list of all costs for the project, as follows:</p> <ol style="list-style-type: none"> <li>1) Direct Labor with additives at the indicated rate</li> <li>2) Equipment and Materials</li> <li>3) Incidental Expenses</li> <li>4) Professional/Technical Services (e.g., consultants)</li> <li>5) Right-of-Way and Land Purchases (e.g., easements, fee title, escrow fees)</li> <li>6) Operating Equipment Use and Rental</li> <li>7) Contract Payments (e.g., construction contracts)</li> <li>8) Administrative Overhead at the indicated rate</li> <li>9) Contingency</li> </ol> <p>All new project proposals and existing projects must include this estimate.</p>
Post-Implementation O&M Impacts	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&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 2021/22. 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.
Approvals	<ol style="list-style-type: none"> <li>1) Person submitting the proposed project - Type name only</li> <li>2) Team manager sponsoring the project</li> <li>3) Unit manager sponsoring the project</li> <li>4) Section manager sponsoring the project (e.g., all new and existing projects)</li> <li>5) Group manager sponsoring the project (e.g., all new projects)</li> </ol>

## Evaluation Criteria

The evaluation criteria cover four characteristics or objectives for capital projects: Project Justification, Directive, Service Disruption, and Cost/Sustainability/Customer Service. 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**

Criteria	Description
Justification	<p>Assessment of the overall importance of a project. Criterion looks at whether or not a project supports the following:</p> <ul style="list-style-type: none"> <li>- Supply reliability</li> <li>- Infrastructure reliability</li> <li>- Regulatory compliance</li> <li>- Other goals (e.g., cost savings, revenue generation, energy savings, and increased productivity)</li> </ul>
Directive	<p>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:</p> <ul style="list-style-type: none"> <li>- Regulatory/Legal Settlement</li> <li>- Special Initiative/Directive</li> <li>- GM Business Plan</li> </ul>
Service Disruption	<p>Assessment of not doing a project. Criterion evaluates the following:</p> <ul style="list-style-type: none"> <li>- Impact to Metropolitan's business operations</li> <li>- Impact to water system operations (e.g., system delivery and/or reliability, cascading impact on system due to failure, etc.)</li> </ul>
Cost/Sustainability/Customer Service	<p>Assessment of whether or not a project improves the following:</p> <ul style="list-style-type: none"> <li>- Cost efficiency</li> <li>- Sustainability</li> <li>- Customer service</li> </ul>

Multiplier	Description
Risk Assessment	<p>Assessment of the probability of:</p> <ul style="list-style-type: none"> <li>- Facility/component/process failure</li> <li>- Health, safety, water quality, or environmental impact</li> <li>- Missed opportunity (e.g., available resources, shutdown, revenue generation, cost savings, supply)</li> <li>- Not meeting service demands</li> </ul>



## Project Evaluation

A CIP Evaluation Committee 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 2022/23 and FY 2023/24 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 2022/23 and FY 2023/24

### 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 this Capital Investment Plan Appendix for the two-year budget cycle. Consistent with this action, all requests to allocate appropriated CIP 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.

In order to arrive at the spending plan for individual programs, the budget and schedule for each individual project is paired with project metadata (sponsor priorities, CIP scores, project status, etc.). The projects are then organized (or leveled) using an algorithm that combines anticipated capital spending with project prioritization. The resulting plan represents a spending model snapshot in time and is adjusted during the biennium as priorities and conditions change.

For this budget preparation cycle, we have deployed a new cloud-based CIP budgeting tool that performs the pairing and leveling work more efficiently. This new tool also makes it easier to create budget scenarios and to better maintain project and budget information, which helps with administration of CIP.

New to this budget cycle, in addition to the CIP scoring described above, each project is being reviewed against set risk criteria to evaluate the relative consequence and likelihood of failure. This data is used as a tool to assist in prioritizing projects.

In addition to the budgeting tool, two other web-based forms were deployed for this budget preparation cycle. One of the forms is a new web-based CIP proposal form, which streamlined the process.

### Additions

Projects not described in this CIP Appendix are considered unplanned and are not included in the planned biennial spending. Unplanned projects require specific board authorization to add unplanned projects to the CIP Appendix before work can be initiated. Five unplanned projects totaling \$57.52 million were added to the FY 2020/21 and FY 2021/22 budget as authorized by the Board. These projects were identified after adoption of the budget and included projects such as Jensen, Skinner, & Weymouth Battery Energy Storage Systems, Gene Communication System Upgrade, Inland Feeder-Rialto Pipeline Intertie, Wadsworth Pump Discharge to Eastside Pipeline Bypass, and Inland Feeder-Citrus Reservoir and Pump Station Intertie. These projects are now included in this document and are considered planned projects for FY 2022/23 and FY 2023/24.

### New Projects

Since the start of the current biennium, a total of approximately 100 new project proposals, including unplanned but excluding Minor Capital projects have been submitted and reviewed by the CIP Evaluation Committee 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 current or the next CIP Appendix.

## 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 CRA Pumping Plant Sump System Rehabilitation and CRA Pumping Plants Crane Improvements projects. Continue construction of CRA 6.9 kV Power Cables Replacement for Pump Units 6 to 9, CRA Pumping Plants Water Treatment Systems Replacement, and CRA Pumping Plant Storage Buildings at Hinds, Eagle Mountain and Iron Mountain.

### Cost Efficiency and Productivity

Deploy the new WINS Water Billing System. Complete the Jensen, Skinner, and Weymouth Battery Energy Storage Systems project. Start the Payroll-Timekeeping Reimplementation project.

### Dams & Reservoirs Improvements

Complete design and begin construction of the Diamond Valley Lake Dam Monitoring System Upgrades project. Complete design of the Mills and Jensen finished water reservoir floating cover replacement projects. Complete preliminary investigations of the Lake Mathews and Lake Skinner spillways.

### Distribution System Reliability

Complete construction of the Casa Loma Siphon Barrel No. 1 Seismic Retrofit, Orange County Feeder Relining - Stage 3, and Etiwanda Pipeline Lining Replacement - Stage 3. Begin design of the Lake Mathews Forebay Pressure Control Structure and Bypass project.

### District Housing and Property Improvements Program

Complete final design and begin construction of District Housing Improvements and Employee Village Enhancement at Hinds, Eagle Mountain, Iron Mountain, and Gene.

### Prestressed Concrete Cylinder Pipe Rehabilitation

Continue design, 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.

### Regional Recycled Water Program

Complete design and initiate construction of Demonstration Plant Direct Potable Reuse Modifications.

### Right-of-Way and Infrastructure Protection

Complete construction of pipeline protection and access improvements of San Bernardino County Region – Stage 1. Start construction of pipeline protection and access improvements of the Orange County Region – Stages 2 & 3 project. Continue efforts to develop and certify programmatic EIRs for the western San Bernardino, Los Angeles, Riverside and San Diego County regions.

### System Flexibility/Supply Reliability

Complete construction of the drought-related projects such as Inland Feeder-Rialto Pipeline Intertie and Wadsworth Pump Discharge to Eastside Pipeline Bypass. Continue design of the Inland Feeder-Citrus Reservoir and Pump Station Intertie project. Begin construction of the Perris Valley Pipeline tunnel project.

### System Reliability

Complete construction of La Verne Shops Improvements-Equipment Installation and Building Completion project. Complete deployment of Maximo Mobile Upgrade, Wifi Upgrade at La Verne, and Fuel Management System Upgrade projects.

### Treatment Plant Reliability

Complete construction of the Jensen Electrical Upgrades – Stage 2 and Mills Electrical Upgrades – Stage 2 projects. Substantially complete construction of Weymouth Basins 5-8 and Inlet Channel Refurbishment project. Complete design of Diemer Filter Rehabilitation.

### Water Quality

Complete the design for the Mills Bromate Control project.

## Financial Projections

Planned capital spending for FY 2022/23 and FY 2023/24 is estimated to be \$300 million and \$300 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 2022/23 and FY 2023/24 biennium is approximately \$600 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 2022/23 and FY 2023/24 by Program

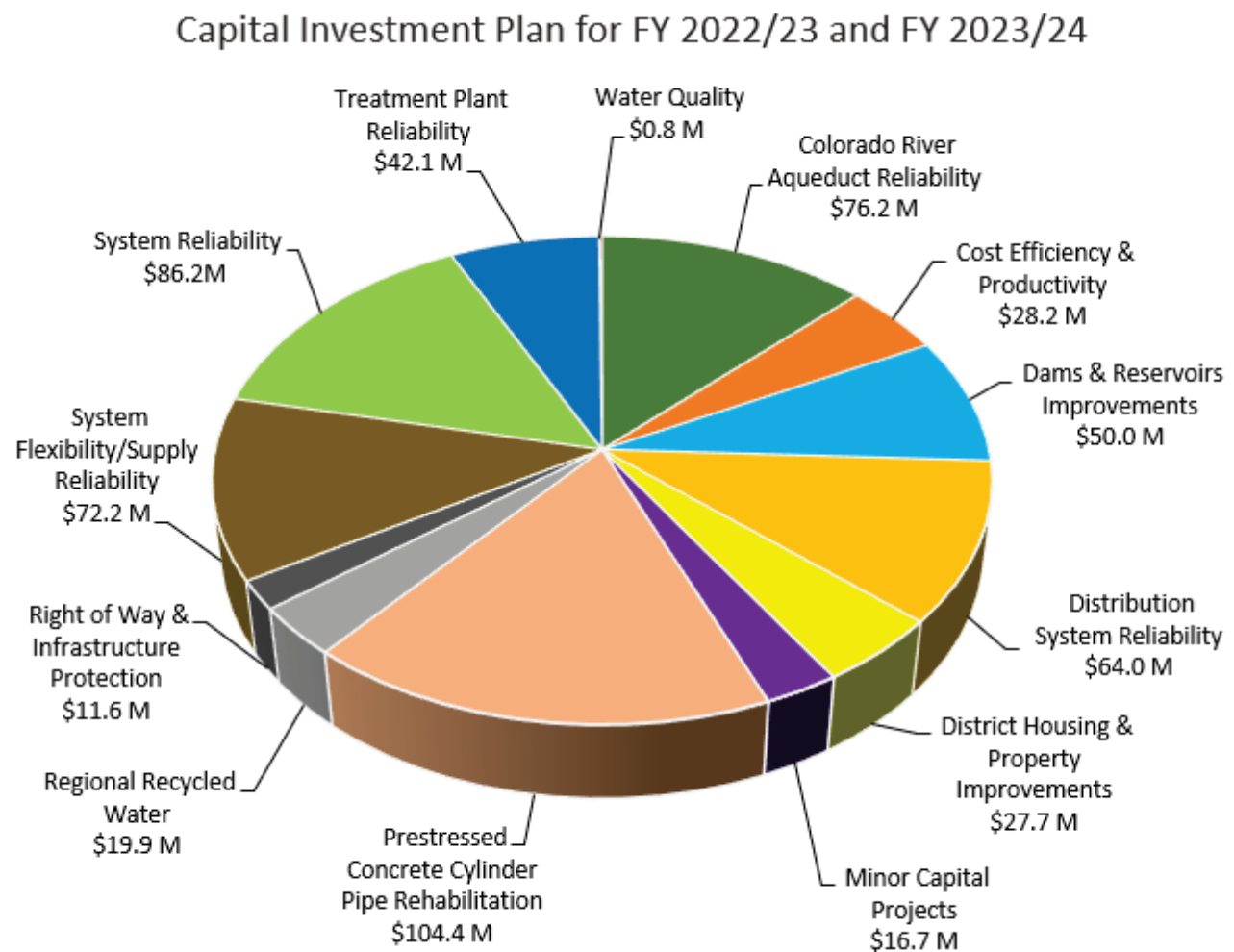




Figure 2 depicts the planned capital spending profile, including actual and projected cash flow, for the 15-year period from FY 2017/18 through FY 2031/32 and Table 4 provides a more detailed two-year outlook.

Figure 2 - CIP 15-year Window by Program FY 2017/18 through FY 2031/32

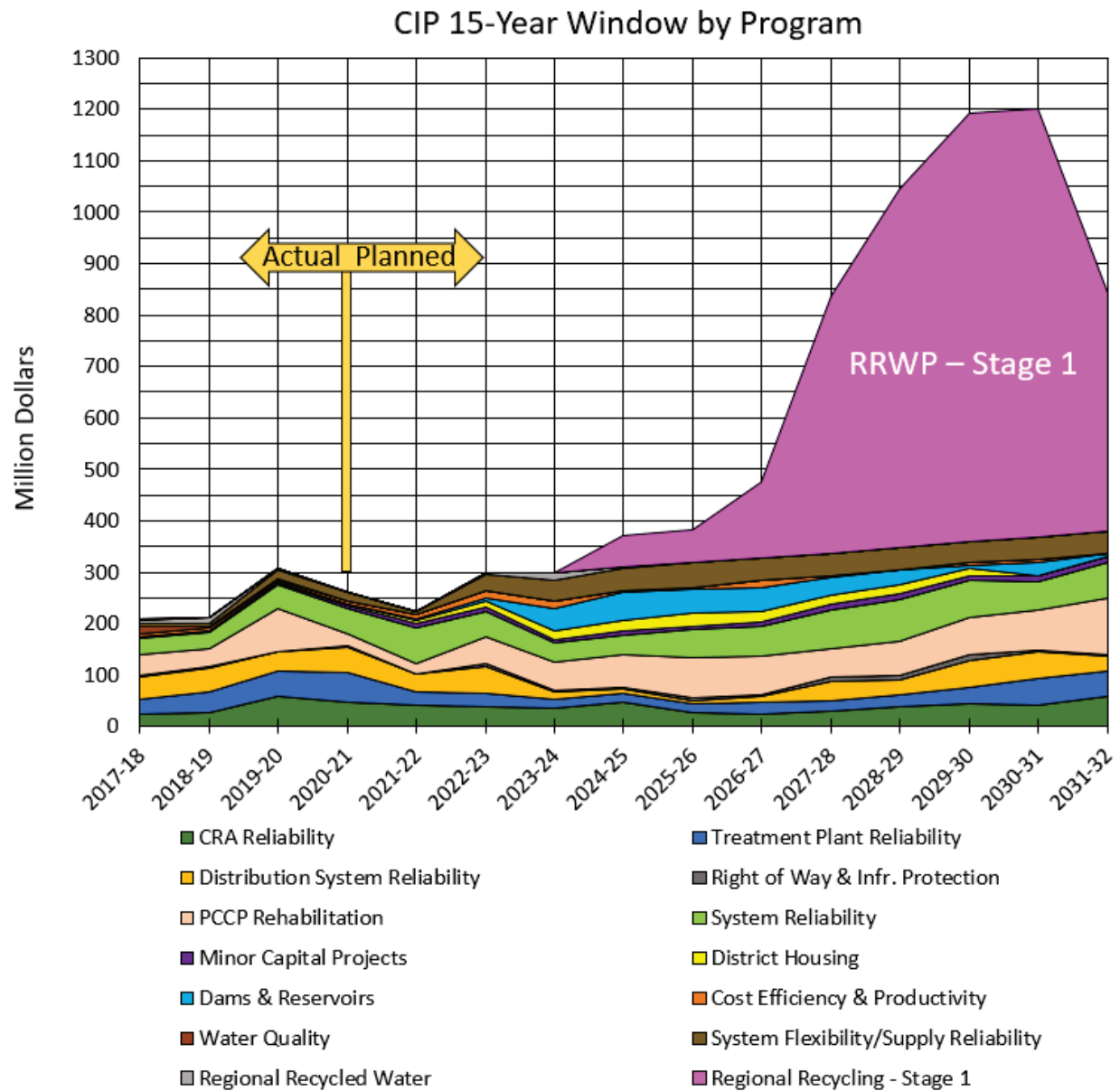


Table 4 - Two-Year Outlook

<b>Capital Program and Project Groups</b>	<b>FY 2022/23</b>	<b>FY 2023/24</b>
<b>Colorado River Aqueduct Reliability</b>	<b>\$ 39,270,000</b>	<b>\$ 36,900,000</b>
CRA - Conveyance	\$ 9,720,000	\$ 170,000
CRA - Electrical Systems	\$ 4,560,000	\$ 8,900,000
CRA - Pumping Plants	\$ 17,940,000	\$ 18,300,000
CRA - Other	\$ 7,050,000	\$ 9,530,000
<b>Cost Efficiency &amp; Productivity</b>	<b>\$ 15,610,000</b>	<b>\$ 12,630,000</b>
Diamond Valley Lake Recreation - New/Improvements	\$ 2,660,000	\$ 4,000,000
Diamond Valley Lake Recreation - Refurbishment & Replacement	\$ 150,000	\$ —
IT - Business Support	\$ 5,100,000	\$ 1,230,000
Cost Efficiency & Productivity - Other	\$ 7,700,000	\$ 7,400,000
<b>Dams &amp; Reservoirs Improvements</b>	<b>\$ 5,300,000</b>	<b>\$ 44,700,000</b>
Dams & Reservoirs - All	\$ 5,300,000	\$ 44,700,000
<b>Distribution System Reliability</b>	<b>\$ 51,250,000</b>	<b>\$ 12,790,000</b>
Pipelines, Tunnels, Canals	\$ 30,000,000	\$ 8,400,000
Pressure Control Structures/Hydroelectric Plants/Service Connections/Valves & Gates	\$ 12,400,000	\$ 4,300,000
Distribution System - Other	\$ 8,850,000	\$ 90,000
<b>District Housing &amp; Property Improvements</b>	<b>\$ 12,000,000</b>	<b>\$ 15,700,000</b>
Housing & Property Improvements	\$ 12,000,000	\$ 15,700,000
<b>Minor Capital Projects</b>	<b>\$ 8,700,000</b>	<b>\$ 8,000,000</b>
Minor Capital Projects - All	\$ 8,700,000	\$ 8,000,000
<b>Prestressed Concrete Cylinder Pipe Rehabilitation</b>	<b>\$ 51,210,000</b>	<b>\$ 53,180,000</b>
Allen McColloch Pipeline	\$ —	\$ —
Calabasas Feeder	\$ —	\$ —
Rialto Feeder	\$ 3,300,000	\$ 5,900,000
Second Lower Feeder	\$ 43,500,000	\$ 46,900,000
Sepulveda Feeder	\$ 3,900,000	\$ 380,000
PCCP - Other	\$ 510,000	\$ —
<b>Regional Recycled Water</b>	<b>\$ 3,860,000</b>	<b>\$ 16,030,000</b>
Regional Recycled Water - All	\$ 3,860,000	\$ 16,030,000
<b>Right-of-Way &amp; Infrastructure Protection</b>	<b>\$ 7,770,000</b>	<b>\$ 3,790,000</b>
Los Angeles Region	\$ 3,780,000	\$ 2,390,000
Orange County Region	\$ 630,000	\$ —
Riverside/San Diego Region	\$ —	\$ —
Western San Bernardino Region	\$ 1,800,000	\$ —
RWIPP - Other	\$ 1,560,000	\$ 1,400,000
<b>System Flexibility/Supply Reliability</b>	<b>\$ 31,590,000</b>	<b>\$ 40,610,000</b>
System Flexibility/Supply Reliability - All	\$ 31,590,000	\$ 40,610,000
<b>System Reliability</b>	<b>\$ 48,500,000</b>	<b>\$ 37,700,000</b>
IT/SCADA - Infrastructure	\$ 12,700,000	\$ 18,300,000
Operations Support	\$ 21,700,000	\$ 15,000,000

<b>Capital Program and Project Groups</b>	<b>FY 2022/23</b>	<b>FY 2023/24</b>
System Reliability - Security and Other	\$ 14,100,000	\$ 4,400,000
<b>Treatment Plant Reliability</b>	<b>\$ 24,940,000</b>	<b>\$ 17,170,000</b>
Diemer	\$ 7,100,000	\$ 320,000
Jensen	\$ 9,050,000	\$ 2,540,000
Mills	\$ 120,000	\$ 40,000
Skinner	\$ 1,470,000	\$ 250,000
Weymouth	\$ 7,200,000	\$ 14,020,000
Treatment - General	\$ —	\$ —
<b>Water Quality</b>	<b>\$ —</b>	<b>\$ 800,000</b>
Water Quality - All	\$ —	\$ 800,000

## 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)

Currently, activities associated with the RRWP are limited to operations and testing at the Advanced Water Treatment Demonstration Plant (demo plant) and environmental permitting. Ongoing modifications to the demo plant are included in the CIP, while preparation of a Programmatic Environmental Impact Report is funded under the O&M budget.

The decision to proceed with the full-scale recycled water program is expected to be brought to the Board during FYs 2022/23 and 2023/24. At that time, the regulatory, operational, and financial impacts of developing the full-scale program will be presented to the Board to decide whether or not to proceed. If the full-scale recycled water program proceeds, the project will be added to the CIP at that time. Subsequent changes to that program such as consideration of direct potable reuse or expanding capacity will be treated the same way.

### Diamond Valley Lake Recreation

The Diamond Valley Lake (DVL) Recreation Program is a unique appropriation. The program was fully funded with \$92.8M in 2004 with the intent of constructing recreational facilities at the East and West Dams. One condition placed on the appropriation was that proceeds from the sale of any surplus DVL properties would be used as additional funds to the program. In 2021, Metropolitan sold DVL land valued at \$4.5M and this amount was added to the DVL Recreation appropriation. Future sales will be addressed similarly.

### Drought Projects

In response to the ongoing historic statewide drought, this CIP includes several projects that address decreasing water supplies both in specific parts of Metropolitan's service area and across the entire District (e.g., Wadsworth Pump Discharge to Eastside Pipeline Bypass project, Rialto Feeder and Mills Plant Pump Station). Engineering Services and Water System Operations are continuing to investigate capital improvements that mitigate drought impacts and more projects are expected to be brought to the Board during FYs 2022/23 and 2023/24.

## 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 2022/23 and FY 2023/24. 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 2022/23 and FY 2023/24 biennial estimate. Table 5 provides an explanation of each item.

Table 5 - Key Program Information

Item	Description
Program Description	A brief explanation of the types of projects included in the Program
Fiscal Year 2022/23 Estimate	Estimate of planned spending from July 2022 through June 2023. It does not include a contingency amount.
Fiscal Year 2023/24 Estimate	Estimate of planned spending from July 2023 through June 2024. It does not include a contingency amount.
Accomplishments for FY 2020/21 and FY 2021/22	Listing of new projects initiated and major milestones achieved during the last biennium
Objectives for FY 2022/23 and FY 2023/24	Listing of key projects with major milestones planned during the budget biennium with the total project estimate, estimated construction completion, and the planned milestone for FY 2022/23 and FY 2023/24

### 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

Program Title	Page No.
Colorado River Aqueduct Reliability	<a href="#">20</a>
Cost Efficiency & Productivity	<a href="#">33</a>
Dams & Reservoirs Improvements	<a href="#">39</a>
Distribution System Reliability	<a href="#">45</a>
District Housing & Property Improvements	<a href="#">71</a>
Minor Capital Projects	<a href="#">73</a>
PCCP Rehabilitation	<a href="#">74</a>
Regional Recycled Water	<a href="#">78</a>
Right-of-Way & Infrastructure Protection	<a href="#">79</a>
System Flexibility/Supply Reliability	<a href="#">82</a>
System Reliability	<a href="#">87</a>
Treatment Plant Reliability	<a href="#">103</a>
Water Quality	<a href="#">119</a>



## Individual Program Summaries

### Colorado River Aqueduct (CRA) Reliability Program

Fiscal Year 2022/23 Estimate: \$39.3 million

Fiscal Year 2023/24 Estimate: \$36.9 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 2020/21 and FY 2021/22

- New projects initiated:
  - Black Metal Mountain 2.4 kV Electrical Power Upgrade
  - CRA Conduit Protection & Lining – Stage 1
  - CRA Eagle Mountain 230 kV Local Breaker Failure Backup
  - CRA Pumping Plant 2.3 kV and 480 V Switchrack Rehabilitation
  - CRA Whipple Mountain Tunnel Flow Metering Equipment Upgrades
  - Eagle Lift and Eagle West Siphons Seismic Improvements
  - Eagle Mountain 230 kV Physical and Cyber Security Upgrades
- Major milestones achieved:
  - Construction completed:
    - CRA Radial Gates Rehabilitation
    - CRA Pumping Plants Discharge Line Isolation Bulkhead Couplings
    - CRA Pumping Plant Sump System Rehabilitation – Procurement
    - CRA Radial Gates Rehabilitation
    - Gene Wash Reservoir Discharge Valve Rehabilitation
  - Construction contracts awarded:
    - CRA Pumping Plants Crane Improvements
    - CRA Pumping Plants Water Treatment Systems Replacement
    - Mile 12 Flow and Chlorine Monitoring Station Upgrades

## Objectives for FYs 2022/23 and 2023/24

Project	Total Project Estimate	Estimated Construction Completion	Major Milestones
Copper Basin Reservoirs Discharge Valve Rehabilitation	\$ 24,000,000	2025	Begin construction
CRA 6.9 kV Power Cables Replacement for Pump Units 6 to 9	\$ 25,000,000	2025	Begin construction
CRA Conduit Structural Protection	\$ 16,000,000	2024	Begin construction
CRA Desert Region Security Improvements	\$ 8,200,000	2024	Begin construction
CRA Main Transformer Refurbishment	\$ 41,000,000	2027	Begin equipment procurement and construction
CRA Pumping Plant Sump System Rehabilitation	\$ 43,000,000	2024	Begin construction
CRA Pumping Plants Crane Improvements	\$ 19,000,000	2023	Complete construction
CRA Pumping Plant Storage Buildings at Hinds, Eagle Mountain and Iron Mountain	\$ 9,000,000	2024	Begin Construction
Eagle Mountain Pumping Plant Village Utilities & Paving Replacement	\$ 7,600,000	2024	Begin construction
Gene Pumping Plant Village Utilities & Paving Replacement	\$ 24,000,000	2025	Begin construction
Hinds Pumping Plant Discharge Valve Pit Platform Replacement	\$ 8,400,000	2026	Begin construction
Hinds Pumping Plant Village Utilities & Paving Replacement	\$ 9,500,000	2024	Begin construction
Mile 12 Flow and Chlorine Monitoring Station Upgrades	\$ 6,000,000	2022	Complete construction

## 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 radial gate, motor, and controls.

**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 or over pressurization due to friction inside the conduits during high pump flow. 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 and epoxy lining the conduits at specific locations. New pressure sensor systems will be installed to monitor the pressure inside the conduits during the high pump-flow operation. The slabs will protect the conduits from damage by distributing the equipment loading to the surrounding soil and epoxy liner will decrease internal friction to allow increased flow through the CRA conveyance system.

**CRA Conveyance System High Flow Reliability Upgrades**

With recent drought conditions and low State Project Water allocations, Metropolitan has needed to maximize flow through the CRA. With climate change impacting regional hydrology, this operational flexibility will continue to be a priority. This project will strengthen the conveyance portion of the CRA system and make other improvements to provide reliable flow through eight CRA pumps year-round. Some of the options that will be considered include: carbon fiber lining, polyurethane lining, epoxy lining, steel lining, and structural strengthening from the outside of the conduits. This project will also add new gauging stations along the conveyance system that will be tied into SCADA to provide flow data and information that will assist with maintaining uniform and steady state flow conditions through the CRA system. This is a new project for this budget cycle.

**CRA Freda Siphon Barrel No. 1 Improvements**

Like many of the CRA's 146 siphons, the Freda Siphon was constructed of cast-in-place reinforced concrete in the 1930s. And like many of these siphons, the Freda Siphon leaks measurably. This project will investigate methods to permanently address reoccurring leaks and will perform improvements that are cost-effective, long-term, and require minimal shutdown time and maintenance. This is a new project for this budget cycle.

**CRA Freda Siphon Barrel No. 1 Leak Repairs**

Surface investigations of the CRA Freda Siphon Barrel No. 1 conducted over the past two years revealed as many as eight leakage locations. This project will install internal seals along the siphon during the 2023 CRA scheduled shutdown, reducing the risk of future unplanned outages and costly emergency repairs. This is a new project for this budget cycle.

**CRA Sodium Hypochlorite Injection Improvements**

Sodium hypochlorite is added along the Colorado River Aqueduct (CRA) to control algal growth, which could damage downstream process equipment and reduce flow through the aqueduct. The existing process of providing weekly chlorine addition into the canal produces spikes in chlorine concentrations, which causes the Colorado River water to be more corrosive to conveyance systems and plant equipment, and produce higher concentrations of trihalomethanes (THMs). This project will construct new chlorine storage and injection facilities to provide a steady rate of chlorine addition at five locations along the CRA. Each new chlorine injection facility will be upgraded to include a sodium hypochlorite tank and pump skid, chemical storage building with climate control and spill containment, delivery driveway with spill containment area, piping, chlorine injection system, security cameras, fencing, electrical and Supervisory Control and Data Acquisition (SCADA) upgrades, and other appurtenances. This is a new project for this budget cycle.

**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.

**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, chlorine analyzers, transducers, and associated cabling; relocate the data and communications equipment from the underground manhole to a new aboveground monitoring station with air-conditioned cabinets to enable stable operation; construct a reliable power source by upgrading the solar power system and installing a propane generator; and install security system.

**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.

## CRA - Electrical Systems Project Group

### **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 Metropolitan-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, and appurtenances. 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 and larger conductors to increase the available power to the sites; and improvements to the service roads to improve access for maintenance and safety.

### **CRA 230 kV Transmission Line Rehabilitation and 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 and cyber 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. Additional scope may be added as a result of the planned assessment of the existing system.



**CRA 6.9 kV Power Cable Replacement for Pump Units 6 to 9**

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 57 to 77 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. The cables for pump units 1 to 5 have been replaced. This project includes the replacement of the deteriorated main power cables for pump units 6 to 9 at each of the five CRA pumping plants. Final design for units 6 to 9 is underway.

**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. Additional scope may be added as a result of preliminary assessment of each of the sites to make the auxiliary power systems reliable.

**CRA Hinds Sand Trap & Wasteway Radial Gate Power Cable Replacement**

The power cables that feed the Hinds sand trap and wasteway radial gate are installed in a shallow ductbank that is deteriorating due to heat, in a conduit that is overfilled. This project will construct a new ductbank with power conductors designed to address these deficiencies. This is a new project for this budget cycle.

**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 rehabilitation of transformer cranes, upgrade of transformer monitoring and protection equipment, and replacement of leaky circulating oil pumps that are used to cool the transformers and construction of secondary spill containment for the transformer banks. Additional scope may be added as a result of preliminary assessment to ensure reliable and safe operation of the CRA pumping plants.

**CRA Pumping Plants 2.3 kV and 480 V Switchrack Rehabilitation**

All five CRA Pumping Plants have a 2.3 kV and 480 V switchracks 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 switchracks 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 or replace the 2.3 kV and the 480V switchracks and associated support systems 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 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.

**CRA - Pumping Plants Project Group****CRA Intake Pumping Plant Shore Protection**

The existing shore protection consisting of rocks and concrete was installed around the time the Intake Pumping Plant was constructed in the 1930s and has exceeded its service life. This project will improve the shore adjacent to the Intake Pumping Plant to protect the access road and facilities and mitigate against short and long-term coastal erosion due to wave attack, flooding, and water surface level changes in Lake Havasu. This is a new project for this budget cycle.

**CRA Iron Mountain and Eagle Mountain Pumping Plant Reservoirs Floor Relining**

The Iron Mountain and Eagle Mountain CRA Pumping Plants each have approximately 9.3-acre forebay reservoirs, constructed in the 1930s. Recent geotechnical investigations of the asphalt reservoir floor liners found them to be in poor condition. This project will replace the liners at each plant with a material that precludes seepage water loss and extends the life of the facility. This is a new project for this budget cycle.

**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. 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 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 or replace 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 and heat exchange system at each pump unit.

**CRA Pumping 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.

**CRA Pumping 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 72-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 awarded by the Board in December 2018, but construction activities were suspended in March 2020 due to the COVID-19 pandemic, which led to cancellation of the construction portion of the contract. The delivered equipment and materials will be installed by another contractor.

**CRA Pumping 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. Additional scope may be added as a result of preliminary assessment to ensure reliable operation of the CRA pumping plants.

**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, the system controls, and other associated support systems.

**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 82 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. A number of the most deteriorated joints have been rehabilitated recently. This project provides a comprehensive rehabilitation of the remainder of 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.

**CRA Pumping Plant Public Address and Alarm Communication System Upgrades**

The existing communication signals at each of the five CRA pumping plants are currently separated into different systems including: the public address system; plant alarms; evacuation, fire, and carbon dioxide alarms; and phones. The signals in these systems were originally installed to utilize the existing 1930's era phone line systems and is becoming increasingly difficult to maintain as replacement parts are becoming harder to find and troubleshooting is difficult. This project will replace the existing communication systems with a new integrated and modernized auditory communication system with alarms that are able to be identified based on different distinct alarm tones. Signal wires will be routed to a network enabled public address and general alarm system and new speakers will be added at each plant to improve ability to hear audible alarms throughout the plants, even when loud pumps are operating. This is a new project for this budget cycle.

**CRA Pumping Plant Pump Lower Guide Access Improvements**

At each of the CRA pumping plants, maintenance staff performs a monthly inspection of the lower guides below each main pump. The access hatch utilized for this inspection is located about twenty feet above the deck and situated where it is difficult for workers to reach and inspect the lower guides. This project will design, fabricate, and install a total of 45 new work platforms/mezzanines to improve safety and to facilitate the routine inspections. This is a new project for this budget cycle.

**CRA Pumping Plant Rollup Door and Window Replacements**

Over the past 80 years, the desert has taken its toll on the windows and rollup doors at all five CRA pumping plants. Many windows can no longer be opened, making it difficult to keep the main pump motors cool on 120-degree summer days. And the rollup doors in the pumphouses and head gate structures require continual maintenance to keep them operable. This project will replace these building features while remaining consistent with architectural standards. This is a new project for this budget cycle.

**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 almost 30 years and now suffer from frequent membrane and pipe failures. This project will replace the skid-mounted water treatment systems in its entirety including replacement of water quality monitoring instrumentation and laboratory equipment, upgrading electrical and instrumentation control systems for the disinfection system, construction of a temperature-controlled building to house GAC vessels and disinfection equipment, and construction of ancillary support systems.

**CRA Pumping 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. Additional scope may be added as a result of preliminary assessment to ensure reliable operation of the CRA pumping plants.

**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 headgate structure outlet gates at the Intake and Gene pumping plants in order to prevent metal loss due to corrosion. Additional scope may be added as a result of preliminary assessment to ensure proper operation and maintenance of the outlet gates.

**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 pumping 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 77 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. Additional scope may be added as a result of preliminary assessment to replace the platform that will ensure the safety of the workers as well as improving access to maintain the discharge valves.

**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 code-compliant hazardous waste storage facility.

**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 72 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; refurbish hydraulically operated gate valve, repair pipes, upgrade of the electrical and control systems; install cathodic protection system, replace ladders on the dam, and improve access road to safely enable construction personnel, materials, and equipment to reach the work site.

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 Copper Basin Road Improvements**

The Copper Basin road provides operational access to the facility, and notably enables critical sodium hypochlorite deliveries used to disinfect the downstream CRA facilities, preventing growth of quagga and zebra mussels. This existing access road is commonly closed for maintenance after a storm event, so sodium hypochlorite tankers are unable to make deliveries. Among other improvements, this project will improve the 4.2-mile dirt road by providing an enhanced driving surface, erosion protection, and adding turn-out areas. This is a new project for this budget cycle.

**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, signage, 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 and access control improvements at the main entrances to the pumping plants and integration of security devices with Metropolitan's security system. Construction of permanent guard stations will be also considered.

**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.

**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 67 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 and add asphalt paving leading to and around each of the 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.



**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, remote water quality analyzers, and other appurtenances to deliver quality water reliably.

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, and other appurtenances to reliably collect and treat wastewater.

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.

**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; refurbish hydraulically operated gate valve, repair pipes, upgrade of the electrical and control systems; install cathodic protection system, replace ladders on the dam, and improve access road to safely enable construction personnel, materials, and equipment to reach the work site.

**Intake Pumping 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. The project will also add traffic safety rails along the road to enhance safety.

## Cost Efficiency and Productivity Program

Fiscal Year 2022/23 Estimate: \$15.6 million

Fiscal Year 2023/24 Estimate: \$12.6 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. Projects that address climate change in addition to providing the economic savings are also included.

### Accomplishments for FY 2020/21 and FY 2021/22

- New projects initiated:
  - Diamond Valley Lake Floating Wave Attenuator Expansion
  - Incident Reporting System
  - Jensen, Skinner, and Weymouth Battery Energy Storage Systems
  - Real Property Group Business System Replacement
  - Service Procurement Implementation
  - WINS Water Billing System Upgrade
- Major milestones achieved:
  - Budget System Replacement – deployment completed
  - Diamond Valley Lake Floating Wave Attenuator Rehabilitation – construction completed
  - Incident Reporting System – deployment completed
  - MWDH2o.com Redesign – main site redesign and deployment completed
  - Project Controls and Reporting System – deployment completed

### Objectives for FYs 2022/23 and 2023/24

Project	Total Project Estimate	Estimated Construction Completion	Major Milestones
Diamond Valley Lake Floating Wave Attenuator Expansion	\$ 4,300,000	2024	Complete Construction
Digital Assets Optimization	\$ 1,500,000	2023	Complete implementation
Enterprise Content Management	\$ 11,000,000	2023	Complete deployment
Jensen, Skinner, and Weymouth Battery Energy Storage Systems	\$ 15,000,000	2023	Complete construction
MWDH2o.com Redesign	\$ 1,900,000	2022	Complete deployment
Payroll-Timekeeping Reimplementation	\$ 1,500,000	2024	Begin project
Real Property Group Business System Replacement	\$ 740,000	2022	Complete deployment
WINS Water Billing System Upgrade	\$ 3,600,000	2023	Complete deployment

## Cost Efficiency & Productivity - Other Project Group

### **Jensen, Skinner, and Weymouth Battery Energy Storage Systems**

In 2020, Metropolitan completed the Energy Sustainability Plan effort to identify new projects and initiatives within the Energy Management Policies' framework. The plan combined an analysis of Metropolitan's electricity charges and a holistic multi-criteria decision analysis framework, in which potential projects were vetted against a range of future scenarios based upon historical water and power demands and time-of-use tariff updates. Through this effort, battery energy storage systems (BESS) facilities at the Jensen, Skinner, and Weymouth plants were recommended for near-term implementation.

BESS is a peak-load reduction technology, which stores energy during off-peak hours and discharges stored energy for use during peak hours. This system will be paired with existing solar facilities of which the excess solar energy will be stored for later use instead of sending this energy to the nearby off-site electrical grid. The construction of the BESS facilities will enable Metropolitan to reduce exposure to energy price volatility, electrical supply reliability, improve operational reliability and resiliency, and support Metropolitan's Climate Action Plan by reducing greenhouse gas emission. The cost of this project will be offset by incentives from the Self-Generation Incentive Program, which is administered by California Public Utilities Commission.

### **Weymouth Energy Management Dashboard**

In 2020, Metropolitan completed the Energy Sustainability Plan (ESP) proposing an adaptive energy management strategy to: contain costs and reduce Metropolitan's exposure to energy price volatility; increase operational reliability and flexibility; move Metropolitan towards energy independence and sustainability; and support Metropolitan's Climate Action Plan effort to reduce greenhouse gas emissions (GHG). In support of that effort, this new project will develop and implement a comprehensive energy monitoring system that will bring access, awareness, and knowledge to operations staff regarding energy usage and cost of the water treatment process, promote sustainable operational decision making, and reduce energy costs at Weymouth plant and other Metropolitan facilities at the La Verne site. This is a new project for this budget cycle.

### **Yorba Linda Power Plant Power Supply to Diemer Water Treatment Plant**

This project will modify the Yorba Linda Power Plant to directly supply power to the Diemer Water Treatment Plant and sell excess power to the wholesale energy market. The scope of work includes installation of new 4.16 kV feeder between the power plant and the Diemer switchgear, breakers, power meters; reprogramming of programmable logic controllers; and modification of switchgears and auxiliary equipment.

## 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-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 Boat Dock Anchoring System Replacement**

The boat dock anchoring system at the Diamond Valley Lake (DVL) marina is over 15 years old and past its service life. Recently, one cable failed and other cables are deteriorating rapidly. The anchor cables run from the top of the boat launch ramp, through the floating boat docks, and terminate at the anchor blocks on the lake floor to secure and stabilize the marina docks for individuals boarding and disembarking vessels. Some of the cables were replaced in 2015 due to the need to extend the boat launch ramps but the remaining system components such as the anchor blocks were not addressed. This project will redesign and replace the DVL marina boat dock anchoring system consisting of galvanized steel cables, associated connectors, anchor blocks, and associated dock components to ensure the continued operation of the boat launching facilities at the marina. This is a new project for this budget cycle.

**Diamond Valley Lake Domestic Water System Improvements**

Potable water used in the Diamond Valley Lake (DVL) facility is conveyed through a 16-inch water pipeline, sized to meet fire system demand. This configuration is oversized for domestic water usage and often results in low chlorine residual levels that requires regular flushing of the system. A volume of approximately 700,000 gallons of potable water is flushed into the DVL Forebay each month to ensure adequate disinfectant is available to inactivate pathogens and prevent recontamination. This project will install approximately 2,500 linear feet of 4-inch domestic water pipe to convey potable water to the DVL facility to address the ongoing low chlorine residual caused by high detention time in the existing larger diameter potable water line that currently serves the facility. This is a new project for this budget cycle.

**Diamond Valley Lake Floating Restroom Replacement**

The floating sanitation facilities at Diamond Valley Lake (DVL) are 18 years old and are at the end of their service life. Restroom equipment requires constant maintenance, particularly because failure of the holding tanks could lead to sewage leaking into the reservoir. New facilities would eliminate these concerns. This project is also needed for Metropolitan to continue to provide operable floating restroom facilities to recreational boaters in accordance with the Recreation Activity Plan approved by the Department of Drinking Water. This is a new project for this budget cycle.

**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. The original FWA has been refurbished to original condition in Spring of 2021. This project will construct additional attenuation system.

## IT - Business Support Project Group

### **Digital Asset Optimization**

The Digital Asset Optimization project will remove redundant, obsolete and trivial (ROT) information from files on Metropolitan's network file 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 has been initiated. 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.

### **HR Information System Improvements**

With the future of Metropolitan's hybrid working environment (telecommute & onsite) initiatives, improved self-services are needed that require less printing, secured electronic transactions, and allowing proper approvals from managers, while working remotely. This project will enhance the current Human Resource (HR) interface with mobile interface capabilities, enhance the Manager Self-Service Module; and implement a new Performance Management Module. This system will provide employees and managers the tools and technology to improve business operations, promote collaboration, and enhance workforce productivity by simplifying access to HR information. This is a new project for this budget cycle.

### **MWD Intranet Upgrade**

The Intranet is a restricted and internal network that enables Metropolitan employees to store, share, and organize information. Initially developed in 1997, the Intranet is built on technologies which have become obsolete. This project will replace Metropolitan's Intranet with newer technologies to serve as a central hub that performs a broad range of purposes which the current Intranet site is not able to. This includes cloud-based file sharing, document management, content management, inclusion of social technology, employee profiles, live messaging, forums, status updates, and Group sites coupled with published data catalogs to allow data sharing which is accessible from any type of device such as laptop, tablets, and mobile phones. This is a new project for this budget cycle.

### **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.

**MyWarehouse Shopping Cart Replacement Project**

Staff currently uses an outdated system for checking availability and acquisition of Metropolitan owned inventory items that lacks an easy-to-use interface and integration with financial systems. The proposed innovative system will provide staff with a fully integrated, "Amazon-like" user experience to improve efficiency of field, warehouse, and financial staff in checking the inventory in real-time, advance ordering of items in low inventory, and by allowing mobile device capability. This is a new project for this budget cycle.

**Oracle Database Upgrade**

Metropolitan currently owns over 50 Oracle databases containing critical systems that will no longer be supported after December 2022. Any database affected by a performance or security issue would have to be removed from the production environment, rendering the associated application inoperable. This project will upgrade all the associated Oracle databases and update or reconfigure the connection points of all affected applications. This is a new project for this budget cycle.

**Oracle EBusiness Suite Upgrade**

Metropolitan's Oracle e-Business Suite (EBS) is an integrated set of business applications for automating Metropolitan's financials, procurement, project management, and grants management activities. Metropolitan's e-Business Suite was last upgraded in 2016 and since then, the technology has been superseded by newer hardware, operating systems, and Oracle database versions. This project will upgrade soon-to-be unsupported, end-of-life EBS to the newer version with more functionality and capabilities. This is a new project for this budget cycle.

**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.

**Real Property Group Business System Replacement**

This project will select and implement a new cloud-based solution for the Real Property Group (RPG). The new solution will replace existing software to 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 and other documents. The implementation of the portal will reduce repetitive inquiries from vendors, saving staff time and reducing vendor frustration.

**Water Planning Application Upgrade**

Water planning staff makes decisions every day that affect storage, cost, and movement of water within our system. The current software tool used is inefficient and obsolete, which was initially launched more than 20 years ago and last partially updated in 2008. This project will replace the existing water planning application with a new cloud-based application, which will build a foundation needed for innovative solutions addressing water supply and operational challenges. The new application will also be able to automate the process of gathering, categorizing, cleaning, validating, and reporting of critical data used by planners and meet today's cyber security standards. This is a new project for this budget cycle.

**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 over 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 replace the WINS to add needed enhancements to the system to add security and functionality for both Metropolitan and member agencies.



## Dams and Reservoirs Improvements Program

Fiscal Year 2022/23 Estimate: \$5.3 million

Fiscal Year 2023/24 Estimate: \$44.7 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 2020/21 and FY 2021/22

- New projects initiated:
  - Live Oak Reservoir Rehabilitation
  - Live Oak Reservoir Emergency Dewatering System Upgrade
  - Weymouth Finished Water Reservoir Rehabilitation
- Major milestones achieved:
  - Lake Skinner Butterfly Valve Replacement – preliminary field investigations completed
  - Mills Finisher Water Reservoir Rehabilitation – preliminary design completed

### Objectives for FYs 2022/23 and 2023/24

Project	Total Project Estimate	Estimated Construction Completion	Major Milestones
Diamond Valley Lake Dam Monitoring System Upgrades	\$ 10,000,000	2025	Begin construction
Jensen FWR # 2 Floating Cover Replacement	\$ 8,600,000	2025	Complete design
Mills Finished Water Reservoir Rehabilitation	\$ 17,000,000	2026	Complete design
Lake Skinner Outlet Tower Seismic Upgrade	\$ 170,000,000	2022	Begin design
Live Oak Reservoir Rehabilitation	\$ 9,300,000	2026	Begin construction

## Dams & Reservoirs - All Project Group

### **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 46 years and 81 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 and upgraded communications system with remote monitoring units at each dam may be required. This project will also rehabilitate embankment surfaces to address erosion and surface drainage issues.

### **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 19 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. 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, upgrades to the communication network, and replace remote monitoring units and ancillary equipment. Stages 1 and 2 have been completed. Stage 3 will be accomplished in two phases. Phase 1 will upgrade the West Dam area and Phase 2 will upgrade the East Dam and Saddle Dam areas.

### **Diemer FWR Slope Protection Improvements**

The California Division of Safety of Dams' annual inspection of the Diemer Finished Water Reservoir (FWR) noted that the existing dense vegetation on the abutting slope was obscuring dam safety inspections and providing shelter for burrowing rodents. This project will remove the existing 2.5-acre dense vegetative ground cover on the embankment slopes of the Diemer FWR and rehabilitate the embankment surface with a new slope protection system that minimizes surface erosion, prevents rodent burrowing, and maintains the stability and integrity of the reservoir embankment slopes. This is a new project for this budget cycle.

### **Etiwanda Reservoir Rehabilitation**

The Etiwanda Reservoir has been in operation for 28 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, evaluation, and rehabilitation or replacement of: (1) the asphalt pavement for the reservoir perimeter roads and parking lot; and (2) various valves and gates.

**Garvey Reservoir Rehabilitation**

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, this project will remove the existing inlet/outlet tower and construct new inlet/outlet facilities; modify circulation piping; replace the standby generator and upgrade the electrical system; replace/repair perimeter and security fences; improve surface drainage and erosion controls; replace the outdated on-site water quality laboratory building; install additional sodium hypochlorite storage tank plus containment and appurtenances; replace valves at the junction structure; construct on-site storage building for equipment and tools; and other improvements necessary to rehabilitate the reservoir and support facilities.

**Gene Wash and Copper Basin Dams Safety Monitoring Improvements**

The Copper Basin and Gene Wash Dams are in a very remote area with difficult access requiring four-wheel drive vehicles and boats. Both dams are visually inspected twice per year by Engineering Services including the annual inspection by the California Division of Safety of Dams (DSOD). This project will improve the safety monitoring system at the Gene Wash and Copper Basin dams to maintain compliance with DSOD regulations and Metropolitan's ability to detect dam safety issues in a timely manner. The project scope includes installation and implementation of a modern dam monitoring system that utilizes automatic data acquisition system (ADAS) for continuous monitoring. This project also will perform dam concrete condition assessments, geological evaluations of dam abutments, inspection, survey, and stability analysis. This is a new project for this budget cycle.

**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. This project will also install bollards with daisy chain around the reservoir to prevent vehicles from entering the top of the reservoir and other improvements necessary to complete the refurbishment of the reservoir.

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, improvement of the existing inlet configuration, modification of plant domestic water system connection, refurbishment of the effluent gate and dewatering system, replacement of instruments and flow meters, installation of diffuser system to enhance mixing, replace perimeter fence, and other improvements necessary to complete the refurbishment of the reservoir.

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 to enhance mixing and reduce the occurrence of nitrification within the reservoirs.

**Lake Mathews Reservoir Dredging and Emergency Dewatering Facilities Lake Skinner Outlet Tower**

Sediment has accumulated in the reservoir since it was first built and filled in 1938. Sediment is a result of continual erosion within the Lake Mathews watershed and has led to increased turbidity at water treatment plants, reservoir storage loss, and plugged the main dam diversion tunnel into Cajalco Creek. In addition, the California Department of Water Resources, Division of Safety of Dams (DSOD), has specific outlet dewatering requirements for large dams/reservoirs that impound over 5,000 acre-feet of water. Although the current dewatering method at the forebay meets DSOD's requirement, there is a possibility that the Upper Feeder and Lower Feeder that take water from the forebay may be damaged and become unusable during a seismic event. It is now recommended to reestablish access to the diversion tunnel at the bottom of the main dam by dredging. This project will evaluate dredging options for Lake Mathews Reservoir. Dredging will remove decades of accumulated sediment that reduces reservoir storage capacity, contributes to decreased water quality, and blocks access to dewatering infrastructure at both Outlet Tower No. 1 and the main dam diversion tunnel. The evaluation will identify and prioritize dredging locations through bathymetric surveys and other remote methods, as well as identify mitigation options for the environmental hazards of dredging. The project will also determine the condition of the main dam diversion tunnel and all its mechanical equipment and perform a comprehensive refurbishment to restore its full function.

**Lake Skinner Outlet Tower Butterfly Valve Replacement**

The Lake Skinner Outlet Tower is a critical component of the Skinner plant and distribution system operations and is equipped with five tiers of submerged butterfly valves. The valves have been in operation for 45 years and are approaching the end of their service lives. Replacement parts are not available and must be custom fabricated. This project will replace or rehabilitate all the butterfly valves at the Lake Skinner Outlet Tower. Although there is a plan to potentially add a new outlet tower to Lake Skinner, improving the condition of the existing outlet tower valves will allow for operational flexibility and maintain operational reliability at the lake. This is a new project for this budget cycle.

**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 (DSOD) 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. This project will (1) replace two valves located at tier 5 of the outlet tower, which are currently not operational, (2) develop an emergency dewatering plan for DSOD's review and approval; and (3) conduct detail seismic evaluation of the tower, develop options to mitigate impacts to the tower, and to implement a preferred option to mitigate the seismic impact to the inlet/outlet operation.

**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; (3) the emergency backup generator is no longer manufactured and parts are obsolete; (4) the existing HVAC system including the ductwork for the control room has exceeded its expected service life; (5) improvements to provide access control, intrusion alarm, and surveillance are needed; and (6) improvements to the grading, surface drainage, and paved roads adjacent to the Live Oak Reservoir are also needed. This project will replace leaking valves, reline the influent manifold with reinforced mortar, rehabilitate the fire loop, rehabilitate the existing asphalt concrete (AC) liner and install liner subdrainage system as necessary, replace the existing Emergency Standby Generator and hydraulic power pack unit, replace the existing Heating, Ventilation, and Air Conditioning (HVAC) system, improve surface drainage and erosion controls for the facility, identify and restore all electrical components to new condition or replace with new, including electrical, panel boards and grounding, sump pumps, and associated instrumentation, replace instruments in piezometer room, conduct a security assessment of the facility to reinforce or upgrade physical features and protect infrastructure, which includes replacement of the inner fencing for the reservoir with security type fencing, and other improvements necessary to rehabilitate the reservoir and support facilities.

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 spillway and 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 five 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, replacement of instruments and flow meters, evaluation of reservoir mixing and implementation of mixing improvements, installation of enhanced security features and rehabilitation of perimeter fences, and other appurtenances for both reservoirs.

**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 incidents at Oroville Dam in 2017, 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 was prepared and submitted to DSOD for review. As part of these comprehensive assessments, re-evaluation of the outlet tower and conduit at Lake Skinner were performed 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. Based on the input from DSOD, the dam spillway and underdrain system will be rehabilitated.

**Weymouth Finished Water Reservoir Rehabilitation**

The Weymouth plant's 50-million-gallon finished water reservoir was built in 1964 to meet then-current building code. 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. In addition, a rapid seismic assessment conducted in 2000, indicated that the reservoir was marginally stable under seismic loading conditions of that time. Since then, seismic evaluations for the Weymouth facilities and revised building codes have indicated that greater ground motions should be considered.

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 also perform seismic evaluation and any needed seismic retrofit to meet the latest DSOD standards.

## Distribution System Reliability Program

Fiscal Year 2022/23 Estimate: \$51.2 million

Fiscal Year 2023/24 Estimate: \$12.8 million

**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 2020/21 and FY 2021/22

- New projects initiated:
  - 108th Street Pressure Control Structure Valve Replacement
  - Appian Way Valve Replacement
  - Etiwanda Pipeline Lining Replacement – Stage 3
  - Garvey Reservoir Drainage & Erosion Control Improvements – Areas 6, 7, 8, 10 and 11
  - OC-88 Pumping Plant Chiller Replacement
  - Palos Verdes Feeder - Long Beach Lateral Turnout Structure Sta. 1442+15 Valve Replacements
  - Rehabilitation of Metallic and Concrete Pipelines Phase 1 - Select High Priority Feeders
  - Rio Hondo Pressure Control Structure Valve Replacements
  - Rialto Pipeline Rehabilitation at Station 2986
  - San Diego Pipelines 1 and 2/Rainbow Tunnel Improvements
  - San Diego Pipelines 3 & 5 Vacuum Valve Replacement
  - Upper Feeder Blow Off Structure Replacement
  - Washington Street Pressure Control Structure Valve Replacement & Security Upgrades
  - West Valley Feeder No. 1 - Access Road & Valve Structure Improvements
- Major milestones achieved:
  - Construction completed:
    - East Orange County Feeder No. 2 Service Connection A-6 Rehabilitation
    - Electrical Upgrades at 15 Structures in Orange County Region
    - Lake Perris Bypass Pipeline Relining
    - Lakeview Pipeline Improvements
    - Orange County C&D Team Support Facility
    - Orange County Feeder Cathodic Protection
    - West Valley Feeder No. 1 – De Soto Valve Structure Improvement



- Completed design:
  - Casa Loma Siphon Barrel No. 1 Seismic Retrofit
  - Etiwanda Pipeline Lining Replacement – Stage 3
  - Orange County Feeder Relining – Stage 3
  - Sepulveda Feeder/East Valley Feeder Interconnection Electrical Upgrades
  - Santa Monica Feeder Cathodic Protection

### Objectives for FYs 2022/23 and 2023/24

Project	Total Project Estimate	Estimated Construction Completion	Major Milestones
Casa Loma Siphon Barrel No. 1 Seismic Retrofit	\$ 50,000,000	2023	Complete construction
Etiwanda Pipeline Lining Replacement	\$ 24,000,000	2023	Begin construction
Garvey Reservoir Drainage & Erosion Control Improvements - Zones 6, 7, 8, 10 & 11	\$ 2,100,000	2022	Complete construction
Garvey Reservoir Sodium Hypochlorite Feed System Upgrades	\$ 9,000,000	2022	Complete construction
Lake Mathews Forebay Pressure Control Structure and Bypass	\$ 110,000,000	2026	Begin design
Orange County Feeder Lining Repair - Reach 3	\$ 14,000,000	2023	Begin construction
Rialto Pipeline Rehabilitation at Station 2986	\$ 3,000,000	2024	Begin construction
San Gabriel Tower and Spillway Improvements	\$ 17,000,000	2026	Complete design
West Valley Feeder No. 1 - Access Road and Valve Structure Improvements	\$ 4,600,000	2024	Begin construction

### 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 rehabilitate the control structure including replacing valves, a corroded ladder, and catwalk grating; restoring electrical components to new condition; installing an emergency backup generator and security features; and refurbishing or replacing other appurtenances. 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 82 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 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 add 240-volt electrical service, provide for SCADA control of the valves, and refurbishment or replacement of other appurtenances. 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. Upgrades of the first 15 highest priority service connection structures within Orange County have been completed as Stage 1. Stage 2 improvements will upgrade the 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 identification and restoration of all electrical components to new conditions including service panels, conduits, wiring lights, and receptacles; and providing new grounding systems, sump pumps, exhaust fans, remotely monitored flood alarms at each structure, and other appurtenances.

**Conveyance and Distribution System Hydraulic Pilot Valve Standardization**

There are approximately 265 pilot valves within the conveyance and distribution system, located at pressure relief or pressure control structures. A pilot valve works together with a control or relief globe valve to set pressures within the distribution system. Currently, several different types of valve and superstructure assemblies exist throughout the system and as they age, lack of a common design makes replacement difficult. This project will develop, fabricate, and install a standardized hydraulic control/relief pilot valve and superstructure at pressure control structures District-wide across the conveyance and distribution system. Utilizing a standardized valve and superstructure assembly will increase productivity and reliability. This is a new project for this budget cycle.

**Covina Pressure Control Structure Rehabilitation**

The Covina Pressure Control Structure (PCS) controls flow in the Middle Feeder North and multiple service connections. It has recently experienced numerous valve failures and pin-hole leaks. This project will replace valves, pipes, and control and electrical systems; rehabilitate the restroom and structural components; install security features and other work necessary to restore reliability of the pressure control structure. This is a new project for this budget cycle.

**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 39 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. This project will also upgrade electrical and mechanical system 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.

**Dominguez Channel Pressure Relief Structure Improvements**

The Dominguez Channel Pressure Relief Structure is located on the Palos Verdes Feeder near the Harbor Freeway and Hoover Street at the Dominguez Channel Crossing. Recent inspections have found leaking valves, inoperable needle valves, failed electrical services, and failed communication cables. This project will replace valves, modify piping and concrete, and construct new underground electrical and communication service as necessary to restore reliability of the relief structure. This is a new project for this budget cycle.

**DVL Secondary Inlet Sleeve Valve Refurbishment**

Diamond Valley Lake (DVL) is used for operational and dry-year, and emergency storage. The existing sleeve valve at the DVL Secondary Inlet is corroding, which will eventually make the valve inoperable. This is the only control valve for the secondary inlet, which is used to refill DVL. This project will remove, refurbish, and replace the existing sleeve valve; recoat existing appurtenant piping; and replace associated couplings. This is a new project for this budget cycle.

**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 tower access ladder and cover, (3) repair slide gate rails and associated components, (4) fabricate and install new drop gate at inlet side of Eagle Rock Tower to improve isolation capability, (5) extend Santa Monica Feeder interconnection blow-off structure and install isolation valves to improve maintenance flexibility, (6) construct new access road from main access road to the Palos Verdes and Eagle Rock Interconnection Structure to facilitate safe access to the structure, (7) replace corroded work platforms and ladders in interconnection structures to improve worker safety, and (8) refurbishment and upgrades of other appurtenances as they are identified during the facility assessments.

**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 52 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 and equipment as required in the Service Connection OC-44A Structure. This project 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 flow meters.

**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. 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. In addition, the electrical and mechanical systems are exhibiting signs of normal wear and tear after 32 years of service. This project will refurbish control and electrical protection systems, mechanical piping for the generator cooling water systems, add a Programmable Logic Controller, install on-line data acquisition and monitoring system, refurbish runner, replace wicket gates, and refurbish or replace other deficient equipment.

**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, and replacement of the isolation valves. This project will also replace control valves for the bypass, install new electrical service to support the load necessary for the new control systems, and other improvements necessary to upgrade and rehabilitate the equipment and support systems.

**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 37 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. This project will also perform seismic evaluation and improvements as necessary to safeguard the hydroelectric plants from known seismic risk.

**LADWP Connection in Magazine Canyon**

The Los Angeles Department of Water and Power (LADWP) connection in Magazine Canyon is rated for 400 cfs and was designed to supply water to the Jensen plant from LADWP's aqueduct system. However, the connection is unreliable as the bar screen located in the LADWP piping builds up debris and clogs. This project will redesign and build new flow control equipment downstream of the LADWP turnout valve with the capability to collect and remove debris. This equipment would allow the LADWP bar screen to be removed and the LADWP turnout valve to be left in the fully open position during operation providing the Jensen plant with a reliable, back-up source water supply to limit disruptions during unforeseen events. This is a new project for this budget cycle.

**Lake Mathews and Temescal Hydroelectric Plants Circuit Breaker and Oil Circuit Recloser Replacement**

The Lake Mathews & Temescal Sulfur Hexafluoride (SF6) circuit breakers have operated for the last 40 years and are at their end of life. Sulfur Hexafluoride is an ozone depleting greenhouse gas with annual leakage reporting requirements. This project will replace the Temescal and Lake Mathews Hydroelectric plant electrical interrupting devices with vacuum circuit breakers and replace damaged switchyard disconnects which will satisfy Metropolitan's regulatory requirements under new proposed regulations to phase out SF6 gas insulated equipment. This is a new project for this budget cycle.

**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 77 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 62- to 77-year-old valves need to be replaced.

Upgraded facilities may include a new bypass system with pressure control structure, which includes new headworks regulating valves, upgraded outlet tower gates, and a new overflow spillway structure. This project will also include seismic retrofit of the existing forebay, forebay tower, and dike; and replacement of mechanical equipment including slide gates as these facilities are used with the existing turbine operation. The system is expected to provide full-service capacity and deliver water to the Upper and Lower Feeders year-round.

**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 (HPUs) 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 and rehabilitate the HPUs and support systems. This project also includes instrumentation and controls upgrade at Outlet Tower No. 2 to obtain accurate readings of the valve positions. 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 and 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, which may include replacement or refurbishment of 30 butterfly valves.

**Oak St. Pressure Control Structure Rehabilitation**

The Oak St. Pressure Control Structure (PCS) is one of two control facilities on the Second Lower Feeder (SLF) and provides water to the Palos Verdes Reservoir and several service connections. Recent inspections have identified various work to be performed to restore reliability of the pressure control structure. This project will replace valves, gratings, fasteners, and control and electrical systems; rehabilitate structural components; install security features; and other work necessary to restore reliability of the pressure control structure. This is a new project for this budget cycle.

**OC-88 Pumping Plant Rehabilitation**

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. In addition, 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 CO<sub>2</sub> emissions. Lastly, the chiller units and ultrasonic flow meters have exceeded expected useful service lives and are in need of replacement. This project will upgrade the OC-88 Pumping Plant's surge tank system, install a second air compressor, replace flow meters and pumps with ones that have high-efficiency motors equipped with variable frequency drives, perform overhead crane improvements, fire protection, and HVAC systems; and perform other associated facility improvements.

**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 and instrumentation components and other facility components will also be evaluated and refurbished or replaced. Replacing the existing 51-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, the Allen-McColloch Pipeline, Lakes Skinner Outlet Conduit, San Diego Pipelines Nos. 3, 4, and 5 have been in service up to 52 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 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 scope of work is to replace approximately 120 deteriorated valves ranging in size from 1 to 12 inches in diameter on various pipelines in the Orange, Riverside, and San Diego County Operating Regions. This project will also include relocation of air release/vacuum valves from underground to above-ground structures.

**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 82 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 and instrumentation 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 67 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 fittings, and pipe supports; providing improved ventilation, insulation, equipment access, and structural resiliency for the structure; rehabilitating the existing wastewater system; upgrading various security features, 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. This project will also perform condition assessment of inlet and outlet manifold piping as well as remaining control lines to identify rehabilitation needs and evaluate hydraulic impact on the adjacent hydroelectric plant resulting from this project.

**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, modifications to the seals and guide rails, and preparing and coating steel surfaces with an approved coating, such as a galvanic metalized coating. This project will also add sensors and software to report the elevation of the gates relative to the water elevation and percent opening of the gates.

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

This project will remove and replace 73 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 62 years, while those on SDPL5 have been in use for almost 42 years. All the valves have reached the end of their service 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 un-scheduled 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.

**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 41 years of service. The scope of work is to rehabilitate the electrical and mechanical systems including turbine, generator, generator cooling system, all bearing and bearing lubrication systems, switchgear, protection and control relays, speed controller, data logger, annunciator, vibration and exciter systems, and to provide associated controls. This project will also include seismic evaluation and upgrades consistent with current building and safety codes and other facility upgrades.

**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 with a single stainless-steel slide gate designed for throttling, replace existing V-03 cast iron slide gate designed for throttling, install a new stainless-steel drop gate at the valve structure V-04, and appurtenances at the both facilities. This project will increase the operational reliability of the structure and the connection to the Casa Loma Siphon No. 1 and CRA.

**Santa Monica Feeder and East Valley Feeder Bypass for Sectionalizing Valves**

The lack of a bypass line at the Santa Monica Feeder and East Valley 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, and replace existing sectionalizing valves

**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 butterfly valve currently leaks resulting in unwanted flows to the south portion of the Santiago Lateral. This project will investigate alternatives to replace existing sectionalizing butterfly valve, which could also be able to handle lower flow rates. The options may include replacing with same type of valve and motor with construction of a bypass or expansion of the existing valve vault or construction of a new vault to accommodate a multi-orifice valve with a knife gate valve for better flow control.

**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. This project will also consider construction of a 96-inch diameter bypass line and new pressure control structure at the Sepulveda Canyon Facility to continue water deliveries if the existing facility is out-of-service due to a major earthquake.

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 perform an investigation and survey of the facility, and rehabilitate the electrical and mechanical components including the turbine/generator and upgrades to the protection and control systems. The project also includes replacement of cooling water piping for the generator enclosure, rehabilitation and structural improvements to the switchyard, and rehabilitation of other facility components.

**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. This project will also replace access ladder, modify stairs and install a platform to meet current Cal OSHA requirements, install guardrail at the upper landing of the ladder, install a swing-gate for the catwalk, and mitigate water infiltration into the vaults by replacing curbs and gutters around the valve structures, sealing the interior of the manway riser joints, and implementing other mitigation measures.

**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 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, identifying and restoring all electrical components to new condition, and refurbishing other facility components. Electrical components will consist of electrical panel boards and grounding, sump pumps, and associated instrumentation.

**Service Connection A-02 Rehabilitation**

A recent inspection of service connection A-02 in the City of Anaheim, revealed that piping in the meter vault had displaced, resulting in misalignment of a coupling and damage to the check valve support pedestal. If not addressed, continued movement of the piping could result in a leak, flooding, disruption of service, and costly repairs. This project will refurbish or replace the Service Connection A-02 Meter Vault piping, thrust restraint(s), meter, coupling, check valve, and plug valve in adjacent isolation valve vault. This is a new project for this budget cycle.

**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 62 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 along with installation of new 24" piping and a mechanical coupling. 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.

**Upper Feeder Raw Water Vacuum Valves and Blowoff Improvements**

Isolation valves along the Upper Feeder Raw have failed to isolate due to a service life of nearly 80 years and there is a need to install sectionalizing valves in strategic locations along the feeder to facilitate isolation and access to the feeder for internal inspections and repairs without having to shut down the Weymouth plant. Further, a higher hydraulic grade is required to pass Upper Feeder flows through the ozone contactors since the ozone facility at the Weymouth plant was commissioned. The grade difference has impacted various systems and operations along the Upper Feeder. This project will study the hydraulic grade elevation changes and impacts to the Upper Feeder and associated systems (Etiwanda and La Verne Pipelines, and Glendora Tunnel); update feeder operations manual, dewatering profiles, and plan and profile drawings; replace various vacuum valves with improved self-closing units; identify new design flow rates at Upper Feeder service connections; replace isolation valves with regulating type valves; install sectionalizing valves to isolate flows to the Weymouth plant; install inflatable rubber dam on the Etiwanda bypass channel to restore bypass channel flow capabilities; and replace failed blow off and vacuum valve isolation valves. This is a new project for this budget cycle.

**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 75 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.

**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 32 years of service. The scope of work is to rehabilitate the electrical and mechanical components including the turbine generator, the protection and control systems, and other facility components. The project also includes rehabilitation and structural improvements to the switchyard.

**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 49 years old and have been experiencing increased failures over the last 12 years. This project will refurbish valves and other appurtenances. This project will also 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 and three electronically operated globe valves at the Washington Street PCS. The work will also include replacing all block valves, identifying and restoring all electrical components to new condition, and moving electric meter from outside to inside the structure. 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 62 years of operation in a damp underground environment has led to deterioration of the equipment within the vault. This equipment needs to be replaced and other facility components rehabilitated to maintain reliable deliveries from the service connection.

**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 62 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 stormwater under certain operating conditions. Refurbishment or replacement of other facility components, including meter replacement or relocation, may be implemented based on the additional site evaluations.

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

The West Valley Feeder No. 1 and appurtenant valves were constructed and installed by Calleguas Municipal Water District in 1962. Metropolitan acquired the feeder in 1970. Most of the deteriorated valves were replaced and valve structures improved between 2006 and 2012. This project will replace the remaining deteriorated valves located in Chatsworth Park, add new valve structures to house isolation valves that are presently directly buried, install enclosures for air release/vacuum valves, and perform grading of an all-weather access road to support maintenance activities.

**Valley View Hydroelectric Plant Rehabilitation**

The Valley View Hydroelectric Plant was constructed in 1986. The mechanical components were rehabilitated in 2019. The electrical and control systems are yet to be rehabilitated and have been requiring increased maintenance. Many of the components are no longer manufactured or supported. This project will replace the electrical protection and control relays, data acquisition equipment, electrical panels, annunciator, vibration system, automated voltage regulator, governor and speed controller, switchyard circuit breakers, and other improvements to extend the service life and improve reliability.

**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 PCS Rehabilitation**

The Yorba Linda Pressure Control Structure (PCS) was constructed in 1975 and controls pressure on the Yorba Linda Feeder prior to the influent flow reaching the Diemer plant. A recent inspection of the facility revealed extensive corrosion at the sleeve valves, damage and failure of mortar lining in appurtenant piping, observed damage to the valve body seat on the butterfly valves, and inadequate cathodic protection. This project will rehabilitate this PCS to restore reliability. This is a new project for this budget cycle.

### **Yorba Linda Power Plant 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 completed in November 2015, and generator enclosure in May 2020. This project will improve emergency shutdown, alarm, and public address systems; and upgrade Human Machine Interface (HMI) panel to improve reliability and safety of the plant operation by replacing the existing shutdown system that requires operator intervention that could cause undesired pipeline pressure surges to a redundant and automated system that will engage in the event of wicket gate closing system failure. Extension of the Diemer plant's public announcement system into the Yorba Linda Power Plant and addition of a new alarm system in key locations will enhance personnel safety and improve operator's response time. This project will also install a new wicket gate drive system and rehabilitate the turbine shutoff valve actuator system.

### **Pipelines, Tunnels, Canals Project Group**

#### **Casa Loma Siphon Barrel No. 1 Seismic Retrofit**

In November 2016, leaks were detected on Barrel No. 1 of the Casa Loma Siphon. It was determined that the pipe has 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 Stage 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. Stage 2 will permanently repair the pipe joints within the siphon by replacing 148-inch diameter steel and concrete pipe segments that cross the Casa Loma Fault zone with two parallel barrels of 104-inch diameter earthquake resistant ductile iron pipe segments and steel pipe, which will accommodate relatively large ground displacements from an earthquake and the ongoing ground settlement.

#### **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. The option to protect the pipeline was selected over the relocation option due to time constraints imposed by the grade separation project. The City will install cast-in drilled hole piles (CIDH) in isolation casing within the main bridge span to protect the pipeline. Metropolitan is responsible for the cost of the City's relocation of rectifier and electrical service cabinets, underground conduits, electrolysis test stations, anode well, and patrol road to access manholes; modification of manholes and vent piping for flowmeters and air release vacuum valves, and sump discharge lines.

**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 2.5 miles of the middle reach of the feeder will be completed under Stage 3, which will also include installation of 1,200 feet of steel liner.

**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. Stage 2 construction was completed in May 2021, which relined a 133-inch diameter section of pipe referred to as a "wye" branch near the east portal of the Bernasconi Tunnel and replaced a 60-inch diameter "tee" section of pipe located at the Lake Perris Control Facility. Completion of this stage, up to 120 cfs of water stored in Diamond Valley Lake can be reliably delivered to the Mills plant, while maintaining overall pipeline structural integrity. The Stage 3 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 3 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 Stage 4 work 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.

**Orange County Feeder Relining**

The Orange County Feeder conveys treated water from the 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 77 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. Stages 1 and 2 of this three-stage project have been completed. Stage 3 will reline the remaining four miles of the middle reach of the feeder. Stage 3 work includes replacement of the lining, welding of corroded pipe joints, and replacement of deteriorated valves along the feeder.



**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. This project also includes installation of permanent pipeline appurtenances required to access the pipeline and rehabilitation of pipelines to reduce the risk of failure, minimize repair costs, and prevent unplanned shutdowns. During the course of this project, other feeders may be identified and added to the high priority list.

**Rialto Pipeline Rehabilitation at Station 2986**

The Rialto Pipeline conveys untreated water from Lake Silverwood to the Live Oak Reservoir in La Verne. The pipeline supplies water from the East Branch of the State Water Project to the Weymouth Water Treatment Plant, and directly services three member agencies through 11 service connections. The size of the pipeline ranges in diameter from 96 to 120 inches and is part of the greater Rialto Pipeline System, which includes the Rialto Pipeline, Etiwanda Pipeline, and La Verne Pipeline.

In February 2010, an internal condition assessment of the pipe mortar lining and remote field eddy current inspection of prestressed concrete cylinder portions were performed. One pipe section with significant mortar damage was observed at Station 2986+09 through Station 2986+44, exposing roughly 26 linear feet of steel. This pipe segment was again inspected in December 2018 and 2020 where it was discovered that an entire 30-foot segment of pipe was completely devoid of mortar lining with a significant amount of the exposed steel needing immediate weld repair. This project will perform extensive weld repair of pipe wall and replacement of missing mortar lining. This project will also replace failed pipe spool and isolation valve at CB-11 service connection, eight 72-inch butterfly valve seats at San Dimas Pressure Control Structure, and six lubricated plug valves ranging in size from 4 inches to 16 inches; reconfigure CB-15 service connection to allow blow off discharge and provide access to one blow off and one pump well structure; and install internal pipe seals at San Dimas Pressure Control Structure.

**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 1940s 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, replace damaged lining, and refurbish or replace other components as needed.

**San Diego Pipeline 1 and 2 Station 1214+00 Exposure Repair**

On February 14, 2019, the Temecula area experienced heavy and sustained precipitation followed by additional storm events over the 2019-2020 storm season. The resulting accelerated stream flows exposed the buried San Diego Pipeline Nos. 1 and 2 where the pipelines cross an ephemeral stream channel. Emergency repairs were made in October 2020 under an emergency permit from the Regional Water Quality Control Board. As a condition of the permit, a permanent solution for the site must be constructed within two years of the authorization of the emergency permit. This project will develop and construct a permanent erosion control solution for the pipeline exposure on San Diego Pipeline Nos. 1 and 2. This is a new project for this budget cycle.

**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 seven 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 liquid ammonium sulfate (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.

**Cone Camp Intertie Bypass Rehabilitation**

This project will rehabilitate the Cone Camp Intertie including the existing 24-inch bypass pipe around the 78-inch butterfly valve. Work may include replacement of the 24-inch bypass pipe and associated valves, and other features necessary to support the bypass operation. The Cone Camp Intertie was constructed in 2002 as a part of the Inland Feeder Highland Pipeline to allow the Inland Feeder to receive State Project Water (SPW) through San Bernardino Valley Municipal Water District (SBVMWD) Foothill Pipeline. At the intertie, a bypass pipeline is used to equalize pressure on both sides of the 78-inch butterfly shutoff valve prior to operating the valve. This bypass pipeline has been taken out of service due to pinhole leaks caused by microbiological corrosion due to stagnant water. Although normal operation of the Inland Feeder does not require the intertie, the intertie may be used to convey water for the Inland Feeder when Devil Canyon 2nd afterbay is offline. This is a new project for this budget cycle.

**Diamond Valley Lake and Skinner Area Flow Meter Replacement**

The flow meters at the Diamond Valley Lake (DVL) Inlet/Outlet Tower, DVL Connection Canal, DVL Secondary Inlet, Cabazon Radial Gate Facility, Lake Skinner Inlet, and DVL North and South siphons are critical to operation of Metropolitan's distribution network in the vicinity of DVL and the Skinner Plant. This project will either replace or refurbish these aging flow meters making them either new or like-new. This is a new project for this budget cycle.

**Diamond Valley Lake Crane Rehabilitation**

The scope of the project is to rehabilitate 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; and (5) a control system to regulate oxygen flow. Also, a cost benefit analysis will be performed during the early stage of the project to compare the life-cycle cost of purchasing LOX from a vendor versus installing a LOX generation facility at DVL.

**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. 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 54 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. 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 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 52 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. Zones 1 to 5 have been completed and zones 6, 7, 8, 10, and 11 are in construction. Improvements for drainage zone 9, the final drainage zone, are under discussion with the city.

**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.

**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. This project will also install an eyewash station.

**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 77 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. This project will evaluate and upgrade power distribution system, which may include use of alternate medium power distribution voltage (4.16 kV) in line with other Metropolitan facilities, underground and overhead power lines and condition of electrical poles, voltage stability for all facilities, the ability to isolate feeders to provide selective isolation and safer maintenance, and emergency generators capability to provide adequate backup. This project also plans to integrate the upgraded electrical system with Metropolitan's system-wide supervisory control and data acquisition system.

**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 Oxygenation System**

Lake Skinner is subject to seasonal thermal stratification when the lake water temperature prevents mixing of vertical layers resulting in anaerobic conditions and cyanobacteria blooms. These conditions in the lake can ultimately affect water treatment operations and the quality of the finished drinking water due to taste and odor compounds and sometimes cyanotoxins produced by the cyanobacteria. Lake Skinner currently has a compressor-based aeration system that pumps air to the bottom of the lake in an attempt to mix the water and prevent the thermal stratification but the system is undersized and has been at times, ineffective. This project will construct a hypolimnetic oxygenation system at Lake Skinner including an oxygen supply or liquid oxygen facilities, an anchored diffuser piping assembly in the lake, and associated electrical modifications to improve water quality conditions in Lake Skinner and ensure water supply reliability. This is a new project for this budget cycle.

**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 now been removed due to operational difficulties. The concrete support structure for the screening equipment constricts flow entering the bypass pipeline and canal must be operated near spill elevation in order to achieve the maximum flow of 280 cfs in the canal/pipeline under current conditions. This project will demolish the concrete support structure for the bypass screening structure to remove the flow constriction point and replace the deteriorated trash rack located upstream of the bypass pipeline entrance.

**Live Oak Reservoir Bypass Pipeline Cathodic Protection**

Constructed in 1973, the Live Oak Reservoir Bypass, 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 Live Oak Reservoir Bypass connects the prestressed reaches 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.

**Lower Feeder Air Entrainment Improvement**

When operated at flows higher than 300 cfs, air becomes entrained in the water traveling through the Lower Feeder due to large elevation drops within the conveyance system. When coagulant is added to this inflowing water in the rapid mixers at the Diemer plant, the result is clusters of floating foam mats on the water surface in the coagulation and sedimentation basins which causes operational, maintenance, and aesthetic concerns. Entrained air also increases filter run time. This project will reduce or eliminate entrained air through modifications and addition of components along the Lower Feeder including at the Corona and Temescal power plants, pressure control structures, pipelines, air stacks, and air release/vacuum valves. This is a new project for this budget cycle.

**Lower Feeder Cathodic Protection System Rehabilitation**

The existing cathodic protection systems for the Lower Feeder were installed in 1995. Recent surveys of the existing systems have indicated that they are no longer providing adequate protection due to gradual deterioration of their anodes. This project will rehabilitate or replace the equipment, such as impressed-current anode wells and rectifiers; and remove existing equipment as required by law. This is a new project for this budget cycle.

**Middle Feeder North Drainage and Protection Restoration**

The Middle Feeder North from Station 1067+00 to Station 1071+00 lies within both a Metropolitan fee parcel and easements between Graves Avenue and Mooney Drive in the unincorporated Los Angeles County community of South San Gabriel. A recent visual inspection and survey of the area determined that the current soil cover over the feeder has eroded to less than design minimums. This project will restore the design soil cover over Middle Feeder North conduit and improve drainage features to preclude this problem in the future. This is a new project for this budget cycle.

**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. The first three locations that were identified during the routine testing, which were no longer providing corrosion protection to the pipeline, have been replaced. This project will install a new cathodic protection system on the remaining portion of Orange County Feeder to protect approximately 11.2 miles of feeder. The scope of work includes design and installation

**Orange County Feeder Dewatering Improvements**

The Orange County Feeder originates at the Weymouth plant in La Verne and extends south for 41 miles to its terminus in the City of Newport Beach. Operations staff struggles with dewatering the pipeline due to development-driven relocations and aging infrastructure. This project will perform the analyses, equipment and facility modifications, and documentation to facilitate future pipe dewatering operations. This is a new project for this budget cycle.

**Palos Verdes Reservoir Sodium Hypochlorite 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.

**Prevention of CRA Water Migration to SPW at Weymouth Junction Structure**

Recently, quagga mussel veligers were discovered at the USG-03 service connection necessitating coordination with local water agencies and implementation of a control and mitigation plan. The affected areas were flushed and chlorinated, groundwater recharge basins were desiccated, and no additional veligers were found. It was determined that Colorado River Water (CRW) was able to inadvertently migrate through the Weymouth Water Treatment Plant (WTP) Junction Structure's sectionalizing valves into the La Verne Pipeline and travel through the Glendora tunnel to service connection USG-03. This project will install pressure monitoring devices connected to nearby existing Remote Terminal Units at key locations along the La Verne Pipeline. Pressure ranges and set points for alarms will be determined in order to provide adequate time for operations and field staff to respond to abnormal conditions in the system to detect CRA water intrusion. This project would minimize the potential for CRW to enter unaffected facilities that normally move State Water Project (SWP). This is a new project for this budget cycle.

**Rialto Pipeline Cathodic Protection System Rehabilitation**

The existing cathodic protection systems for Rialto Pipeline were installed between 1988 and 1995. Recent surveys of the existing systems have indicated that they are no longer providing adequate protection due to gradual deterioration of their anodes. This project will rehabilitate or replace the equipment such as impressed-current anode wells and rectifiers; and remove existing equipment as required by law. This is a new project for this budget cycle.

**Santa Ana River Discharge Pad - Upper Feeder**

Severe storm events eroded the north slope of the Santa Ana River near the Upper Feeder crossing. This damage resulted in large voids in the riverbank to the footing supporting the bridge span and the foundation of the emergency discharge bunker valve. The damage was repaired, and a recommendation was made during the repair to construct a concrete pad to prevent a reoccurrence of this type of damage. This project will construct a concrete discharging pad to prevent erosion from storms and discharge from the bunker valve.

**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) replacing the slide gates and actuators to restore isolation capability for the Upper Feeder; (3) improving access to the tower and spillway, including the river crossing; (4) repairing the spillway's concrete; (5) stabilizing the adjacent rocky slope; and (6) installing a barrier such as new fencing or protective screen to prevent animal entry into the spillway. This project will also evaluate and repair the Morris Dam connection, which includes large needle and isolation butterfly valves, and evaluate condition of the conical plug valve at groundwater replenishment connection USG-03 before deciding to upgrade to control valves or installation of a crane system that allows safe installation of the various orifice plates to control flow.

**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.

**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 and retrofit the tower. 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 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.

**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, providing a fenced secure outdoor storage yard, 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. The work includes but is not limited to replacement of manhole, access ladder, and various valves and valve stem extensions; and addition of various pipe couplings, various valves, pumps, pipes, and catwalk platforms.

**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 22 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.

**Western Conveyance and Distribution Region - Blind Flange Structures Washdown Improvements**

Currently, a substantial number of blind flange pipeline access and turn-out structures in the western conveyance and distribution region do not have an accessible and reliable water connection for washdown of piping, valves, and equipment during preventive maintenance. This project will modify or enhance structures that contain blind flanges to provide washdown capabilities. This is a new project for this budget cycle.

## District Housing and Property Improvements Program

Fiscal Year 2022/23 Estimate: \$12.0 million

Fiscal Year 2023/24 Estimate: \$15.7 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 2020/21 and FY 2021/22

- New projects initiated:
  - CRA Kitchen and Lodging Improvements
- Major milestones achieved:
  - CRA Kitchen and Lodging Improvements – conceptual study and preliminary design completed
  - District Housing Property Improvements – assessments, conceptual and relocation studies, and preliminary design completed
  - Employee Village Enhancement - master planning, study and preliminary design for Gene, Iron Mountain, Eagle Mountain, and Hinds Pumping Plants completed

### Objectives for FYs 2022/23 and 2023/24

Project	Total Project Estimate	Estimated Construction Completion	Major Milestones
CRA Kitchen and Lodging Improvements	\$ 19,000,000	2027	Begin construction at Eagle and Iron Mountain pumping plants
District Housing Improvements	\$ 72,000,000	2027	Begin construction at Gene, Iron Mountain, Eagle Mountain, and Hinds pumping plants
Employee Village Enhancement	\$ 44,000,000	2027	Begin construction at Gene, Iron Mountain, Eagle Mountain, and Hinds pumping plants

## Housing & Property Improvements Project Group

### **CRA Kitchen and Lodging Improvements**

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 42 years of service and require frequent short-term repairs.

An initial assessment discovered that replacement of these facilities would be more economical since renovation would require significant seismic, electrical, plumbing, and roofing upgrades to meet current codes. This project will replace the kitchen and lodge facilities with new buildings with higher capacity in preparation of increasing work to upkeep the facilities out in the desert to maintain the CRA conveyance system reliability.

### **District Housing Improvements**

Metropolitan owns 99 houses throughout the five CRA pumping plants and rents to employees involved in operation and maintenance of the CRA. A pilot renovation of 11 houses was completed in 2019 and construction of ten new houses was completed in 2018. In the same year, the Board authorized an assessment to determine whether the best course forward was to replace or renovate the remaining 78 houses. The assessment revealed that replacement of the houses was the best option. In addition, a recent housing analysis determined that only 75 of 78 remaining houses need to be replaced at four of the five pumping plants along with construction of two maintenance and two storage buildings, one each at Eagle Mountain and Iron Mountain Pumping Plants, to support the long-term corrective and preventative maintenance activities after the houses have been replaced.

### **Employee Village Enhancement**

Metropolitan owns houses throughout the five CRA pumping plants and rents to employees involved in operation and maintenance of the CRA. In addition, due to the remote location of the pumping plants, each of the pumping plants has an employee village to provide a sense of community and offer the residents a space away from the work areas. Amenities such as swimming pool and tennis courts are also part of these villages.

These villages and their current amenities are deteriorating due to the age and exposure to the harsh desert environment. This project will replace and enhance the village amenities at four CRA pumping plants (Hinds, Eagle Mountain, Iron Mountain, and Gene) that would focus on building a vibrant, healthy, and sustainable community for Metropolitan's staff.

## Minor Capital Projects Program

Fiscal Year 2022/23 Estimate: \$8.7 million

Fiscal Year 2023/24 Estimate: \$8.0 million

**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 2020/21 and FY 2021/22

- New projects initiated thru December 2021:
  - Forty-two projects were initiated
- Major milestones achieved thru December 2021:
  - Thirty-five projects were completed

### Objectives for FYs 2022/23 and 2023/24

Project	Total Project Estimate	Estimated Construction Completion	Major Milestones
Various projects costing less than the Board approved maximum project cost * *Prior to Fiscal Year 2018/19 - \$250,000 Currently - \$400,000	\$56,000,000 for projects in open and new Minor Cap Appropriations	2027	Complete all projects within 3 years of initiation

## Prestressed Concrete Cylinder Pipe (PCCP) Rehabilitation Program

Fiscal Year 2022/23 Estimate: \$51.2 million

Fiscal Year 2023/24 Estimate: \$53.2 million

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

### Accomplishments for FY 2020/21 and FY 2021/22

- New projects initiated:
  - Allen-McColloch Pipeline PCCP 2021 Relining
- Major milestones achieved:
  - Completed construction
    - Allen-McColloch Pipeline PCCP 2021 Relining
    - Second Lower Feeder Reach 2
    - Second Lower Feeder Reach 8
  - Completed design
    - Allen-McColloch Pipeline PCCP 2021 Relining
    - Second Lower Feeder Reach 3A
    - Second Lower Feeder Reach 8

### Objectives for FYs 2022/23 and 2023/24

Project	Total Project Estimate	Estimated Construction Completion	Major Milestones
Electromagnetic Inspections of PCCP Lines	\$ 10,000,000	Ongoing	Continue inspections in conjunction with pipeline shutdowns
Second Lower Feeder PCCP Rehabilitation - Reach 3A	\$ 26,000,000	2023	Complete construction
Second Lower Feeder PCCP Rehabilitation - Reach 3B	\$ 67,000,000	2024	Begin construction
Sepulveda Feeder PCCP Rehabilitation – Reach 1	\$ 130,000,000	2025	Complete preliminary and final design

## 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. The project includes restoring the Allen McColloch Pipeline 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 pressure control structures, 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. The project includes restoring the Calabasas 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 pressure control structures, 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. The project includes restoring the Rialto Pipeline 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 pressure control structures, master meters, and meter structures.

## Second Lower Feeder Project Group

### **PCCP Rehabilitation Valve and Equipment Storage Building**

For the PCCP Program, staff procures large-diameter isolation valves and other long-lead, critical equipment and material in advance of the start of construction. Advanced procurement helps to prevent potential manufacturing or logistical delays from impacting future construction contracts. These contracts are typically scheduled with pipeline shutdowns that are coordinated with member agencies and local cities years in advance. Procuring valves in advance also ensures that the valves are available in the event of material shortages or to address an unanticipated repair. Suitable facilities are needed to store and maintain the large equipment as they will be delivered to the region over the next two to three years. This project will construct an approximately 18,200 square-foot pre-engineered metal building with a reinforced concrete slab foundation and motorized roll-up doors to protect Metropolitan's assets, enhance operational flexibility, and reduce risk of project delays for the PCCP Program.

### **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. The project includes restoring the Second Lower 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, installation of new isolation valve structures, construction of bypasses, 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 pressure control structures, master meters, and meter structures.

### **Second Lower Feeder Rehabilitation Reach 3 Acoustic Fiber Optic PCCP Monitoring System**

Prestressed concrete cylinder pipe (PCCP) is well-known in the waterworks industry to be at risk of sudden failure from loss of strength due to the breaking of pre-stressed wires. The Second Lower Feeder is included in Metropolitan's list of five PCCP pipelines slated for rehabilitation. Rehabilitation is scheduled to occur over several years to reduce the duration that a portion of the pipeline is out of service, and the work is prioritized based on the condition of the pipe. Shutdown procedures for inspections, such as complete dewatering of Second Lower Feeder, have become increasingly difficult because of operational constraints. This project will design, install, start-up, an innovative monitoring system for wire breaks using an acoustic fiber optic PCCP monitoring system on approximately 5 miles of Second Lower Feeder thereby eliminating the need for staffed pipe inspections. The fiber optic cable system is sensitive to sound that will detect wire breaks. The cable extends to a data acquisition computer that continuously "listens" for the distinct sound of wires breaking. This is a new project for this budget cycle.

## Sepulveda Feeder Project Group

### **Sepulveda 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. The project includes restoring the Sepulveda 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 pressure control structures, 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 eight 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.

### **Foothill Feeder Acoustic Fiber Optic PCCP Monitoring System**

Prestressed concrete cylinder pipe (PCCP) is well-known in the waterworks industry to be at risk of sudden failure from loss of strength due to the breaking of pre-stressed wires. Currently, staff must dewater the Foothill Feeder in order to inspect the pipeline's condition manually. The proposed project installs an innovative acoustic fiber optic system that will provide continuous condition monitoring over approximately 11 miles of the Foothill Feeder without having to dewater and enter the pipeline, along with other associated monitoring work. This is a new project for this budget cycle.

### **West Valley Feeder No 1 PCCP Rehabilitation**

An electromagnetic inspection conducted in April 2021 identified an increase in wire breaks since the previous 2014 inspection of the 54-inch Prestressed Concrete Cylinder Pipe (PCCP) portion of the West Valley Feeder No. 1. 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 West Valley Feeder No. 1 from approximately Station 1277+27.68 to the De Soto Avenue Sectionalizing Structure at Station 1290+16.70 to "as like new condition." This is a new project for this budget cycle.

## Regional Recycled Water Program

Fiscal Year 2022/23 Estimate: \$ 3.9 million

Fiscal Year 2023/24 Estimate: \$16.0 million

**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 2020/21 and FY 2021/22

- Major milestones achieved:
  - Demonstration Plant Direct Potable Reuse Modifications – design initiated

### Objectives for FYs 2022/23 and 2023/24

Project	Total Project Estimate	Estimated Construction Completion	Major Milestones
Demonstration Plant Direct Potable Reuse Modifications	\$ 18,000,000	2025	Complete preliminary and final design

### Regional Recycled Water - All Project Group

#### Demonstration Plant Direct Potable Reuse Modifications

Metropolitan's Advanced Water Treatment Plant (AWT) at the Joint Water Pollution Control Plant (JWPCP) in Carson was designed to demonstrate testing of potential treatment processes for Indirect Potable Reuse (IPR) applications. This project will expand Metropolitan's existing process train to accommodate testing of potential Direct Potable Reuse (DPR) treatment options for regulatory acceptance of a DPR treatment train for full-scale implementation, as part of the Regional Recycled Water Program (RRWP). Additional treatment processes will be implemented for chemical use, pathogen inactivation, and testing in accordance with the latest DPR framework provided by the California Division of Drinking Water.

## Right-of-Way and Infrastructure Protection Program

Fiscal Year 2022/23 Estimate: \$7.8 million

Fiscal Year 2023/24 Estimate: \$3.8 million

**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 2020/21 and FY 2021/22

- Major milestones achieved:
  - Completed preliminary design:
    - Los Angeles Region – Stage 1 Improvements
    - Orange County Region – Stage 3 Improvements
  - Completed final design:
    - Orange County Region - Stage 1 Improvements
    - Western San Bernardino Region – Stage 1 Improvements
  - Completed construction
    - Orange County Region - Stage 1 Improvements

### Objectives for FYs 2022/23 and 2023/24

Project	Total Project Estimate	Estimated Construction Completion	Major Milestones
Right-of-Way Infrastructure Protection Program - Western San Bernardino County Operating Region (Stage 1)	\$ 6,700,000	2023	Complete construction
Right-of-Way Infrastructure Protection Program – Los Angeles County Operating Region	\$ 9,300,000	2025	Begin construction of Stage 1

### 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. In order to expeditiously complete this project, sites within this region are grouped and prioritized and staged for construction depending on the site requirements.

### Orange County Region Project Group

#### **Right-of-Way & Infrastructure Protection - Orange County Region**

This project identifies and addresses right-of-way, access, 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. In order to expeditiously complete this project, sites within this region are grouped and prioritized and staged for construction depending on the site requirements.

### 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, access, 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. In order to expeditiously complete this project, sites within this region are grouped and prioritized and staged for construction depending on the site requirements.

### 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, access, 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. In order to expeditiously complete this project, sites within this region are grouped and prioritized and staged for construction depending on the site requirements.

## RWIPP - Other Project Group

### **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.

### **Right-of-Way & Infrastructure Protection Program - Property Acquisition**

The scope of this project includes procurement of right-of-way or property to support access or needed repairs to pipelines and facilities. 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.

## System Flexibility/Supply Reliability Program

Fiscal Year 2022/23 Estimate: \$31.6 million

Fiscal Year 2023/24 Estimate: \$40.6 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. Projects under this program address climate change affecting water supply, regional drought, and alternative water sources for areas dependent on State Project Water.

### Accomplishments for FY 2020/21 and FY 2021/22

- New projects initiated:
  - Delta Properties Infrastructure Improvements
  - Inland Feeder - Citrus Reservoir and Pump Station Intertie
  - Inland Feeder - Rialto Pipeline Intertie
  - New Westside Pump Stations
  - Wadsworth Pump Discharge to Eastside Pipeline Bypass
- Major milestones achieved:
  - Completed construction:
    - Greg Avenue Pump Station Rehabilitation
    - Delta Properties Infrastructure Improvements - Completed installation of first eight flow meters
  - Completed design
    - Perris Valley Pipeline - Tunnels

### Objectives for FYs 2022/23 and 2023/24

Project	Total Project Estimate	Estimated Construction Completion	Major Milestones
Delta Islands Pump Station Rehabilitation	\$ 5,600,000	2024	Complete design
Delta Properties Infrastructure Improvements	\$ 960,000	2024	Complete construction
Delta Smelt and Native Species Preservation Wetlands	\$ 2,700,000	2024	Complete design and construction
Inland Feeder – Citrus Reservoir and Pump Station Intertie	\$ 23,700,000	2026	Complete design
Inland Feeder – Rialto Pipeline Intertie	\$ 2,200,000	2023	Complete construction
Perris Valley Pipeline - Tunnels	\$ 79,000,000	2025	Begin construction
Wadsworth Pump Discharge to Eastside Pipeline Bypass	\$ 11,400,000	2023	Complete construction

## System Flexibility/ Supply Reliability - All Project Group

### **Delta Islands Pump Station Rehabilitation**

In 2016, Metropolitan purchased four islands/tracts (about 20,000 acres) in the central Delta: Bacon and Bouldin Islands, and Holland and Webb tracts islands. Collectively, these lands represent a crucial part of the Delta for multiple potential values that are consistent with the State's co-equal goals of ecosystem restoration and water supply reliability for California. As part of this purchase, each property has an existing infrastructure that contains a system of individual siphons that bring diverted river water onto the property irrigation canals that conveys excess water by gravity to pump stations to be pumped off the property to prevent flooding. This project will rehabilitate and upgrade aging pump stations to increase system reliability and minimize the service disruption that could result in loss of revenue if tenant operations are impacted. This is a new project for this budget cycle.

### **Delta Properties Infrastructure Improvements**

California State Senate Bill (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 flow meter locations, coordinate with the Delta Watermaster, and install approximately 88 or more meters with telemetry and support equipment. First eight flow meters were installed during FY 2020/21. Next set of 25 flow meters are planned to be installed during FY 2021/22, and rest of the flow meters are planned to be installed during the following two years.

### **Delta Smelt and Native Species Preservation Project**

The Delta Smelt is a small, euryhaline fish species endemic to the San Francisco Estuary. Since the 1980s, the Delta Smelt population has exhibited a decline in abundance leading to it being listed as endangered under the California Endangered Species Act, which may potentially create additional regulatory operational constraints on water exports for state and federal water contractors. Metropolitan will work with multiple state and federal government agencies and researchers from UC Davis to advance research objectives through multiple collaborative study efforts. This project will utilize natural pond habitats located on tracts of land within the Delta to construct tule marsh wetlands, supplementation ponds, and associated hydraulic water conveyance systems including irrigation ditches and potential groundwater wells to address issues and questions including methods for successful reintroduction. This project also includes an evaluation to determine which of Metropolitan's Delta Islands would be the most suitable location for the project. Other goals related to this project could involve use of floating peat wetlands, setting back the existing levee, and reintroduction of tidal energy gradients. This is a new project for this budget cycle.

### **Etiwanda Pump Station**

This project will construct a pump station to enable Metropolitan to pump CRA water from the Upper Feeder to the Rialto Pipeline in case of a disruption of supplies from the East Branch due to severe drought or earthquake. This project will include construction of new interconnecting pipeline, new suction and discharge manifolds, valves, electrical power and control facilities, and other features necessary to support the pump station. The Etiwanda Pipeline extends in a north-south direction for approximately 6.5 miles and connects the Rialto Pipeline with the Upper Feeder to provide the feeder with State Project Water (SPW). The Etiwanda Reservoir and Hydroelectric Plant (HEP) were constructed to generate power as the water is conveyed. This is a new project for this budget cycle.

**Groundwater Well Rehabilitation and Treatment**

This project will take groundwater wells owned and operated by Metropolitan's member agencies or their sub-agencies and rehabilitate them and/or to construct new groundwater wells to increase local groundwater production in Metropolitan's service area. Local groundwater supplies within Metropolitan's service area are currently underutilized due to contamination, political constraints, or cost concerns. This project will also add water treatment systems where needed to treat contaminated groundwater. Addition of the treatment systems will be primarily focused for State Project Water (SWP) dependent areas. This project will improve resiliency against severe drought or earthquake and reduce dependency on imported water supplies. This is a new project for this budget cycle.

**Hayfield Groundwater Storage and Extraction**

This project will improve the spreading basin and construct a well field extraction and conveyance system to withdraw stored CRA water and discharge it back into the CRA at the Hinds Pumping Plant. The initial stage of the project will focus on installing a limited conveyance system capable of extracting the 100,000 acre-ft stored in the Hayfield Groundwater Basin. This stage will include a groundwater well installation, pump and motor, and approximately 1,500 feet of small diameter pipe. The Hayfield basin is located south of the Julian Hinds Pumping Plant, adjacent to the CRA. The project will improve drought resilience and enhance reliability of CRA operation. This is a new project for this budget cycle.

**Inland Feeder-Citrus Reservoir and Pump Station Intertie**

This project will construct an intertie between the Inland Feeder and a San Bernardino Valley Municipal Water District (SBVMWD) and Department of Water Resources (DWR) pump station. The intertie will include pipelines, valve vaults with valves, electrical and control systems, and other features necessary to support the intertie operation. Construction of an intertie between the Inland Feeder and a SBVMWD and DWR pump station would enable Metropolitan to deliver water from DVL to the Rialto Pipeline service area. After completion of this project along with completion of Inland Feeder-Rialto Pipeline Intertie and Wadsworth Pump Discharge Eastside Pipeline Bypass, up to 160 cfs will be able to be delivered from Diamond Valley Lake to the Rialto Pipeline. This project will improve resiliency against severe drought or earthquake by providing the Rialto Pipeline region a second source of water besides State Water Project (SWP) supplies.

**Inland Feeder-Rialto Pipeline Intertie**

This project will construct an intertie pipeline between the Inland Feeder and the Rialto Pipeline south of Department of Water Resources (DWR) Devil Canyon. The intertie will be approximately seven feet in diameter and 200 feet long, and will include a large diameter valve, meter, and valve and meter structures, and other features necessary to support the intertie operation. Currently flows from the Inland Feeder must pass through higher elevation DWR facilities which reduces flow and expends more energy. An intertie will allow delivery of up to 60 cfs of water from San Bernardino Valley Municipal Water District (SBVMWD) and DWR via a water exchange program. After completion of this project along with completion of Wadsworth Pump Discharge Eastside Pipeline Bypass and Inland Feeder-Citrus Reservoir and Pump Station Intertie, up to 160 cfs will be able to be delivered from Diamond Valley Lake to the Rialto Pipeline. This project will improve resiliency against severe drought or earthquake by proving the Rialto Pipeline region a second source of water besides State Water Project (SWP) supplies.

**La Verne Pipeline & Weymouth Plant Intertie and Upper Feeder Modification**

This project will provide an alternate source of supplies for groundwater replenishment at Service Connection USG-03. USG-3 is a replenishment connection located at the end of the Glendora Tunnel and is typically fed by the Rialto Feeder/Live Oak Reservoir, which is untreated State Project Water (SPW). In times of low SPW supplies, an alternative connection from CRA supplies will allow continued delivery of supplies. This project may include an intertie between the Weymouth plant and the La Verne Pipeline, and modification of a blow-off and/or air release & air vacuum valve on Upper Feeder near Azusa Canyon, and other features necessary to provide an alternate source of supplies at USG-3. This project will improve resiliency against severe drought or earthquake. This is a new project for this budget cycle.



**Lake Perris Seepage Water Conveyance Pipeline**

Metropolitan and Department of Water Resources (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.

**New Westside Pump Stations**

This project will construct a new or expand existing pump stations to convey approximately 100 cfs of CRA water into areas reliant on State Project Water (SPW). This may involve constructing two new pump stations, one at Venice PCS and one at Sepulveda Canyon PCS or expanding pumping capacity at the Greg Avenue Pump Station or some other facilities. Project elements will include pipelines, vertical or horizontal pumps, motors, interconnection piping to the Sepulveda Feeder; valve control structures; mechanical equipment for surge control; electrical modifications; and a small building at each site. This project will improve resiliency against severe drought and seismic events in the west side of Metropolitan's service area by mitigating the reduction in State Water Project (SWP) supplies.

**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.

**Rialto Pipeline and Mills Plant Pump Station**

Several service connections within Metropolitan's service area rely on State Water Project water supplies to deliver water. One such area is along the Rialto Pipeline. This project will enable backup water supply deliveries from the Colorado River Aqueduct (CRA) or Diamond Valley Lake (DVL) to these areas. It will allow more operational flexibility by enabling DVL or CRA water to be delivered to the Rialto Pipeline as well as the Mills plant, and will also enhance reliability in a seismic event or during planned shutdowns. This new pump station at PC-1 control structure, which will include pumps, valves, suction and discharge manifolds, interconnection pipelines, and electrical power and control facilities, may be constructed to also serve as a power generation facility. After completion of this project along with the Wadsworth Pump Discharge to Eastside Pipeline Bypass and the Inland Feeder-Rialto Pipeline Intertie, water from both the CRA and from DVL can be delivered to both the Rialto Pipeline and to the Mills plant. The Pump Station will meet the future demands of both Mills and Rialto Pipeline service areas. This is a new project for this budget cycle.

**Service Area Interconnection Enhancement**

This project will construct new or enhance existing water delivery and treatment infrastructure between Metropolitan and its member agency systems and between the member agency and sub-agency systems to reduce SWP reliant areas and provide increased flexibility for future long-term shutdowns. This infrastructure may include but are not limited to service connections, pipelines, pump stations, and treatment facilities. This project will improve resiliency against severe droughts or earthquakes. This is a new project for this budget cycle.

**Wadsworth Pump Discharge to Eastside Pipeline Bypass**

This project will construct a bypass pipeline connecting the Wadsworth Pumping Plant discharge pipeline to the Eastside Pipeline to allow continuous pumping from the Diamond Valley Lake (DVL) forebay to supply DVL water to the Mills plant and the Rialto Pipeline via PC-1 Pump Station in case of a supply disruption from the State Water Project's (SWP) East Branch due to severe drought or earthquake. The bypass will be approximately seven feet in diameter and 700 feet long and will include a large diameter valve with a valve structure, and other features necessary to support the bypass operation. In addition, a surge tank system will be installed to protect the Inland Feeder from pressure surges. After completion of this project along with completion of Inland Feeder-Rialto Pipeline Intertie and Inland Feeder-Citrus Reservoir and Pump Station Intertie, up to 160 cfs will be able to be delivered from Diamond Valley Lake to the Rialto Pipeline. The Wadsworth Pumping Plant is located near Hemet at 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.

## System Reliability Program

Fiscal Year 2022/23 Estimate: \$48.5 million

Fiscal Year 2023/24 Estimate: \$37.7 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 2020/21 and FY 2021/22

New projects initiated:

- Applications-Servers Upgrade from Old Windows OS
- Arc Flash Software Model Development
- Enterprise GIS Disaster Recovery
- Etiwanda Test Facility
- Headquarters Building Physical Security Improvements - Stage 2
- HQ HVAC System Equipment Upgrades – Phase 1
- Information Technology Service Management System
- Two-Way Radio System Upgrade
- Weymouth Area Paving

Major milestones achieved:

- Business Systems Disaster Recovery Upgrade – deployment completed
- Control System Upgrade – Phases 1 & 2 - completed
- Data Center Modernization Upgrade Phase I – backup data center completed
- Information Technology Service Management System – deployment completed
- Information Technology System – Communication Infrastructure Reliability Upgrade – deployment completed
- IT Network Reliability Upgrades – deployment completed
- La Verne Shops Improvements – Equipment Installation and Building Completion – design completed
- Lake Mathews Facility Wastewater System Replacement – construction started
- Lake Mathews IT Disaster Recovery Facility Upgrades – deployment completed
- Maximo Upgrade – deployment completed
- MWD HQ Boardroom Technology Upgrade – deployment completed
- Skinner Area Paving– construction started
- Water Ordering and Energy Scheduling System – deployment completed

## Objectives for FYs 2022/23 and 2023/24

Project	Total Project Estimate	Estimated Construction Completion	Major Milestones
AMR System RTUs and Radio Modem Upgrade Project	\$ 13,000,000	2023	Complete deployment
Applications-Servers Upgrade from Old Windows OS	\$ 2,800,000	2024	Complete deployment
Control System Upgrade - Phase 4	\$ 6,400,000	2024	Begin Phase 4
Data Center Backup Infrastructure Upgrade	\$ 1,600,000	2022	Complete deployment
Data Center Modernization Upgrade	\$ 8,800,000	2022	Complete Phase 2 deployment
Desert Microwave Tower Site Upgrades	\$ 8,100,000	2024	Complete design and begin construction
Enterprise Data Analytics	\$ 3,300,000	2022	Complete deployment of pilot
Enterprise GIS Disaster Recovery	\$ 300,000	2022	Complete deployment
Fuel Management System Upgrade	\$ 1,300,000	2022	Complete deployment
La Verne Shops Improvements - Equipment Installation and Building Completion	\$ 14,000,000	2023	Complete construction
Maximo Mobile Upgrade	\$ 500,000	2022	Complete deployment
Security Operation Center	\$ 4,500,000	2022	Complete construction
Two-Way Radio System Upgrade	\$ 7,700,000	2022	Complete deployment of pilot
Headquarters Building Improvements	\$ 78,600,000	2022	Complete construction
WiFi Upgrade	\$ 5,300,000	2022	Complete deployment at Headquarters

## IT/SCADA - Infrastructure Project Group

**AMR System RTUs and Radio Modem Upgrade**

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 three phases. The first phase consists of a pilot study to evaluate various communication technologies, field test each of the selected communication technologies, and installation of 900 MHz radio modems and master radio station near Garvey Reservoir. The second phase consists of replacement of the remaining radio modems and radio master stations. The third phase consists of replacement of the AMR Remote Terminal Units (RTUs), operator interface terminals, digital displays, configuration laptops, battery chargers for Uninterruptible Power Supply (UPS), associated networking equipment and servers, and other appurtenances to complete the upgrades. 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 third phase (AMR RTUs) will be started after the Control System Upgrade Phase 4 (final design) is initiated.

**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 (e.g., 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. This project will also install arc flash labels for all equipment required to be labeled per the NFPA standards.

**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.

**Asset Monitoring System Stage 1 Conveyance and Distribution**

Currently, asset condition and performance data are maintained in multiple data systems. At times, data is redundant, not consistent, or missing resulting in delays in decision making and increased uncertainty. This project will create an integrated dashboard interface inter-connected with existing disparate data systems and utilize geographic information system (GIS) functionality to visualize key information related to asset health, condition, performance, location, and other key data in the conveyance and distribution system. Subsequent stages will address treatment plants, reservoirs, power transmission lines, support facilities, communication sites, fleet, real property, and advanced water purification. This is a new project for this budget cycle.

**CIP Budgeting System Improvements**

The Capital Investment Plan (CIP) process has been in place for over 20 years and since inception, the process has been largely manual. The scope of this project is to consolidate the CIP proposal, risk form, and cash flow form into one seamless single proposal form. This project will also create a new evaluation form, which will be designed to leverage the available historical evaluation data, new scores suggested by the proposal form, and risk/consequence data to provide a clearer reference of information when evaluating projects. This project will reduce staff time to generate proposals and required CIP documents, and also reduce the scoring efforts. This is a new project for this budget cycle.

**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 (HQ) and Lake Mathews data centers to provide sufficient computing power and modernize the data centers to meet current and future capacity, security, and reliability needs. This project will conduct a detail assessment, design, and relocate the HQ and Lake Mathews data centers to improve security and reliability.

**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 will address the most critical components that need to be replaced or upgraded in the Desert Region microwave tower sites. Phase 2 will upgrade the remainder of the sites throughout Southern California. 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.

**Distribution System Online Analyzers Replacement**

Online analyzers continuously monitor water quality in the treated water distribution system and help ensure that safe reliable water reaches our member agencies. They provide prompt indication of water quality issues and an early warning to allow actions to be taken to minimize impacts. The existing online analyzers are almost 20 years old and have exceeded their typical service life. They are outdated, no longer sold or supported by vendors, and replacement parts are becoming increasingly difficult to obtain. At approximately 23 locations, this project will (depending on the location): decommission existing analyzers; install chlorine, turbidity, UV and total ammonia analyzers; install conductivity and pH probes; and install prefabricated sheds. This is a new project for this budget cycle.

**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 DocuSign, 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 Asset Planning System**

Currently, short-term asset renewals are addressed by staff submitting Capital Investment Plan (CIP) proposals that identify upcoming needs to maintain a reliable system. This project will acquire a software application and implement a comprehensive solution to forecast long-term asset lifecycle costs. The resulting decision support tool will support the strategic planning for renewal of Metropolitan assets based on condition, performance, outage constraints, staff resource limitations, planned budget, shutdown schedules, relative value, and risk. This is a new project for this budget cycle.

**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.

**Fiber Installation at Iron Mountain, Eagle Mountain, and Hinds Pumping Plants**

Metropolitan currently relies on microwave radio equipment to provide a voice and data communication backbone for the business network, the Supervisory Control and Data Acquisition (SCADA) network, Automated Meter Reading (AMR), and two-way radio network. Information Technology Group's strategic vision is for more reliable fiber optic cables to become the primary communications path connecting all desert sites. This project will connect Iron Mountain, Eagle Mountain, and Hinds Pumping Plants to the public telecommunications network using fiber optic cable thereby enhancing reliability and increasing bandwidth of communications for desert facilities. The fiber optic would follow the paths of existing power transmission lines and terminate in the areas near switchyards and will require repeater stations. A separate project to install a fiber optic line from Gene Pumping Plant to Parker Dam is scheduled for completion in 2023. This is a new project for this budget cycle.

**Fuel Management System Upgrade**

This project's objective is to upgrade the twelve-year-old Fuel Management System (FMS), which is no longer supported by the 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.

**Gene Communication System Upgrade**

Metropolitan's microwave radio wide-area network (WAN) was constructed in the late 1990s and is approaching the end of its useful service life. The network is comprised of 72 transmission tower sites located throughout Southern California, including 24 which support the CRA. It transmits telephone, voice, data, and video communication between all Metropolitan facilities, utilizing point-to-point microwave transmission. While microwave transmission is highly effective, it is limited to line-of-sight propagation; thus, it cannot pass through mountains or other similar obstacles.

Gene Pumping Plant relies on a microwave tower at Black Metal Mountain and does not have a redundant site to support the plant if the system at Black Metal Mountain were to fail. Furthermore, the desert region now requires high-capacity carrier-grade communication links to provide reliable data, voice, and video transmission to support the need of new IT and supervisory control and data acquisition system (SCADA) infrastructures. The type of information that rely on this network are real-time data from the supervisory control and data acquisition system, automated meter reading system, security cameras and teleprotection, and system alarms to Metropolitan's control facilities, and provides access at remote sites to the email, geographical information system, Oracle financial, timekeeping, and PeopleSoft applications. This project will install approximately 22 poles and two miles of fiber optic cable from Parker Dam to Gene Pumping Plant administration building to connect to high-quality, high-speed data system to improve a variety of technological challenges at the desert facilities.

**Hydraulic Model Enhancements**

Metropolitan uses its current state-of-the industry hydraulic model daily in support of operational and facility planning requests. While the model has significant hydraulic simulation capabilities, this project proposes to enhance the software to better address water quality analyses, hydroelectric power plant power production estimating, hydraulic surge transient analysis, flood simulations, and other studies. The proposed enhancements also include storing this information on the cloud for improved data access. This is a new project for this budget cycle.



**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.

**Maximo Mobile Interface Software**

Metropolitan uses Maximo software to schedule, plan, and execute maintenance work. Currently, Maximo web-based software is not designed for mobile use and desktop or laptop computers are used to generate work orders as the primary method to distribute and plan work for field staff. This project will install and configure a mobile software system that will allow field employees to interact with the Maximo Computer Maintenance Management System from iPad mobile devices. The new system will maximize the value of the new mobile devices, increase the options and opportunity to implement a proactive data driven maintenance strategy, improve response time for corrective actions, and improve timely access to information such as manuals, construction plans, and work plans. This is a new project for this budget cycle.

**Maximo Mobile Upgrade**

The goal of this project is to replace existing mobile devices used in WSO with latest tablet technology. 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 several hundred 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.

**Replacement of Network Switches at MWD Headquarters Building**

Network switches are the backbone of the Information Technology (IT) network and connect all IT systems and infrastructure components. There are currently 12 network switches that were installed at Metropolitan Headquarters in 2014 which have reached end of their life cycle and are going out of support. Replacement of these network switches is needed to mitigate risks presented by old and out of support switches. This project will consist of multiple deployments of 12 new network switches at Metropolitan Headquarters. This is a new project for this budget cycle.

**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 Metropolitan's IT infrastructure and environment to identify potential vulnerabilities and deploy effective solutions to strengthen our cyber security.

**Security Operations Center - Cyber Security Upgrade Phase 2**

Cyber security remains a high priority and is a key part of the Information Technology Strategic Plan. Cyber criminals, including cyber terrorists from rogue nations, are launching increasingly sophisticated threats targeting critical infrastructure agencies such as water utilities. This project will assess and remediate exposures and cyber threats throughout Metropolitan with special emphasis on the business and Supervisory Control and Data Acquisition (SCADA) networks. The proposed security measures will enhance incident response times, protect against social engineering attacks, enhance SCADA security, and protect the rapidly growing network of Metropolitan's connected objects including SCADA sensors and telemetry data. This is a new project for this budget cycle.

**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 forces 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.

**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 or replace 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 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.

**Western Region Microwave Tower Sites Upgrade Project**

The western region microwave network consists of 52 sites with microwave radios that provide a voice and data communication backbone for the business network, the Supervisory Control and Data Acquisition (SCADA) network, Automated Meter Reading (AMR), and the two-way radio network. A majority of Metropolitan's current microwave radios are over twelve years old and have reached the end of their service lives, are no longer supported by the manufacturer, and replacement parts and software updates are no longer available leaving microwave infrastructure vulnerable to equipment failure. Also, inspection of the electrical grounding systems has revealed deficiencies in grounding requirements of some sites and, due to regulatory changes, some propane generators may require upgrades. This project will decrease the frequency of microwave system troubleshooting and repair activities and increase in network service reliability. The scope is to procure microwave radio equipment and associated antennas with waveguides; design microwave network and system infrastructure; install equipment on towers and inside buildings; design and install battery backup systems; rectify any grounding issues; and review the condition and level of code compliance of the propane generator systems and upgrade as necessary. This is a new project for this budget cycle.

**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.

**Operations Support Project Group****Apprentice Training Center Facility**

The current apprentice training center (ATC) has come to the end of its useful life and lacks the needed space for break rooms and training without reconfigurations. As a result, some training modules are outsourced to other vocational training colleges and programs. This project will refurbish and make modifications to the former Diamond Valley Lake (DVL) Visitor Center building to enable its use as Metropolitan's apprentice training center facility. The former visitor center building was completed in 2008 and shares several building components with the adjacent Western Science Center Museum. The project will address the need for additional space dedicated to individual apprentice training center functions such as break rooms, classrooms, restrooms with added capacity and ample space for library and storage areas. The project will also address the aging and obsolete building systems that are currently shared with the adjacent Western Science Center Museum. To meet Metropolitan building standards, upgrades will be made to security, access, architectural, mechanical, electrical, plumbing systems, and other building features and equipment. Completion of this project will provide the necessary facilities for apprentice training well into the future for the development of the workforce that will operate and maintain Metropolitan's conveyance, distribution, and treatment systems. This is a new project for this budget cycle.

**CRA Aircraft Facility Improvements**

Metropolitan owns and operates several airstrips along the Colorado River Aqueduct (CRA) that are deteriorating with age. There is also no designated landing area for helicopters or an enclosed area to store aircraft. Currently, planes must be taken offsite for hangar storage in Lake Havasu. The project will design and construct various improvements to runway pavement and landing communication systems at the four aircraft facilities located near the CRA Pumping Plants (Gene, Iron Mountain, Eagle Mountain, and Hinds). This includes (1) rehabilitation of the existing asphalt paved runway, (2) rehabilitate the existing asphalt paved access road leading to the runway and construct new asphalt paved access road to replace the existing access road without asphalt pavement, (3) replacement of the existing incandescent bulb lighting along the runways at Iron Mountain and Eagle Mountain with energy efficient Light Emitting Diode (LED) bulbs, (4) installation of a weather reporting station at Eagle Mountain and Hinds Pumping Plants, (5) construction of a new helipad at Eagle Mountain Pumping Plant and, (6) construction of a new aircraft hangar and parking area at the runway facility near Gene Pumping Plant. This is a new project for this budget cycle.

**CRA Pumping Plant Access Road Rehabilitation**

The Colorado River Aqueduct (CRA) pumping plant access roads must accommodate heavy traffic loads for deliveries of chemicals, materials, equipment, and staff. The existing asphalt roads are distressed and show numerous areas of longitudinal and alligator cracking. The harsh desert climate conditions have caused the pavement to age and become distressed more quickly. These roads are the sole means of access to the pumping plants, making reliable use of the roads critical to allow equipment, chemical, and material deliveries, ingress for first responders, and general access. This project will rehabilitate approximately 11 miles of the existing access roads leading to the Intake, Iron Mountain, Eagle Mountain, and Hinds Pumping Plants using a combination of pavement overlay and pavement replacement with new aggregate base subgrade. This project will also include pavement markings. This is a new project for this budget cycle.

**District-wide Fall Protection Improvements**

Working at elevated areas within 6-feet of an edge that have 6-feet falling height, requires fall protection per California Occupational Safety and Health Administration (Cal-OSHA) regulations. The current procedures require that when employees need to enter a rooftop area to service equipment, they must develop and implement a specific plan for safe access; complete a job safety hazard checklist to address all fall hazards; and utilize safety belts, lanyards, or other approved fall protection systems as required. This project will construct guardrail and skylight fall protection on building rooftops, and other types of fall abatement projection for other serviceable areas on facilities with fall protection deficiencies at the District's five Colorado River Aqueduct pumping plants, five water treatment plants, and other miscellaneous facilities throughout the service area per Cal-OSHA Title 8 requirements. Engineered controls such as guardrails and skylight screens will provide the highest level of protection ensuring safety, limiting District liability, improving staff productivity, and ensuring compliance with Cal-OSHA requirements. This is a new project for this budget cycle.

**District-wide Zero and Near-Zero Emissions Fleet Infrastructure**

Identifying new ways to reduce greenhouse gas (GHG) emissions and reduce Metropolitan's carbon footprint is essential to the implantation of Metropolitan's Climate Action Plan (CAP). This project will design and construct infrastructure to meet mandated Zero Emission (ZE) and Near-Zero Emission (NZE) state and local regulations and comply with California Environmental Quality Act (CEQA) GHG reductions identified in CAP. This project would be implemented in phases, starting with development of a comprehensive transition plan to a ZE and NZE fleet, implementation of transition plan that includes interim and long-term infrastructure design, installation of recommended infrastructure (e.g., charging and/or dispensing stations), and installation of infrastructure related to solar and/or battery energy storage and other sustainability opportunities. The fleet includes passenger vehicles; light-, medium-, and heavy-duty on-road vehicles, off-road construction vehicles/equipment; forklifts; and employee and rideshare vehicles.

**Eagle Rock Security Upgrade**

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 and lower entrance gates, and existing intercom system at the gates; and installation of additional security cameras, lighting fixtures, flood lights with motion detectors, fencing, gates around the perimeter of building, signage, new electrical and communication conduits, and other related security features.

**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 32 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 (1) 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; and (2) upgrade existing or install new air filtration systems with high efficiency particulate air (HEPA) filtration and germicidal equipment such as UV disinfection to occupied buildings to provide enhanced protection from airborne viral and bacterial particulates.

**La Verne Shops Improvements**

The La Verne Shops are located on the grounds of the Weymouth 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 27 to 37 years old, with a few pieces close to 47 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. The first four stages of this project are complete, which included building expansion and refurbishment/replacement of most of the equipment.

The fifth and final stage focuses on the procurement and installation of new fabrication and machine shop equipment, including a hydraulic shear, hydraulic press brake, waterjet cutting system, horizontal band saw, and vertical machining center. This new equipment will replace existing equipment that is up to 35 years old and is not viable to refurbish. This last stage will also include refurbishment of various remaining existing machines; safety upgrades to roof ladders and walkways; and installation of new electrical circuit, unit power center for an uninterruptible power supply, ductbanks for various utilities, shop heaters, air compressors, various utilities, and other appurtenances to support the shop operations.

**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 52 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.

**La Verne Support Buildings Seismic Improvements**

As part of Metropolitan's seismic upgrade program, a rapid evaluation was conducted and identified seismic deficiencies in Weymouth Softener Buildings Nos. 1, 2, and 3, Weymouth Central Stores Storage/Paint Shop - Building 32/32A, and the Weymouth General Storage Building - Building No. 33. This project will evaluate future uses of these structures, construct improvements to address these deficiencies, as well as, should it provide value to the District, improve non-structural features in each building such as roofing, insulation, and other building characteristics. This is a new project for this budget cycle.

**Lake Mathews, Garvey and CUF Support Facilities Seismic Upgrade**

As part of Metropolitan's seismic upgrade program, a rapid evaluation was conducted and identified seismic deficiencies in the Garvey microwave station; the Lake Mathews Hazardous Materials Building, meter shop, auto shop, and heavy equipment shop; the Chlorine Unloading Facility Main Office; and other buildings at these locations. This project will construct improvements to address these deficiencies, as well as, should it provide value to the District, improve non-structural features in each building such as roofing, insulation, and other building characteristics. This is a new project for this budget cycle.

**Lake Mathews Facility Wastewater System Replacement**

The wastewater system at Lake Mathews has been in operation for nearly 82 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. This project will remove the on-site wastewater system and construct wastewater system that ties into the Western Municipal Water District's sewer line to reduce the risk of costly unplanned repairs and to maintain system reliability.

**Etiwanda Test 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. It is comprised of four main buildings (Buildings 30, 31, 32A, and 33). A recently completed seismic evaluation found that the buildings may be damaged from a maximum credible earthquake. The cost to retrofit the all four buildings is cost prohibitive. In addition, the buildings lack the storage space necessary to house Metropolitan's materials, supplies and equipment. The buildings also are not suitable to safely store adequate supplies of medical grade supplies and essential commodities for emergency preparedness such as for pandemics. Furthermore, they lack equipment to handle large assets like the large diameter specialty valves. This project will construct a new warehouse, which will provide approximately 55,000 square feet of indoor floor space with approximately 30,000 square feet of outdoor storage yard covered under canopies. This project will also demolish Buildings 30 and 31 and restore and seismically retrofit the Buildings 32A and 33 to meet the current building code. The new warehouse and retrofitted buildings will support Metropolitan's ongoing operations and maintenance, capital construction efforts, and emergency preparedness.

**System-wide Paving & Roof Replacements**

Similar to infrastructure throughout 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, building expansion, 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, a building expansion and functional layout improvements such as laboratory and office space reconfiguration, lab equipment replacements, accessibility improvements, HVAC and roof replacements, and other related building improvements necessary to renovate the building to support Metropolitan to meet current and future water quality regulations.

**System Reliability - Security and Other Project Group****Coyote Creek PCS HEP Perimeter Security Upgrade**

The Coyote Creek Pressure Control Structure (PCS) and Hydroelectric Plant (HEP) facility falls under North American Electric Reliability Corporation (NERC) and Federal Energy Regulatory Commission (FERC) oversight and must adhere to critical infrastructure regulations set by these agencies. The current perimeter security fencing and security measures at this site do not meet the NERC/FERC security standards. This project will replace all perimeter fencing and both entry gates, relocate the rear vehicle gate to the front of the driveway at Lambert Road, and install multiple network security detection systems to detect and deter unauthorized individuals from accessing the site. This is a new project for this budget cycle.

**Diamond Valley Lake Network Security Detection Systems**

In 2018, a serial arsonist set 11 fires in the Diamond Valley Lake (DVL) area. This project will install multiple network detection security systems around DVL to cover areas with historically high security incidents. The network detection security system will utilize ground-based radar and thermal imaging as necessary to monitor for trespassing, criminal activity, security incidents, illegal dumping, fire, and medical emergencies. This is a new project for this budget cycle.

**Eastern Region Security Camera Replacement**

The existing camera system that serves the Eastern Region of Metropolitan's distribution system requires frequent maintenance, is obsolete and is not integrated with the current enterprise system, and its coverage is incomplete. This project will replace the existing camera system with new enhanced camera system and install other security related equipment in this region to enhance the theft and trespassing detection and deterrence, lower maintenance costs, and better leverage the available bandwidth and data storage capabilities to provide better video feeds and recordings. This is a new project for this budget cycle.

**Etiwanda Reservoir Security Upgrades**

Etiwanda Reservoir has experienced incidents of trespassing and illegal dumping. This project will replace the gate near residences with a high security gate that is cut and climb resistant and install multiple network security detection systems to detect and deter unauthorized individuals from accessing the site. This is a new project for this budget cycle.

**Headquarters 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.

**Headquarters Building Interior and Exterior Lighting and Control System Upgrade**

The existing fluorescent lighting fixtures in the Metropolitan Headquarters building are 23 years old and past their service lives. As the fixtures and components continue to age, the risk of fire hazard will increase and in July 2019, a fire incident occurred on the first floor due to the deterioration of fixture components. This project will replace and upgrade interior and exterior lighting with new energy efficient light emitting diode (LED) fixtures controlled by a new lighting control system which allows for programmable on/off, dimming, daylight harvesting, and occupancy sensing. This project will bring the building lighting up to the current California Title 24 building standards and may qualify for Los Angeles Department of Water and Power's Commercial Lighting Incentive Program. This is a new project for this budget cycle.

**Headquarters Chiller Plant Upgrade**

Metropolitan's Headquarters' original central plant cooling equipment was installed in 1997 when the building was constructed. This equipment provides the comfort cooling requirements for the Metropolitan Headquarters Building. Chillers and cooling tower equipment typically has a lifespan of 10 to 25 years and the existing equipment in the building is no exception. Costs to maintain the aging, obsolete, and inefficient equipment continue to increase. This project will replace the central plant cooling equipment with new chillers, cooling towers and related mechanical, electronic and electrical systems that meet today's energy efficiency and seismic standards. This is a new project for this budget cycle.

**Headquarters Facility Replacement of Modular Furniture**

The service life of office modular furniture is about 20 years and the existing furniture in Metropolitan Headquarters Building predates the building since it was originally purchased and used when Metropolitan worked out of Cal Plaza. Additionally, the furniture supplier has discontinued this line of products. This project includes space planning, which will develop new furniture standards and guidelines that address changing organizational needs; replacement of obsolete modular furniture; installation of new common use space/privacy rooms/meeting rooms/storage; additional enclosed offices; associated power, communication and network installations in walls, ceilings, and floors; and other work to comply with safety codes. This is a new project for this budget cycle.



**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, air handler units, chillers, air disinfection systems, and associated mechanical, electrical, and control systems, restroom facilities on several floors, and video rooms and video production equipment.

**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 is complete, which enhanced perimeter windows and doors by providing needed blast protection. The Stage 2 work, currently in construction, provides security system upgrades inside the building with entry validation, surveillance and intrusion protection, and additional security features in the main entry rotunda area, board room, executive dining lounge, and security control room. Stage 3 is in design phase and will enhance perimeter security along the exterior of the building and courtyard including bollards and gates.

**Hinds Pumping Plant Perimeter Security Upgrades**

Existing portions of the current perimeter fencing at Hinds Pumping Plant are deteriorated and do not deter intruders. The inability to properly monitor the area has resulted in incidents of theft and illegal dumping. This project will install a complete and continuous anti-cut anti-climb perimeter fence and multiple network security detection systems at Hinds Pumping Plant to detect and deter unauthorized individuals from accessing the site. This is a new project for this budget cycle.

**Lake Mathews Network Security Detection Systems**

Existing portions of the current perimeter fencing at the Lake Mathews facility are deteriorated and do not prevent intruders. The inability to properly monitor the area has resulted in incidents of theft and illegal dumping. This project will install multiple network detection security systems around Lake Mathews to cover areas with historically high security incidents. The network detection security system will utilize ground-based radar and thermal imaging to monitor for trespassing, criminal activity, security incidents, illegal dumping, fire, and medical emergencies. This is a new project for this budget cycle.

**Perris PCS Perimeter Security Upgrades**

The current fencing at the Perris Pressure Control Structure (PCS) is inadequate, evidenced by a recent intrusion. This project will replace all perimeter fencing with a high security fence that is cut and climb resistant with a 3-strand barbed wire top guard, and install multiple network security detection systems with the intent to lower the District's exposure to theft, arson, and vandalism. This is a new project for this budget cycle.

**Power Switch Yard Protection**

Several of Metropolitan's switch yard facilities fall under North American Electric Reliability Corporation (NERC) and Federal Energy Regulatory Commission (FERC) oversight and must adhere to infrastructure regulations set by these agencies. This project will install ballistic barriers and chain link roofs at all power switch yards throughout the District to protect equipment from projectiles and drone attacks. This is a new project for this budget cycle.

**Security System Upgrade**

The electronic security system is the backbone of Metropolitan's physical security system. Studies indicate that replacement of the 17-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.

**Valley View PCS HEP Perimeter Security Upgrades**

The Valley View Pressure Control Structure (PCS) and Hydroelectric Plant (HEP) facility falls under North American Electric Reliability Corporation (NERC) and Federal Energy Regulatory Commission (FERC) oversight and must adhere to critical infrastructure regulations set by these agencies. Upgrades to perimeter security fencing and security measures are needed to comply with NERC/FERC security standards. This project will replace fencing and gates to meet security standards and will install multiple network security detection systems to detect and deter unauthorized individuals from accessing the site. This is a new project for this budget cycle.

**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.

**West Portal Perimeter Security Upgrade**

The West Portal site of the San Jacinto Tunnel does not have a continuous perimeter fence. The location is susceptible to intruders. This project will install a complete and continuous anti-cut anti-climb perimeter fence with barbed wire top guard at West Portal to meet security standards and will install multiple network security detection systems to detect and deter unauthorized individuals from accessing the site. This is a new project for this budget cycle.

**Western Region Security Camera Replacement**

The existing camera system that serves the Western Region of Metropolitan's distribution system requires frequent maintenance, is obsolete, is not integrated with the current enterprise system, and its coverage is incomplete. This project will replace the existing camera system with new enhanced camera system and install other security related equipment in this region to enhance the theft and trespassing detection and deterrence, lower maintenance costs, and better leverage the available bandwidth and data storage capabilities to provide better video feeds and recordings. This is a new project for this budget cycle.

## Treatment Plant Reliability Program

Fiscal Year 2022/23 Estimate: \$24.9 million

Fiscal Year 2023/24 Estimate: \$17.2 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 2020/21 and FY 2021/22

#### Diemer Plant

##### New Projects Initiated:

- Diemer Electrical Improvements
- Diemer Filter Rehabilitation
- Diemer Power and Distribution Panel Upgrades

##### Major Milestones Achieved:

- Diemer Basin Rehabilitation - construction of the west basins completed
- Diemer Filter Building Seismic Upgrades - construction of seismic upgrades for the west filter building completed
- Diemer Filter Valve Replacement - construction of valve replacement for the west filters completed
- Diemer Water Sampling System Improvements - construction completed

#### Jensen Plant

##### New Projects Initiated:

- Jensen Control Room HVAC
- Jensen New Caustic Soda Tank Farm at the Combined Filter Effluent
- Jensen Reservoir Bypass Gate Refurbishment

##### Major Milestones Achieved:

- Jensen Modules 2 and 3 Flocculator Rehabilitation – construction completed
- Jensen Ozone PSU and Critical Component Upgrade – design completed
- Jensen Electrical Upgrades - Stage 2 – construction completed

### Mills Plant

#### New Projects Initiated:

- Mills Ozone PLC Control and Communication Equipment Upgrade
- Mills Electrical Upgrades – Stage 2

#### Major Milestones Achieved:

- Mills Electrical Upgrades – construction of Stage 1 completed
- Mills Electrical Upgrades – construction of Stage 2 started
- Mills Ozone PLC Control and Communication Equipment Upgrade – procurement contract awarded

### Skinner Plant

#### New Projects Initiated:

- Skinner Fluoride Tank Replacement

#### Major Milestones Achieved:

- Skinner Survey Building Roof Replacement – construction completed
- Skinner Ozone PLC Upgrade – installation completed

### Weymouth Plant

#### New Projects Initiated

- None

#### Major Milestones Achieved:

- Weymouth Basins 5-8 and Inlet Channel Refurbishment – final design completed
- Weymouth Chlorination System Upgrades – construction completed
- Weymouth Domestic Water System Improvements – construction completed
- Weymouth Water Quality Instrumentation Improvements – construction completed

## Objectives for FYs 2022/23 and 2023/24

Project	Total Project Estimate	Estimated Construction Completion	Major Milestones
Diemer Chemical Feed Systems Improvements	\$ 11,300,000	2026	Complete design
Diemer Filter Rehabilitation	\$ 49,700,000	2026	Complete design
Jensen Electrical Upgrades - Stages 1 & 2	\$ 54,000,000	2022	Complete Stage 2 construction
Jensen Ozone PSU and Critical Component Upgrade	\$ 14,300,000	2023	Complete construction
Jensen Site Security Upgrade	\$ 2,100,000	2024	Complete construction
Mills Electrical Upgrades - Stage 2	\$ 14,500,000	2024	Complete construction of Stage 2
Mills Fluorosilicic Acid Tank Replacement	\$ 2,500,000	2024	Complete construction
Mills Perimeter Security and Erosion Control Improvements	\$ 5,800,000	2024	Complete construction
Skinner Fluorosilicic Acid Tank Replacement	\$ 1,600,000	2024	Complete construction
Skinner Ozone Contactor Roof Elastomeric Coating	\$ 2,300,000	2023	Complete construction
Skinner Sulfuric Acid Transfer Line Rehabilitation	\$ 1,400,000	2025	Complete design
Weymouth Basin 5-8 and Inlet Channel Refurbishment	\$ 65,000,000	2024	Begin construction
Weymouth Filter Valve Replacement	\$ 24,400,000	2024	Begin construction
Weymouth Hazardous Waste Staging and Containment	\$ 2,600,000	2023	Complete construction

## 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 57-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. The project will also replace chiller, boiler, compressor, and make ductwork modifications. Seismic anchorage of the equipment will be incorporated to meet the current building code.

**Diemer Chemical Feed System Improvements**

The chemical feed equipment for ammonia, alum/ferric chloride, sodium hydroxide, fluorosilicic acid, liquid polymer, and dry polymer at the Diemer plant has aged and its reliability has deteriorated over the years. Most equipment is over 22 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.

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.

**Diemer Power and Distribution Panel Upgrades**

Power and distribution panels that were installed during the original Diemer plant construction, are more than 57 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 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.

**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.

**Diemer Ozone Network Upgrade**

Ozone is the primary disinfectant at Metropolitan's water treatment plants. At the Diemer plant, the programmable logic controllers (PLCs), which control the ozone process, have exceeded their service lives; are discontinued; and the existing firmware has security flaws. This project will replace the PLC processors, upgrade the network modules to ethernet, modify the existing fiber optic cable infrastructure to support the new district standard ethernet, and other appurtenances necessary to complete the upgrade. The existing PLC configuration will be migrated to the new processors and the operations manual will be updated to reflect the associated changes. This is a new project for this budget cycle.

**Diemer Wastewater Reclamation Facilities Reliability Improvement**

Approximately 40 percent of Diemer plant's existing Wastewater 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 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. Seismic stabilization will be accomplished by replacing the existing sedimentation basins with smaller footprint inclined plate settlers to reduce the footprint and move the process away from the seismically vulnerable fill portion of the pad. The project also includes modifications to the existing chemical feed system, sludge line, and utilities at the west slope.

**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.

**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 through the use of biological and engineered solutions. The work includes: installation of rip rap and slurry backfill along the channel; repairing damaged concrete liner on the channel sides, restoration of the broken apron next to the railroad bridge, and revegetation of native species to keep sediments in place and reduce erosion. In addition, a catch basin and other stormwater management infrastructure 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.

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.

**Jensen Chlorine Caustic Scrubber Tanks Replacement**

Similar to the other four water treatment plants, the Jensen plant uses caustic scrubbers to neutralize chlorine gas in the event of an accidental leak in the chlorine containment building. The existing scrubber systems are experiencing corrosion and the best option for rehabilitation of this safety system is replacement of the scrubber tanks. This project replaces the caustic scrubber tanks and associated equipment. This is a new project for this budget cycle.

**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 Electrical Upgrades**

The Jensen plant's electrical system was designed to meet then-current electrical codes when the plant was constructed over 42 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 are underway to 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, including geotechnical seismic analysis of the east side of the plant to determine areas of seismic vulnerability.

**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.

**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 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 52 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 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; replacing suction pumps and flexible hoses; retrofitting the suction piping; replacing sludge line piping, rehabilitating/replacing launder gates and launders; upgrading the bridge control system and power supply; replacing the 48-existing basin inlet gate actuators; recoating bridge trusses; replacing basin guardrails; and installing improvements to prevent bird nesting within the basin.

**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 17 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 (PSU); (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. This project also will make modifications to re-purpose one existing PSU chiller as a backup HVAC chiller.

**Jensen Raw Water Emergency Bypass**

The Jensen plant is located within proximity of a number of faults, which are capable of generating large earthquakes. In the event of a large earthquake that can cause extensive damages to the plant and disables the water treatment capability, the plant does not have an emergency raw water bypass to deliver raw water under a boil water order in such a need were to occur. This project will improve resiliency against severe earthquake and enhance operational flexibility by constructing a raw water emergency bypass for the Jensen plant.

**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 curity, 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 and motion-activated lights in sensitive areas; replacement of existing aging security cameras with high resolution cameras; addition of new cameras, motion detection devices, and public announcement speakers to monitor the perimeter of the plant and deter intruders; 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, it was recently determined that construction of two new lagoons to replace the two existing lagoons that must be returned to LADWP is not sufficient. This project will design and construct a new mechanical solids handling facility at the Jensen plant instead of constructing two new lagoons to replace the ones that must be returned to LADWP. This new mechanical facility will be sized to handle all of Jensen plant's solids handling needs when treating as much as 500 mgd.

**San Fernando Road Rail Crossing Rehabilitation**

The Jensen plant receives water treatment chemical supply by rail. Metropolitan's chlorine vendor is transitioning to heavier chemical railcars which require heavier gauge rails to meet Federal Railroad Administration regulations for hazardous chemical transportation requirements. This project will rehabilitate the deteriorated railroad crossing at San Fernando Road, upgrade the strength of the rails and turnout, add concrete crossing panels to handle heavy truck traffic, replace damaged asphalt, and install crossing arms and signage. This is a new project for this budget cycle.

**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.

**Mills 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 addressed 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, washwater 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 install climate control systems and doors at two electrical buildings, modify electrical manholes, replace digital metering modules for all motor control centers, and add fiber optic cabling.

**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 7,900-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.

**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, valves, actuators, and control panels, and install flow meter display units in a weatherproof enclosure outside of the containment areas.

**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.

**Mills 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, replace existing guard shack and motorized sliding gate at the Barton Street entrance with motorized double swing gate with associated controls, replace three existing secondary gates with taller security gates with security cameras, and install one security camera at each of the sliding gates. 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.

**Mills Raw Water Emergency Bypass**

The Mills plant is located within proximity of a number of faults, which are capable of generating large earthquakes. In the event of a large earthquake that can cause extensive damages to the plant and disables the water treatment capability, the plant does not have an emergency raw water bypass to deliver raw water under a boil water order in such a need were to occur. This project will improve resiliency against severe earthquake and enhance operational flexibility by constructing a raw water emergency bypass for the Mills plant.

**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 28 years and have not been 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. The existing gate frames will be replaced with new frames and other installation components (i.e., guides, wedge blocks, and seals). 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 Fire Protection System Expansion**

The installation of a new Battery Energy Storage System (BESS) at the Skinner plant requires improvements to the plant's fire protection system. This project constructs a new fire hydrant, water pipes, and other improvements to provide a permanent fire protection water source for the Skinner's solar facility and BESS to comply with the fire codes. This is a new project for this budget cycle.

**Skinner Fluorosilicic Acid Tank Replacement**

Fluorosilicic acid tanks will be removed and replaced with two 8,200-gallon above-ground (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 Raw Water Emergency Bypass**

The Skinner plant is located within proximity of a number of faults, which are capable of generating large earthquakes. In the event of a large earthquake that can cause extensive damages to the plant and disables the water treatment capability, the plant does not have an emergency raw water bypass to deliver raw water under a boil water order in such a need were to occur. This project will improve resiliency against severe earthquake and enhance operational flexibility by constructing a raw water emergency bypass for the Skinner plant.

**Skinner Sulfuric Acid Transfer Line Rehabilitation**

The sulfuric acid transfer system at the Skinner plant is used to move chemical between tanks and is also used to homogenize the chemical within individual tanks. This critical water treatment system recently experienced a leak in a transfer pipeline. This project will replace degraded transfer and recirculation pipes with pipe made from more appropriate material, and includes adding pressure relief valves and alarms, and other appurtenant work to improve the safety and reliability of the sulfuric acid transfer system. This is a new project for this budget cycle.

**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. Option to replace the building will be considered during the early phases of this project.

**Weymouth Project Group****Oxidation Demonstration Plant Rehabilitation**

Constructed in 1992, the 5.5 MGD Oxidation Demonstration Plant (ODP) provides a 1:100 demonstration-scale test facility of Metropolitan's full-scale plants. This demonstration scale testing capability is needed to ensure that Metropolitan continues to meet all current and future drinking water regulations. Currently, much of ODP's infrastructure has reached the end of its service life, which adversely affects the facility's continued safe and reliable operation. Among other associated improvements, the project will remove obsolete equipment; install new ozone generators, a new liquid oxygen (LOX) storage tank, and associated equipment; install variable frequency drives (VFDs) for the backwash pumps; rehabilitate secondary containment system for all chemicals used at the plant; and upgrade other electrical, mechanical, and control systems to make the plant operation more efficient, reliable, and safe. This is a new project for this budget cycle.

**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 77 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 and modernized. 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 32 years.

**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 hours 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.

**Weymouth Basins 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 refurbishment, 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; replacing the sedimentation basin sludge collector rakes, drives, and pumps; replacing launders, launder isolation gates, and drains; installing utilities, handrails, and other work necessary to complete the basin refurbishment. Replacement of inlet channel gates for Basins 1 through 8 and inlet channel seismic structural upgrades for Basins 5 through 8 are also part of this project.

**Weymouth Chlorine Delivery Railroad Tracks Replacement**

The Weymouth plant receives chlorine deliveries via rail cars. The railroad spur to the Weymouth plant was originally installed in the 1930s to transport material and equipment for the construction of the Weymouth plant. This project will replace the track dedicated to the Weymouth plant, improve traffic control and intersections as necessary, and install new rail car scales. This is a new project for this budget cycle.

**Weymouth Chlorine Maintenance Shop Expansion**

With the completion of the Weymouth Chlorine System Upgrades project, the amount of equipment to maintain has increased resulting in insufficient space in the existing shop to perform necessary maintenance and accommodate storage of equipment and spare parts. Storage cabinets and electrical panels have been added where desks and workspace were located. Also, due to the space limitations, spare equipment is currently stored in the two storage bays which poses the potential of the equipment being compromised in the event of a leak. This project will expand the existing Chlorine Maintenance Shop including a room addition to ensure adequate working space and storage exist to address these space, storage, and maintenance needs to reliably maintain the chlorine equipment for the expanded chlorine process. This is a new project for this budget cycle.

**Weymouth Dry Polymer System Upgrade**

Cationic polymers are used as a coagulant aid for the wastewater 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 although it was constructed to meet the codes at that the time of construction.

The project will construct a new dry polymer mixing facility to replace the existing facility. The scope of the project includes construction of a new building designed to meet current seismic standards, installation of a dry polymer mixing system to allow simultaneous mixing and feeding of cationic and nonionic polymers, independently; and construction of a covered containment area to house feed equipment and new polymer storage tanks.

**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 47 to 57 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. This project will also replace or refurbish appurtenant equipment which is ancillary to the reliable operation of the filter valves, such as flow meters, underdrain valves, electrical and control systems, pipes, and other equipment.

**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; (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; and (3) constructing sludge lagoons that would replace the belt press facility as the main solids handling facility to process residual solids.

**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 evaluate options to improve minimizing fluctuations in the treated washwater flow returned to the plant inlet and implement the most effective and feasible option. Options for improvements include: (1) construction of a new stand-alone pumpback structure with adequate buffering instead of making improvements to the existing washwater pumpback structure; and (2) modifying the ODP clearwell pumps with variable speed pumps; upgrading washwater pump station pump program to moderate changes in pump speed; reconfiguring 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 other improvements identified during early stages of the project

**Weymouth Wheeler Gates Security Improvements**

Construction vehicles and chemical delivery trucks access the Weymouth plant through the Wheeler entrance gate. This project will provide safety and security improvements to the Weymouth plant's Wheeler gate, including construction of a new guard enclosure; improved lighting, security cameras, and communication features; crash rated gates at vehicle and train entrances; perimeter wall and fencing along Wheeler Avenue; two traffic lanes at the entrance and exit; chemical delivery staging and containment area; and vehicle rejection turn-about outside the plant entrance gate.

## 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 Program

Fiscal Year 2022/23 Estimate: \$0

Fiscal Year 2023/24 Estimate: \$0.8 million

**Program Information:** The Water Quality Program 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 2020/21 and FY 2021/22

- New projects initiated:
  - None
- Major milestones achieved:
  - Weymouth Hypochlorite Feed Facilities – Completed project
  - Weymouth ORP - Ozonation Facilities Construction, and Completion Activities – Completed project

### Objectives for FYs 2022/23 and 2023/24

Project	Total Project Estimate	Estimated Construction Completion	Major Milestones
Mills Enhanced Bromate Control	\$ 5,700,000		Complete final design

### Water Quality - 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.