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2017 Asset Management Plan Long-Term Funding Forecast Update

Zone 7 Water Agency

October 2017

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1 Introduction and Background

This Asset Management Plan Funding Update (2017 Update) provides a summary of the findings and recommendations of the work done to update the long-term funding forecast and related renewal funding needs for Zone 7 Water Agency's (Zone 7) Asset Management Program (AMP).

1.1 Background

Zone 7 provides water to retailers serving approximately 240,000 residents in Pleasanton, Livermore, Dublin, and through a special agreement with the Dublin San Ramon Services District, to the Dougherty Valley area of San Ramon. Zone 7 also supplies untreated water for irrigation of 3,500 acres, primarily South Livermore Valley vineyards. Zone 7 has an ongoing commitment to plan for existing and future needs, maintain a high quality, reliable water delivery system and provide a quality product and service to the community.

The purpose of the AMP is to proactively plan for and implement asset renewal projects such that Zone 7 can continue to provide high quality, reliable water delivery to the residents of the Livermore-Amador Valley.

Zone 7 initiated its first formal AMP in 2004, including the development of an asset registry and proposed methodology for forecasting long-term renewals, as described in the *2004 Asset Management Program Phase II Summary Report*. As part of a *2011 Asset Management Plan Update (2011 Update)* some of the definitions and methodologies were improved and updated along with significant changes to the long-term funding forecast methodology and the creation of asset classes to facilitate future data collection and decision-making.

As part of the current update, the long-term funding forecast has been updated to reflect Capital Improvement Projects (CIP) that were completed and assets that were renewed since 2011, incorporate new and future projects, and the long-term renewal of assets. All the assumptions used during the *2011 Update* for the near-term and long-term asset renewals and funding forecast were utilized for the current update as well.

1.2 Objectives

The primary objectives of the 2017 Update include the following:

- Forecast long-term funding requirements based on anticipated renewal/replacement CIP projects, long-term renewal of existing assets through fiscal year (FY) 2057/58, and other system-wide improvements (SWI) projects.
- Forecast near-term renewal needs to aid Zone 7 in identifying assets that need condition assessment to better define future CIP projects.



- Identify funding gaps using current funding rates.
- Provide a 10-year plan to incorporate into the Zone 7 FY 2018/19 CIP.

1.3 Stakeholder Involvement

During the development of this 2017 Update, two workshops were held with representatives from Zone 7's Retailers, including California Water Service Company, the Cities of Livermore and Pleasanton, and Dublin San Ramon Services District. The purpose of the workshops was to share the results and recommendations of the project and provide opportunities for the Retailers to understand the process and provide input on key aspects.

The first workshop focused on providing a recap of the Zone 7 CIP projects, reviewing the findings of the near-term and long-term asset renewals and associated costs, and presenting the various alternatives that were analyzed for long-term project funding. The second workshop was to present and obtain input on staff recommendations.

1.4 Report Organization

The 2017 Update is divided into three sections. The first section presents general background information. The second section, Near-Term Renewal, provides a review of the near-term asset renewal forecast methodology, the existing asset database, discussion on draft renewal/replacement CIP projects, and a list of CIP projects pending condition assessment that were developed based on near-term renewal needs. The third section, Long-Term Funding Forecast, presents the long-term asset renewal forecast methodology, System-Wide Improvement (SWI) projects, and recommended long-term AMP funding forecast through FY 2057/58, and provides a discussion on funding analysis and recommended funding levels.

There are also three appendices to this 2017 Update, which present detailed information supporting the results discussed in the main report. These appendices are presented in the order they appear in the main report and include:

- Appendix A – List of AMP-Identified CIP Projects
- Appendix B – List of System-Wide Improvement (SWI) Projects
- Appendix C – Total Funding Forecast

2 Near-Term Renewal

This section presents the recommended near-term renewal CIP plan. The near-term renewal plan is based on CIP project information provided by Zone 7 and an analysis of the remaining useful lives of the assets in the asset management database. These results are described in the following subsections.

2.1 Near-Term Asset Renewal Methodology

Near-term renewals are those which will be implemented during the 10-year period through FY 2027/28. Zone 7 developed a list of CIP projects based on condition assessments conducted since the *2011 Update* as well as a review of the remaining useful lives of the assets in the asset database. These CIP projects were directly incorporated in the near-term renewal plan.

The entire asset database was then analyzed to identify other assets that reached the end of their useful life or will reach the end of their useful life within the next ten years. The original useful life (OUL) information was developed as part of the *2011 Update* and was updated as Zone 7 obtained additional information on its assets, and is provided in Table 2.1. Those assets that reached or are nearing the end of their OUL and were not included in the CIP project list provided by Zone 7 were identified for condition assessment. The results of this assessment are described in the following subsections.

2.2 Renewal/Replacement CIP Projects

As described in Section 2.1, Zone 7 has several draft renewal/replacement CIP projects that were incorporated into the near-term renewal plan. Some of these CIP projects were recommended in the *2011 Update*, but have not been completed yet. The total estimated draft renewal/replacement CIP project cost is approximately \$72.4 million. 69 assets are included for renewal in these projects. Table 2.2 provides a list of these projects with their estimated cost and timing. This list includes annually-recurring renewal costs for projects that are not associated with specific assets in the database, costs associated with program management, and renewal projects for assets before they reach their OUL due to safety, as well as improvements to assets not associated with capacity expansion. The costs of annually-recurring and renewal projects beyond FY 2027/28 have been included in the long-term renewal costs described in Section 3.



Table 2-1: Asset Classes and OUL

Asset Type (Discipline)	Asset Class	OUL (Years)	Useful Life Source
Mechanical	Filtration Media - Membranes	5	Owner's Judgment
	Filtration Media - Conventional	25	Engineer's Judgment
	Filter Underdrains ^b	50	Owner's Judgment
	Hypochlorite System ^b	15	Owner's Judgment
	HVAC	15	Chartered Institute of Building Services.
	Mechanical/Electrical/Instrumentation/Piping	Varies	Owner's Judgment
	Motor	30	Engineer's Judgment
	Pumps	30	Engineer's Judgment
	Pumps - Chemical	15	Engineer's Judgment
	Pumps - Well ^b	12	Owner's Judgment
	Rotating Equipment	25	Engineer's Judgment
	Specified Equipment	25	Owner's Judgment
	Valves	25	Engineer's Judgment
	Well Casing ^b	50	Owner's Judgment
	Well - Arch Mud Rot Combo	50	Owner's Judgment
	Well - Hollow Stem Auger	50	Owner's Judgment
	Well - Nested	50	Owner's Judgment
	Well - Sonic	50	Owner's Judgment
Structural	Civil / Sitework	75	Owner's Judgment
	Coating ^b	20	Owner's Judgment
	Cathodic Protection System ^b	10	Owner's Judgment
	Electrolysis Test Stations	75	Owner's Judgment
	Roof ^b	30	Owner's Judgment
	Structural / Architectural	75	Owner's Judgment
	Tank - Ammonia ^b	30	Owner's Judgment
	Tank - Chemical	15	Engineer's Judgment
	Tank - HDPE Chemical ^b	10	Owner's Judgment
	Tanks	50	Engineer's Judgment
	Turnout	50	Owner's Judgment
Electrical	Power Distribution	30	Engineer's Judgment
	Power Distribution - Generator Systems	30	Engineer's Judgment
	Power Distribution - Variable Frequency Drives	20	Manufacturer's Estimate
Instrumentation	Instrumentation - Radios	5	Engineer's Judgment
	Instrumentation - Turbidimeters	10	Engineer's Judgment
	Instrumentation - Analyzers	15	Engineer's Judgment
	Instrumentation - General Instrumentation	30	Engineer's Judgment
Pipeline	Piping - Above Ground	40	Owner's Judgment
	Piping - Buried	75	Engineer's Judgment
	Valves w/ Actuator	25	Engineer's Judgment

a. OULs were developed during the 2011 Update.

b. Additional asset classes were added by Zone 7 Staff after the 2011 Update.

The following is a brief description of the major CIP projects included in Table 2.2.

- **DVWTP Washwater Recovery Ponds Rehabilitation** – This project involves the redesign of the washwater recovery ponds at the Del Valle Water Treatment Plant (DVWTP) as new concrete basins since the original recovery ponds were not designed to handle the full 40 million gallon per day (MGD) plant capacity or the current Filter/Backwash Recycle Rules. The ponds would be designed to be narrow and deep to allow for better decanting as well as better sludge concentration at the bottom of the ponds. New valves and actuators, electrical appurtenances, and SCADA would also be a part of the project to allow for automated decanting and sludge discharge to the equalization basin.
- **DVWTP Drying Beds 1 – 4 Rehabilitation Project** – This project consists of rebuilding and rehabilitation of drying beds 1 to 4 at DVWTP. Due to their proximity, these beds have a history of affecting adjacent properties as their poor underdrain system does not properly contain percolated flows. This project will pave the beds and make modifications to the underdrain system to minimize percolation while still providing underdrain use for other drying beds thereby improving system reliability and reducing maintenance costs.
- **DVWTP and PPWTP Ammonia System Replacement** - This project will replace or upgrade the last pure gaseous chemical systems at DVWTP and Patterson Pass Water Treatment Plant (PPWTP) with an aqueous ammonia storage and feed system. Aqueous ammonia bulk storage will be approximately 19% ammonia and will be safer to handle and less of a hazardous threat. The proposed replacement project improves safety for operations and maintenance personnel and other on-site plant personnel.
- **PPWTP Upgrades** – This projects consists of the design and construction of an additional treated water storage clearwell reservoir at PPWTP with 5 MG of usable storage, a new 12 MGD conventional media filtration system, concrete repair and coatings, and improvements to the existing filtration system including the filter valves, pumps, piping systems, backwash system, filter air system, media, underdrains. This will increase treated water storage in the system to help meet near-term peak hourly and maximum day demands. The new conventional media filtration system is necessary to provide additional capacity and to replace the 7 MGD ultrafiltration (UF) membrane system, which has become obsolete.
- **Patterson Pass Pipeline Enlargement and Rehabilitation** – This project is a transmission pipeline from the PPWTP site to the Liv1/Vasco pipeline connection. The existing pipeline from PPWTP does not have the capacity to handle the full range of production when the water treatment plant is expanded to 24 MGD.



Table 2-2: List of Draft Renewal/Replacement CIP Projects

Existing CIP Projects ^b	Fiscal Year (Dollars are in Millions, \$2017) ^a										Total
	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	
Asset Management Program Management	\$0.06	\$0.06	\$0.06	\$0.06	\$0.30	\$0.07	\$0.07	\$0.07	\$0.07	\$0.35	\$1.17
Capital Improvement Program Management	\$0.01	\$0.03	\$0.01	\$0.03	\$0.01	\$0.03	\$0.01	\$0.03	\$0.02	\$0.03	\$0.22
COL 1 Yard and Slope Stabilization	\$1.92										\$1.92
Corrosion Protection – Implementation of CP Survey Recommendations	\$0.26					\$0.45					\$0.71
Distribution System Control Station Replacement				\$0.86							\$0.86
Dougherty Reservoir Recoating		\$2.04									\$2.04
DVWTP Ammonia System Replacement				\$0.30	\$2.20						\$2.50
DVWTP Chemical Ferric Chloride and Caustic System Replacements				\$0.23	\$1.00						\$1.23
DVWTP Chemical Roadway and Parking Lot Improvements			\$0.24	\$0.62							\$0.86
DVWTP Drying Beds 1-4 Rehabilitation Project				\$0.67	\$3.69						\$4.36
DVWTP HVAC Replacement	\$0.10	\$0.53									\$0.63
DVWTP Polymer Mixing System Replacement	\$0.05										\$0.05
DVWTP PWRPA Service	\$0.48										\$0.48
DVWTP Sewer Line Connection	\$0.63										\$0.63
DVWTP Underdrain Pump Station Replacement				\$0.28	\$1.47						\$1.75
DVWTP Washwater Recovery Ponds Rehabilitation				\$0.03	\$0.31	\$6.29	\$0.05				\$6.67
Hopyard Well No. 6 Inspect & Rehabilitate Pump, Motor, and Well Casing				\$0.22							\$0.22
Hopyard Well No. 9 Inspect & Rehabilitate Pump, Motor, and Well Casing			\$0.22								\$0.22
Laboratory Equipment Replacement	\$0.13	\$0.13	\$0.13	\$0.13	\$0.13	\$0.13	\$0.13	\$0.13	\$0.13	\$0.13	\$1.30
Maintenance Yard and Building Improvements		\$0.39	\$1.76								\$2.15
MGDP Concentrate Discharge Pipeline Cleaning		\$0.08	\$1.00								\$1.08
MGDP RO Membrane Replacement	\$0.01	\$0.72				\$0.01	\$0.81				\$1.55
MGDP Water Softening System		\$0.53									\$0.53
Minor Renewal/Replacement Projects	\$0.41	\$0.43	\$0.45	\$0.47	\$0.48	\$0.49	\$0.52	\$0.53	\$0.56	\$0.58	\$4.92
Mocho 2 Building and Electrical Systems Replacement				\$0.30	\$0.99						\$1.29
Mocho Well No. 3 OSG R/R		\$0.49									\$0.49



Existing CIP Projects ^b	Fiscal Year (Dollars are in Millions, \$2017) ^a										Total
	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	
Monitoring Well Replacements & Abandonments	\$0.24	\$0.22	\$0.15			\$0.17		\$0.09		\$0.10	\$0.96
North Canyons Renewal Replacement/Improvements	\$0.05				\$0.20					\$0.20	\$0.45
Patterson Pass Pipeline Enlargement and Replacement				\$1.02	\$5.34	\$0.26					\$6.62
PPWTP 2 MG Clearwell Seismic Retrofit				\$0.20	\$0.52						\$0.72
PPWTP Ammonia System Replacement				\$0.35	\$1.82	\$0.25					\$2.42
PPWTP Chemical Systems Replacement				\$0.16	\$0.60						\$0.76
PPWTP Clarifiers Concrete Coating					\$0.23	\$1.37					\$1.60
PPWTP Conventional Clarifier Corrosion Control Repairs				\$0.02	\$0.26						\$0.28
PPWTP HVAC Improvements				\$0.08	\$0.35						\$0.43
PPWTP Upgrades	\$8.76	\$0.17	\$0.17	\$0.09							\$9.18
SCADA Upgrades and Replacements	\$0.45	\$0.45	\$0.75	\$0.30	\$0.30	\$0.33	\$0.33	\$1.46	\$0.37	\$0.37	\$5.11
Silver Oaks Pump Station Replacement		\$0.29	\$1.60								\$1.89
Stream Gauge Replacement		\$0.26					\$0.26				\$0.52
Vasco Pipeline Enlargement and Replacement										\$0.40	\$0.40
Wellfield Switchboard Replacement Project						\$1.30					\$1.30
Total CIP Projects (\$2017)	\$13.48	\$6.33	\$6.56	\$6.41	\$20.20	\$11.40	\$2.12	\$2.36	\$1.15	\$2.21	\$72.44

- a. All costs are presented in 2017 dollars and do not include inflation.
- b. Projects are based on Zone 7's FY 2018/19 Capital Improvements Program.
- c. Some of the projects have recurring costs annually through FY 57/58. Annual costs for these projects beyond FY 2027/28 are included in long-term renewal costs.

- SCADA Upgrades and Replacements** – This project consists of reprogramming, installation of additional devices and upgrading of the existing devices to improve the use of the supervisory control and data acquisition (SCADA) system to accommodate the changes in the plant and transmission system operations. The SCADA system will also require major software and hardware replacements about every five years. This project will continue maintaining a reliable SCADA system to enable operators to maintain control and monitoring capability of the treatment and transmission facilities using SCADA.

Detailed descriptions of all existing CIP projects can be found in Zone 7's *Fiscal Year 2018/19 Capital Improvement Program*.

2.3 Review of Asset Database

The asset management database includes 1,071 assets. The asset database was reviewed to identify those assets which are already past 100% OUL based on age and condition assessment, or those that will reach 100% of OUL before 2027. These assets were considered for the near-term renewal plan. Figure 2.1 illustrates the number of assets that will reach 100% OUL in each decade through 2059. Only first-time renewals are included in the figure to indicate the portion of assets that need to be renewed out of the entire asset database during the planning horizon.

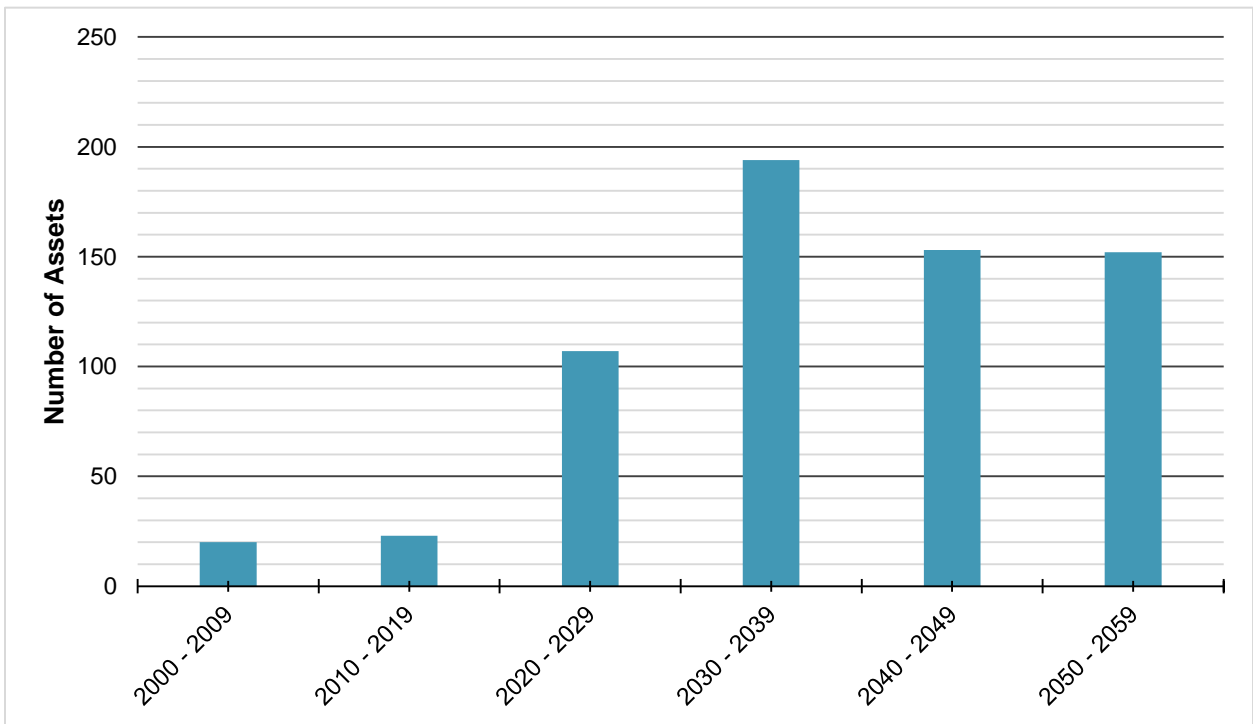


Figure 2-1: Number of Assets Reaching 100% of OUL per Decade

Of the 1,071 assets recorded in the asset database, there are approximately 33 assets that reached 100% OUL before 2017 and an additional 62 that will reach



100% of OUL before 2027, totaling 95 assets that need to be renewed in the near-term. These assets were reviewed to determine if they would be addressed by a project in Zone 7’s draft renewal/replacement CIP projects described in Section 2.2. 69 out of the 95 assets will be addressed by the draft renewal/replacement CIP projects and other annual maintenance projects. These included all the assets that reached the end of their useful life before 2017. Table 2.3 provides a summary of these results.

The 26 assets that are not addressed by a draft renewal/replacement CIP project were identified for future condition assessment. For planning purposes, these assets were grouped together as future renewal/replacement CIP projects which will serve as placeholders in the CIP and near-term renewal plan for funding forecasts, and are discussed in Section 2.4. Following the condition assessment of these assets, the conceptual projects, including their respective schedules and budgets, should be refined.

Table 2-3: Summary of Near-Term Assets by Category

Asset Type	Number of Assets
Total Assets Reaching 100% of OUL by 2027	95
Addressed in Existing CIP Projects	69
Recommended for Condition Assessment	26

2.4 AMP-Identified CIP Projects

The near-term assets not included in the renewal/replacement CIP projects described above have been categorized into six (6) future renewal CIP projects that consist of rehabilitation or replacement of the assets based on condition assessment in the future to further define the scope of these projects. These assets were identified based on the analysis described in Section 2.1. The assets have been grouped together into projects based on their location for planning purposes. The total estimated replacement value for these assets is approximately \$9.1 million.

The following is a brief summary of the projects:

- **DVWTP Assets Renewal** – This project involves the rehabilitation or replacement of mechanical systems such as the DAF building HVAC system, recycle pumps, chemical pump systems and a backwash rate control valve.
- **PPWTP Assets Renewal** – This project involves the rehabilitation or renewal of the sodium hypochlorite tanks, the cathodic protection system and the plant backup generators. Note that PPWTP HVAC Improvements is a separate project identified in the previous CIP.
- **MGDP Assets Renewal** – This project involves the rehabilitation or renewal of bulk storage tanks, chemical feed pumps, piping, valves and the plant HVAC system at the Mocho Groundwater Demineralization Plant (MGDP).

Note that MGD RO Membrane Replacement is a separate project identified in the previous CIP.

- **Distribution System Assets Renewal** – The Turnouts CWS-5, CWS-6, and VA-2 will be replaced as part of this project.
- **Groundwater Wells Assets Renewal** – This project involves the rehabilitation or renewal of pumps, motors and piping at several groundwater production wells. Note that well casing for Zone 7’s production wells is in the long-term AMP as this asset class has an original useful life of 50 years.
- **Kitty Hawk Pump Station Assets Renewal** – This project involves the rehabilitation or renewal of the pumps, motors, piping, appurtenances and associated electrical systems at the pump station.

A project cost and schedule, shown in Table 2.4, was developed for each of the projects described above. The project costs are based on projected replacement cost provided in the asset database. To allow time for Zone 7 to complete the recommended condition assessments, the conceptual projects, and their associated costs, were scheduled beginning in FY 2023/24 and extending through FY 2026/27.

Table 2-4: AMP-Identified CIP Projects

Conceptual Project Name	Fiscal Year (Dollars are in Millions, \$2017)				
	22/23	23/24	24/25	25/26	Total
DVWTP Assets Renewal	\$0.72				\$0.72
Distribution System Assets Renewal	\$0.27	\$0.27	\$0.30		\$0.84
Groundwater Wells Assets Renewal		\$0.08		\$1.80	\$1.87
MGDP Assets Renewal		\$4.43			\$4.43
PPWTP Assets Renewal		\$0.31	\$0.34		\$0.66
Kitty Hawk Pump Station Assets Renewal			\$0.59		\$0.59
Total Conceptual Projects	\$0.99	\$5.09	\$1.23	\$1.80	\$9.12

Note: All costs are presented in 2017 dollars and do not include inflation.

The complete list of assets included in each of the conceptual projects is included in Appendix A. As previously described, the scope, schedule and cost of the conceptual projects should be refined based on the results of future condition assessments. The recommended conceptual projects for assets that need condition assessment, combined with the recommended CIP projects described in the previous subsection, were included in developing the recommended funding level, described in section 3.

It is important to note that the costs presented above are based on asset replacement costs included in the asset database. For assets included in the database prior to 2006, these costs were developed as part of Zone 7’s original AMP efforts, and include an estimated contingency, general conditions and contractor adjustments (including overhead and profit), and a contingency for engineering, legal, administrative and construction management costs. For new assets



constructed since 2006, replacement costs were provided by Zone 7 staff and reflect the actual cost of construction or installation. All costs were updated using the Engineering News Record Construction Cost Index to escalate the original replacement cost to current 2017 dollars.

3 Long-Term Funding Forecast

This section presents the long-term funding requirements to support future renewal needs. The long-term funding analysis includes a discussion of SWI projects that involve the creation of new assets, long-term renewal of existing assets, and total funding needed during the planning period, and then presents a recommended annual funding level to address both renewal programs and SWI projects through FY2057/58. These are described in the following sections.

3.1 Long-Term Asset Renewal Methodology

Similar to the near-term renewal methodology described in Section 2.1, asset renewal forecasts and the subsequent long-term funding plan was based on asset replacement at 100% of the asset's OUL through FY 2057/58 for existing assets.

3.2 System-Wide Improvements (SWI)

CIP projects described in Section 2 focus on existing facilities that have deteriorated or are in need of rehabilitation or replacement to maintain the established level of service to existing Zone 7 customers. SWI projects address enhancements to existing facilities that will improve water quality, environmental compliance, reliability, efficiency, and operational flexibility. Since both renewal/replacement and SWI projects in the CIP are funded by water rates through Zone 7's Fund 120, SWI costs were included in the long-term funding forecast.

The SWI ten-year project list and associated costs are included in Zone 7's FY 2018/19 CIP. The SWI costs up to FY 2040/41 are included in Zone 7's long-term CIP planning. The total cost of all SWI projects until FY 2040/41 is approximately \$107 million (2017 dollars, see Figure 3.1 and Appendix B), with about \$66 million for projects between FY 2018/19 and 2022/23. This includes large projects such as the DVWTP and PPWTP Ozonation projects.

It is reasonable to anticipate that Zone 7 will continue with system-wide improvements related to future regulatory requirements or security improvements beyond 2040. For the rest of the planning period from FY 2041/42 until FY 2057/58, an average yearly funding level of \$200,000 is assumed based on the annual costs for the projects that have recurring costs.

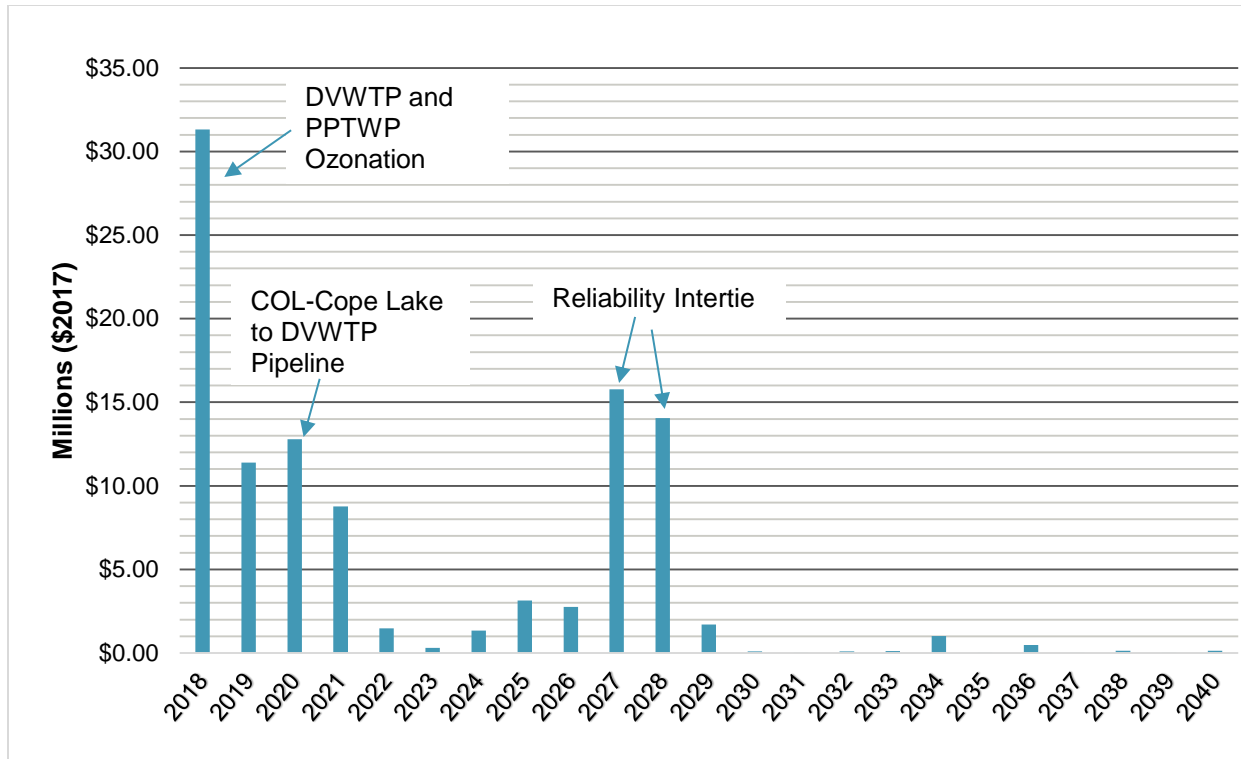


Figure 3-1: System-Wide Improvements Projects

3.3 Long-Term Renewal Forecast

As previously described, the recommended method to forecast long-term renewal budgets is to assume asset replacement at approximately 100% of estimated original useful life (OUL). The long-term renewal forecast includes the following components:

- First and subsequent replacements of assets that will reach 100% of OUL between FY 2027/28 and FY 2057/58.
- Subsequent replacements of assets between FY 2027/28 and FY 2057/58 whose first time replacements were included in the near-term analysis described in Section 2.
- The recurring annual costs of the draft renewal/replacement CIP projects from FY 2027/28 to FY 2057/58 previously described in Section 2.2.

The projected long-term renewal needs, and associated timing through FY 2057/58, are illustrated in Figure 3.2 and Appendix C. The total projected long-term renewal funding requirement, from FY 2027/28 through FY 2057/58 is estimated to be approximately \$355.7 million (2017 dollars). The annual replacement amounts range from \$1.1 million in 2036 to approximately \$64.2 million in 2050. The largest annual funding requirements occur in 2037, 2039, 2049 and 2050 due in large part to the projects highlighted in Figure 3.2. There is a large forecasted renewal requirement of about \$39.8 million in 2037. During this year, a number of existing pipelines will



reach 100 % of OUL (75 years), including the Livermore No. 1 and No.2 pipelines and the Santa Rita–Dougherty pipeline. In 2039, the largest contributing factors to the projected funding need are instrumentation and various pump assets at MGD P as it reaches 30 years of service and structural rehabilitations to the Steel Clearwell at DVWTP. In 2049, there is another spike in projected funding needs due to the structural/architectural rehabilitations required at the DVWTP Control Building. In 2050, the spike in projected funding needs is a result of the Cross Valley and the Del Valle-Livermore pipelines reaching 100% OUL.

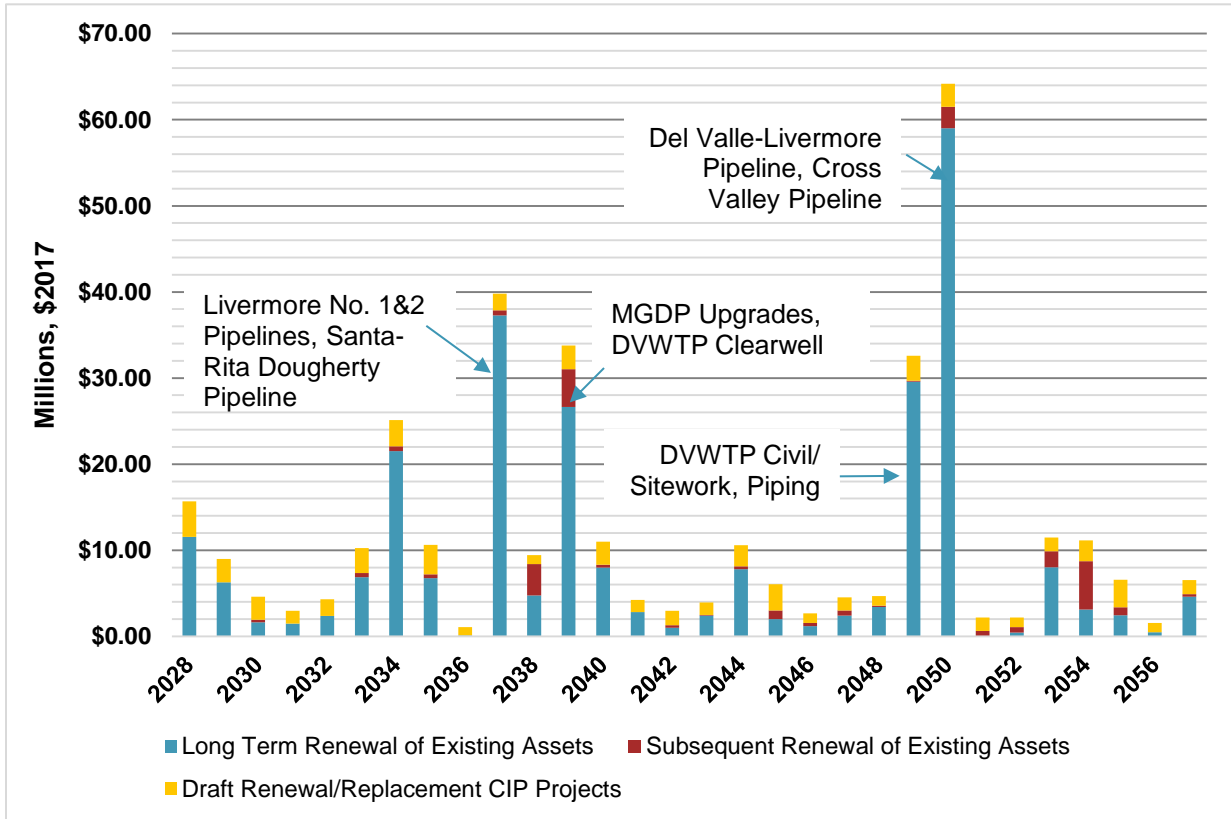


Figure 3-2: Long-Term Renewal Forecast

To provide additional insight into the data presented in this section, the ten highest value asset classes are listed in Table 3.1.



Table 3-1: Highest Value Asset Classes

Asset Class	Estimated Replacement Cost, FY 2027/28 – FY 2057/58 (\$2017 Millions)	Percent of Total Long-Term Funding Renewal Cost
Piping - Buried	\$101.6	34%
Structural / Architectural	\$37.0	12%
Instrumentation	\$34.8	12%
Civil / Sitework	\$16.0	5%
Piping - Above Ground	\$12.1	4%
Valves	\$10.3	3%
Coating	\$9.6	3%
Power Distribution	\$9.1	3%
Tank - Chemical	\$7.9	3%
Pumps	\$7.2	2%

Note: All Costs are provided in 2017 dollars and do not include inflation.

3.4 Funding Analysis

The recommended funding level described in this section is based on the forecasted capital expenditures for total renewal costs, including near- and long-term renewal costs, as well as SWI costs. The basis and assumptions for near-term, long-term and SWI costs were previously described in this report.

The total renewal and SWI funding needs are illustrated in Figure 3.3 and included in detail in Appendix C. The total estimated capital cost for renewal and SWI projects between FY 2018/19 and FY 2057/58 is approximately \$547.6 million. The total cost for each component of the funding forecast is presented in Table 3.2.

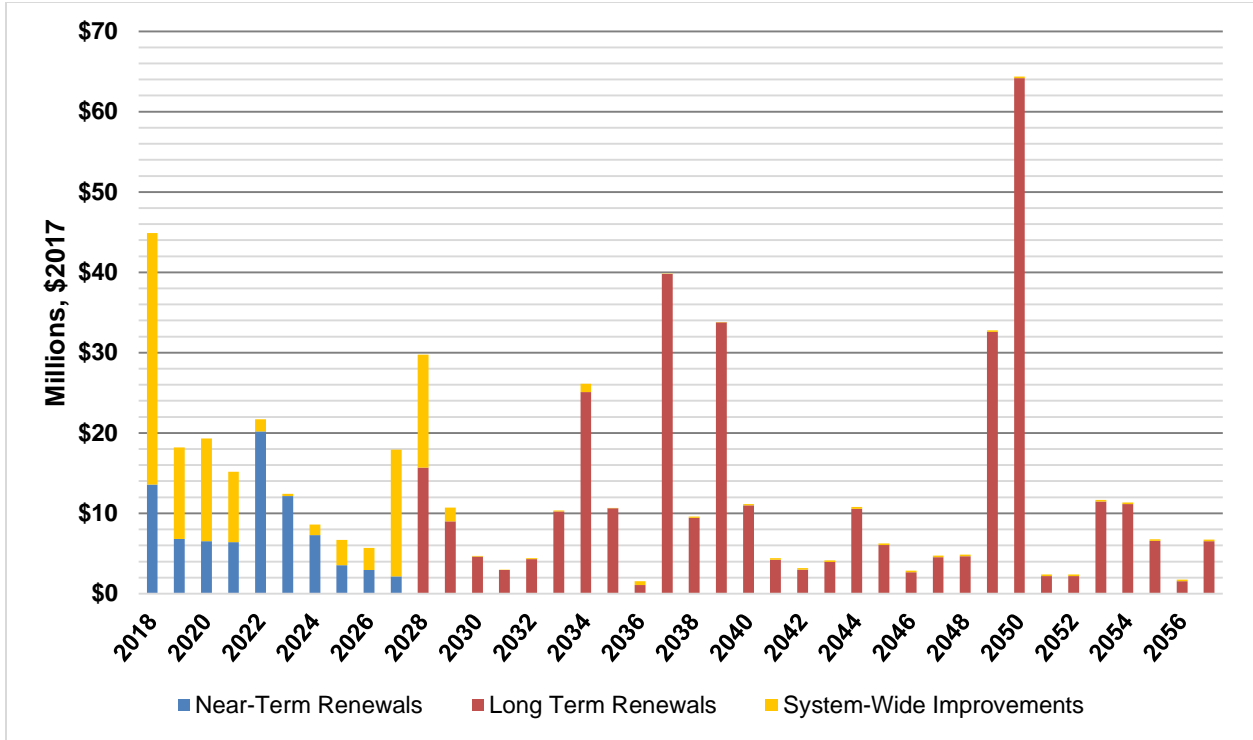


Figure 3-3: Total Forecasted Renewal and SWI Funding Requirements

Table 3-2: Total Forecasted Renewal and SWI Funding Requirements

Funding Forecast Component	Total Capital Cost, FY 18/19 – FY 57/58 ^a (\$2017 Millions)
Near-Term Renewal	
Draft Renewal/Replacement CIP Projects ^b	\$72.4
AMP-Identified CIP Project ^c	\$9.1
Long-Term Renewal Projects	
Subsequent Renewals of Existing Assets ^d	\$26.2
Long-Term Renewals of Existing Assets ^d	\$329.5
System-Wide Improvement Projects^e	\$110.3
Total Forecasted Capital Cost	\$547.5

- a. Refer to Appendix C for a complete listing of annual costs for each component of the funding forecast.
- b. Refer to Table 2.2.
- c. Refer to Table 2.4 and Appendix A.
- d. Based on replacement of assets at 100% of OUL; Refer Appendix C.
- e. Refer to Appendix B

To determine the appropriate recommended annual funding level, Zone 7’s Fund 120 balance at the beginning of the planning period (May 2018), \$28.8 million, was considered. Zone 7’s reserve policy requires maintenance of 100% of the next year’s annual costs as a reserve at the end of a fiscal year. Hence, it was assumed that 100% of FY 2057/58 capital cost should remain at the end of the planning period, since FY 5058/59 costs were not forecast to be included in this analysis.

Based on these adjustments, the total funding needed was reduced from \$547.5 million as described in Table 3.2 to \$527.5 million as shown in Table 3.3.



Table 3-3: Net Forecasted Capital Funding Need

	(\$2017 Millions)
Total Forecasted Capital Funding Need	\$547.5
Less: Current Fund 120 Balance ^a	\$28.8
Plus: Required Remaining Fund 120 Balance at end of Planning Period ^b	\$8.8
Net Forecasted Capital Funding Need, FY 18/19 through FY 57/58	\$527.5

- a. Fund balance provided by Zone 7. Deducted from total forecasted funding need.
- b. Per Zone 7's reserve policy, it is assumed that approximately 100% of the next year's annual costs should be held in reserve. Added to forecasted funding need.

3.5 Recommended Annual Funding Level

Due to the presence of major SWI projects such as the PPWTP and DVWTP Ozone projects and a portion of the PPWTP Upgrades Project described in Sections 3.2 and 2.2 respectively and illustrated in Figure 3.3, an approximately \$132 million funding need is forecasted between FY 2018/19 and 2023/24. This five-year need equates to about 25% of the overall forecasted funding need for the 40-year planning period. Thus, a flat annual funding level of \$13.2 million derived by spreading the forecasted capital funding need of \$527.5 million over the planning period of 40 years will not be sufficient to meet the capital funding need for the first few years. Therefore, various alternatives such as debt financing of large SWI projects and altering the schedule of large projects to improve cash flow were considered and discussed with Zone 7 staff and other stakeholders.

The recommended funding alternative includes debt financing of the construction phase of the DVWTP and PPWTP Ozonation Projects. This alternative provides positive cash flow over the immediate 10-year CIP period. While the reserve policy is difficult to achieve under this scenario for some of the years during the 10-year period, the budget and CIP are reviewed and updated every two years by Zone 7, which allows adjustment and updating of projected revenues, expenditures and capital projects which could improve reserve levels.

The DVWTP and PPWTP Ozonation Projects are SWI projects in Zone 7's draft FY 2018/19 CIP, scheduled for completion in FY 2019/20 and FY 2020/21, respectively. These projects consist of the construction of an ozonation facility at each plant that would improve water quality and increase production reliability. The DVWTP Ozonation Project is funded by Fund 120 (CIP project fund), and construction phase costs are anticipated to be debt-financed. The PPWTP Ozonation Project is partially funded (50%) by Fund 120 and Fund 130 (Expansion Fund). The Fund 120 portion of the construction phase costs is anticipated to be debt-financed.

As shown in Table 3.4, the recommended funding alternative lowers the recommended funding level for all pay-as-you-go projects to \$12.3 million per year and adds a debt repayment cost of \$2.9 million per year for 30 years beginning in FY 2017/18 that includes debt service payment of \$2.12 million per year for the DVWTP Ozonation Project and \$0.76 million per year for the PPWTP Ozonation Project. These costs are



based on a 3.5% interest rate and 1.5% cost of issuance. Actual costs will depend on the type of financing received, interest rates, and the duration of the borrowing.

It is important to note that the costs presented in this 2017 Update, including the recommended funding level of \$12.3 million per year, have been presented in 2017 dollars. The recommended pay-as-you-go funding level will be adjusted annually for inflation based upon the Engineering News Record San Francisco Construction Cost Index.

Table 3-4: Forecasted Capital Funding Need for Recommended Alternative

	(\$2017 Millions)
Total Forecasted Capital Funding Need	\$547.5
Less: Current Fund 120 Balance ^a	\$28.8
Less: Construction Capital Cost of DVWTP and PPWTP Ozone Projects (to be debt-funded) ^b	\$38.5
Plus: Required Remaining Fund 120 Balance at end of Planning Period ^c	\$8.8
Net Forecasted Capital Funding Need Adjusted for Debt Funding, FY 18/19 through FY 57/58	\$489
Planning Period (FY 2018/19 – 2057/58)	40 Years
Recommended Annual Funding Level^d	\$12.3/Year
Annual Debt Repayment^e	\$2.9/Year

- a. Fund balance provided by Zone 7, projected to July 1, 2018. Deducted from total forecasted funding need.
- b. As the AMP planning period begins in FY 2018/19, the FY 2017/18 construction capital cost is not included. However, the debt service payment is included in the FY 2017/18 Budget Amendment.
- c. Per Zone 7's reserve policy, it is assumed that approximately 100% of the next year's annual costs should be held in reserve. Added to forecasted funding need.
- d. Recommended pay-as-you-go funding level does not include inflation and will be adjusted annually for inflation based upon the Engineering News Record San Francisco Construction Cost Index.
- e. Assumes debt service payment of \$2.12 million per year (beginning in 2017) plus another \$0.76 million per year (beginning in 2018) for the DVWTP and PPWTP Ozonation Projects, respectively, over 30 years based on a 3.5% interest rate and 1.5% cost of issuance. Actual costs will depend on the type of financing received, interest rates, and the duration of the borrowing.

Based on the recommended annual funding level and forecasted renewal and SWI funding needs, Figure 3.4 shows the end of year Fund 120 balances through FY 2057/58. The figure indicates that the recommended annual funding level and current available Fund 120 balance provides sufficient revenue to fund the forecasted capital requirements through the immediate 10-year CIP period through FY 2027/28.

As Zone 7 updates the budget and CIP every two years, additional analysis of funding alternatives for future CIP projects should be considered to meet project funding requirements and maintain reserve levels. It is recommended that Zone 7 view funding of its renewal and SWI needs as an on-going process. Studies such as this lead to identification of both immediate renewal needs and needed condition assessments. The results of those efforts should be used to reexamine and adjust projected costs and actual renewal needs. Remaining useful lives should also be

adjusted to reflect the condition of Zone 7’s assets. These adjustments will enable Zone 7 to better define, schedule, and prioritize both its renewal and SWI projects.

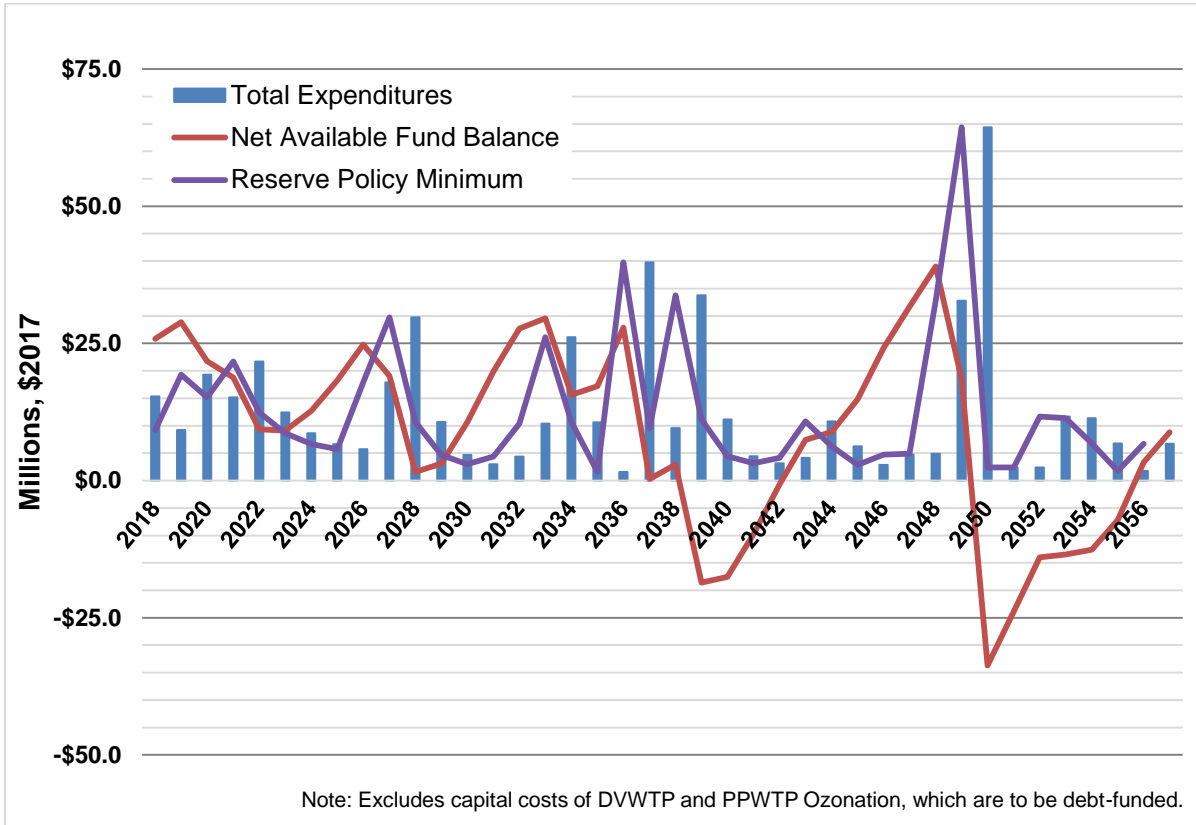


Figure 3-4: Forecasted Funding Needs and Fund 120 Balance

In addition, ongoing maintenance programs will provide further input regarding the needed renewals and condition assessments. Zone 7 should monitor its annual expenditures for minor, unplanned replacements and increase the Minor Renewal/Replacement Project CIP line item to appropriately fund additional maintenance costs associated with keeping its assets in service longer. Furthermore, as future regulations and system improvement needs are better understood, Zone 7 should update its SWI projects.



Appendix A

Conceptual Project	Asset Name	Location Path	Class Name	Replacement Year	Fiscal Year Replacement Cost (in Millions, \$2017)				
					23/24	24/25	25/26	26/27	Total
Del Valle Water Treatment Plant Assets Renewal	Backwash Rate Control Valve for Pump #1	Del Valle Water Treatment Plant\Backwash Supply\	Valves w/ Actuator	2023	\$0.07				\$0.07
	Chemical Pump System (excluding 2010 PEC replacement)	Del Valle Water Treatment Plant\Chemical System\Filter Aid\	Pumps - Chemical	2023	\$0.20				\$0.20
	HVAC	Del Valle Water Treatment Plant\Clarification - Dissolved Air Flotation\DAF Basin\	HVAC	2023	\$0.19				\$0.19
	Plant Recycle Pumps (3)	Del Valle Water Treatment Plant\Waste Stream\	Pumps	2023	\$0.26				\$0.26
Distribution System Assets Renewal	CWS-5	Distribution System\Cross Valley Pipeline\Cross Valley Pipeline\	Turnout	2023	\$0.27				\$0.27
	CWS-6	Distribution System\Del Valle - Livermore Pipeline\Del Valle - Livermore Pipeline\	Turnout	2024		\$0.27			\$0.27
	VA-2 Turnout	Distribution System\DVWTP Transmission Pipeline\DVWTP Transmission Pipeline\	Turnout	2025			\$0.30		\$0.30
Groundwater Wells Assets Renewal	Sodium Hypochlorite Tanks	Groundwater Wells\Production Wells\Chain of Lakes Well #1 Chemical System\Sodium Hypochlorite System\	Tank - Chemical	2024		\$0.08			\$0.08
	Pump and Motor	Groundwater Wells\Production Wells\Chain of Lakes Well #1\	Pumps - Well	2026			\$0.29		\$0.29
	Pump and Motor	Groundwater Wells\Production Wells\Chain of Lakes Well #2\	Pumps - Well	2026			\$0.39		\$0.39
	Pump/Rehab Downhole/Motor	Groundwater Wells\Production Wells\Chain of Lakes Well #5\	Pumps - Well	2026			\$0.27		\$0.27
	Pump and Piping	Groundwater Wells\Production Wells\Mocho #3\	Pumps - Well	2026			\$0.27		\$0.27
	Pump and Piping	Groundwater Wells\Production Wells\Mocho #4\	Pumps - Well	2026			\$0.27		\$0.27
Mocho Groundwater Demineralization Plant Assets Renewal	Pump and Piping	Groundwater Wells\Production Wells\Stoneridge\	Pumps - Well	2026			\$0.31		\$0.31
	Polyethylene Tanks	Mocho Groundwater Demineralization Plant\Chemical Equipment\	Tank - HDPE Chemical	2024		\$0.14			\$0.14
	Chemical Piping and Valves	Mocho Groundwater Demineralization Plant\Chemical Equipment\	Pumps - Chemical	2024		\$1.10			\$1.10
	Chemical Feed Pumps	Mocho Groundwater Demineralization Plant\Chemical Equipment\	Pumps - Chemical	2024		\$0.23			\$0.23
	FRP Above Ground Tanks	Mocho Groundwater Demineralization Plant\Chemical Equipment\	Tank - Chemical	2024		\$0.36			\$0.36
	Rotary Screw Compressor, Aqueous Ammonia, Caustic Soda Tanks	Mocho Groundwater Demineralization Plant\Chemical Equipment\	Tank - Chemical	2024		\$0.83			\$0.83
Patterson Pass Water Treatment Plant Assets Renewal (Includes UF Assets)	HVAC	Mocho Groundwater Demineralization Plant\Support System\	HVAC	2024		\$1.78			\$1.78
	Sodium Hypochlorite Tanks	Patterson Pass Conventional Water Treatment Plant\Chemical System\	Tank - Chemical	2025			\$0.34		\$0.34
	Generator	Patterson Pass Conventional Water Treatment Plant\Electrical\	Power Distribution - Generator Systems	2024		\$0.12			\$0.12
	Cathodic Protection System	Patterson Pass Ultrafiltration Water Treatment Plant\Clarification\	Cathodic Protection System	2024		\$0.16			\$0.16
Kitty Hawk Pump Station Assets Renewal	Bird Control Netting	Patterson Pass Ultrafiltration Water Treatment Plant\Clarification\	Specified Equipment	2024		\$0.03			\$0.03
	Pump and Piping	Pump Stations\Kitty Hawk\Airport\	Pumps	2025			\$0.28		\$0.28
	Electrical	Pump Stations\Kitty Hawk\Airport\	Power Distribution	2025			\$0.31		\$0.31
Total Cost					\$0.99	\$5.09	\$1.23	\$1.80	\$9.12

1. All project costs are presented in 2017 dollars.
2. List includes near-term renewal of assets that are not included in draft renewal/replacement CIP projects that was provided by Zone 7.



Appendix B

Project	Fiscal Year Cost (\$2017 Millions)																				Total			
	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30	30/31	31/32	32/33	33/34	34/35	35/36	36/37	37/38		38/39	39/40	40/41
Booster Pump Station			\$4.89																					\$4.89
Chain of Lakes - Cope Lake to DVWTP Pipeline	\$1.33	\$1.33	\$6.91	\$6.91	\$0.59																			\$17.07
Chain of Lakes Facilities and Improvements - Water Supply	\$0.27		\$0.71	\$1.79	\$0.89	\$0.30	\$1.26	\$0.46		\$1.80		\$0.30				\$0.11	\$0.90		\$0.36					\$9.15
Chain of Lakes Master Planning	\$0.01	\$0.08	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.08	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.28
Cross Valley Line Valve at Stanley/Murrieta Blvd	\$0.16	\$0.55																						\$0.71
DVWTP Ozonation	\$17.12	\$9.00																						\$26.12
PPWTP Ozonation	\$12.42	\$0.27	\$0.27																					\$12.97
PPWTP Solar Panels Installation		\$0.10																						\$0.10
Reliability Intertie								\$2.66	\$2.66	\$13.96	\$13.96	\$1.33												\$34.58
System-Wide Installation of Line Valves		\$0.06		\$0.07			\$0.07		\$0.08		\$0.09		\$0.09		\$0.10		\$0.11		\$0.12		\$0.13		\$0.14	\$1.06
Total	\$31.31	\$11.39	\$12.78	\$8.77	\$1.49	\$0.31	\$1.34	\$3.13	\$2.75	\$15.77	\$14.06	\$1.70	\$0.10	\$0.01	\$0.11	\$0.11	\$1.02	\$0.01	\$0.49	\$0.01	\$0.14	\$0.01	\$0.15	\$106.93

1. All project costs are presented in 2017 dollars.
2. Projects are based on Zone 7's FY 2018/19 Capital Improvements Program
3. Project costs were provided till FY 2040/41 by Zone 7. Annual costs for the projects that have recurring costs have been projected till FY 2057/58 as part of Total Funding Forecast (Appendix C).



Appendix C

Year	Renewal Costs (Millions, \$2017)						System-Wide Improvements (\$2017 Millions) ⁴	Total Project Costs (Millions, \$2017)
	Draft R/R CIP Projects	AMP-Identified CIP Projects	Long-Term Annual Cost of Draft R/R CIP Projects	Long-Term Renewal of Existing Assets ²	Subsequent Renewal of Existing Assets ³	Subtotal Renewal Costs		
2018	\$13.56			\$0.00	\$0.00	\$13.56	\$31.31	\$44.87
2019	\$6.81			\$0.00	\$0.00	\$6.81	\$11.39	\$18.20
2020	\$6.54			\$0.00	\$0.00	\$6.54	\$12.78	\$19.32
2021	\$6.41			\$0.00	\$0.00	\$6.41	\$8.77	\$15.18
2022	\$20.20			\$0.00	\$0.00	\$20.20	\$1.49	\$21.69
2023	\$11.14	\$0.99		\$0.00	\$0.00	\$12.14	\$0.31	\$12.44
2024	\$2.18	\$5.09		\$0.00	\$0.00	\$7.28	\$1.34	\$8.62
2025	\$2.31	\$1.23		\$0.00	\$0.00	\$3.54	\$3.13	\$6.67
2026	\$1.15	\$1.80		\$0.00	\$0.00	\$2.94	\$2.75	\$5.69
2027	\$2.16			\$0.00	\$0.00	\$2.16	\$15.77	\$17.93
2028			\$4.13	\$11.55	\$0.00	\$15.68	\$14.06	\$29.74
2029			\$2.72	\$6.29	\$0.00	\$9.00	\$1.70	\$10.70
2030			\$2.68	\$1.61	\$0.31	\$4.60	\$0.10	\$4.70
2031			\$1.47	\$1.49	\$0.00	\$2.96	\$0.01	\$2.96
2032			\$1.91	\$2.39	\$0.00	\$4.30	\$0.11	\$4.40
2033			\$2.92	\$6.87	\$0.46	\$10.25	\$0.11	\$10.36
2034			\$3.04	\$21.51	\$0.56	\$25.11	\$1.02	\$26.13
2035			\$3.42	\$6.76	\$0.45	\$10.63	\$0.01	\$10.63
2036			\$0.97	\$0.11	\$0.00	\$1.08	\$0.49	\$1.57
2037			\$1.91	\$37.26	\$0.62	\$39.79	\$0.01	\$39.80
2038			\$1.05	\$4.76	\$3.64	\$9.45	\$0.14	\$9.58
2039			\$2.76	\$26.65	\$4.37	\$33.79	\$0.01	\$33.79
2040			\$2.67	\$7.98	\$0.34	\$10.99	\$0.15	\$11.14
2041			\$1.38	\$2.84	\$0.00	\$4.22	\$0.20	\$4.42
2042			\$1.66	\$1.00	\$0.31	\$2.97	\$0.20	\$3.17
2043			\$1.46	\$2.41	\$0.07	\$3.94	\$0.20	\$4.14
2044			\$2.44	\$7.81	\$0.33	\$10.57	\$0.20	\$10.77
2045			\$3.07	\$2.00	\$0.99	\$6.06	\$0.20	\$6.26
2046			\$1.10	\$1.20	\$0.37	\$2.66	\$0.20	\$2.86
2047			\$1.51	\$2.40	\$0.61	\$4.53	\$0.20	\$4.73
2048			\$1.12	\$3.41	\$0.15	\$4.68	\$0.20	\$4.88
2049			\$2.88	\$29.56	\$0.14	\$32.57	\$0.20	\$32.77
2050			\$2.68	\$59.01	\$2.48	\$64.18	\$0.20	\$64.38
2051			\$1.55	\$0.00	\$0.64	\$2.19	\$0.20	\$2.39
2052			\$1.10	\$0.46	\$0.62	\$2.18	\$0.20	\$2.38
2053			\$1.60	\$8.02	\$1.85	\$11.47	\$0.20	\$11.67
2054			\$2.45	\$3.11	\$5.60	\$11.16	\$0.20	\$11.36
2055			\$3.20	\$2.44	\$0.93	\$6.57	\$0.20	\$6.77
2056			\$1.10	\$0.46	\$0.00	\$1.56	\$0.20	\$1.76
2057			\$1.64	\$4.59	\$0.31	\$6.54	\$0.20	\$6.74
	\$72.45	\$9.12	\$63.55	\$265.97	\$26.16	\$437.24	\$110.33	\$547.57

1. All project costs are presented in 2017 dollars and do not include inflation
2. Renewal of assets that are not anticipated to be renewed in the next 10 years, when they reach 100% OUL through FY 2057/58 .
3. Subsequent renewals of assets that will be renewed during the next 10 years if they reach 100% of OUL before FY 57/58
4. Project costs for SWI projects were provided through FY 40/41 by Zone 7. Annual costs for the projects that have recurring costs have been projected through FY 57/58