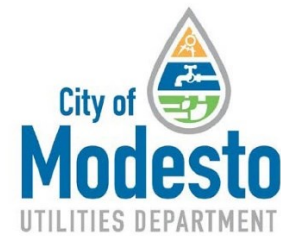


2022 Water System Engineer's Report

PREPARED FOR

City of Modesto



Updated April 2023

PREPARED BY



2022 Water System Engineer's Report

Prepared for

City of Modesto

Project No. 418-60-20-65



Project Manager: Roberto Vera, PE

4/14/23

Date


QA/QC Review: Elizabeth Drayer, PE

4/14/23

Date

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LIST OF ACRONYMS AND ABBREVIATIONS

Af/yr	Acre-Feet per Year
AMI	Advanced Metering Infrastructure
AWIA	America’s Water Infrastructure Act
CIP	Capital Improvement Project
City	City of Modesto
ENR	Engineering News Record
GWMP	Groundwater Management Plan
IRGMP	Integrated Regional Groundwater Management Plan
mgd	Million Gallons per Day
MID	Modesto Irrigation District
MRWTP	Modesto Regional Water Treatment Plant
Report	2022 Water System Engineer’s Report
RRMS	Risk and Resilience Management Strategies
SCADA	Supervisory Control and Data Acquisition
SJV Basin	San Joaquin Valley Groundwater Basin
SOI	Sphere of Influence
UWMP	Urban Water Management Plan
VA	Water System Vulnerability Assessment
WMP	Water Master Plan

1.0 INTRODUCTION

This 2022 Water System Engineer's Report (Report) is an essential supporting document to conduct new water rate and capacity charge studies for the City of Modesto (City). It describes and justifies the various capital improvement projects and programs that are needed to provide and maintain reliable water service, including required water supplies, storage volumes, pumping capacities, distribution facilities, and system pressures under different demand conditions. It also identifies associated budgetary-level cost estimates and determines the appropriate cost allocation between existing and future water customers. The City is proposing to fund the needed water system improvements using a combination of water utility rates, capacity charges (connection fees), and possibly some level of bond financing, as appropriate.

This Report is based on capital improvement projects (CIPs) developed as part of the City's 2017 Water Master Plan (2017 WMP), on-going CIPs identified in the City's 2021/22 fiscal year preliminary CIP budget, improvements previously identified in the City's 2016 Engineer's Report that have not yet been implemented or constructed, improvements by Modesto Irrigation District (MID) associated with the Modesto Regional Water Treatment Plant (MRWTP), as well as other needed improvements identified by City staff. CIPs identified in this Report are based on the best information available at the time of preparation.

It should be noted that estimated program costs and their associated cost allocations, may change as future conditions change (e.g., change in demands, additional and/or new regulations requiring City to implement groundwater well treatment, increase in pipeline failures leading to more strengthen and replace projects). It is recommended that the City update program costs and associated cost allocations on a regular basis (e.g., every five years). As summarized in the following sections, program costs and allocations are provided for a five-year period and a ten-year period, with costs allocated to existing and future customers based on projected needs within the ten-year capital improvement plan.

This Report is organized into the following sections:

- Introduction
- Summary of Capital Improvement Project Costs
- Water System Background
- Justification and Cost Allocation for Proposed Improvements
- Project Schedule and Cost Projections

2.0 SUMMARY OF CAPITAL IMPROVEMENT PROJECT COSTS

The estimated CIP costs by project category and the recommended allocations between existing and future customers are summarized in Table 1. The new water rate and capacity charge studies will be based on funding only those improvements needed within the next ten years. Thus, the estimated five-year and ten-year program costs are approximately \$220 million and \$490 million, respectively. Additional information on program costs, and associated timing, is provided in Section 5 of this Report. All costs in this Report have been estimated based on the September 2022 Engineering News Record (ENR) Construction Cost Index of 15083.26 for San Francisco and have been escalated by 4 percent annually¹ to the year of planned implementation and/or construction.

The CIP costs include allowances for project implementation (i.e., engineering, construction management and program implementation) and a construction contingency. The allowances and construction contingency total 50 percent of the estimated construction cost and are summarized as follows:

- Construction Contingency: 20 percent
- Engineering: 10 percent
- Construction Management: 10 percent
- Program Implementation: 10 percent

As described in Section 4, the cost allocation split between the existing rate payers and future users is specific to each project and is based on a methodology developed for each specific type of CIP. The ten-year CIP cost allocated to existing customers is approximately \$407 million (approximately 83 percent of the ten-year cost) and to future users is approximately \$83 million (approximately 17 percent of the ten-year cost).

¹ The ENR CCI (SF) index was reviewed for the last ten years to determine the appropriate escalation. The year-over-year escalation average is 3.9 percent. For the purposes of this evaluation, a 4.0 percent escalation was used to estimate capital improvement costs for future years.

Table 1. Summary of Five-Year and Ten-Year Water System Capital Improvement Program Costs and Allocations for Existing and Future Customers

Category Number and Name	Existing / Future Customer Allocation, percent	5-Year Costs			10-Year Costs			
		Total Cost, dollars	Costs Allocated to Existing Customers, dollars	Costs Allocated to Future Customers, dollars	Total Cost, dollars	10-Year Costs Allocated to Existing Customers, dollars	10-year Costs Allocated to Future Customers, dollars	
1	MRWTP Phase Two Expansion	62 / 38	\$10,732,400	\$6,654,100	\$4,078,300	\$27,523,000	\$17,064,300	\$10,458,700
2	City-Side Downstream Improvements related to MRWTP Expansion	62 / 38	\$7,971,000	\$4,942,000	\$3,029,000	\$7,971,000	\$4,942,000	\$3,029,000
3	Improvements for South Modesto	62 / 38	\$10,074,200	\$6,246,000	\$3,828,200	\$30,933,700	\$19,178,900	\$11,754,800
4	Water Quality Related Studies	100 / 0	\$130,900	\$130,900	\$0	\$325,100	\$325,100	\$0
5	SCADA System Upgrades	100 / 0	\$8,448,000	\$8,448,000	\$0	\$9,358,000	\$9,358,000	\$0
6	New Corporation Yard	100 / 0	\$9,035,500	\$9,035,500	\$0	\$10,044,600	\$10,044,600	\$0
7	Existing Tank Improvements	100 / 0	\$7,776,000	\$7,776,000	\$0	\$16,009,100	\$16,009,100	\$0
8	Extend Water Mains	0 / 100	\$2,494,300	\$0	\$2,494,300	\$6,285,200	\$0	\$6,285,200
9	Strengthen and Replace Water System	100 / 0	\$69,059,200	\$69,059,200	\$0	\$197,285,600	\$197,285,600	\$0
10	Install New Wells	30 / 70	\$28,985,700	\$8,695,700	\$20,290,000	\$67,190,900	\$20,157,300	\$47,033,600
11	Wellhead Treatment	100 / 0	\$13,537,700	\$13,537,700	\$0	\$27,045,100	\$27,045,100	\$0
12	Purchase & Install New Generators	100 / 0	\$2,543,100	\$2,543,100	\$0	\$6,902,700	\$6,902,700	\$0
13	Water System Security Enhancements	100 / 0	\$558,600	\$558,600	\$0	\$1,133,100	\$1,133,100	\$0
14	Groundwater Management Program	62 / 38	\$2,154,700	\$1,335,900	\$818,800	\$2,773,900	\$1,719,800	\$1,054,100
15	Urban Water Management Plan	62 / 38	\$383,700	\$237,900	\$145,800	\$745,300	\$462,100	\$283,200
16	Water Master Plan	62 / 38	\$479,504	\$297,300	\$182,204	\$1,213,404	\$752,300	\$461,104
17	Water System Evaluation	62 / 38	\$1,648,100	\$1,021,800	\$626,300	\$2,665,300	\$1,652,500	\$1,012,800
18	New Water Tanks	62 / 38	\$4,168,700	\$2,584,600	\$1,584,100	\$4,168,700	\$2,584,600	\$1,584,100
19	Water Meters	100 / 0	\$38,752,300	\$38,752,300	\$0	\$67,693,000	\$67,693,000	\$0
21	New or Replacement Pumps	100 / 0	\$575,100	\$575,100	\$0	\$1,001,100	\$1,001,100	\$0
22	Utility Cuts	100 / 0	\$934,900	\$934,900	\$0	\$2,072,300	\$2,072,300	\$0
Total		83 / 17	\$220,444,000	\$183,366,600	\$37,077,004	\$490,340,000	\$407,383,974	\$82,956,604
Total Percent Allocation:		--	--	83%	17%	--	83%	17%

3.0 WATER SYSTEM BACKGROUND

The City's existing water system is a conjunctive use system, which utilizes both surface water and groundwater to meet water demands within its water service area. In 2020, the City produced approximately 27,121 acre-feet per year (af/yr) (24.2 million gallons per day, mgd) of groundwater and purchased an estimated 25,983 af/yr (23.2 mgd)² of treated surface water from MID. The treated surface water and groundwater supplies are used to serve North Modesto (the portion of the City's contiguous service area north of the Tuolumne River). Groundwater supplies are used to serve South Modesto (the portion of the City's contiguous service area south of the Tuolumne River) and the outlying areas where the City also provides water service. In the future, additional needed supply will be provided by additional groundwater supplies, pumped from either new wells or existing out-of-service wells that are planned to be rehabilitated.

The characteristics of the City's water system are described in the following sections:

- Water Service Area
- Current and Projected Water Demands
- Existing Water Supplies

3.1 Water Service Area

The City's water service area consists of one large contiguous service area and several outlying non-contiguous service areas. The City's contiguous service area is primarily defined by the current Sphere of Influence (SOI), Salida, North Ceres and some unincorporated Stanislaus County "islands" within or adjacent to the SOI (Empire is within the SOI). The outlying service areas include Grayson, Del Rio, Ceres (Walnut Manor), and portions of Turlock. Figure 1 illustrates the location of the City's contiguous and outlying service areas.

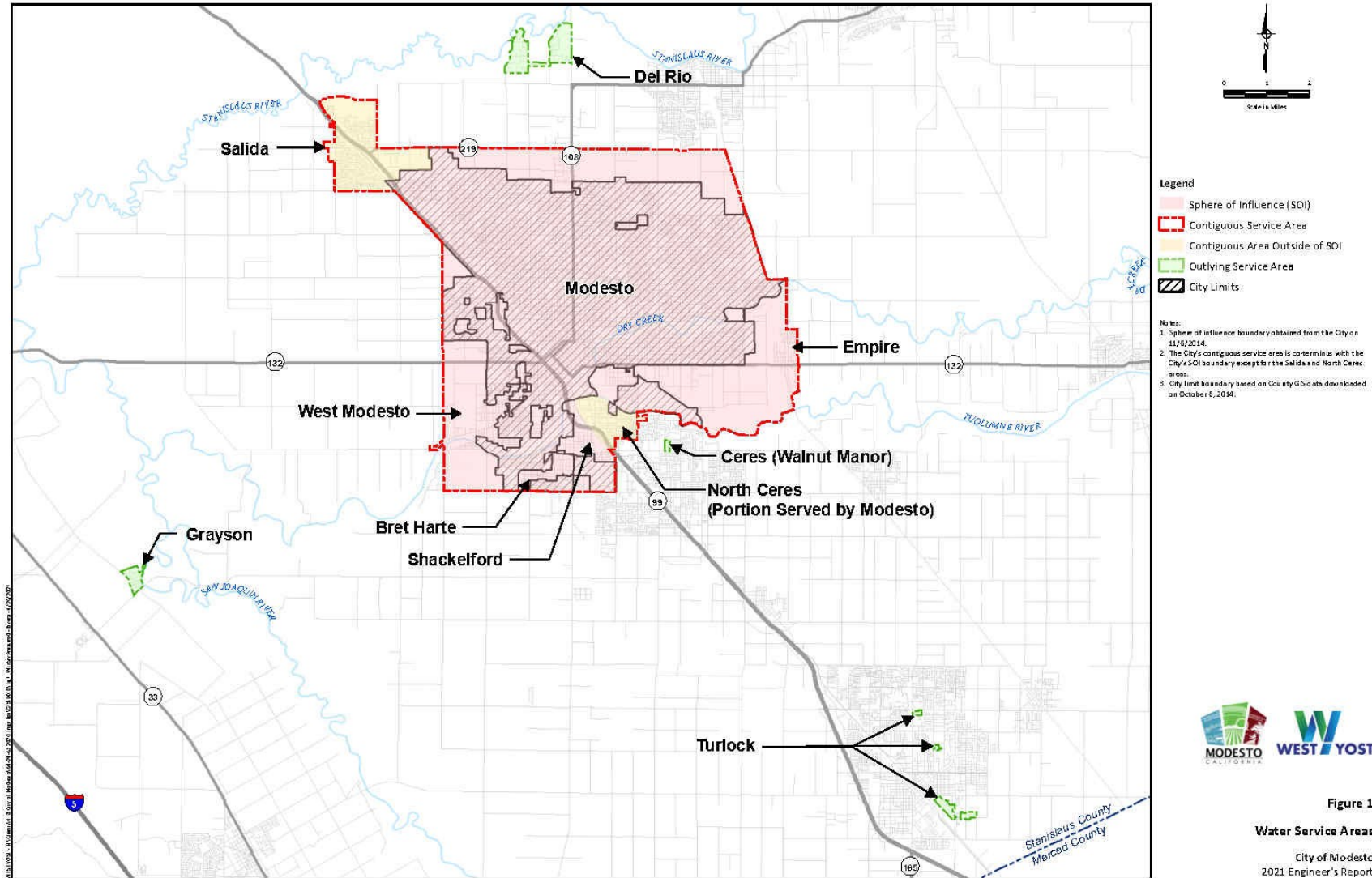
3.2 Current and Projected Water Demands

The City's 2017 WMP defined existing demands within the contiguous area to be approximately 71,600 af/yr (63.9 mgd). Based on planned development of vacant areas within the General Plan area, projected water demand at buildout is estimated to be approximately 100,000 af/yr (89.3 mgd).

The City's 2017 WMP, however, includes existing water demand based on City water use patterns from 2000 through 2013, which is prior to the 2012 to 2016 drought experienced in the State of California. Since then, the City has been actively implementing water use efficiency and conservation measures that have resulted in a decrease in baseline existing water demand. Actual demand from 2015 to 2020 has ranged from 47,159 af/yr (2016) to 53,104 af/yr (2020), averaging 49,630 af/yr. Since recent actual demands have been lower than the City's 2017 WMP projections, the City's 2020 Urban Water Management Plan (UWMP) has reduced the City's 2017 WMP buildout projections by 15 percent to 86,778 af/yr to reflect more recent and projected water use trends. This Report uses these reduced buildout demand projections (estimated to occur by 2050).

² These estimates are based on Table 6-13 of the City's 2020 Urban Water Management Plan.

Figure 1. Water Service Areas



3.3 Existing Water Supplies

The City has two existing water supply sources: local groundwater and treated surface water purchased from MID. The combination of these water supply sources allows the City to implement a conjunctive use operational strategy that is described further under the following topics:

- Groundwater Supply
- Surface Water Supply

The following sections are intended to be a brief overview of the City's water supplies. Additional detailed information can be found in the City's WMP and the City's Urban Water Management Plan (UWMP).

3.3.1 Groundwater Supply

The City's groundwater supply wells are located throughout the contiguous and outlying service areas, and located within the San Joaquin Valley Groundwater Basin (SJV Basin). The City currently has 89 active groundwater wells (including six wells for non-potable uses and two wells on standby). Groundwater supply is pumped from the following three subbasins within the SJV Basin:

- Modesto Subbasin
- Turlock Subbasin
- Delta-Mendota Subbasin

The City's contiguous service area and some outlying service areas span both the Modesto and Turlock Subbasins. North Modesto, Salida, Empire, and Del Rio, are located in the Modesto Subbasin. South Modesto, Turlock, North Ceres, and Ceres (Walnut Manor) are located in the Turlock Subbasin. Grayson is located in the Delta-Mendota Subbasin. The City has developed a preliminary operational yield of 51,500 af/yr for the three groundwater subbasins (underlying the City's service area).

The preliminary operational yield is a long-term average used to assess groundwater reliability for planning level type analyses, such as this Report, during all hydrologic conditions (dry, normal, and wet years). This preliminary operational yield is based on historical groundwater pumping by the City and the general conclusion is that if the total, long-term average groundwater pumping quantity is held at or below 51,500 af/yr, then stable groundwater levels will result, at approximately 40 feet above mean sea level within and near the City's contiguous service area. If groundwater pumping is significantly less than 51,500 af/yr, groundwater levels will likely rise, thereby increasing the quantity of available groundwater stored within the basin for later use via "in-lieu" groundwater banking. Alternatively, if more than 51,500 af/yr is extracted (e.g., during dry years), groundwater levels will likely decline. However, actual groundwater extractions may be lower in wet years and higher in dry years; consequently, the preliminary groundwater operational yield available to the City for the planning period is assumed to be equal to the long-term average, or 51,500 af/yr.

It is worth noting that while the operational yield is currently defined as 51,500 af/yr, it does not imply that the City has the available infrastructure to extract this amount. As described in the various programs in subsequent sections, there are several groundwater well improvements planned. These improvements are intended to bolster the City's infrastructure to have the ability to extract up to the operational yield. The City's various groundwater wells are aging and/or possibly threatened due to declining water quality or because of contaminants of emerging concern. The planned improvements are intended to improve the City's capacity and reliability of these facilities, which are an important facet of the City's overall conjunctive use strategy.

3.3.2 Surface Water Supply

The City purchases treated surface water from the MID's Modesto Regional Water Treatment Plant (MRWTP) during all hydrologic conditions (i.e., dry, normal, and wet years). MID has surface water rights on the Tuolumne River, which MID uses to supply some of its raw water to the MRWTP. The first phase of the MRWTP became operational in 1995 and provides the City with an annual average supply of 30 mgd (33,600 af/yr), with a functional peaking capacity of 42.5 mgd that helps meet the Maximum Day and Peak Hour demands of North Modesto. The MRWTP Phase Two Expansion Project was completed in 2016 and doubled the annual average capacity of the MRWTP to 60 mgd (67,200 af/yr). The MRWTP terminal reservoir facilities (booster pump station and tanks) and a portion of the transmission pipelines traversing the City are owned and operated by MID and the delivery of surface water is governed through an existing "Amended and Restated Water Treatment and Delivery Agreement".

4.0 JUSTIFICATION AND COST ALLOCATION FOR PROPOSED IMPROVEMENTS

The following recommended CIPs are necessary to meet projected demands described in the previous section and maintain safe and reliable water service to existing and future customers. These CIP recommendations only identify improvements at a master plan level and do not constitute a design of such improvements. Subsequent detailed design is required to determine the exact sizes, locations, and costs of the proposed improvements. Each recommendation is grouped into one of twenty-one CIP categories based on project type. CIP categories and cost allocations are shown in Table 1.

Costs allocated to existing customers are for those improvements necessary to safely and reliably serve existing customers. Costs allocated to future customers are for those improvements that are necessary to serve future customers after fiscal year 2021/22 and within the buildout planning horizon. The cost split between existing and future customers is clearly defined in the CIP categories based on the type of improvement or the proportionate share of demand for existing versus future customers.

The justification and cost allocation methodology for each individual project or program are described on the following pages.

4.1 MRWTP Phase Two Expansion (Category 1)

Description

This category was used in the City's 2016 Engineer's Report to expand the capacity of the MRWTP from an annual average of 30 mgd to 60 mgd. Most of the costs associated with the MRWTP expansion have been expended. Costs within this category are intended to fund on-going operations and maintenance of the MRWTP, and are based on MID's long-term maintenance projections.

Justification

Maintenance tasks include replacing filters, membranes, tanks, and pumps once they have reached the end of their useful life, as well as general system upgrades and improvements to the operations building. These periodic updates ensure the MRWTP is kept up-to-date and able to maintain reliable water service to customers.

Cost Allocation

The cost allocation for existing and future customers for MRWTP maintenance is based on the proportionate share of demands for existing and future customers. The program is expected to require additional funds beyond the 10-year time horizon, as part of routine maintenance, but those are not yet known. The five-year and ten-year cost allocation for improvements is summarized in Table 1.

4.2 City-Side Downstream Improvements related to MRWTP Expansion (Category 2)

Description

This program is to provide funding for the design, construction, and rights-of-way acquisition for the City-side downstream improvements necessary to accommodate the increased production capacity of the MRWTP Phase Two Expansion. This project first received funding under the City's 2016 Engineer's Report and is mostly complete. The only remaining Project is Phase II of the previously planned Yosemite Transmission Mains.

Justification

Previous studies evaluated and recommended that conveyance be constructed for the City's contiguous service area as part of the MRWTP Phase Two Expansion. One project has not been constructed, and is still required to further integrate the MID transmission mains with the City's distribution system. The proposed improvement will help correct low pressures currently observed during Peak Hour conditions, which will benefit existing customers. It will also help distribute the additional treated surface water and therefore benefit future customers.

Cost Allocation

The cost allocation for existing and future customers for the City-Side Downstream Improvements related to the MRWTP Phase Two Expansion project is based on the proportionate share of demands for existing and future customers. The five-year and ten-year cost allocation for improvements is summarized in Table 1.

4.3 Improvements for South Modesto (Category 3)

Description

Since the City has opted out of the regional surface water treatment project using Turlock Irrigation District supplied water, alternative improvements are needed to increase delivery reliability to customers in South Modesto. These improvements specific to South Modesto include new and replacement distribution/transmission pipelines (related to high and low priority fire flow improvements, the strengthen and replace program, and general grid improvements), as well as water meters and a new storage tank with associated booster pump station. Most of these improvements come from recommendations made in the 2017 WMP to support existing and future customers.

Justification

These improvements are needed for the City to better meet peak demands, maintain sufficient service pressures, and better meet future storage deficiencies. Since the South Modesto service area is not completely built out, these improvements would benefit both existing and future customers.

Cost Allocation

The cost allocation is based on the proportionate share of demands for existing and future customers. The five-year and ten-year cost allocation for improvements is summarized in Table 1.

4.4 Water Quality Related Studies (Category 4)

Description

This program provides funding for water quality related studies and activities, such as to investigate the presence of uranium and arsenic in groundwater. These studies are needed to identify cost-effective methods to manage groundwater resources for meeting the City's water supply needs.

Justification

Some of the City's wells are out of service due to water quality concerns. Additionally, it is expected that more stringent regulations on groundwater quality in the future would require the City to shut down, replace, or provide wellhead treatment for more of its existing groundwater wells. These studies are a step in developing a plan to stabilize and manage the City's groundwater resources.

Cost Allocation

Since these studies address existing wells needed to serve current customers, all of the cost is allocated to existing customers. The five-year and ten-year cost allocation for improvements is summarized in Table 1.

4.5 SCADA System Upgrades (Category 5)

Description

This project implements Supervisory Control and Data Acquisition (SCADA) system upgrades to improve the City's operation and management of the water system.

Justification

The City uses its current SCADA system to monitor and control water system facilities to maintain reliable water service to customers. Improvements to the SCADA system are needed to continue to be able to reliably monitor and control the City's water system. In 2017, the City undertook a SCADA Upgrade Study to develop a detailed set of requirements for a future SCADA system. The City's current SCADA system is based on HSQ MISER software and associated proprietary hardware, which has been in place for over 20 years.

Several issues have recently been identified that have prompted the City to undertake a complete overhaul of its SCADA system. These issues generally include: 1) concerns over hardware/software obsolescence; 2) increased demands for access to the SCADA system and collected data for planning and analysis; 3) desire for system functionality enhancements; 4) dependence on a single vendor for SCADA system supply/support; and 5) concerns over SCADA system support.

Cost Allocation

The total cost of the project was estimated to be approximately \$18 million. This cost, however, was intended to be split with other City departments and it is estimated that the water system would fund approximately half of this project. There is likely to be on-going annual operations and maintenance costs associated with this program after it is implemented, but these costs are not included since they are not known at this time.

Since the SCADA system is used for monitoring and control of the existing system, and its need for upgrade represents an existing system deficiency, existing customers are allocated 100 percent of the cost of this project. The five-year and ten-year cost allocation for improvements is summarized in Table 1.

4.6 New Corporation Yard (Category 6)

Description

This project will cover Phase 2 of the new Water Division Corporation Yard located along Litt Road. Phase 1 of construction is complete, however, several site improvements have not yet been completed, which are intended to be captured in Phase 2. Phase 2 improvement include: 1) construction/expansion of the employee parking lot; 2) construction of a new warehouse; 3) construction of material bins; 4) construction of solar canopies over the employee parking lot; 5) vehicle fuel station; and 6) vehicle car wash.

Justification

The City previously identified the need to construct a new corporation yard to replace the existing facility. The scoping, design and construction of a new building was completed under Phase 1. The site development (as listed above) still needs to be completed under Phase 2.

Cost Allocation

Because the corporation yard supports current system operations, costs for this project are allocated to existing customers. The five-year and ten-year cost allocation for improvements is summarized in Table 1.

4.7 Existing Tank Improvements (Category 7)

Description

This program provides funding for interior and exterior enhancements to existing water storage tanks to improve water quality, system efficiency, and prolong their useful life. The improvements are generally routine maintenance items (e.g., tank inspections, re-coating, sealing, replacement of existing appurtenances, generator platforms, etc.) as well as fall protection safety enhancements.

Justification

The goal of this program is to maintain system integrity and prolong the useful life of existing tanks via tank rehabilitation improvements.

Cost Allocation

This program is funded annually and is expected to require additional funds beyond the ten-year time horizon, as part of routine maintenance, but those are not included as part of this Report. Although future customers might receive some benefit from the maintenance of these tanks, the tanks are existing facilities and these improvements are required to help maintain existing system performance. Therefore, 100 percent of the total cost for this category is allocated to existing customers. The five-year and ten-year cost allocation for improvements is summarized in Table 1.

4.8 Extend Water Mains Program (Category 8)

Description

This program extends water mains, on an as-needed basis, into developing areas to meet the demands of new growth, based on the recommendations identified in the 2017 WMP. Typically, this includes the installation of 12-inch diameter and larger pipelines, fire hydrants and valves, on a one-half mile grid. Projects to complete distribution pipeline “looping” are included to improve service reliability to new water service areas.

Justification

As needed, this program includes the installation of new and/or upsized water mains that contribute to creating a distribution grid by extending or looping existing water mains to help maintain adequate system performance. These pipes will also enable the City to more efficiently integrate and distribute additional treated surface water from the MRWTP Phase Two Expansion.

Cost Allocation

This program is required to support demands from future customers. Therefore, costs are allocated entirely to future users. The five-year and ten-year cost allocation for improvements is summarized in Table 1.

4.9 Strengthen and Replace Water System Program (Category 9)

Description

This category includes distribution and transmission pipeline replacements for high and low priority fire flow improvements, as well as grid improvements that were recommended in the 2017 WMP. In addition, this program replaces and upgrades deficient water mains throughout the water system that have reached the end of their useful life, on an as-needed basis.

Justification

Pipelines have a finite life expectancy, and eventually corrode, leak, or otherwise fail. This program aims to replace pipelines before they reach the point of failure. This program also includes pipelines that have been identified as inadequate to meet pressures under normal operating conditions or fire flows, as identified in the 2017 WMP.

Cost Allocation

This program is intended to maintain the system's performance by strengthening and replacing existing pipelines; therefore, all costs are allocated to existing customers. This program is anticipated to extend past the ten-year planning horizon. The five-year and ten-year cost allocation for improvements is summarized in Table 1.

4.10 Install New Wells Program (Category 10)

Description

This program includes the following improvements: 1) replaces wells previously taken out of service due to water quality concerns and that are deemed unsuitable for rehabilitation; 2) replaces older, low producing wells that are reaching the end of their service life; 3) adds new wells to help alleviate low flow problems and/or maintain adequate system pressures for existing customers; and 4) provides additional capacity (13 new wells, resulting in an additional 16.8 mgd of firm supply capacity) to meet increasing demands for new growth, as recommended in the 2017 WMP. The cost of a well field improvement plan is also included.

Justification

Since one of the primary sources of supply for the City is groundwater, these new wells will help maintain or increase the groundwater supply. The program is expected to produce approximately one to two new wells every year, mainly as new supply sources for the water system. It should be noted that historically, the City has replaced fewer wells than scheduled. In addition, the City has actively been destroying wells that have reached their useful life, and thus the City no longer has access to that capacity. With recent reductions in demands, this lost capacity has been to date inconsequential, but if demands increase (either by increased/rebounded water use patterns or growth, or both) additional wells will be required.

Cost Allocation

Costs for this program are anticipated to extend beyond this ten-year program. Costs are allocated to existing and future customers based on the currently identified number of wells for the existing system and the projected required number of wells for the buildout system. The current estimate for new wells that replace older existing wells is approximately 30 percent of the overall ten-year cost. The remaining portion, 70 percent of the total ten-year cost, is associated with new wells to support future demands. The five-year and ten-year cost allocation for improvements is summarized in Table 1.

4.11 Wellhead Treatment Program (Category 11)

Description

This program provides funding for the design and construction of wellhead treatment or blending facilities for wells throughout the water service area that are currently off-line due to high contaminant levels or are at risk of exceeding mandated maximum contaminant levels.

Justification

The program rehabilitates existing groundwater wells that the City has shut down because of water quality concerns, but are not candidates for replacement, as defined in the Install New Wells Program (Category 10). This category thereby extends the useful life of wells and therefore reduces the need to construct more than one well per year in Category 10. This program includes evaluating various wellhead treatments and available treatment alternatives that will bring key wells back into production. Bringing as many of these wells back on-line will maintain the City's groundwater production capacity. This program also includes funding for the purchase and installation of new chlorine analyzers and flush lines.

Cost Allocation

Funding for this program addresses existing system deficiencies and is wholly allocated to existing customers. Costs for this program are anticipated to extend beyond this ten-year program. The five-year and ten-year cost allocation for improvements is summarized in Table 1.

4.12 Purchase and Install New Generators Program (Category 12)

Description

This program provides funding to purchase and install generators for back-up power at various booster pump stations for tanks and well sites throughout the water system. Providing emergency power to these facilities during power interruptions or outages of the main grid is critical to maintaining reliable water service.

Justification

The back-up generators for these facilities improve supply reliability to meet existing demands. In addition, back-up generators for wells are recommended to provide for groundwater storage credit in-lieu of construction of more costly storage tanks.

Cost Allocation

Generators are for existing facilities that are needed to support existing customers, and so all costs are allocated to existing customers. The five-year and ten-year cost allocation for improvements is summarized in Table 1.

4.13 Water System Security Enhancements (Category 13)

Description

This program implements water system security improvements identified in the March 2003 Water System Vulnerability Assessment (VA), to comply with the Public Health Security and Bioterrorism Response Act of 2001. This program is ongoing, with several fencing installations already completed, and more fencing, security signage, and other security measures to be implemented at well and tank sites throughout the water distribution system. This program also includes implementing various Risk and Resilience Management Strategies (RRMSs) developed as part of the City's Risk and Resilience Assessment (in compliance with the 2018 America's Water Infrastructure Act [AWIA]) and includes periodic updates to the City's Emergency Response Plan.

Justification

This program helps the City meet State and Federal requirements and implement the recommendations presented in the 2003 VA and identified as part of the City's 2018 AWIA compliance.

Cost Allocation

Although future customers may benefit from these security enhancements, existing customers are allocated 100 percent of the category costs, since the improvements identified in the CIP are associated with existing system facilities. Costs for this program are anticipated to extend beyond this ten-year program. The five-year and ten-year cost allocation for improvements is summarized in Table 1.

4.14 Groundwater Management Program (Category 14)

Description

This program provides funding to develop projects that are identified through the Integrated Regional Groundwater Management Plan (IRGMP) in the Modesto Groundwater Basin and the Groundwater Management Plan (GWMP) in the Turlock Groundwater Basin. The two GWMPs were developed with respective jurisdictions that share a common groundwater basin. These programs are needed to effectively manage the groundwater basin as a safe and sustainable water supply. This program is intended to fund groundwater monitoring wells that need to be constructed to support the groundwater planning efforts discussed above. In addition, planning and studies aimed at securing State grants are also included under this category.

Justification

The IRGMP and GWMP identify goals and objectives needed to effectively manage the groundwater basin(s) as a safe and sustainable water supply. Work through this program will be coordinated with other jurisdictions to implement the IRGMP and GWMP, along with periodic amendments and updates as necessary. Participation in this program will also allow the City to become eligible for grants that can be used on various groundwater related projects (e.g., recharge programs and aquifer storage and recovery wells).

Cost Allocation

The groundwater management program enhances the City's groundwater supply, which benefits both existing and future customers. The cost allocation is based on the proportionate share of demands for existing and future customers. Costs for this program are anticipated to extend beyond this ten-year program. The five-year and ten-year cost allocation for improvements is summarized in Table 1.

4.15 Urban Water Management Plan (Category 15)

Description

This program provides funding to develop UWMPs every five years. The program also provides funding for future water loss audits, conservation program implementation and potential future water supply assessments. This program will help ensure the reliability of the water supply and includes conservation programs, residential plumbing retrofits, recycled water implementations, and water system audits.

Justification

The City is required to comply with the Urban Water Management Planning Act and prepare an updated UWMP every five years. In addition, compliance with developing regulatory requirements centered around conservation will require additional conservation/consumption reporting.

Cost Allocation

This program benefits both existing and future customers because the UWMP is developed to assist decisions that affect existing system performance and future assured water supplies. The cost allocation is based on the proportionate share of demands for existing and future customers. Costs for this program are anticipated to extend beyond this ten-year program. The five-year and ten-year cost allocation for improvements is summarized in Table 1.

4.16 Water Master Plan (Category 16)

Description

This program provides funding for the preparation of a system wide WMP and the completion of the associated environmental review (California Environmental Quality Act) work on a recurring basis. The WMP evaluates the hydraulic and operational performance of the City's water system and addresses, among other items, future sources of supply, water quality issues, water demands, conjunctive use strategies, water system modeling updates, and capital improvements (for both existing and future customers).

Justification

The WMP allows the City to assess the impacts of future planned water system expansions, compare existing and planned supplies to existing and projected demands, and develop a revised capital improvement plan for both existing and future customers based on trends observed at the time.

Cost Allocation

This program benefits both existing and future customers since it addresses water system performance for both existing and future conditions. The cost allocation is based on the proportionate share of demands for existing and future customers. Costs for this program are anticipated to extend beyond this ten-year program. The five-year and ten-year cost allocation for improvements is summarized in Table 1.

4.17 Water System Evaluations (Category 17)

Description

This program provides funding for the preparation of "as-needed" engineering studies and water system evaluations throughout the water service area. These studies and evaluations normally involve assessing and evaluating demands for proposed developments, supply capabilities, the potential loss of key groundwater production wells, capital deficiencies, regulatory impacts, environmental reviews, water supply assessments, hydraulic modeling support, and other water system related activities. These studies are smaller than a WMP and are budgeted annually. This program also includes funding for maintenance of the hydraulic modeling software and hydraulic model updates.

Justification

The City needs to conduct time-critical engineering studies and evaluations of the water system, on an ongoing basis. The City typically conducts these engineering evaluations and water system studies in response to proposed development projects, determining impacts of changes to proposed capital improvement projects, regulatory agency requirements, and to increase the City staff's level of understanding of the entire water system between updates of the WMP and UWMP.

Cost Allocation

The purpose of this program is to conduct various time critical engineering studies and water system evaluations required for existing and future expansions. The cost allocation is based on the proportionate share of demands for existing and future customers. Costs for this program are anticipated to extend beyond this ten-year program. The five-year and ten-year cost allocation for improvements is summarized in Table 1.

4.18 New Water Tanks (Category 18)

Description

This program provides funding for new water tanks including booster pump stations, generators for back-up power, and other associated facilities. Only one project is included within the ten-year timeframe: completion of the Grayson Tank 15 and associated booster pump station. Other storage tanks were recommended in the 2017 WMP to mitigate the future storage deficiency, associated with future demands. These projects, however, are not expected to be required within the next ten years, and therefore are not included in the ten-year cost.

Justification

Using the performance and design criteria from the 2017 WMP, storage tanks should provide sufficient storage to address the following three supply components:

- Operational Storage: 25 percent of the Maximum Day demand.
- Fire Flow Storage: Meets the required fire flow for two simultaneous fire flow events (a multi-family residential fire event that is non-sprinklered, and an industrial fire event).
- Emergency Storage: Average Day demand for one day.

Cost Allocation

The Grayson Tank will serve both existing and future customers. The cost allocation is based on the proportionate share of demands for existing and future customers. The five-year and ten-year cost allocation for improvements is summarized in Table 1.

4.19 Water Meters Program (Category 19)

Description

This program is established to fund the purchase and installation of advanced metering infrastructure (AMI) for customers throughout the City's service areas, as well as to provide funding to upgrade obsolete meters. Costs associated with the data handling and storage of the associated AMI data is also included in this program.

Justification

While the City has already implemented a metering program to convert from a flat water rate structure to a metered one, there is now a need to upgrade the overall program to an AMI program. An AMI program will improve metering technology to allow for enhanced demand tracking, management, and to identify areas more easily where there is apparent water loss. This upgrade will ultimately support the City in current and future water conservation and/or water use efficiency efforts and provide the City's water customers with the ability to track and monitor their own water use.

Cost Allocation

Since future customers are required to have meters installed as new areas are developed, this program directly affects and benefits existing customers only. Therefore, 100 percent of these costs are allocated to existing customers. The five-year and ten-year cost allocation for improvements is summarized in Table 1.

4.20 New or Replacement Pumps (Category 21)

Description

This Program replaces deficient water pumps, on an as-needed basis, at wells and booster pump stations that are beyond their useful life and/or too costly to repair.

Justification

Similar to the need to replace aging pipeline infrastructure in the water system over time, it is also necessary to replace existing deficient water pumps at wells and booster pump stations. In particular, pumps may need replacement over time if pump efficiency decreases or if the pump experiences mechanical problems that cannot be remedied with routine maintenance.

Cost Allocation

The costs for this program are budgeted annually and since these improvements are primarily focused on maintaining existing system performance, costs are only allocated to existing customers. Costs for this program are anticipated to extend beyond this ten-year program. The five-year and ten-year cost allocation for improvements is summarized in Table 1.

4.21 Utility Cuts Program (Category 22)

Description

This program funds pavement repairs related to utility construction activities, such as the installation of water lines, valve replacement, water connections, and leak repairs.

Justification

The City maintains this program to cover costs beyond funds included as part of the Strengthen and Replace Water System Program (Category 9).

Cost Allocation

Utility cuts are required for existing pavement repairs which will benefit existing customers; therefore, 100 percent of the costs are allocated to existing customers. Costs for this program are anticipated to extend beyond this ten-year program. The five-year and ten-year cost allocation for improvements is summarized in Table 1.

5.0 PROJECT SCHEDULE AND COST PROJECTIONS

The proposed CIP expenditures by year are summarized in Table 2. Table 2 shows the anticipated cost per fiscal year for each of the CIP projects, and the total cost for each fiscal year. Costs shown in Table 2 are escalated 4 percent annually to the year of planned construction.

Table 2. Proposed Ten-Year Water System Capital Improvement Program Expenditures by Year

Category No.	Category	FY 2022/23	FY 2023/24	FY 2024/25	FY 2025/26	FY 2026/27	FY 2027/28	FY 2028/29	FY 2029/30	FY 2030/31	FY 2031/32	5 Year Total	10 Year Total
1	MRWTP Phase Two Expansion	\$1,280,600	\$1,981,500	\$1,733,500	\$1,268,300	\$4,468,500	\$4,574,500	\$5,459,100	\$1,718,400	\$4,015,100	\$1,023,500	\$10,732,400	\$27,523,000
2	City-Side Downstream Improvements related to MRWTP Expansion	\$862,900	\$3,111,000	\$3,608,800	\$388,300	\$0	\$0	\$0	\$0	\$0	\$0	\$7,971,000	\$7,971,000
3	Improvements for South Modesto	\$3,221,500	\$4,546,800	\$2,208,800	\$97,100	\$0	\$1,606,900	\$6,490,200	\$4,709,300	\$4,180,400	\$3,872,700	\$10,074,200	\$30,933,700
4	Water Quality Related Studies	\$23,100	\$24,000	\$25,600	\$27,900	\$30,300	\$32,900	\$35,700	\$38,700	\$41,800	\$45,100	\$130,900	\$325,100
5	SCADA System Upgrades	\$650,000	\$1,300,000	\$1,300,000	\$2,599,000	\$2,599,000	\$650,000	\$65,000	\$65,000	\$65,000	\$65,000	\$8,448,000	\$9,358,000
6	New Corporation Yard	\$0	\$12,000	\$311,100	\$4,270,800	\$4,441,600	\$699,900	\$72,800	\$75,700	\$78,800	\$81,900	\$9,035,500	\$10,044,600
7	Existing Tank Improvements	\$3,969,300	\$514,600	\$547,600	\$1,210,100	\$1,534,400	\$14,000	\$1,565,000	\$1,612,400	\$3,322,300	\$1,719,400	\$7,776,000	\$16,009,100
8	Extend Water Mains	\$201,400	\$658,100	\$246,400	\$621,200	\$767,200	\$699,900	\$727,900	\$757,000	\$787,300	\$818,800	\$2,494,300	\$6,285,200
9	Strengthen and Replace Water System	\$12,613,000	\$12,833,900	\$15,426,600	\$15,998,300	\$12,187,400	\$26,745,000	\$23,653,600	\$29,577,000	\$22,513,600	\$25,737,200	\$69,059,200	\$197,285,600
10	Install New Wells	\$6,770,800	\$5,545,900	\$4,598,000	\$5,603,800	\$6,467,200	\$5,599,100	\$6,550,900	\$7,570,000	\$8,660,000	\$9,825,200	\$28,985,700	\$67,190,900
11	Wellhead Treatment	\$3,238,700	\$2,117,900	\$2,849,700	\$2,976,300	\$2,355,100	\$2,463,300	\$2,576,700	\$2,695,700	\$2,820,400	\$2,951,300	\$13,537,700	\$27,045,100
12	Purchase & Install New Generators	\$28,800	\$329,100	\$311,100	\$1,100,100	\$774,000	\$804,900	\$837,100	\$870,600	\$905,400	\$941,600	\$2,543,100	\$6,902,700
13	Water System Security Enhancements	\$143,900	\$59,900	\$62,300	\$90,600	\$201,900	\$70,000	\$72,800	\$75,700	\$110,300	\$245,700	\$558,600	\$1,133,100
14	Groundwater Management Program	\$69,100	\$1,017,100	\$597,400	\$0	\$471,100	\$42,000	\$0	\$529,900	\$47,300	\$0	\$2,154,700	\$2,773,900
15	Urban Water Management Plan	\$115,100	\$30,000	\$31,200	\$32,400	\$175,000	\$35,000	\$36,400	\$37,900	\$39,400	\$212,900	\$383,700	\$745,300
16	Water Master Plan	\$10,904	\$0	\$0	\$64,800	\$403,800	\$0	\$0	\$0	\$78,800	\$655,100	\$479,504	\$1,213,404
17	Water System Evaluation	\$589,700	\$618,100	\$135,100	\$146,300	\$158,900	\$172,200	\$186,400	\$202,200	\$218,900	\$237,500	\$1,648,100	\$2,665,300
18	New Water Tanks	\$0	\$89,800	\$1,306,700	\$1,358,900	\$1,413,300	\$0	\$0	\$0	\$0	\$0	\$4,168,700	\$4,168,700
19	Water Meters ^(c)	\$0	\$0	\$13,293,000	\$12,356,600	\$13,102,700	\$13,894,200	\$14,733,900	\$95,200	\$107,900	\$109,500	\$38,752,300	\$67,693,000
21	New or Replacement Pumps	\$0	\$0	\$248,900	\$258,900	\$67,300	\$72,800	\$78,700	\$84,800	\$91,400	\$98,300	\$575,100	\$1,001,100
22	Utility Cuts	\$172,600	\$179,500	\$186,700	\$194,200	\$201,900	\$210,000	\$218,400	\$227,100	\$236,200	\$245,700	\$934,900	\$2,072,300
	Total	\$33,961,404	\$34,969,200	\$49,028,500	\$50,663,900	\$51,820,600	\$58,386,600	\$63,360,600	\$50,942,600	\$48,320,300	\$48,886,400	\$220,443,604	\$490,340,104

"(a) Costs based on September 2022 San Francisco Engineering News Record (ENR) Construction Cost Index (CCI) (15083.26) and Costs are escalated by 4% annually to the year of planned construction.

(b) While some Categories show zero remaining costs, there will be costs beyond the ten-year plan horizon (e.g., Categories 7, 9, 14, 15, 16, 19, etc.).

(c) Updated capital costs for Water Meters provided by City staff on April 13, 2023."