

FINAL DRAFT



2016 Water System Engineer's Report



Prepared for

City of Modesto

May 2016



WEST YOST

ASSOCIATES
Consulting Engineers

418-02-14-36

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5/25/16

Date





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List of Acronyms and Abbreviations

af/yr	Acre-feet per year
CIP	Capital Improvement Projects and Programs
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	Engineer's Report
SCADA	Supervisory Control and Data Acquisition
SOI	sphere of influence
UWMP	Urban Water Management Plans
VA	Vulnerability Assessment
WMP	Water Master Plan

1.0 INTRODUCTION

This Engineer's Report (Report) is an essential supporting document needed to conduct new water rate and capacity charge studies. In general, this Report describes and justifies the various Capital Improvement Projects and Programs (CIP) that are needed to provide and maintain reliable water service (i.e., required supplies, storage volumes, pumping capacities, distribution facilities, system pressures, etc. under different demand conditions), identifies associated budgetary level cost estimates, and determines the cost allocations between existing rate payers and future users of the City of Modesto's (City) water system. The City is proposing to fund the needed improvements using water utility rates, capacity charges (connection fees), and possibly some level of bond financing.

The City is currently preparing a Water Master Plan (WMP), which will evaluate the water distribution system under existing and future supply and demand conditions to identify the improvements needed to address system deficiencies. However, since the WMP is not yet complete, this Report is based on the capital improvements identified in the City's 2016/17 Fiscal Year preliminary CIP budget (as of February 2016), improvements based on the hydraulic analysis performed for and identified in the City's 2010 Water System Engineer's Report that have not yet been implemented or constructed, and needed improvements derived from other studies. As a result, the identification of the CIPs in this Report is based on the best information available at the time of its preparation.

Subsequent sections of this report include:

- Summary of Results
- Water System Background
- Justification and Cost Allocation for Proposed Improvements
- Project Schedule and Cost Projections

2.0 SUMMARY OF RESULTS

The estimated total cost of the CIPs to meet the existing and buildout supply, demand, and distribution needs of the City's water system is \$483M. However, the five-year program cost is \$159,783,000, which is what the new water rate and capacity charge studies will be based on. Detailed information on individual project costs is provided in Section 4. All costs in this Report have been adjusted based on the October 2015 Engineer News Record (ENR) construction cost index of 11169.31 for San Francisco and have been escalated by three percent (3%) annually to the year of implementation and/or construction. The CIP costs include a total soft cost and contingency mark-up of 50 percent on the estimated construction cost. The soft cost and contingency mark-up include: Construction Contingency (20 percent), Engineering (10 percent), Construction Management (10 percent), and Program Implementation (10 percent).

The City's existing water supply consists of an estimated 53,500 acre-feet per year (af/yr)¹ (47.8 mgd) of groundwater and up to 67,204 af/yr (60 million gallons per day (mgd)) of surface water from the Modesto Irrigation District's (MID) Modesto Regional Water Treatment Plant (MRWTP). The MRWTP and groundwater sources will meet the water supply needs in North Modesto (the portion of the City's contiguous service area north of the Tuolumne River; the River is the southern boundary of MID's service area). To meet the needs for an additional water supply in 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, the needed supply will be met by more groundwater pumping via new wells and wellhead treatment on wells currently out of service. The City's existing and future water demands and supplies are discussed further in Section 3.

As described in Section 4, the cost allocation split between the existing rate payers and future users is unique and is based on a methodology developed for each specific type of CIP. The five-year CIP cost allocated to existing customers is approximately \$140M or just under 90 percent and to future users it is approximately \$20M, or just over 10 percent. The estimated CIP costs and the recommended allocations between customers are summarized in Table 1.

3.0 WATER SYSTEM BACKGROUND

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

- Service Area
- Current and Projected Water Demands

3.1 Service Area

The City's 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

Current demands for the contiguous service area are about 75,000 af/yr (67 mgd), which has been adjusted slightly to account for the ongoing drought and the continuing flat economic climate. Based on development of vacant areas within the General Plan, projected water demand at buildout is estimated to be about 100,000 af/yr (89.3 mgd).

¹ This is the City's 10-year old estimate of the preliminary operational yield of the Modesto Groundwater Subbasin. This preliminary operational yield does not represent the City's current groundwater pumping capacity.

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

Category Number	Project Category	Cost, dollars	Existing / Future, dollars	Existing, dollars	Future, dollars
1	MRWTP Phase Two Expansion ^(b)	\$0	--	--	--
2	City-Side Downstream Improvements related to MRWTP Expansion	\$21,206,000	75 / 25	\$15,904,500	\$5,301,500
3	Improvements for South Modesto	\$2,312,000	75 / 25	\$1,734,000	\$578,000
4	Water Quality Related Studies	\$160,000	100 / 0	\$160,000	\$0
5	SCADA System Upgrades	\$3,026,000	100 / 0	\$3,026,000	\$0
6	New Corporation Yard	\$9,864,000	100 / 0	\$9,864,000	\$0
7	Existing Tank Improvements	\$2,125,000	100 / 0	\$2,125,000	\$0
8	Extend Water Mains	\$7,579,000	0 / 100	\$0	\$7,579,000
9	Strengthen and Replace Water System	\$48,311,000	100 / 0	\$48,311,000	\$0
10	Install New Wells	\$12,858,000	75 / 25	\$9,643,500	\$3,214,500
11	Wellhead Treatment	\$8,360,000	100 / 0	\$8,360,000	\$0
12	Purchase & Install New Generators	\$1,964,000	100 / 0	\$1,964,000	\$0
13	Water System Security Enhancements	\$1,062,000	100 / 0	\$1,062,000	\$0
14	Groundwater Management Program	\$1,792,000	75 / 25	\$1,344,000	\$448,000
15	Urban Water Management Plan	\$109,000	75 / 25	\$81,750	\$27,250
16	Water Master Plan	\$1,591,000	75 / 25	\$1,193,250	\$397,750
17	Water System Evaluation	\$797,000	75 / 25	\$597,750	\$199,250
18	New Water Tanks	\$7,200,000	64 / 36	\$4,608,000	\$2,592,000
19	Water Meters	\$26,547,000	100 / 0	\$26,547,000	\$0
21	New or Replacement Pumps	\$2,389,000	100 / 0	\$2,389,000	\$0
22	Utility Cuts	\$531,000	100 / 0	\$531,000	\$0
Total		\$159,783,000		\$139,445,750	\$20,337,250
Total Percent Allocation				87.3%	12.7%

^(a) Costs based on October 2015 San Francisco Engineering News Record (ENR) Index (11169).

^(b) This project is complete, but this category remains as a placeholder so that the numbering sequence of other CIP categories remains consistent with past and ongoing studies.

3.2.1 Water Supply

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

- Groundwater Supply
- Surface Water Supply

3.2.2 Groundwater Supply

The City's service area is located within the San Joaquin Valley Groundwater Basin (SJV Basin) and serves the contiguous and outlying service areas. The 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 53,500 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 53,500 af/yr,² 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 53,500 af/yr, groundwater levels will probably rise, thereby increasing the quantity of available groundwater stored within the basin for later use via "in-lieu" groundwater banking. Alternatively, if more than 53,500 af/yr is extracted (e.g., during dry years), groundwater levels will probably 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 53,500 af/yr.

² Per discussion with City staff on 5/8/08.

3.2.3 Surface Water Supply

The City purchases treated surface water from the MID's MRWTP during all hydrologic conditions (dry, normal, and wet years). The MID has historic 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 (33,602 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 Plant is permitted by the State to produce up to 45 mgd; however, certain hydraulic limitations prevent MID from producing this quantity). The MRWTP Phase Two Expansion Project is anticipated to be operational in 2016 and will double the annual average capacity of the plant to 60 mgd (67,204 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 the projected demands described in the previous section and maintain quality 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 the CIP categories based on what type of program or project it is. CIP categories and cost allocations are shown in Table 1.

Existing costs include improvements necessary for reliable water quality and system performance for existing customers. Buildout costs include all improvements that are necessary for customers after fiscal year 2016/17 and within the buildout planning horizon. The buildout costs represent the future users' share of all the proposed improvements. The 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 below.

4.1 MRWTP Phase Two Expansion (Category 1)

Description: This project expanded MID's MRWTP's capacity from an annual average of 30 mgd to 60 mgd. This project is complete, but this category remains as a placeholder so that the numbering sequence of the other CIP categories remains consistent with past and ongoing studies.

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. Projects include: the Industrial Tank and Booster Pump Station, and the Codoni Transmission Mains, and the Yosemite Transmission Mains.

Justification: Previous studies evaluated and recommended that two storage tanks and two booster pump stations be constructed for the City's contiguous service area as part of the MRWTP Phase Two Expansion. Of the facilities identified, three projects have not been constructed, and are still required to further integrate the MID transmission mains with the City's distribution system. The City-Side Downstream Improvements proposed will help correct low pressures currently observed during Peak Hour conditions. In addition to alleviating existing system deficiencies to benefit existing customers, these City-Side Downstream Improvements 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 their proportionate demand. The five-year cost for all of the improvements is \$21,206,000. The overall allocation for all improvements to existing and future customers is as follows:

<i>Five-Year Cost:</i>	\$21,206,000
<i>Allocation to Existing Customers:</i>	\$15,904,500 / 75%
<i>Allocation to Future Customers:</i>	\$5,301,500 / 25%

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 transmission pipelines crossing the River to strengthen the interconnectivity with North Modesto, new storage tanks, new transmission pipelines to more effectively distribute the water, and additional wellhead treatment to increase the supply. Transmission pipelines are included in this category. Wellhead treatment is included in Category 11 and storage is included in Category 18.

Justification: These improvements are needed for the City to better meet peak demands, maintain sufficient service pressures, improve water quality, and offset wells out of service. Since the South Modesto service area is not completely built out, these improvements would benefit both existing and future customers.

Cost Allocation: The five-year cost of the improvements is \$2,312,000. This cost is allocated based on the proportionate share of system demands for existing and future customers.

<i>Five-Year Cost:</i>	\$2,312,000
<i>Allocation to Existing Customers:</i>	\$1,734,000 / 75%
<i>Allocation to Future Customers:</i>	\$578,000 / 25%

4.4 Water Quality Related Studies (Category 4)

Description: This program provides funding for a variety of system-wide water quality related studies and activities. These studies are needed to identify cost effective methods to manage groundwater resources for meeting the City's water supply needs.



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Justification: The City has a significant percent of its wells 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 to more of its existing groundwater wells. These studies are a step in developing a plan to stabilize and manage the City's groundwater supply.

Cost Allocation: The five-year cost of \$160,000 is allocated to existing customers.

<i>Total Cost:</i>	<i>\$160,000</i>
<i>Allocation to Existing Customers:</i>	<i>\$160,000 /100%</i>
<i>Allocation to Future Customers:</i>	<i>\$0 /0%</i>

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.

Cost Allocation: The five-year cost for this work is \$3,026,000. 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.

<i>Five-Year Cost:</i>	<i>\$3,026,000</i>
<i>Allocation to Existing Customers:</i>	<i>\$3,026,000 / 100%</i>
<i>Allocation to Future Customers:</i>	<i>\$0 / 0%</i>

4.6 New Corporation Yard (Category 6)

Description: This project will develop (e.g., planning, design, property acquisition, construction, etc.) a new Water Division Corporation Yard.

Justification: The City has identified the need to construct a new corporation yard to replace the existing facility and land has been acquired for this purpose. Costs include scoping, design and construction of a new building, and site development (parking, landscaping, lighting, security measures, etc.). The site would also be used to store soil, concrete, and asphalt removed during construction of water projects for later reuse as part of the City's recycling program.



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Cost Allocation: The five-year cost of this project is \$9,864,000. This project will replace the existing corporation yard. Because the corporation yard supports current system operations, costs for this project are allocated to existing customers.

<i>Five-Year Cost:</i>	\$9,864,000
<i>Allocation to Existing Customers:</i>	\$9,864,000 /100%
<i>Allocation to Future Customers:</i>	\$0 / 0%

4.7 Existing Tank Improvements (Category 7)

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

Justification: The goal of this program is to maintain system integrity via tank improvements.

Cost Allocation: This program is funded annually and the five-year cost of this program is \$2,125,000.

Although future customers might receive some benefit from the maintenance of these tanks, the tanks are existing facilities and these improvements are targeted to help maintain existing system performance. Therefore, 100 percent of the total cost for this category is allocated to existing customers.

<i>Five-Year Cost:</i>	\$2,125,000
<i>Allocation to Existing Customers:</i>	\$2,125,000 / 100%
<i>Allocation to Future Customers:</i>	\$0 / 0%

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. Typically, this includes the installation of 12-inch diameter and larger pipes, 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: The five-year program cost is \$7,579,000 and is based on recommendations identified in previous planning studies and the City’s CIP. This program is required to support demands from future customers; therefore, costs are allocated entirely to future users.

<i>Five-Year Cost:</i>	\$7,579,000
<i>Allocation to Existing Customers:</i>	\$0 / 0%
<i>Allocation to Future Customers:</i>	\$7,579,000 / 100%

4.9 Strengthen and Replace Water System Program (Category 9)

Description: On an as-needed basis, this program replaces and upgrades deficient water mains throughout the water system service area that have reached the end of their useful life. The “looping” of system pipelines may also be included, so as to provide an increase in service reliability. This program includes funding for pipeline repair and replacement projects, replacement of broken valves, blow-offs, and other appurtenances.

Justification: Pipelines have a finite life expectancy, and eventually corrode and leak, or otherwise fail. The program also includes pipelines that have been identified as inadequate to meet pressures under normal operating conditions or fire flows, as identified in previous studies.

Cost Allocation: The five-year cost of the program is \$48,311,000. This program is intended to maintain the system’s performance by strengthening and replacing existing pipelines; therefore, all costs are assigned to existing customers.

<i>Five-Year Cost:</i>	\$48,311,000
<i>Allocation to Existing Customers:</i>	\$48,311,000 / 100%
<i>Allocation to Future Customers:</i>	\$0 / 0%

4.10 Install New Wells Program (Category 10)

Description: This program: (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 to meet increasing demands for new growth.

Justification: Since one of the primary sources of supply is groundwater, these new wells will help maintain or increase the groundwater supply. The program is expected to produce approximately one new well every two years, mainly as new supply sources for the water system. It should be noted that historically, the City has replaced fewer wells than scheduled.

Cost Allocation: The five-year cost for this program is \$12,858,000. The costs are allocated to existing and future customers based on the required number of wells for the existing system and the projected required number of wells for the buildout system. Within the next five years four new well are expected to be constructed; three allocated to existing customers and one to support new growth. Therefore, the allocation to existing and future customers is as follows:

<i>Five-Year Cost:</i>	\$12,858,000
<i>Allocation to Existing Customers:</i>	\$9,643,500 / 75%
<i>Allocation to Future Customers:</i>	\$3,214,500 / 25%

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 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 improve the City's reliable groundwater production capacity to meet future demands. This program also includes funding for the purchase and installation of new chlorine and nitrate analyzers to improve existing monitoring capabilities.

Cost Allocation: The five-year cost of the program is \$8,360,000. Funding for this program addresses existing system deficiencies, and is wholly allocated to existing customers.

<i>Five-Year Cost:</i>	\$8,360,000
<i>Allocation to Existing Customers:</i>	\$8,360,000 / 100%
<i>Allocation to Future Customers:</i>	\$0 / 0%

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 water service throughout the system.

Justification: The back-up generators for these facilities improve supply reliability to meet existing demands.

Cost Allocation: The five-year cost for this category is \$1,964,000 and all costs are allocated to existing customers.

<i>Five-Year Cost:</i>	\$1,964,000
<i>Allocation to Existing Customers:</i>	\$1,964,000 / 100%
<i>Allocation to Future Customers:</i>	\$0 / 0%

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), as needed 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.

Justification: This program helps the City meet state and federal requirements and implement the recommendations presented in the 2003 VA.

Cost Allocation: The five-year cost of this program is \$1,062,000. Though 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.

<i>Five-Year Cost:</i>	<i>\$1,062,000</i>
<i>Allocation to Existing Customers:</i>	<i>\$1,062,000 / 100%</i>
<i>Allocation to Future Customers:</i>	<i>\$0 / 0%</i>

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 sustaining water supply. They include, but are not limited to groundwater quality monitoring, groundwater replenishment studies, and continued participation in regional groundwater related activities. A portion of these implementation programs may be funded through future grants. Grant application preparation is also included in this CIP.

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 five-year cost of this program is \$1,792,000. The groundwater management program enhances the City's groundwater supply, which benefits both existing and future customers. Therefore, costs attributed to each are allocated based on their proportionate share of the total system demand.

<i>Five-Year Cost:</i>	<i>\$1,792,000</i>
<i>Allocation to Existing Customers:</i>	<i>\$1,344,000 / 75%</i>
<i>Allocation to Future Customers:</i>	<i>\$448,000 / 25%</i>

4.15 Urban Water Management Plan (Category 15)

Description: This provides funding to develop Urban Water Management Plans (UWMP) every five years. 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.

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Cost Allocation: The five-year cost of this program is \$109,000 and benefits both existing and future customers because the UWMP is developed to assist decisions that affect existing system performance and future assured water supplies. Therefore, costs are allocated between existing and future customers, based on their proportionate share of total system demand.

<i>Five-Year Cost:</i>	\$109,000
<i>Allocation to Existing Customers:</i>	\$81,750 / 75%
<i>Allocation to Future Customers:</i>	\$27,250 / 25%

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 capital improvement plan for both existing and future customers. The City currently is preparing a WMP.

Cost Allocation: The five-year cost of this program is \$1,591,000 and benefits both existing and future customers since it addresses water system performance for both existing and future conditions. Costs are allocated between existing and future customers based on their proportionate share of total system demand.

<i>Five-Year Cost:</i>	\$1,591,000
<i>Allocation to Existing Customers:</i>	\$1,193,250 / 75%
<i>Allocation to Future Customers:</i>	\$397,750 / 25%

4.17 Water System Evaluation (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 are normally related to demand expectations, 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 private development 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.

2016 Water System Engineer's Report

Cost Allocation: The five-year cost of this program is \$797,000. Since the purpose of this program is to conduct various time critical engineering studies and water system evaluations required for existing and future expansions, costs are allocated to existing and future customers based on their proportionate share of total demand.

<i>Five-Year Cost:</i>	\$797,000
<i>Allocation to Existing Customers:</i>	\$597,750 / 75%
<i>Allocation to Future Customers:</i>	\$199,250 / 25%

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. Two projects are included within the five-year timeframe, completion of a tank for Del Rio, and initial planning and design for a new tank in South Modesto.

Justification: Using previously established performance and design criteria, 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 times the duration period, as required by the City's Fire Department. However, for a City the size of Modesto, two simultaneous fire flow events were assumed for storage to provide a more conservative fire flow storage estimate.
- Emergency Storage: Average Day demand for one day.

Cost Allocation: The five-year cost of these projects is \$7,200,000. Tanks will serve both existing and future customers. The Del Rio system is estimated to be approximately 60 percent built out, so the budgeted cost of \$5,512,000 is allocated 60 percent to existing customers and 40 percent to future customers based on their proportionate share of the Del Rio system demand. The South Modesto Tank is allocated 75 percent to existing customers, and 25 percent to future customers, based on their proportionate share of overall system demand.

<i>Five-Year Cost:</i>	\$7,200,000
<i>Allocation to Existing Customers:</i>	\$4,608,000 / 64%
<i>Allocation to Future Customers:</i>	\$2,592,000 / 36%

4.19 Water Meters Program (Category 19)

Description: This program is established to fund the purchase and installation of automated meters readers for customers throughout the service area, as well as upgrading existing obsolete meters.

Justification: This work is mandated by State law and must be complete by 2025.



2016 Water System Engineer's Report

Cost Allocation: This program has a five-year cost of \$26,547,000. 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.

<i>Five-Year Cost:</i>	\$26,547,000
<i>Allocation to Existing Customers:</i>	\$26,547,000 / 100%
<i>Allocation to Future Customers:</i>	\$0 / 0%

4.20 New or Replacement Pumps (Category 21)

Description: On an as needed basis, this Program replaces deficient water pumps 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 category are budgeted annually and since these improvements are primarily focused on maintaining existing system performance, costs are only allocated to existing customers. The five-year program cost is \$2,389,000.

<i>Five-Year Cost:</i>	\$2,389,000
<i>Allocation to Existing Customers:</i>	\$2,389,000 / 100%
<i>Allocation to Future Customers:</i>	\$0 / 0%

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: The five-year cost of this program is \$531,000. Utility cuts are required for existing pavement repairs which will benefit existing customers; therefore, 100 percent of the costs are allocated to existing customers.

<i>Total Cost:</i>	\$531,000
<i>Allocation to Existing Customers:</i>	\$531,000 / 100%
<i>Allocation to Future Customers:</i>	\$0 / 0%

5.0 PROJECT SCHEDULE AND COST PROJECTIONS

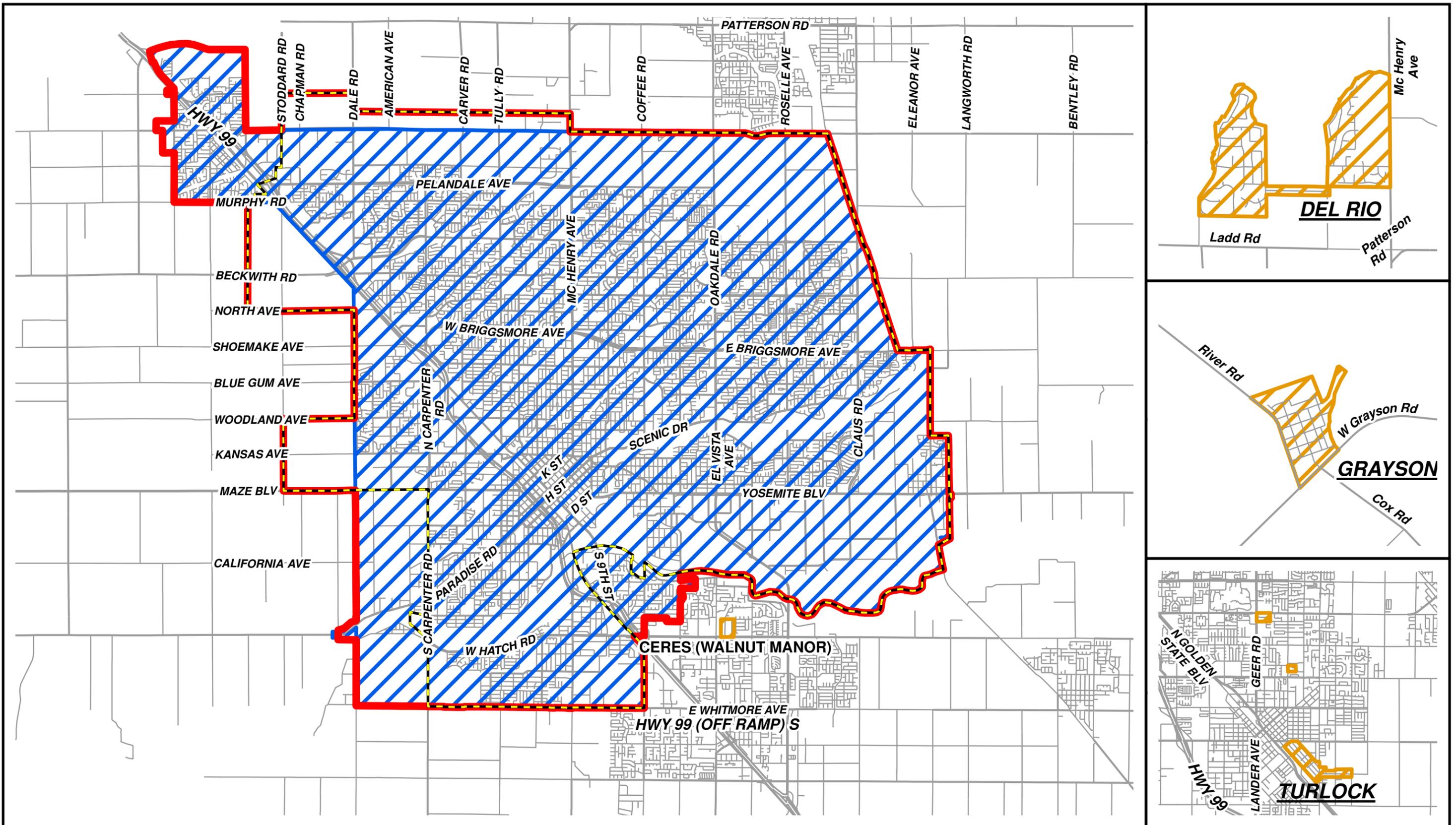
The proposed CIP expenditures by year are summarized in Table 2. Table 2 shows the anticipated cost per fiscal year for each of the CIP projects, and the total cost for each fiscal year. Costs shown in Table 2 are escalated 3 percent annually to the year of construction.

Table 2. Proposed Five-Year Water System Capital Improvement Program Expenditures by Year^(a)

Category Number	Category	Fiscal Year 2016/17	Fiscal Year 2017/18	Fiscal Year 2018/19	Fiscal Year 2019/20	Fiscal Year 2020/21	Five-Year Total
1	MRWTP Phase Two Expansion ^(b)	--	--	--	--	--	--
2	City-Side Downstream Improvements related to MRWTP Expansion	\$3,100,000	\$5,150,000	\$5,559,000	\$3,278,000	\$4,119,000	\$21,206,000
3	Improvements for South Modesto	\$45,000	\$46,000	\$859,000	\$0	\$1,362,000	\$2,312,000
4	Water Quality Related Studies	\$30,000	\$31,000	\$32,000	\$33,000	\$34,000	\$160,000
5	SCADA System Upgrades	\$50,000	\$258,000	\$265,000	\$765,000	\$1,688,000	\$3,026,000
6	New Corporation Yard	\$1,500,000	\$4,120,000	\$4,244,000	\$0	\$0	\$9,864,000
7	Existing Tank Improvements	\$700,000	\$309,000	\$361,000	\$372,000	\$383,000	\$2,125,000
8	Extend Water Mains	\$0	\$2,060,000	\$212,000	\$3,169,000	\$2,138,000	\$7,579,000
9	Strengthen and Replace Water System	\$8,150,000	\$8,910,000	\$10,874,000	\$10,326,000	\$10,051,000	\$48,311,000
10	Install New Wells	\$3,050,000	\$5,047,000	\$1,910,000	\$2,513,000	\$338,000	\$12,858,000
11	Wellhead Treatment	\$1,250,000	\$1,700,000	\$1,750,000	\$1,803,000	\$1,857,000	\$8,360,000
12	Purchase & Install New Generators	\$370,000	\$381,000	\$393,000	\$404,000	\$416,000	\$1,964,000
13	Water System Security Enhancements	\$200,000	\$206,000	\$212,000	\$219,000	\$225,000	\$1,062,000
14	Groundwater Management Program	\$300,000	\$515,000	\$424,000	\$328,000	\$225,000	\$1,792,000
15	Urban Water Management Plan	\$0	\$0	\$0	\$109,000	\$0	\$109,000
16	Water Master Plan	\$0	\$0	\$1,591,000	\$0	\$0	\$1,591,000
17	Water System Evaluation	\$150,000	\$155,000	\$159,000	\$164,000	\$169,000	\$797,000
18	New Water Tanks	\$3,400,000	\$2,112,000	\$0	\$0	\$1,688,000	\$7,200,000
19	Water Meters	\$5,000,000	\$5,150,000	\$5,305,000	\$5,464,000	\$5,628,000	\$26,547,000
21	New or Replacement Pumps	\$450,000	\$464,000	\$477,000	\$492,000	\$506,000	\$2,389,000
22	Utility Cuts	\$100,000	\$103,000	\$106,000	\$109,000	\$113,000	\$531,000
Total		\$27,845,000	\$36,717,000	\$34,733,000	\$29,548,000	\$30,940,000	\$159,783,000

^(a) Costs escalated by 3% annually to the year of construction.

^(b) This project is complete, but this category remains as a placeholder so that the numbering sequence of other CIP categories remains consistent with past and ongoing studies.



Legend

- Outlying Service Area Names
- Sphere of Influence
- Study Area Boundary*
- Contiguous Service
- Roads

***THIS IS THE MAXIMUM AREA; ACTUAL BOUNDARY WILL BE DETERMINED BY FUTURE COUNCIL ACTION**

Figure 1. Modesto Water Service Areas

