FINAL

CITY OF MODESTO & MODESTO IRRIGATION DISTRICT

Joint 2010 Urban Water Management Plan

CITY of MODESTO

MID Modesto Irrigation District The Power To Grow

WEST YOST ASSOCIATES

Joint 2010 Urban Water Management Plan

Prepared for

City of Modesto

and

Modesto Irrigation District

May 2011

WEST YOST ASSOCIATES

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List of Acronyms

AB 1420	Assembly Bill 1420
AB 3030	1992 California State Assembly Bill 3030
AB 32	Global Warming Solutions Act of 2006
AB 797	Assembly Bill 797
AFY	Acre Feet Per Year
ARTDA	Amended and Restated Water Treatment and Delivery Agreement
AWMP	Agricultural Water Management Plan
AWWA	American Water Works Association
BMPs	Best Management Practices
CalGreen	California Green Building Standards
CBDA	California Bay-Delta Authority
CCR	California Code of Regulations
CII	Commercial, Industrial, and Institutional
CIMIS	California Irrigation Management Information System
CPD	Comprehensive Planning Districts
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
DAF	Dissolved Air Flotation
DBCP	Dibromochloropropane
DMMs	Demand Management Measures
DOF	Department of Finance
DOST	DWR Online Submittal Tool
DPWD	Del Puerto Water District
DWR	California Department of Water Resources
DWR Methodologies	Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use, October 1, 2010
Engineer's Report	2010 Water System Engineer's Report
EOC	Emergency Operations Center
ET	Evapotranspiration
General Plan	2008 Urban Area General Plan
GHG	Greenhouse Gases
GIS	Geographical Information Systems
gpcd	Gallons Per Capita Per Day
GPS	Global Positioning Systems
HECW	High-Efficiency Clothes Washers
IRWMP	Integrated Regional Water Management Plan

MCLs	Maximum Contaminant Levels
MDWP	Modesto Domestic Water Project
MG	Million Gallons
MGD	Million Gallon Per Day
MID	Modesto Irrigation District
MOU	Memorandum of Understanding
MRWTP	Modesto Regional Water Treatment Plant
NPDES	National Pollutant Discharge Elimination System
NPU	Neighborhood Preservation Unit
PCE	Perchloroethylene
PG&E	Pacific Gas & Electric
RO	Reverse Osmosis
RSWSP	Regional Surface Water Supply Project
SB 1672	Integrated Regional Water Management Planning Act of 2002
SB 1938	Groundwater Management Planning Act of 2002
SBx7-7	Water Conservation Act of 2009, Senate Bill x7-7
SJRNWR	San Joaquin River National Wildlife Refuge
SOI	Sphere of Influence
SWRCB	State Water Resources Control Board
TBD	To Be Determined
TCE	Trichloroethylene
TDA	Treatment and Delivery Agreement
TID	Turlock Irrigation District
ULFT	Ultra-Low Flush Toilets
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
UV	Ultraviolet
UWMP	Urban Water Management Plan
UWMP Act	Urban Water Management Planning Act
WBIC	Weather-Based Irrigation Controller
WDR	Waste Discharge Requirement
West Yost	West Yost Associates
WSS	WaterSense Specification
WWTP	Wastewater Treatment Plant

ES.1 INTRODUCTION

This 2010 Urban Water Management Plan (UWMP) has been prepared for the City of Modesto (City) and the Modesto Irrigation District (MID) by West Yost Associates (West Yost) as a joint UWMP. This 2010 UWMP for the City and MID describes the current and future water use, sources of supply and its reliability, and existing and planned conservation measures.

This 2010 UWMP complies with the Urban Water Management Planning Act (UWMP Act), which was originally established by Assembly Bill 797 (AB 797) on September 21, 1983. The law requires water suppliers in California providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet per year (AFY) of water to prepare and adopt an UWMP every five years.

Several changes to the UWMP Act have been approved in recent years. Revisions to the UWMP Act include requiring a robust supply and demand comparison, as well as detailed discussion of groundwater resources, water recycling and desalination. Also, this 2010 UWMP is also required to comply with the requirements of the Water Conservation Act of 2009 Senate Bill x7-7 (SBx7-7) which was enacted in November 2009. SBx7-7 requires urban retail water suppliers, such as the City of Modesto, to develop per capita water use targets to be met by 2015 and 2020. The overall statewide objective of SBx7-7 is to reduce per capita water use by 20 percent by the year 2020.

The requirements of SBx7-7 extended the deadline for adoption of the 2010 UWMPs for urban retail water suppliers from December 31, 2010 to July 1, 2011. Similar legislation (SB 1478) was passed in September 2010 to also extend the adoption submittal deadline for urban wholesale water suppliers' UWMPs to July 1, 2011, to allow for coordination between retail and wholesale water suppliers.

ES.2 PLAN ADOPTION

The City and MID adopted this 2010 UWMP on May 24, 2011. Copies of the adoption resolutions are included in Appendix B.

Following plan adoption, the 2010 UWMP was submitted to the Department of Water Resources (DWR) and to the California State Library. Copies of the adopted 2010 UWMP were also provided to the following agencies within 30 days of adoption:

- City of Ceres
- City of Turlock
- City of Waterford
- Stanislaus County[1]
- Turlock Irrigation District

[1] Stanislaus County is the governing agency for the communities of Del Rio, Empire, Hickman, Grayson and Salida.

Within 30 days of submitting the adopted 2010 UWMP to DWR, copies of the adopted 2010 UWMP will be made available during normal business hours at the following locations:

- City of Modesto, Public Works Department, 1010 Tenth Street, 4th Floor, Modesto
- MID Secretary's Office, 1231 Eleventh Street, Modesto

Copies of the adopted 2010 UWMP will also be available on the City and MID websites:

- City of Modesto Public Works Department website (http://www.ci.modesto.ca.us/pwd)
- MID website (http://www.mid.org/water/uwmp)

Should this 2010 UWMP be amended or changed, copies of amendments or changes to the plan shall be submitted to DWR, the California State Library, and any city or county within which the City of Modesto provides water supplies within 30 days after adoption.

ES.3 PLAN OVERVIEW

ES.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, Hickman, Del Rio, Waterford, Ceres (Walnut Manor), and portions of Turlock. The City currently serves approximately 264,000 people within its service area.

The City of Modesto has historically been among the fastest growing areas in California. However, since 2007, growth within the City's service area has slowed significantly as a result of the national and statewide economic downturn. The City's current estimated service area population of about 264,000 people is about 20,000 less than what was projected for 2010 in the 2005 UWMP.

For this 2010 UWMP, a growth rate of approximately 1.9 percent has been assumed for the future; however, with the economic slowdown in the last few years, the City's projected future service area population is significantly lower than projected in the 2005 UWMP. At 2030, the City's service area population is projected to be about 375,000 people, about 12,000 less people than what was projected in the 2005 UWMP.

ES.3.2 Water Demand

Unlike past UWMPs, the projected water demand in this 2010 UWMP is primarily driven by the per capita water use targets mandated by the Water Conservation Act of 2009 (enacted by Senate Bill SBx7-7 in November 2009). As part of the City's compliance with SBx7-7, the City has established its baseline per capita water use and has established and adopted a 2015 interim per capita water use target and a 2020 final per capita water use target. The development of the

City's baseline and target per capita water use are described in Chapter 4 and Appendix I and are summarized as follows:

- Baseline Per Capita Water Use: 285 gallons per capita per day (gpcd)
- 2015 Interim Per Capita Water Use Target: 256 gpcd
- 2020 Final Per Capita Water Use Target: 228 gpcd

Projected water demands were then determined by multiplying the per capita water use targets by the projected service area populations. Projected water demands are summarized in Table ES-1.

Table ES-1. City of Modesto Projected Water Demand, AFY[a]

Water Use	2010 (actual)	2015	2020	2025	2030	2035
Total Projected Demand (including unaccounted for water[a])	64,464	82,900[b]	80,500[c]	87,900[d]	96,000[d]	104,800[d]

[a] Unaccounted for water is estimated to be 15 percent of total production.
[b] Consistent with City's interim gpcd target of 256 gpcd per SBx7-7 (256 gpcd x 289,076 service area population = 82,900 AFY). Rounded to nearest 100 AFY.
[c] Consistent with City's final gpcd target of 228 gpcd per SBx7-7 (228 gpcd x 315,324 service area population = 80,500 AFY). Rounded to nearest 100 AFY.
[d] Consistent with City's 2020 gpcd target and projected populations for 2025, 2030 and 2035. Rounded to nearest 100 AFY.

ES.3.3 Demand Management and Water Conservation

The City's compliance with the established SBx7-7 targets will be achieved through the implementation of the City's recently developed Water Conservation Plan. As described in Chapter 5, the City has implemented, or is in the process of implementing, the foundational and programmatic Best Management Practices (BMPs) included in the California Urban Water Conservation Council (CUWCC) Memorandum of Understanding (MOU).

Implementation of these programs will allow the City to achieve the water reduction goals required by SBx7-7. In particular, the City's implementation of the residential metering program and billing based on metered usage, anticipated to be completed by 2020, will help the City to monitor and track actual water use and reduce per capita water use through the City's water service area. The completion of the metering program will also allow the City to perform system water audits and assist the City in identifying and reducing system losses due to pipeline leaks. Other key programs will be those that target the reduction of outdoor water uses, including residential landscape water surveys (BMP 3.2) and large landscape conservation programs and incentive programs (BMP 5).

MID will continue to support the City in its water conservation efforts through on-going operational coordination, promotion of water conservation programs and incentives, and water supply allocation in accordance with the provisions of the *Amended and Restated Treatment and Delivery Agreement*.

ES.3.4 Projected Water Supply

As described in Chapter 3, the City relies on two primary water sources: groundwater and Tuolumne River surface water deliveries (purchased wholesale from MID). The future supply for the City will continue to be a mix of groundwater and surface water supply. Although the City is pursuing recycled water opportunities, use of recycled water will focus on providing a more reliable supply for agricultural use, rather than potable water offset (this is described further in Chapter 8 of this 2010 UWMP).

Available, sustainable groundwater supplies for the City of Modesto from the underlying Modesto, Turlock and Delta-Mendota Subbasins are estimated to total 53,500 AFY (estimated "operational yield"). The City's total groundwater pumpage in 2010 was about 33,800 AFY (about 63 percent of the "operational yield"). This supply made up about 52 percent of the City's total water supply. In the future, as described in Chapter 3, groundwater pumpage is expected to be reduced with the introduction of additional surface water supplies from the Modesto Regional Water Treatment Plant (MRWTP) Phase Two (anticipated to be completed in late 2012).

The City's currently available surface water supplies from MID total 33,602 AFY (30 million gallons per day (MGD)) of treated surface water. In 2010, the City purchased 30,647 AFY of treated surface water from MID. When MRWTP Phase Two is completed in late 2012, the available surface water supply from MID will increase to 67,204 AFY. This supply source will then become the City's primary water supply, with groundwater supplementing the available surface water supplies to meet demands. Table ES-2 summarizes the anticipated use of available water supplies to meet future demands.

Table ES-2. City of Modesto Current and Planned Water Supplies, AFY

Supply	2010 (actual)	2015	2020	2025	2030	2035
Purchases from MID (surface water diversions from the Tuolumne River treated at the MRWTP)[a]	30,647	67,200	67,200	67,200	67,200	67,200
City produced groundwater[b]	33,817	15,700	13,300	20,700	28,800	37,600
Total[c]	64,464	82,900	80,500	87,900	96,000	104,800

(a) Once MRWTP Phase Two is completed, anticipated in late 2012, an additional 33,602 AFY of demand will be met with surface water supplies.
(b) Groundwater quantity calculated based on remaining supply required to meet the City's total demand. Sustainable groundwater yield estimated to be 53,500 AFY.
(c) Buildout demand for the entire Modesto Water Service area is 104,800 AFY based on current projections developed in this UWMP. Projections incorporate anticipated conservation reductions to comply with SBx7-7.

As described in Chapter 3, the City is also evaluating potential participation in other surface water supply projects, including a potential future MRWTP Phase Three, which could result in additional treated water deliveries north of the Tuolumne River, and potential participation in the Regional Surface Water Supply Project (RSWSP), which would provide treated surface water using water supplied by Turlock Irrigation District to areas south of the Tuolumne River.

The City has engaged in very preliminary discussions with MID regarding the possibility of implementing a potential future MRWTP Phase Three project, but at this time, this project is speculative. For the RSWSP, some project planning, environmental review and design have previously been completed. The project is currently under review by a steering committee made up of elected city council representatives of the four cities potentially participating in the project (Modesto, Ceres, Hughson and Turlock). The steering committee is anticipated to make a recommendation on whether and how to proceed with the project sometime in 2011.

As described in Chapter 9, based on the anticipated reliability of the City's water supplies during normal, single dry and multiple dry years, the City anticipates that it has adequate water supplies to meet projected water demands during all hydrologic conditions through 2035.

ES.3.5 Water Shortage Contingency Plan

However, in the event of water shortages due to prolonged drought conditions or other water supply outages, the City has developed a Water Shortage Contingency Plan delineating three stages of action, triggers, prohibitions and other water consumption reduction methods and associated penalties and charges for violating the established water use restrictions. The three stages of the plan are intended to address up to a 50 percent reduction in available water supplies. This plan is described in Chapter 10 of this 2010 UWMP.

In 2002, the City implemented Stage I of its Water Shortage Contingency Plan calling for a 10 to 20 percent reduction in water use by its customers through implementation of specific water use restrictions (see Chapter 10 and Appendix K). The City has remained in Stage I since it was implemented in 2002.

ES.4 ON-LINE SUBMITTAL TO DWR USING DOST

This 2010 UWMP will be submitted to DWR using the DWR On-line Submittal Tool (DOST) when the DOST system becomes available.

ES.5 DEMONSTRATION OF PLAN COMPLETENESS

This 2010 UWMP complies with the requirements of the Urban Water Management Planning Act, as amended by recently enacted legislation. DWR's Urban Water Management Plan Checklist, as provided in the 2010 UWMP Guidebook as been completed by West Yost to demonstrate the plan's compliance with applicable requirements. A copy of the completed checklist is included in Appendix N.

Furthermore, this 2010 UWMP contains all of the tables recommended by DWR. Table ES-3 provides a listing of the required DWR tables with a cross-reference to the table locations in this 2010 UWMP.

Table ES-3. Location of DWR Recommended Tables		
DWR Table Number and Title	2010 UWMP Chapter and Table Number	
Table 1. Coordination with Appropriate Agencies	Chapter 1	Table 1-1
Table 2. Population—Current and Projected	Chapter 2	Table 2-3
Table 3. Water Deliveries—Actual, 2005	Chapter 4	Table 4-3 (City of Modesto) Table 4-5 (MID)
Table 4. Water Deliveries—Actual, 2010	Chapter 4	Table 4-4 (City of Modesto) Table 4-5 (MID)
Table 5. Water Deliveries—Projected, 2015	Chapter 4	Table 4-6 (City of Modesto) Table 4-10 (MID)
Table 6. Water Deliveries—Projected, 2020	Chapter 4	Table 4-7 (City of Modesto) Table 4-10 (MID)
Table 7. Water Deliveries—Projected, 2025, 2030 and 2035	Chapter 4	Table 4-8 (City of Modesto) Table 4-10 (MID)
Table 8. Low-Income Projected Water Demands	Chapter 4	Table 4-9 (City of Modesto) Table 4-11 (MID)
Table 9. Sales to Other Water Agencies	Chapter 4	Table 4-12 (City of Modesto) Table 4-13 (MID)
Table 10. Additional Water Uses and Losses	Chapter 4	Table 4-14 (City of Modesto) Table 4-16 (MID)
Table 11. Total Water Use	Chapter 4	Table 4-15 (City of Modesto) Table 4-17 (MID)
Table 12. Retail Agency Demand Projections Provided to Wholesale Suppliers	Chapter 3 and 4	Table 3-3 Table 4-18
Table 13. Base Period Ranges	Chapter 4	Table 4-19
Table 14. Base Daily Per Capita Water Use—10- to 15-Year Range	Chapter 4	Table 4-20
Table 15. Base Daily Per Capita Water Use—5-Year Range	Chapter 4	Table 4-21
Table 16. Water Supplies—Current and Projected	Chapter 3	Table 3-6 (City of Modesto)
Table 17. Wholesale Supplies—Existing and Planned Sources of Water	Chapter 3	Table 3-7 (MID)
Table 18. Groundwater—Volume Pumped	Chapter 3	Table 3-1
Table 19. Groundwater—Volume Projected to be Pumped	Chapter 3	Table 3-2
Table 20. Transfer and Exchange Opportunities	Chapter 3	Table 3-4 (City of Modesto) Table 3-5 (MID)
Table 21. Recycled Water—Wastewater Collection and Treatment	Chapter 8	Table 8-1
Table 22. Recycled Water—Non-Recycled Wastewater Disposal	Chapter 8	Table 8-2
Table 23. Recycled Water—Potential Future Use	Chapter 8	Table 8-4
Table 24. Recycled Water—2005 UWMP Use Projection Compared to 2010 Actual	Chapter 8	Table 8-3
Table 25. Methods to Encourage Recycled Water Use	Chapter 8	Table 8-6
Table 26. Future Water Supply Projects	Chapter 6	Table 6-5 (City of Modesto) Table 6-6 (MID)
Table 27. Basis of Water Year Data	Chapter 6	Table 6-2
Table 28. Supply Reliability—Historic Conditions	Chapter 6	Table 6-3
Table 29. Factors Resulting in Inconsistency of Supply	Chapter 6	Table 6-1
Table 30. Water Quality—Current and Projected Water Supply Impacts	Chapter 7	Table 7-1
Table 31. Supply Reliability—Current Water Sources	Chapter 6	Table 6-4
Table 32. Supply and Demand Comparison—Normal Year	Chapter 9	Table 9-3 (City of Modesto) Table 9-6 (MID)
Table 33. Supply and Demand Comparison—Single Dry Year	Chapter 9	Table 9-9 (City of Modesto) Table 9-12 (MID)
Table 34. Supply and Demand Comparison—Multiple Dry Year Events	Chapter 9	Table 9-15 (City of Modesto) Table 9-18 (MID)
Table 35. Water Shortage Contingency—Rationing Stages to Address Water Supply Shortages	Chapter 10	Table 10-1
Table 36. Water Shortage Contingency—Mandatory Prohibitions	Chapter 10	Table 10-4
Table 37. Water Shortage Contingency—Consumption Reduction Methods	Chapter 10	Table 10-4
Table 38. Water Shortage Contingency—Penalties and Charges	Chapter 10	Table 10-5

1.1 INTRODUCTION

The Urban Water Management Planning Act was originally established by Assembly Bill 797 (AB 797) on September 21, 1983. Passage of this law was recognition by state legislators that water is a limited resource and a declaration that efficient water use and conservation would be actively pursued throughout the state. The law requires water suppliers in California providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet per year (AFY) of water to prepare and adopt an Urban Water Management Plan (UWMP) every five years.

Several changes to the Urban Water Management Planning Act have been approved in recent years. Revisions to the act include requiring a robust supply and demand comparison, as well as detailed discussion of groundwater resources, water recycling and desalination. Also, this 2010 UWMP is also required to comply with the requirements of the Water Conservation Act of 2009, Senate Bill x7-7 (SBx7-7) which was enacted in November 2009. SBx7-7 requires urban retail water suppliers, such as the City of Modesto, to develop per capita water use targets to be met by 2015 and 2020. The overall statewide objective of SBx7-7 is to reduce per capita water use by 20 percent by the year 2020.

The requirements of SBx7-7 have extended the deadline for adoption of the 2010 UWMPs for urban retail water suppliers from December 31, 2010 to July 1, 2011. Similar legislation (SB 1478) was passed in September 2010 to also extend the adoption submittal deadline for urban wholesale water suppliers' UWMPs to July 1, 2011, to allow for coordination between retail and wholesale water suppliers.

A copy of the current version of the Urban Water Management Planning Act, SBx7-7 and SB 1478 is provided in Appendix A of this document.

1.2 PLAN ORGANIZATION

As with the 2000 and 2005 UWMPs, this 2010 UWMP has been prepared as a joint UMWP by the City of Modesto (City) and the Modesto Irrigation District (MID). This 2010 UWMP for the City and MID describes the current and future water use, sources of supply and its reliability, and existing and planned conservation measures.

Where applicable, separate descriptions have been prepared for the City and MID. Throughout this document, the City and MID sections reference each other extensively. This is because MID delivers treated water supplies exclusively to the City, and the City currently receives surface water supplies only from MID. Because this relationship is currently exclusive, much of the retail-wholesale information is interchangeable between these agencies. In addition, because MID does not have any direct urban customers, the City oversees demand management measures and other public outreach activities.

This Joint City of Modesto/Modesto Irrigation District 2010 UWMP has been prepared by West Yost Associates (West Yost). This 2010 UWMP contains the appropriate sections and tables required per California Water Code Division 6, Part 2.6 (Urban Water Management Planning Act), included in Appendix A of this document.

To demonstrate the completeness of this 2010 UWMP, the UWMP checklist provided in DWR's "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" has been completed and is included in Appendix N.

1.3 BACKGROUND AND ANTICIPATED BENEFITS

The purpose of the joint UWMP is to provide a planning tool for both the City and MID for developing and delivering municipal water supplies to the City's water service area.[1] The primary basis for the general information and specific data cited in this 2010 UWMP is the 2010 Water System Engineer's Report (Engineer's Report) which was prepared for the City in May 2010 by West Yost Associates.

1.3.1 Background: City of Modesto

The City of Modesto is the largest retail water supplier in Stanislaus County. The City has been providing potable water service to its urban area since 1895 through the purchase and acquisition of several private water companies. Until 1995, the sole source of water supplies to the City was groundwater from the Modesto and Turlock groundwater subbasins.[2]

The City completed UWMPs for 1985 and 1990 without MID's participation since MID did not supply domestic water to the City during that time. In the early 1990s, the City of Modesto, MID and the former Del Este Water Company formed a partnership to use of a portion of MID's surface water supplies for municipal uses. The Modesto Domestic Water Project (MDWP) was the result of this partnership. The MDWP consists of a 30-million gallon per day (mgd) surface water treatment plant (Modesto Regional Water Treatment Plant, or MRWTP) and storage and delivery facilities, which were completed in January 1995. MRWTP Phase Two, currently anticipated to be completed by late 2012, will increase capacity of the MRWTP by an additional 30 MGD. The implementation of the MRWTP and the associated shift to surface water supplies has allowed the City to stabilize groundwater pumping rates for some groundwater recovery. The Phase Two expansion, when completed, will allow additional groundwater recovery, as well as groundwater banking, via the in-lieu conjunctive use of surface water supplies.

In July of 1995, the City acquired the former Del Este Water Company, which had previously served approximately 30 percent of the municipal customers in the Modesto area. As a result of this acquisition, the City also became the primary domestic water purveyor in Stanislaus County, serving not only the City of Modesto but also the communities of Waterford, Hickman, Del Rio, Empire, Salida, Grayson, and parts of Ceres and Turlock. The MRWTP delivers water to municipal customers within the City of Modesto City limits north of the Tuolumne River, including the communities of Salida and Empire. The City also serves municipal customers south of the Tuolumne River in the Turlock Irrigation District (TID) service area via groundwater extraction. TID currently serves only agricultural customers and does not supply water for municipal uses.

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[1] MID has projected water deliveries to additional urban areas outside the City of Modesto in future years. These deliveries will be addressed in subsequent sections of this UWMP.

[2] The Modesto groundwater subbasin has been referred to as the Tuolumne subbasin in previous documents.

The City is currently pursuing the option of participating in a Regional Surface Water Supply Project (RSWSP) with TID-supplied water to serve Modesto (south of the Tuolumne River), Turlock, Ceres and Hughson. Discussions between the cities are on-going; however, final participation has not yet been determined. However, if the City and TID were to participate, the RSWSP could further enhance Modesto's ability to manage its surface and groundwater supplies conjunctively by providing surface water south of the Tuolumne River. Further discussion of this potential future supply is provided in Chapter 3.

The Modesto, Turlock and Delta Mendota groundwater subbasins are all unadjudicated. This means that there is no court-appointed "watermaster" to resolve groundwater pumping issues, and there are no specific limits on the amount of groundwater that individuals and agencies may extract from the basins. The City is currently dependent on groundwater for about 60 percent of its total supply (north of the Tuolumne River) during summer and fall months, and will continue to use groundwater pumping to meet demands until construction of the MRWTP Phase Two is completed in late 2012. Once MRWTP Phase Two is completed, there will be sufficient surface water treatment capacity to deliver an additional 30 MGD of MID supplies to the City, allowing the City (north of the Tuolumne River) to meet almost all but peak demands using surface water and reducing the City's dependence on groundwater supplies for servicing areas north of the Tuolumne River. Likewise, the City's potential participation in the proposed RSWSP could help to reduce the City's dependence on groundwater supplies to serve customers in the South Modesto area south of the Tuolumne River.

1.3.2 Background: Modesto Irrigation District

MID was formed as the second irrigation district in California in 1887. Since that time, MID has developed numerous water rights and facilities to provide agricultural irrigation water from the Tuolumne River. MID has also developed groundwater supplies for agricultural uses. A complex network of storage facilities, canals, pipelines, pumps, and control structures has been constructed to deliver both surface water and groundwater to agricultural customers.

The original *Treatment and Delivery Agreement Among the Modesto Irrigation District, City of Modesto, and Del Este Water Compan*y (Treatment and Delivery Agreement) was the document controlling the delivery of domestic treated water from MID to the City. Originally signed in 1992 by the City, MID, and the former Del Este Water Company, the Treatment and Delivery Agreement obligates MID to deliver up to 33,602 AFY (30 MGD) of treated surface water, commencing each year on May 1 and ending the following April 30, during normal years. The Treatment and Delivery Agreement includes a formula to reduce deliveries in drier than average years based on the number of inches allocated to agricultural customers.

On October 2005, MID and the City approved the *Amended and Restated Water Treatment and Delivery Agreement between Modesto Irrigation District and the City of Modesto* (Amended and Restated Treatment and Delivery Agreement). This agreement supersedes the original Treatment and Delivery Agreement and sets forth the MRWTP Phase Two. With the expansion of the MRWTP, MID will deliver to the City up to 67,204 AFY of treated water for urban use. A copy of *Amended and Restated Treatment and Delivery Agreement* is included as Appendix E of this document.

On September 2005, the State Water Resources Control Board approved a long-term transfer through 2054 for 67,204 AFY of water from MID to the City. A copy of the SWRCB order approving this transfer has been included as Appendix F of this document.

1.3.3 Anticipated Plan Benefits

This joint 2010 UWMP will benefit both the City and MID by providing a planning tool for treating and delivering municipal water supplies to the City's water service area.[3] In addition, the water management elements, supply alternatives, and demand management strategies incorporated in this document will assist both agencies in effectively utilizing available supplies to maximize resources.

1.4 AGENCY COORDINATION, NOTIFICATION & PARTICIPATION

Water Code § 10620 (d)(1)(2)

(d) (1) An urban water supplier may satisfy the requirements of this part by participation in area-wide, regional, watershed, or basin-wide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use.

(2) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

A variety of agency and public interests participated in the coordination and preparation of this 2010 UWMP, and are summarized in Table 1-1.

[3] MID has projected water deliveries to additional urban areas outside the City of Modesto in future years. These deliveries will be addressed in subsequent sections of this UWMP.

Table 1-1. Coordination with Appropriate Agencies (DWR Table 1)

Agency	Notified of UWMP Preparation/ Contacted for Input	Participated in UWMP Development	Notified 60 days Prior to Public Hearing	Attended Public Meetings	Sent Copy of Draft UWMP[b]	Commented on Draft UWMP	Sent Notice of Intention to Adopt[c]	Not Involved/ No Info.
City of Ceres	✓		✓		✓		✓	
City of Turlock	✓		✓		✓		✓	
City of Waterford	✓		✓		✓		✓	
Stanislaus County[a]	✓		✓		✓		✓	
City of Riverbank			✓		✓		✓	
City of Oakdale			✓		✓		✓	
City of Patterson			✓					
City of Newman			✓					
Oakdale Irrigation District			✓		✓		✓	
Turlock Irrigation District	✓		✓		✓		✓	
Manufacturers Council of the Central Valley			✓		✓		✓	
Building Industry Association of Central California			✓		✓		✓	

(a) Stanislaus County is the governing agency for Del Rio, Empire, Hickman, Grayson and Salida.
(b) Indicated agencies were notified of the availability of the Draft UWMP on May 2, 2011 (see copy of notice in Appendix C).
(c) Notice of intention to adopt was sent to indicated agencies on May 2, 2011 (see copy of notice in Appendix C).

In February 2011, a notice of preparation was sent to stakeholders to inform them of the UWMP update process and schedule and solicit input for the update. A copy of the notice is included in Appendix C.

In accordance with the requirements of SBx7-7, Water Code Section 10608.26, a public hearing was held in February 22, 2011 to discuss the City's proposed per capita water use targets for 2015 and 2020 (see Chapter 4 Section 4.7 Compliance with SBx7-7 and Appendix I for additional information).

Following completion of the Draft UWMP, a notification of public review was placed in the City's newspaper about the 2010 UWMP update process and copies of the Draft UWMP were made available at the City's Public Works Department and at the MID Board Secretary's office, with an electronic version placed on the City and MID websites. During the public review period, local cities, communities and the County served by MID, as well as the general public, were encouraged to comment on the draft document.

A public hearing to discuss the Draft UWMP was held on May 24, 2011, in conjunction with the Modesto City Council meeting prior to formal adoption of the UWMP. A public hearing was also held by MID on the same day. Noticing for these public hearings was conducted pursuant to Section 6066 of the Government Code. Also, per California Water Code section 10621, notice regarding the public hearing was sent to the cities and county located in the City/MID service area 60 days prior to the public hearing date.

Copies of the public hearing notices and notices to City and county entities served by the City and MID are included in Appendix C.

1.5 PUBLIC PARTICIPATION

Water Code §10642

Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area. After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

The City and MID have both actively encouraged community participation in water management activities and specific water-related projects, such as preparation of the recurring Urban Water Management Plans, Groundwater Management Plans, and Urban Area General Plan, as well as implementation of water conservation programs. Public participation has also been encouraged for specific regional water supply projects including the MRWTP.

The City's public participation program includes both active and passive means of obtaining input from the community, such as mailings, public meetings, and web-based communication. The City's website describes major multi-year water projects for extending water lines and installing wells and updating and rebuilding existing facilities. The website also posts announcements of planned rate increases to fund these water projects.

MID provides educational videos on water to classrooms within the District free of charge. MID's website solicits public comment on water projects, as well as providing public information.

As part of development of this 2010 UWMP, the City and MID allowed a public review period, following noticing and prior to adoption, to allow ample time for public comments to be developed and received. Public noticing, pursuant to Section 6066 of the Government Code, was conducted prior to commencement of the public comment period. Public hearing notices are included in Appendix C of this document. During the public comment period, the Draft UWMP update was made available at the City's Public Works Department and at the MID Board Secretary's Office, as well as on the City Public Works Department and MID websites. No comments were received from stakeholders or the public during the public comment period.

2.1 OVERVIEW

Water Code § 10631 (a), §10620 (f)

A plan shall be adopted in accordance with this chapter and shall do all of the following:

(a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

§10620 (f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

The City and MID are located in the heart of the San Joaquin Valley, approximately 90 miles southesast of the San Francisco Bay Area and 77 miles south of the City of Sacramento (see Figure 2-1). Both the City and MID are located in Stanislaus County.

2.2 CITY OF MODESTO SERVICE AREA

The City's service area consists of one large "contiguous" service area and several "outlying" non-contiguous service areas[1]. The City's contiguous service area is primarily defined by the current City Sphere of Influence (SOI), Salida, North Ceres and some unincorporated Stanislaus County "islands" within or adjacent to the SOI (including Empire, Bret Harte, Shackelford and West Modesto). The outlying service areas include Grayson, Hickman, Del Rio, Waterford, Ceres (Walnut Manor), and portions of Turlock. This service area is largely the result of the City's 1995 acquisition of the Del Este Water Company. Figure 2-2 illustrates the location of the City's contiguous and outlying service areas.

2.3 MODESTO IRRIGATION DISTRICT SERVICE AREA

As described in Chapter 1, MID is primarily an agricultural water supplier, and though treated water is provided to the City Municipal Water System for urban delivery, MID does not directly serve any domestic water customers. MID's service area is shown on Figure 2-3. The MID treated water place of use is defined by the overlap of the MID water service boundary with the City Municipal Water System service area north of the Tuolumne River. The common City and MID water service area excludes those areas served by the City of Modesto with groundwater and/or which lie outside the MID water service boundary; these excluded areas include the communities of Hickman and Grayson and parts of Ceres and Turlock and other City water service areas south of the Tuolumne River. All of the other communities served by the City of Modesto (Salida, Empire and Waterford) lie within the MID service area.

[1] This service area is consistent with the service area assumed in the City's 2010 Water System Engineer's Report and the City's Master Plans for wastewater and storm water.

In future years, additional agricultural land is likely to be converted to urban uses, and MID may serve as a wholesale provider of urban supplies outside the overlapping area with the City. However, the area currently served by MID treated water supplies does not extend beyond the City Municipal Water System.

2.4 WATER SYSTEM FACILITIES

This section describes water facilities to supply and deliver urban water supplies to the City service area. As described above, MID is primarily an agricultural water supplier and operates extensive facilities to deliver agricultural water supplies. These facilities, although not described below, include a network of canals, pipelines, pumps, drainage features, and control structures.

2.4.1 Raw Water Reservoirs

There are two raw water reservoirs serving the Modesto area:

- Modesto Reservoir, and
- New Don Pedro Reservoir.

The Modesto Reservoir was completed in 1911, is owned and operated by MID, and has a gross storage capacity of 28,000 AF. Today it serves as a regulating reservoir for irrigation and domestic water. Two natural lakes, Dallas Lake and Warner Lake, and eight earthen dams were used to form the reservoir. The reservoir, which is also a recreational area operated by Stanislaus County, is located 14 miles east of Modesto off of Highway 132 on Reservoir Road.

The New Don Pedro Reservoir, owned and operated by MID and TID, is located four miles northeast of La Grange in the Sierra Nevada foothills. In addition to extensive recreation facilities, it provides water storage and power production for MID and TID, and flood control for the Army Corps of Engineers. The facility was completed in 1971, replacing the first Don Pedro Dam and Reservoir built in 1923. The New Don Pedro Dam is an earth-filled dam with a clay core. Most of the 16 million cubic yards of material came from gold dredge tailings from the Tuolumne River near La Grange. The reservoir is 26 miles long with a capacity of 2.03 million AF.

2.4.2 Surface Water Facilities

In the early 1990's, the City, MID and the former Del Este Water Company formed the Modesto Domestic Water Partnership to use a portion of MID's surface water rights for municipal uses, and entered into a Treatment and Delivery Agreement (TDA) to cover the design, construction, commercial operation, and financing for the Initial Phase of the MRWTP. This new treatment plant, along with associated storage and delivery facilities, became operational in 1995.

The MRWTP currently treats water from MID's Modesto Reservoir and conveys it to the City's service area to combine with groundwater sources to meet the City's water supply needs for those municipal customers within the City limits north of the Tuolumne River (the southern boundary of MID's service area), including the communities of Salida and Empire.

Since 1995, the City has received 33,602 AFY (30 MGD) of treated water from the MRWTP. The City and MID have been working together on MRWTP Phase Two, which is currently under construction. Once MRWTP Phase Two is complete, anticipated in late 2012, the City will be receiving an additional 33,602 AFY (for a total of 67,204 AFY, or 60 MGD). The 60 MGD capacity is an annual average, and both the original and expanded facilities will have peaking capacities greater than the annual averages. Delivery of this surface water is made possible via the Amended and Restated Water Treatment and Delivery Agreement (ARTDA) between the MID and the City dated October 2005 (included in Appendix E).

2.4.3 Groundwater Facilities

The City currently supplies approximately 52 percent of its total water use from City-owned and operated groundwater wells. As of December 2010, the City of Modesto operated 92 of its 113 groundwater wells located throughout the City's entire water service area (76 operational wells in the contiguous area and 16 operational wells in outlying areas).

The total production capacity of the City's currently operational groundwater wells is 133 MGD. However, this capacity must be reduced to account for wells that are out of service at any given time due to mechanical breakdowns, maintenance or other operational issues. For planning purposes, the City defines its firm groundwater pumping capacity as equal to 60 percent of the total production capacity from all operational wells.

The wells are located in the Modesto, Turlock and Delta-Mendota subbasins of the San Joaquin Valley Groundwater Basin (see Figure 2-4). In general, residents within the contiguous water service area north of the Tuolumne River (North Modesto, Salida and Empire) rely on treated surface water year-round; in this part of the City's service area, surface water supplies are only augmented with groundwater to meet increased demands primarily in the summer months. Demands originating south of the Tuolumne River (South Modesto) are met with groundwater supplies year-round.

2.4.4 Distribution System Facilities

The City's contiguous service area consists of approximately 940 miles of transmission and distribution pipelines. A portion of the transmission pipelines traversing the City is owned by MID and treated surface water is discharged into either the former Del Este system or the City system through a number of turnouts. The contiguous system has seven at-grade storage tanks with a combined total storage capacity of 8.1 million gallons (MG). Each storage tank has a booster pump station to pump water from the tank into the distribution system. There are also two 5 MG MRWTP reservoirs (10 MG total) that are owned and operated by MID. Figure 2-5 shows the major water facilities in the City service area.

The City's outlying service areas are served by groundwater wells located in each of the outlying service areas. Only the Grayson service area has a storage tank (0.22 MG capacity). The other outlying service areas are served exclusively from the existing groundwater wells.

2.5 CLIMATE

Water use within the City's service area is dependent on various climate factors such as temperature, precipitation, and evapotranspiration (ET). Climate data, including temperature and precipitation estimates, were obtained from the Western Regional Climate Center for Modesto, California. The period of record was March 1, 1906 to July 31, 2010.

ET is a term used to describe water lost through evaporation from the soil and surface-water bodies combined with plant transpiration. In general, the reference evapotranspiration (ET_o) is given for turf grass, and then corrected for a specific crop type. Local ET_o data was obtained from California Irrigation Management Information System (CIMIS) station #71, located west of Modesto, California and operated by DWR.

Table 2-1 shows the historic climate characteristics affecting water management in the Modesto area.

Table 2-1. Modesto Climate

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Monthly Average ET_o[(a)], in	0.87	1.71	3.43	5.24	6.70	7.40	7.85	6.75	4.93	3.37	1.66	0.87	50.78
Average Total Precipitation[(b)], in	2.47	2.08	1.91	1.03	0.46	0.12	0.02	0.04	0.18	0.63	1.23	2.06	12.22
Average Max Temperature[(b)], °F	53.8	60.9	67.0	73.3	81.2	88.4	94.3	92.2	87.6	77.9	64.6	54.3	74.6
Average Min Temperature[(b)], °F	37.6	40.8	43.5	46.8	51.8	56.6	59.9	58.8	55.9	49.5	41.7	37.7	48.4

(a) Data from CIMIS Station #71 (http://wwwcimis.water.ca.gov/cimis/monthlylyEToReport). DWR requests that information be based on the last 30 years; however, the CIMIS information for this station is available only from June 1987 to the present.
(b) Data from Western Regional Climate Center (http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca5738) for Modesto, California. Period of record is 03/01/1906 to 07/31/2010.

Other climate characteristics that affect water management in the Modesto area include solar radiation, relative humidity, dew point, wind speed, and soil temperature. Daily and monthly averages for these values can be obtaining from the CIMIS station website at: http://wwwcimis.water.ca.gov/.

2.6 OTHER DEMOGRAPHIC FACTORS

No other demographic factors affecting water use in the City or MID service areas have been identified at this time. If additional demographic factors are identified, these will be addressed in subsequent updates to this 2010 UWMP.

2.7 SERVICE AREA POPULATION

2.7.1 Historical Population

The City has historically been among the fastest growing areas in California. However, since 2007, growth within the City's service area has slowed significantly as a result of the national and statewide economic downturn. As such, the growth from 2005 to 2010 (projected in the 2005 UWMP to be about 7.6 percent for the five-year period, or about 1.5 percent per year) was only 2.4 percent for the five-year period, or about 0.5 percent per year. Historical population estimates for the various portions of the City's water service area from 1996 through 2010 are shown in Table 2-2.

Historical population estimates for the City's water service area are based on Census data for 1990 and 2000 and California Department of Finance (DOF) data (Report E-4), where available. Where Census and DOF data are not available (*e.g.*, for the Turlock and Walnut Manor areas served by the City), the population has been estimated based on a count of existing dwelling units served by the City (from aerial photographs) and an estimated housing density (people per dwelling unit) (based on Census data for the surrounding communities). For many of the City's service areas, growth since 2007 has been assumed to be zero due to the statewide economic downturn. Data sources and assumptions for the Modesto service area historical population estimates are shown in Table 2-2.

Table 2-2. City of Modesto Historical Service Area Population

Year	City of Modesto	Salida	Empire	Del Rio	Grayson	Hickman	Waterford	Turlock	North Ceres (Bystrom)	Ceres (Walnut Manor)	Bret Harte (County area served by Modesto)	Shackelford (County area served by Modesto)	West Modesto (County area served by Modesto)	Total Modesto Service Area
1996	178,467	9,336	3,903	1,168	1,077	457	6,446	1,137	4,518	154	5,161	5,170	6,059	223,053
1997	179,932	10,142	3,903	1,168	1,077	457	6,545	1,137	4,518	154	5,161	5,170	6,059	225,423
1998	181,674	10,948	3,903	1,168	1,077	457	6,615	1,137	4,518	154	5,161	5,170	6,059	228,041
1999	184,136	11,754	3,903	1,168	1,077	457	6,730	1,137	4,518	154	5,161	5,170	6,059	231,424
2000	187,816	12,560	3,903	1,168	1,077	457	6,900	1,137	4,518	154	5,161	5,170	6,059	236,080
2001	193,672	12,786	3,973	1,189	1,096	465	7,039	1,137	4,518	154	5,161	5,170	6,059	242,420
2002	199,455	13,012	4,044	1,210	1,116	473	7,196	1,137	4,518	154	5,161	5,170	6,059	248,704
2003	203,892	13,238	4,114	1,231	1,135	481	7,694	1,137	4,518	154	5,161	5,170	6,059	253,984
2004	206,934	13,465	4,184	1,252	1,154	490	7,885	1,137	4,518	154	5,161	5,170	6,059	257,562
2005	207,101	13,691	4,254	1,273	1,173	498	7,877	1,137	4,518	154	5,161	5,170	6,059	258,066
2006	206,991	13,917	4,325	1,294	1,193	506	8,171	1,137	4,518	154	5,161	5,170	6,059	258,595
2007	207,613	14,143	4,395	1,315	1,212	514	8,525	1,137	4,518	154	5,161	5,170	6,059	259,916
2008	208,375	14,143	4,395	1,315	1,212	514	8,697	1,137	4,518	154	5,161	5,170	6,059	260,850
2009	209,574	14,143	4,395	1,315	1,212	514	8,793	1,137	4,518	154	5,161	5,170	6,059	262,145
2010	211,536	14,143	4,395	1,315	1,212	514	8,860	1,137	4,518	154	5,161	5,170	6,059	264,174
Data Sources:	California Dept of Finance Report E-4 for City of Modesto	1990 and 2000 data: Census 2007 data: City-data.com	2000 data: Census 2007 data: City-data.com	2000 data: Census 2007 data: City-data.com	2000 data: Census 2007 data: City-data.com	2000 data: Census 2007 data: City-data.com	California Dept of Finance Report E-4 for City of Waterford	Count of dwelling units within City of Modesto service area (392 dus) x 2.9 people per du (2000 census data for City of Turlock--people per housing unit)	2000 data: Census	Per City of Modesto data: 53 Low Density Residential parcels in Walnut Manor (assume 2.9 people per du per 2000 Census data for City of Modesto--people per housing unit)	2000 data: Census	2000 data: Census	2000 data: Census	
Notes:	Parts of City were served by Del Este prior to 1996	Served by Del Este prior to 1996 Assume no growth since 2007	Served by Del Este prior to 1996 Assume no growth since 2007	Served by Del Este prior to 1996 Assume no growth since 2007	Served by Del Este prior to 1996 Assume no growth since 2007	Served by Del Este prior to 1996 Assume no growth since 2007	Served by Del Este prior to 1996	Served by Del Este prior to 1996	Served by Del Este prior to 1996	Served by Del Este prior to 1996	Served by Del Este prior to 1996	Served by Del Este prior to 1996	Served by Del Este prior to 1996	

Note: Service area population for years prior to 1996 are not available as City of Modesto city limits included areas served by the Del Este Water Company. The Del Este Water Company was acquired by the City of Modesto in 1996 and the City of Modesto began providing service to former Del Este Water Company service areas.

2.7.2 Projected Population

Based on the 2010 Engineer's Report, a growth rate of 1.9 percent is estimated from 2010 through buildout for the City's contiguous service area (assumed to occur in 2035 for the purposes of the 2010 UWMP). Growth rates for the outlying service areas are based on the current estimate of percent developed and the estimated buildout year for each outlying service area. For this 2010 UWMP, the 2035 population is projected to be 410,494. These population projections are based on the following growth assumptions for each portion of the City's water service area:

- Modesto: Assume a 1.9 percent growth rate from 2010 through 2035
- Salida: Assume a 1.9 percent growth rate from 2010 through 2035
- Empire: Assume a 1.9 percent growth rate from 2010 through 2035
- Del Rio: Currently 57 percent developed; remaining areas to build out by 2035
- Grayson: Currently 75 percent developed; remaining areas to build out by 2035
- Hickman: Currently 90 percent developed; remaining areas to build out by 2035
- Waterford: Currently 90 percent developed; remaining areas to build out by 2015[2]
- Turlock: Fully developed; no additional growth anticipated
- North Ceres (Bystrom): Fully developed; no additional growth anticipated
- Ceres (Walnut Manor): Fully developed; no additional growth anticipated
- Bret Harte: 37.8 acres of vacant and underdeveloped lots; to be built out by 2035
- Shackelford: Fully developed; no additional growth anticipated
- West Modesto: Assume a 1.9 percent growth rate from 2010 through 2035

These population projections are shown in Table 2-3.

[2] Assumed buildout date for Waterford is as assumed in the City's 2010 Water System Engineer's Report.

Table 2-3. Population Served by the City of Modesto – Current and Projected[a] (DWR Table 2)

Area Served	2010	2015	2020	2025	2030	2035
City of Modesto	211,536	232,554	255,661	281,064	308,991	339,693
Salida	14,143	15,549	17,094	18,793	20,659	22,711
Empire	4,395	4,832	5,312	5,842	6,423	7,062
Del Rio	1,315	1,515	1,715	1,915	2,115	2,307
Grayson	1,212	1,292	1,372	1,452	1,532	1,616
Hickman	514	524	534	544	554	571
Waterford	8,860	9,844	9,844	9,844	9,844	9,844
Turlock	1,137	1,137	1,137	1,137	1,137	1,137
North Ceres (Bystrom)	4,518	4,518	4,518	4,518	4,518	4,518
Ceres (Walnut Manor)	154	154	154	154	154	154
Bret Harte	5,161	5,326	5,491	5,656	5,821	5,983
Shackelford	5,170	5,170	5,170	5,170	5,170	5,170
West Modesto	6,059	6,661	7,322	8,049	8,849	9,728
Total	264,174	289,076	315,324	344,138	375,767	410,494

[a] For each area served, population was assumed to increase as described above until buildout was reached.

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LEGEND

- Modesto
- Stanislaus County
- California Counties

N

0 50 100

Miles

FIGURE 2-1

City of Modesto / MID 2010 UWMP

MODESTO VICINITY MAP

CITY of MODESTO

MID Modesto Irrigation District The Power To Grow

WEST YOST ASSOCIATES Consulting Engineers

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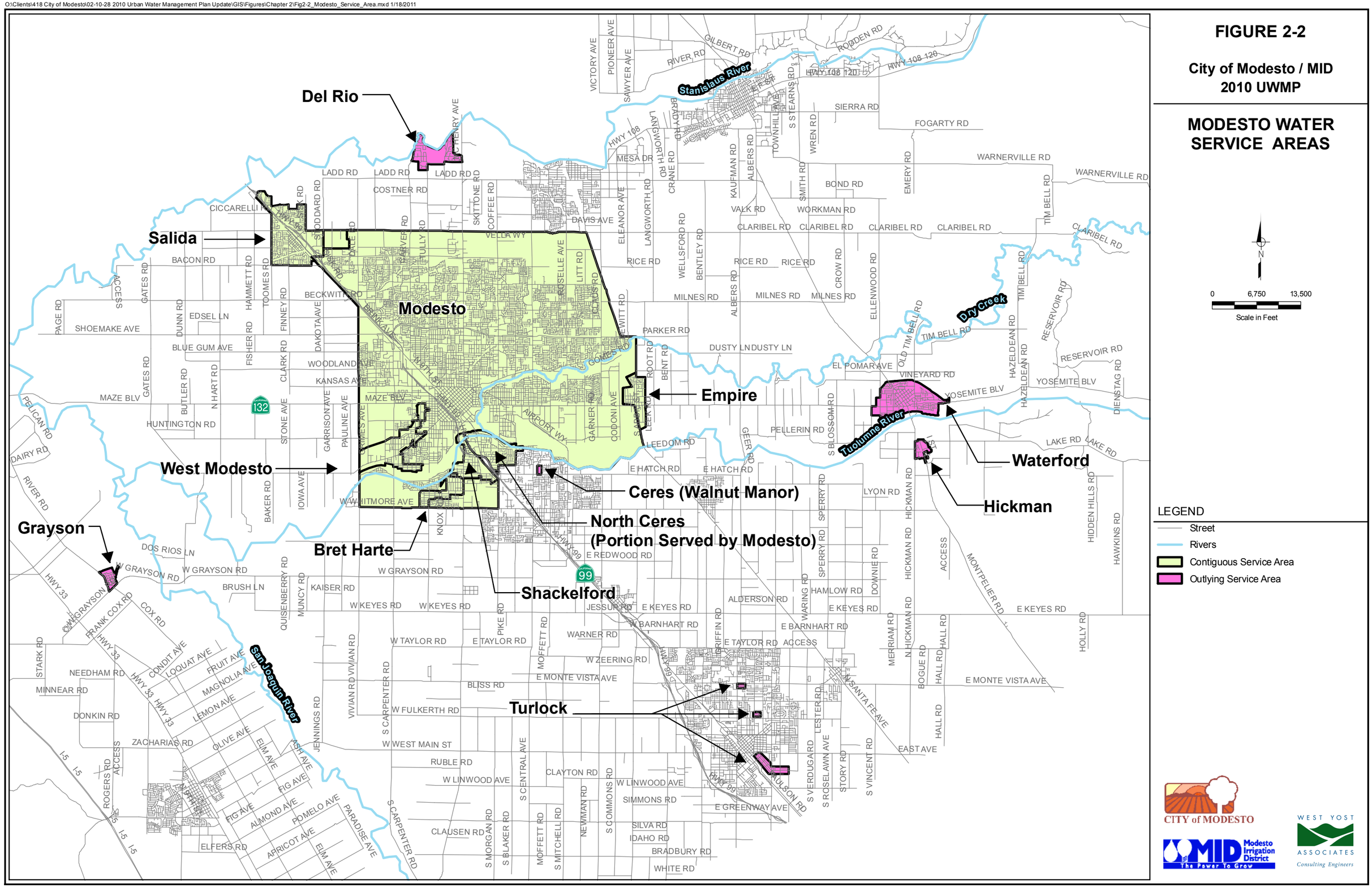

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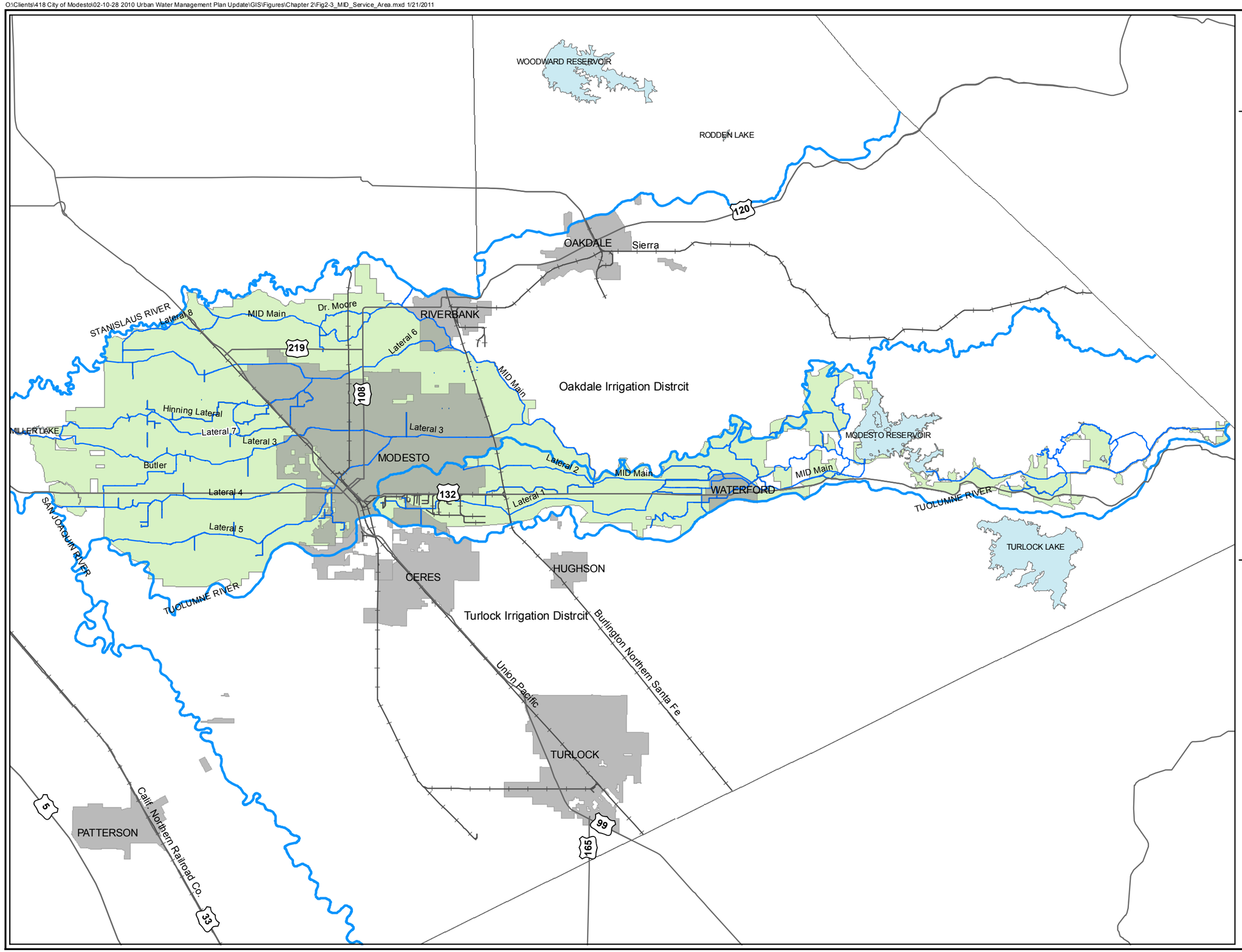

FIGURE 2-3

City of Modesto / MID 2010 UWMP

MID WATER SERVICE AREA

N

0 7,500 15,000

Scale in Feet

Notes

1. Source: Modesto Irrigation District.

LEGEND

- MID Service Boundary
- Cities
- Lake
- River
- Pipeline/Lateral/Crossing
- Railroad

CITY of MODESTO

MID Modesto Irrigation District The Power To Grow

WEST YOST ASSOCIATES Consulting Engineers

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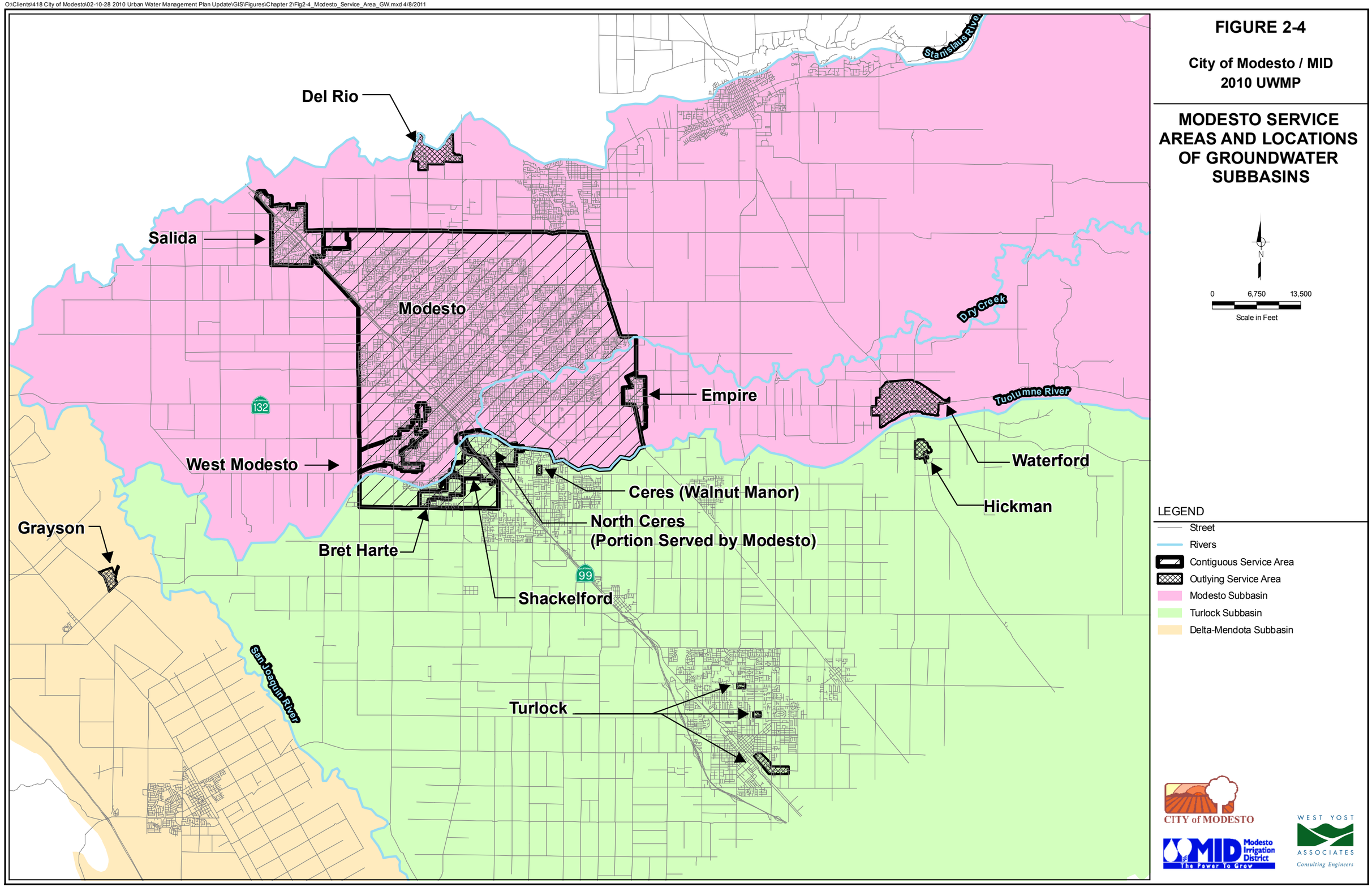

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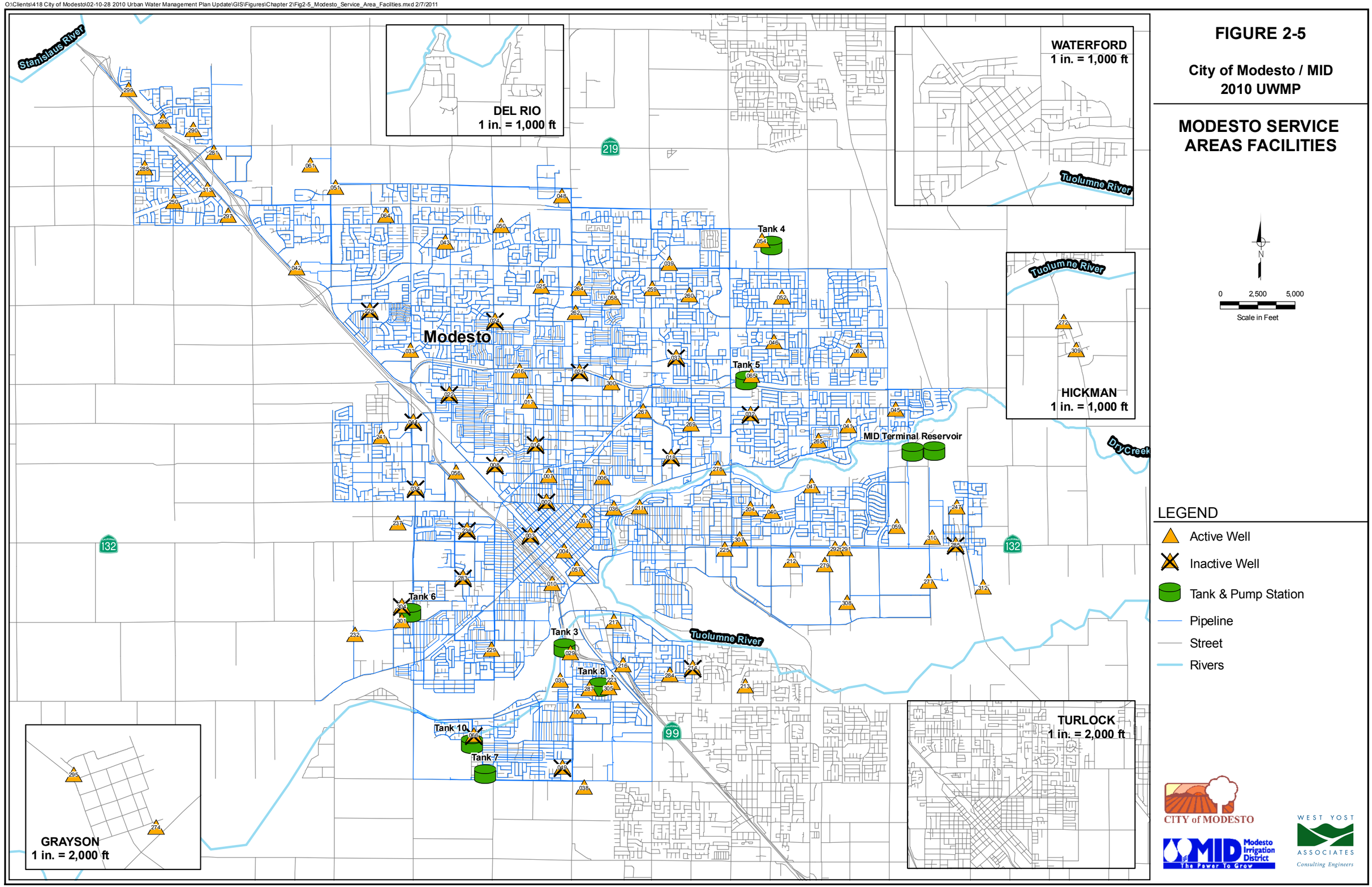

3.1 WATER SUPPLY OVERVIEW

This chapter describes the sources of water available to the City and MID. The chapter includes a description of each water source, including limitations, water quality and water exchange opportunities.

The City relies on a conjunctive water use strategy with two primary water sources: groundwater and Tuolumne River surface water deliveries, purchased wholesale from MID. The future water supply for the City will continue to be a mix of groundwater and surface water supply. Although the City is pursuing recycled water opportunities, as described in Chapter 8, use of recycled water currently focuses on exchanges for agricultural use, rather than potable water offset.

3.2 GROUNDWATER

Water Code §10631 (b)(1-4)

A plan shall be adopted in accordance with this chapter and shall do all of the following:

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a). If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:

(1) A copy of any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management.

(2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree.

For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.

(3) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

3.2.1 City of Modesto Groundwater

The City has historically relied on groundwater from the San Joaquin Valley Groundwater Basin as a major source of supply. The City's service area spans three subbasins: the Modesto Subbasin north of the Tuolumne River, the Turlock Subbasin south of the river, and the Delta-Mendota Subbasin west of the San Joaquin River that provides groundwater to the community of Grayson. The Modesto, Turlock and Delta-Mendota subbasins are not adjudicated. Descriptions of the groundwater basins are provided in Appendix G.

As of December 2010, the City operated 92 of its 113 groundwater wells located throughout the City's entire water service area (76 active wells in the contiguous area and 16 active wells in outlying areas). The wells within the City's contiguous service area pump directly into the distribution system or into one of the City's water storage tanks. Wells within outlying areas pump into separate distribution systems for each outlying area, with the exception of Grayson which pumps to a storage tank. Historical groundwater pumping from 2005 through 2010 is shown in Table 3-1. Based on the historical groundwater pumping shown in this table, average groundwater pumping between 2005 and 2010 was 41,600 AFY.

Table 3-1. Amount of Groundwater Pumped, AFY (DWR Table 18)[(a)]

Basin Name	Metered or Unmetered	2005	2006	2007	2008	2009	2010
Modesto Subbasin[(b)]	Metered	41,441	39,896	38,170	40,966	37,567	30,828
Turlock Subbasin[(c)]	Metered	4,903	5,004	4,501	4,084	3,110	2,803
Delta-Mendota Subbasin[(d)]	Metered	237	176	200	200	256	185
Groundwater Pumped (Total)		46,581	45,076	42,871	45,250	40,933	33,816
% of Total Supply[(e)]		59%	57%	54%	59%	58%	52%

(a) Based on City of Modesto SCADA records.
(b) Includes Modesto, Waterford, Del Rio, and Salida.
(c) Includes South Modesto, Hickman, portions of North Ceres and Turlock.
(d) The Community of Grayson is within the Delta-Mendota Subbasin
(e) Surface water production for 2005 through 2010 was 32,507 AFY; 33,507 AFY; 36,572 AFY; 32,034 AFY; 29,736 AFY and 30,646 AFY, respectively. The MRWTP is capable of delivering more than 33,602 AFY of treated water on a short-term basis.

A groundwater basin's sustainable, or "safe" yield is defined as the average annual amount of groundwater that can be extracted from the groundwater basins, while maintaining a non-overdraft condition. DWR has not identified the Modesto, Turlock or Delta Mendota subbasins as being "overdrafted."

DWR's report called *California's Groundwater* (also referred to as Bulletin 118) describes groundwater basins and subbasins throughout the State, and includes information on groundwater level trends (where available). DWR descriptions of the Modesto, Turlock and Delta-Mendota subbasins are provided in Appendix G. According Bulletin 118, groundwater levels in the Modesto subbasin declined nearly 15 feet between 1970 and 2000. However, since augmenting the City's water supply with treated surface water from the MRWTP beginning in 1995, the City has observed that groundwater levels have started to rise, particularly in the Modesto subbasin, as a result of reduced groundwater pumping. According to Bulletin 118, the groundwater levels in the Modesto subbasin rose approximately six feet from 1996 to 2000[1,2]. Water levels in the Turlock subbasin, similarly, rose about seven feet from 1994 to 2000[1,2].

[1] Modesto subbasin description: http://www.water.ca.gov/pubs/groundwater/bulletin_118/basindescriptions/5-22.02.pdf; Turlock subbasin description: http://www.water.ca.gov/pubs/groundwater/bulletin_118/basindescriptions/5-22.03.pdf; accessed January 24, 2011.

[2] The Modesto groundwater subbasin has been referred to as the Tuolumne subbasin in previous documents.

Water levels in the Delta Mendota subbasin increased by an average of 2.2 feet from 1970 through 2000. The rising water levels suggest that the current level of pumping in each subbasin is less than the previously assumed "safe yields."

The sustainable yields of the Modesto and Turlock subbasins are currently unknown; however, the City is participating in a study with the United States Geological Survey (USGS) to model the Modesto and Turlock subbasins eventually leading to quantifying sustainable yields for both subbasins. In the interim, the City has prepared an estimate of its 'operational yield' for use in managing groundwater (Modesto, 2007). The memorandum describing this methodology is included in this report as Appendix G.

Operational yield is defined as the amount (or rate) of *localized* groundwater extraction, on an annual average basis, that does not exceed the long-term annual average recharge rate of the localized aquifer(s) from which the groundwater is being pumped and does not create conditions that exceed the minimum groundwater elevation determined, based on available data, as required for long-term sustainable use of the basin. For the City, this minimum level has been determined to be 40 feet above sea level. At any given time, the quantity of water that can be pumped by the City depends on the amount groundwater available in the basin, the ability of the City's wells to pump (*e.g.* operational capacity), as well as pumping by other users.

Current groundwater production is less than historical highs and overdraft conditions have not occurred in either subbasin. Using historic groundwater level and pumping data from the past 25 years, the City estimated an operational yield of 53,500 AFY for the Modesto water service area for use until a more accurate estimate of sustainable yield is available from the ongoing hydrogeologic studies and modeling being conducted by the USGS. This operational yield, or ultimate amount of groundwater extraction, represents the amount of groundwater that can be extracted from the three groundwater subbasins without lowering groundwater levels below 40 feet above sea level and potentially affecting long-term sustainability of the basin. Therefore, it can be assumed that the City could potentially increase its annual groundwater extraction rates to volumes greater than are currently being pumped without adversely affecting the basin. However, the City's current operational capacity for groundwater production is limited by the reliable pumping capacity of its existing wells.

The City has elected to continue to diversify its water supply alternatives by developing additional surface water supplies to offset groundwater pumping. MRWTP Phase Two, anticipated to be completed in late 2012, will provide an additional 33,600 AFY of surface water supplies to offset groundwater pumping to meet demands north of the Tuolumne River. The City is also evaluating potential participation in other surface water supply projects, including a potential future MRWTP Phase Three expansion, which could result in additional treated water deliveries north of the Tuolumne River, and potential participation in the RSWSP, which would provide treated surface water using water supplied by Turlock Irrigation District to areas south of the Tuolumne River. The groundwater that is not pumped will be stored in the groundwater subbasins to be used by the City for meeting future demands in normal and dry years and during periods of emergency. This conjunctive use arrangement will allow the City to optimize its water supplies to best meet demands under a range of hydrologic conditions.

Table 3-2 presents the City's current and projected future groundwater pumping. These projections for groundwater pumping only consider participation in MRWTP Phase Two, since other future surface water supply projects are still under evaluation and implementation is uncertain. The City has developed a groundwater budget that conservatively assumes that pumping at current levels will result in constant groundwater levels over time. Because demands are first met with surface water supplies and groundwater is used primarily to meet demands in excess of the surface water delivered or where necessary to manage system pressures, the implementation of MRWTP Phase Two will result in reductions in groundwater pumping. In years in which groundwater pumping falls below the operational yield of 53,500 AFY, it is assumed that the unused groundwater is banked in the basin via in-lieu water use for later use.

Table 3-2. Amount of Groundwater Projected to be Pumped in the City of Modesto and Outlying Areas[(a)] – Normal Average Annual Demands (DWR Table 19)

Basin Name	2010 (actual)	2015	2020	2025	2030	2035
Modesto, Turlock and Delta Mendota Subbasins Total, AFY[(b)]	33,816	15,700	13,300	20,700	28,800	37,600
% of Total Supply	52%	19%	16%	24%	30%	36%

(a) Total groundwater pumped is calculated as demand minus MID surface water supply. By late 2012, completion of MRWTP Phase Two yields an additional 33,600 AFY of MID surface supply. Demands for years 2015, 2020, 2025, 2030 and 2035 are projected to be 82,900 AFY, 80,500 AFY, 87,900 AFY, 96,000 AFY and 104,800 AFY, respectively, as shown in Chapter 4, Table 4-2.

(b) Includes groundwater pumped in Salida, Waterford, Empire, Del Rio, North Ceres, Hickman, Turlock.

The City's future water supply planning incorporates sufficient future surface water supplies to allow the City to meet demands primarily through the use of surface water, banking groundwater for future use and protecting the basin from overdraft. Groundwater pumping would increase in dry years to meet any demands unmet by available surface water supplies. Based on historical groundwater production and basin recovery (as observed from the monitoring water levels), short-term 'over pumping' of the groundwater subbasins (such that groundwater levels drop below the 40 feet above sea level minimum groundwater level) may also occur, as needed, to meet supplies without causing any significant basin impacts. These 'short-term overdraft' conditions and more severe extended drought scenarios are part of the work planned by the City and will be modeled along with current modeling scenarios to establish the subbasins' sustainable yield and to provide recommended guidelines for basin management to ensure the long-term sustainability of groundwater supplies.

3.2.2 Modesto Irrigation District Groundwater

MID currently pumps groundwater to supplement surface irrigation water supplies. MID does not currently pump and deliver groundwater to urban suppliers, nor does it have plans to do so in future years.

3.2.3 Groundwater Management Plans

Groundwater Management Plans have been prepared for both the Turlock and Modesto subbasins. Copies of the Modesto Subbasin and Turlock Subbasin groundwater management plans are provided in Appendix H.

The City and MID participated in groundwater management studies initiated by the 1992 California State Assembly Bill 3030 (AB 3030). The goal of this bill, also referred to as the Groundwater Management Act, is to maximize the total water supply while protecting the quality of the groundwater basin. The Stanislaus and Tuolumne Rivers' Groundwater Basin Association completed the *Integrated Regional Groundwater Management Plan for the Modesto Subbasin* in 2005 in compliance with the Groundwater Management Planning Act of 2002 (SB 1938) and the Integrated Regional Water Management Planning Act of 2002 (SB 1672). The Association is made up of the following agencies: City of Modesto, MID, City of Oakdale, Oakdale Irrigation District, City of Riverbank, and Stanislaus County. The *Integrated Regional Groundwater Management Plan* covers the entire Modesto Groundwater Subbasin as well as parts of the Eastern San Joaquin Groundwater Subbasin. The Plan was adopted by MID and the City of Modesto in July of 2005.

The City also participated in the preparation of the *Turlock Groundwater Basin Management Plan*. This Plan was prepared by the Turlock Groundwater Basin Association and was completed in 2008. Other agencies involved in this association include the City of Turlock, Turlock Irrigation District, City of Ceres, City of Hughson, Merced Irrigation District, Eastside Water District, Delhi County Water District, Ballico Community Services District, Ballico-Cortez Water District, Hillmar Water District, Denair Community Services District, the Keyes Community Water District, Stanislaus County and Merced County.

As described above, the City currently uses its surface water and groundwater supplies conjunctively to meet customer demands. Additional future surface water supplies provided from MRWTP Phase Two will provide the City with the opportunity to further utilize available surface water directly to meet demands in lieu of using groundwater. To assist in managing the groundwater subbasins and associated surface water and groundwater supplies, the City is planning a ten-year program including extensive groundwater monitoring as part of an AB 3030 groundwater management plan. Through this project, a complex network of groundwater monitoring wells will be established to characterize existing hydrogeologic conditions in the subbasins and identify subbasin capacities and operational yields. The groundwater monitoring program and management plan will assist the City in understanding the localized and overall effects of groundwater pumping alternatives on the subbasins, and will provide information related to the total storage capacity available in the subbasins.

3.3 WHOLESALE SUPPLIES

Water Code §10631 (k)

A plan shall be adopted in accordance with this chapter and shall do all of the following:

(k) Urban water suppliers that rely upon a wholesale agency for a source of water, shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (c). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (c).

3.3.1 City of Modesto Wholesale Supplies

The City purchases wholesale surface water supplies from MID. Surface water supplies are diverted from the Tuolumne River and are treated at the MRWTP and delivered to the City. The original *Treatment and Delivery Agreement among the Modesto Irrigation District, City of Modesto, and Del Este Water Company* (Treatment and Delivery Agreement) was the document controlling the delivery of treated surface water to the City. It obligates MID to deliver 33,600 acre-feet (30 MGD) of treated surface water to the City, commencing on May 1 and ending the following April 30 during normal years. The City assumed the rights and responsibilities for domestic treated water delivery as defined under the Treatment and Delivery Agreement upon purchase of the former Del Este Water Company in 1995. The Treatment and Delivery Agreement includes a formula to reduce deliveries in drier than average years based on the number of inches allocated to agricultural customers. In addition, the Treatment and Delivery Agreement contains, in writing, both the City's demand for MID water and the reliability and vulnerability of the MID supplies to the City.

In October 2005, MID and the City approved the *Amended and Restated Water Treatment and Delivery Agreement between Modesto Irrigation District and the City of Modesto* (Amended and Restated Treatment and Delivery Agreement). This agreement supersedes the original Treatment and Delivery Agreement and sets forth the MRWTP Phase Two. With the expansion of the MRWTP, MID will deliver to the City up to 67,200 AFY of treated water for urban use. A copy of Amended and Restated Treatment and Delivery Agreement is included as Appendix E of this document. In September 2005, the State Water Resources Control Board approved an order for a long-term transfer through 2054 for up to 67,200 AFY of water from MID to the City. A copy of the SWRCB order approving this transfer has been included as Appendix F of this document.

The original Modesto Domestic Water Project's EIR was completed in March 1990. It was anticipated at that time that the proposed regional water treatment plant would be constructed in two phases of 30 MGD each. Phase One of the MRWTP was completed in January 1995. The EIR for MRWTP Phase Two was completed in July of 2005. MRWTP Phase Two is expected to be completed in late 2012. The increased water treatment capacity provided by MRWTP Phase Two will allow the City to treat more surface water, thereby reducing its long-term dependence on groundwater.

In addition, the City is currently pursuing the option of participating in a RSWSP to provide an additional supply source for customers in South Modesto. The City is evaluating future delivery of 6,720 AFY (6 MGD) of surface water to the south Modesto area under Phase 1 of the RSWSP (participation in subsequent phases will be determined in the future). This would further enhance Modesto's ability to manage its surface and groundwater supplies conjunctively. The City's demand for wholesale supplies from MID is shown in Table 3-3.

Table 3-3. City of Modesto Demand Projections Provided to MID, AFY (DWR Table 12)

Wholesaler	Contracted Volume	2010 (actual)	2015	2020	2025	2030	2035
Modesto Irrigation District	33,602[(a)]	30,647	67,200	67,200	67,200	67,200	67,200
Total	33,602	30,647	67,200	67,200	67,200	67,200	67,200

[(a)] Once MRWTP Phase Two is completed, anticipated in late 2012, an additional 33,602 AFY of demand will be met with surface water supplies.

3.3.2 Modesto Irrigation District Wholesale Supplies

MID does not purchase wholesale water supplies.

3.4 EXCHANGE OR TRANSFER OPPORTUNITIES

Water Code §10631 (d)

A plan shall be adopted in accordance with this chapter and shall do all of the following:
(d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

3.4.1 City of Modesto Exchange or Transfer Opportunities

During supply shortage years, MID surface water supplies to the City may be reduced in equal proportion to deliveries to agricultural customers. The City, however, has the option of delivering groundwater to MID's irrigation canal system in exchange for an equal amount of raw surface water to be treated at the MRWTP during dry years. In addition, transfer agreements will be explored with TID to exchange Tuolumne River water for groundwater supplies for areas south of the Tuolumne River in the future. The City's transfer and exchange opportunities are shown in Table 3-4, below.

Table 3-4. City of Modesto Transfer and Exchange Opportunities (DWR Table 20)

Transfer Agency	Transfer or Exchange	Short term	Proposed Quantities	Long term	Proposed Quantities
MID	Transfer or Exchange	Yes	TBD	Yes	TBD
Turlock Irrigation District	Transfer or Exchange	Yes	TBD	Yes	TBD
Total			TBD		TBD

3.4.2 Modesto Irrigation District Exchange or Transfer Opportunities

During supply shortage years, MID surface water supplies may be reduced. MID may execute exchange agreements with the City, which would allow the City to deliver groundwater to MID's irrigation canal system in exchange for an equal amount of raw surface water to be treated at the MRWTP during dry years. In general, MID has not sought exchange or transfer opportunities. MID transfer and exchange opportunities are shown in Table 3-5.

Table 3-5. MID Transfer and Exchange Opportunities (DWR Table 20)

Transfer Agency	Transfer or Exchange	Short term	Proposed Quantities	Long term	Proposed Quantities
City of Modesto	Exchange	Yes	TBD	No	TBD
Total			TBD		TBD

3.5 DESALINATED WATER

Water Code §10631 (i)

A plan shall be adopted in accordance with this chapter and shall do all of the following:

(i) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

3.5.1 City of Modesto Desalinated Water Opportunities

Due to the significant infrastructure investment required to convey seawater for desalination, the lack of proximate brackish supply sources and the depth to saline groundwater, desalination is not currently a viable water supply option for the City.

3.5.2 Modesto Irrigation District Desalinated Water Opportunities

Due to the lack of necessity for securing additional supplies, significant infrastructure required to convey seawater for desalination, lack of proximate brackish supply sources and the depth to saline groundwater, desalination is not currently a viable water supply option for MID.

3.6 SUMMARY OF CURRENT AND FUTURE WATER SUPPLIES

3.6.1 Current and Future Supplies: City of Modesto

Table 3-6 summarizes the current and projected future water supplies for the City. Increased future water purchases from MID are projected to occur beginning in 2013, coinciding with completion of MRWTP Phase Two in late 2012.

Table 3-6. City of Modesto Current and Planned Water Supplies, AFY (DWR Table 16)

Supply	2010 (actual)	2015	2020	2025	2030	2035
Wholesale Water Providers						
Modesto Irrigation District[(a)]	30,647	67,200	67,200	67,200	67,200	67,200
Supplier produced groundwater	33,816	15,700	13,300	20,700	28,800	37,600
Supplier surface diversions	0	0	0	0	0	0
Transfers in or out	0	0	0	0	0	0
Exchanges In or out	0	0	0	0	0	0
Recycled Water (projected use)	0	0	0	0	0	0
Desalination	0	0	0	0	0	0
Other	0	0	0	0	0	0
Total[(b)]	64,464	82,900	80,500	87,900	96,000	104,800

(a) See Table 3-7 below. Once MRWTP Phase Two is completed, anticipated in late 2012, an additional 33,602 AFY of demand will be met with surface water supplies.
(b) Buildout demand for the entire Modesto Water Service area is 104,800 AFY based on current projections developed in this UWMP. Projections incorporate anticipated conservation reductions to comply with SBx7-7.

The reliability and vulnerability of these supplies under various hydrologic conditions is described in Chapter 6.

3.6.2 Current and Future Supplies: Modesto Irrigation District

Table 3-7 summarizes the current and projected future wholesale water supplies from MID to the City. In 2013, MID urban supplies are projected to double with the completion MRWTP Phase Two in late 2012.

Table 3-7. MID Current and Planned Urban Water Supplies, AFY (DWR Table 17)

Water Purchased From	Contracted Volume	2010 (actual)	2015	2020	2025	2030	2035
Wholesale Water Providers	0	0	0	0	0	0	0
Supplier produced groundwater	0	0	0	0	0	0	0
Supplier surface diversions (Tuolumne River)	33,602[(a)]	30,647	67,200	67,200	67,200	67,200	67,200
Transfers in or out	0	0	0	0	0	0	0
Exchanges In or out	0	0	0	0	0	0	0
Recycled Water (projected use)	0	0	0	0	0	0	0
Desalination	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Total	33,602	30,647	67,200	67,200	67,200	67,200	67,200

[(a)] Once the MRWTP Phase Two is completed, anticipated in late 2012, an additional 33,602 AFY of City demand will be met with surface water supplies.

The reliability and vulnerability of these supplies under various hydrologic conditions is described in Chapter 6.

4.1 OVERVIEW OF WATER USE

As described in Chapter 2, the City's water service area consists of one large "contiguous" service area and several "outlying" non-contiguous service areas. The City is currently in the process of converting all residential unmetered accounts to metered usage. The metering program is anticipated to be completed by 2020. Since 1991, water meters have been installed for most new residential development, but have not been necessarily billed at a metered rate. As of 2010, approximately 57 percent of the City's single family residential accounts are billed based on metered usage[1]. As of 2008, all commercial, industrial, institutional and landscape water use is billed based on metered water usage.

Past water use, based on water production records, in the City's water service area is summarized in Table 4-1.

Table 4-1. City of Modesto Water Use by Service Area—Actual (2005 and 2010)[(a)]

Service Area	2005 Water Use, AFY	2010 Water Use, AFY
Modesto (includes Surface Water purchased from MID)[(b)]	72,612	59,991
Salida	2,711	1,730
Del Rio	694	622
Grayson	237	185
Hickman	270	177
Waterford	2,015	1,437
Turlock	494	266
Ceres (Walnut Manor)	59	55
Totals[(c)]	79,092	64,464

(a) Source: City of Modesto spreadsheet "Monthly system flow totals 2000 to present.xls"
(b) Includes water use in Empire, North Ceres, Bret Harte, Shackelford and West Modesto service areas
(c) Includes unaccounted for water.

As shown in Table 4-1, water use in the City's water service area dropped significantly from 2005 to 2010. There are two primary reasons for this drop in water use: drought conditions and economic conditions. From 2008 to 2010, California experienced drought conditions which resulted in increased water conservation and water use awareness resulting in reduced water use by customers. Secondly, in that same period, California experienced an economic downtown which resulted in numerous housing foreclosures, unsold existing homes and business closures; the City's service area was particularly impacted by this downturn. This, in turn, resulted in reduced water use as a result of numerous unoccupied homes and closed businesses within the

[1] Based on residential metered and unmetered accounts for 2010 as compiled in "Active Water Accounts by Year" by Shibumi Consulting Services, LLC, January 18, 2011.

City's service area. This reduction in water use in the last few years has been experienced in many communities in California.

Future water use in the City's water service areas has been projected based on the projected service area populations in each portion of the service area (see Table 2-3) and the City's per capita water use targets, as established in accordance with SBx7-7 (described later in this chapter). These projected future water uses are summarized in Table 4-2.

Table 4-2. City of Modesto Water Use by Service Area—Projected (2015 to 2035)[a]

Service Area	2015 Water Use, AFY	2020 Water Use, AFY	2025 Water Use, AFY	2030 Water Use, AFY	2035 Water Use, AFY
City of Modesto	66,691	65,299	71,787	78,920	86,761
Salida	4,459	4,366	4,800	5,277	5,801
Empire	1,386	1,357	1,492	1,640	1,804
Del Rio	434	438	489	540	589
Grayson	371	350	371	391	413
Hickman	150	136	139	141	146
Waterford	2,823	2,514	2514	2,514	2,514
Turlock	326	290	290	290	290
North Ceres (Bystrom)	1,296	1,154	1,154	1,154	1,154
Ceres (Walnut Manor)	44	39	39	39	39
Bret Harte	1,527	1,402	1,445	1,487	1,528
Shackelford	1,483	1,320	1,320	1,320	1,320
West Modesto	1,910	1,870	2,056	2,260	2,485
Totals[b]	82,900	80,500	87,900	96,000	104,800

[a] Based on projected population in each part of the City's service area (from Table 2-3) multiplied by the SBx7-7 per capita water use targets.
[b] Includes unaccounted for water. Totals rounded to nearest 100 AFY.

4.2 PAST AND CURRENT WATER USE BY WATER USE SECTOR

Water Code §10631 (e)(1)(2)

(e) (1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors including, but not necessarily limited to, all of the following uses:

(A) Single-family residential.

(B) Multifamily.

(C) Commercial.

(D) Industrial.

(E) Institutional and governmental.

(F) Landscape.

(G) Sales to other agencies.

(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.

(I) Agricultural.

(2) The water use projections shall be in the same five-year increments described in subdivision (a).

4.2.1 Past and Current Water Use: City of Modesto

Actual water use by the City's customers, by water use sector, in 2005 is summarized in Table 4-3.

Table 4-3. City of Modesto Water Deliveries—Actual (2005) (DWR Table 3)

Water Use Sectors	2005				
	Metered		Non Metered		Total Deliveries, AFY
	# of Accounts[a]	Deliveries, AFY[b]	# of Accounts[a]	Deliveries, AFY[c]	
Single Family	12,326[d]	1,830	49,303[d]	42,455	44,285
Multi-Family	4,499	5,971	No data available[e]	No data available[f]	5,971
Commercial	3,659	8,558	0	0	8,558
Industrial	69	3,658	0	0	3,658
Institutional/Governmental	366	2,507	0	0	2,507
Landscape	548	2,222	0	0	2,222
Agriculture	0	0	0	0	0
Other	195	22	0	0	22
Total[g]	21,662	24,768	49,303	42,455	67,223

(a) Number of 2005 accounts based on "2005 Billing Accounts" as compiled by Shibumi Consulting Services, LCC dated November 10, 2010.
(b) 2005 metered deliveries based on "2005 Billed Consumption Metered" as compiled by Shibumi Consulting Services, LCC dated November 10, 2010.
(c) 2005 non-metered deliveries value shown for single family includes non-metered deliveries for single family and multi-family residential and is estimated based on total production minus estimated unaccounted for water minus metered deliveries.
(d) Actual number of metered vs. non-metered single family residential accounts is not available for 2005; 20 percent of total single family residential accounts for 2005 assumed to be metered.
(e) Actual number of metered vs. non-metered multi-family residential accounts is unknown.
(f) Actual non-metered deliveries for single-family and multi-family water use is not available; value shown for non-metered single-family deliveries represents total non-metered deliveries for single family and multi-family residential.
(g) Does not include unaccounted for water.

Actual water use by the City's customers, by water use sector, in 2010 is summarized in Table 4-4.

Table 4-4. City of Modesto Water Deliveries—Actual (2010) (DWR Table 4)

Water Use Sectors	2010				
	Metered		Non Metered		Total Deliveries, AFY
	# of Accounts[a]	Deliveries, AFY[b]	# of Accounts[a]	Deliveries, AFY[b]	
Single Family	36,651[c]	11,519	27,531[c]	27,813	39,332
Multi-Family	4,544	5,532	94	82	5,614
Commercial	3,790	7,749	0	2	7,751
Industrial	67	3,308	0	0	3,308
Institutional/Governmental	372	2,196	0	0	2,196
Landscape	865	2,625	1	1	2,626
Agriculture	0	0	0	0	0
Other	91	35	102	111	146
Total[d]	46,380	32,964	27,728	28,009	60,973

(a) Number of 2010 metered and non-metered accounts based on "2010 Active Water Accounts By Year" as compiled by Shibumi Consulting Services, LCC dated January 18, 2011.
(b) 2010 deliveries based on "2010 Billed Consumption" as compiled by Shibumi Consulting Services, LCC dated March 14, 2011.
(c) Approximately 57 percent of single family residential connections are metered as of 2010 based on "2010 Active Water Accounts By Year" as compiled by Shibumi Consulting Services, LCC dated January 18, 2011. It is believed that the number of metered single family accounts may include accounts for which meters have been installed, but for which billing is still conducted on a flat rate basis. As the City progresses with its Residential Metering Program, the City will convert these flat rate customers to a metered rate.
(d) Does not include unaccounted for water.

4.2.2 Past and Current Water Use: Modesto Irrigation District

MID does not deliver water directly to urban customers, as shown in Table 4-5.

Table 4-5. MID Water Deliveries—Actual (2005 and 2010) (DWR Tables 3 and 4)

Water Use Sectors	2005 Deliveries, AFY	2010 Deliveries, AFY
Single Family	0	0
Multi-Family	0	0
Commercial	0	0
Industrial	0	0
Institutional/Governmental	0	0
Landscape	0	0
Agriculture	0	0
Other	0	0
Total	0	0

4.3 PROJECTED WATER USE BY WATER USE SECTOR

4.3.1 Projected Water Use: City of Modesto

Projected water use by the City's customers, by water use sector, in 2015 is summarized in Table 4-6.

Table 4-6. City of Modesto Water Deliveries—Projected (2015) (DWR Table 5)

Water Use Sectors	2015				
	Metered		Non Metered		Total Deliveries, AFY
	# of Accounts[a]	Deliveries, AFY[b]	# of Accounts[a]	Deliveries, AFY[c]	
Single Family	56,137[d]	36,512	14,034[d]	9,128	45,640
Multi-Family	5,021	6,323	50	64	6,387
Commercial	4,144	9,169	0	0	9,169
Industrial	73	3,748	0	0	3,748
Institutional/Governmental	407	2,406	0	0	2,406
Landscape	947	2,981	0	0	2,981
Agriculture	0	0	0	0	0
Other	211	171	0	0	171
Total[e]	66,940	61,308	14,084	9,192	70,500

(a) Number of accounts projected based on 1.8 percent annual increase in the number of connections (based on annual increase in number of total connections from 2000 to 2005, prior to the economic downturn)
(b) Deliveries by water use sector based on 2010 ratios of water use by water use sector (as compiled by Shibumi Consulting Services, LLC dated January 18, 2011).
(c) Non-metered deliveries estimated based on total production minus estimated unaccounted for water minus metered deliveries.
(d) 80 percent of total single family residential accounts for 2015 assumed to be metered.
(e) Does not include unaccounted for water. Total deliveries rounded to nearest 100 AFY.

Projected water use by the City's customers, by water use sector, in 2020 is summarized in Table 4-7.

Table 4-7. City of Modesto Water Deliveries—Projected (2020) (DWR Table 6)

Water Use Sectors	2020				
	Metered		Non Metered		Total Deliveries, AFY
	# of Accounts[a]	Deliveries, AFY[b]	# of Accounts	Deliveries, AFY	
Single Family	76,719[c]	44,280	0	0	44,280
Multi-Family	5,544	6,197	0	0	6,197
Commercial	4,530	8,895	0	0	8,895
Industrial	80	3,636	0	0	3,636
Institutional/Governmental	445	2,334	0	0	2,334
Landscape	1,035	2,893	0	0	2,893
Agriculture	0	0	0	0	0
Other	231	165	0	0	165
Total[d]	88,584	68,400	0	0	68,400

(a) Number of accounts projected based on 1.8 percent annual increase in the number of connections (based on annual increase in number of total connections from 2000 to 2005, prior to the economic downturn)
(b) Deliveries by water use sector based on 2010 ratios of water use by water use sector (as compiled by Shibumi Consulting Services, LLC dated January 18, 2011).
(c) 100 percent of single family residential accounts for 2020 assumed to be metered.
(d) Does not include unaccounted for water. Total deliveries rounded to nearest 100 AFY.

Projected water use by the City's customers, by water use sector, in 2025, 2030 and 2035 is summarized in Table 4-8.

Table 4-8. City of Modesto Water Deliveries—Projected (2025, 2030 and 2035) (DWR Table 7)

Water Use Sectors	Metered					
	2025		2030		2035	
	# of Accounts[(a)]	Deliveries, AFY[(b)]	# of Accounts[(a)]	Deliveries, AFY[(b)]	# of Accounts[(a)]	Deliveries, AFY[(b)]
Single Family	83,879	48,358	91,706	52,825	100,264	57,681
Multi-Family	6,061	6,767	6,627	7,392	7,245	8,072
Commercial	4,953	9,715	5,415	10,612	5,921	11,587
Industrial	88	3,971	96	4,338	105	4,736
Institutional/Governmental	486	2,549	532	2,784	581	3,040
Landscape	1,132	3,159	1,237	3,451	1,353	3,768
Agriculture	0	0	0	0	0	0
Other	252	181	276	197	301	215
Total[(c)]	96,851	74,700	105,889	81,600	115,770	89,100

(a) Number of accounts projected based on 1.8 percent annual increase in the number of connections (based on annual increase in number of total connections from 2000 to 2005, prior to the economic downturn)
(b) Deliveries by water use sector based on 2010 ratios of water use by water use sector (as compiled by Shibumi Consulting Services, LLC dated January 18, 2011).
(c) Does not include unaccounted for water. Total deliveries rounded to nearest 100 AFY.

On October 7, 2005, SB 1087 was signed into law, requiring public agencies and private entities providing water or sewer services to grant priority for those services to proposed developments that include housing units for lower income households (Government Code Section 65589.7). The City passed Resolution 2006-508 on August 8, 2006, adopting written procedures to uphold this legislation. This resolution is provided in Appendix L.

Based on the City's Draft Housing Element (2009-2014) dated October 2010, the City has 1,157 existing units of affordable multi-family housing (which was either City-supported or Federally-assisted). This equates to approximately 5 percent of the City's existing multi-family residential accounts[2]. The City's Draft Housing Element does not provide projections for affordable housing beyond 2014; therefore, for purposes of this 2010 UWMP, it has been assumed that the existing percentage of affordable housing will be maintained in the future through 2035.

[2] 1,157 units of multi-family residential housing is estimated to equal 231 multi-family accounts (assuming an average of 5 multi-family dwelling units per multi-family account). In 2010, the City had 4,638 multi-family accounts; therefore, 231 affordable multi-family accounts equals about 5 percent of the total multi-family accounts.

Projected water use by the City's low income customers is summarized in Table 4-9.

Table 4-9. City of Modesto Low Income Projected Water Demands (DWR Table 8)

Low Income Water Demands	2015	2020	2025	2030	2035
Single Family Residential	0	0	0	0	0
Multi-Family Residential[(a)]	319	310	338	370	404
Total	319	310	338	370	404

[(a)] Based on 5 percent of the projected future multi-family residential water demand.

4.3.2 Projected Water Use: Modesto Irrigation District

MID does not deliver water directly to urban customers, as shown in Table 4-10.

Table 4-10. MID Water Deliveries—Projected (2015 to 2035) (DWR Table 5, 6 and 7)

Low Income Water Demands	2015	2020	2025	2030	2035
Single Family	0	0	0	0	0
Multi-Family	0	0	0	0	0
Commercial	0	0	0	0	0
Industrial	0	0	0	0	0
Institutional/Governmental	0	0	0	0	0
Landscape	0	0	0	0	0
Agriculture	0	0	0	0	0
Other	0	0	0	0	0
Total	0	0	0	0	0

As MID does not deliver water directly to urban customers, MID has no low income water demands as summarized in Table 4-11.

Table 4-11. MID Low Income Projected Water Demands (DWR Table 8)

Low Income Water Demands	2015	2020	2025	2030	2035
Single Family Residential	0	0	0	0	0
Multi-Family Residential	0	0	0	0	0
Total	0	0	0	0	0

4.4 SALES TO OTHER AGENCIES

4.4.1 City of Modesto Sales to Other Agencies

The City of Modesto does not currently sell water to other agencies, as shown in Table 4-12.

Table 4-12. City of Modesto Sales to Other Agencies, AFY (DWR Table 9)

Water Distributed	2010 (actual)	2015	2020	2025	2030	2035
None	0	0	0	0	0	0
Total	0	0	0	0	0	0

4.4.2 Modesto Irrigation District Sales to Other Agencies

Although MID is primarily an agricultural supplier, MID currently sells water for urban uses exclusively to the City of Modesto, as shown in Table 4-13.

Table 4-13. MID Sales to Other Agencies, AFY (DWR Table 9)

Water Distributed	2010 (actual)	2015	2020	2025	2030	2035
City of Modesto	30,647	67,200	67,200	67,200	67,200	67,200
Total	30,647	67,200	67,200	67,200	67,200	67,200

[a] 2010 data reflects actual MID deliveries (sales) to the City of Modesto.

4.5 ADDITIONAL WATER USES AND LOSSES

4.5.1 City of Modesto Additional Water Uses and Losses

Additional water uses include such uses as saline barriers and groundwater recharge. The City does not use water for such uses. Water losses occur due to distribution system leaks and other unmetered water uses (such as firefighting, main flushing, etc.). Actual water losses within the City's water system cannot be confirmed until the City has completed its current efforts to implement metering City-wide. Therefore, unaccounted for water and system losses are assumed to comprise approximately 15 percent of total production. This assumption is intended to provide a conservative estimate of water losses throughout the City's distribution system. Once the City completes its on-going water metering program (anticipated by 2020), actual water losses can be determined. Estimates of unaccounted-for system losses are documented in Table 4-14.

Table 4-14. City of Modesto Additional Water Uses and Losses, AFY (DWR Table 10)

Water Use	2010 (actual)	2015	2020	2025	2030	2035
Saline Barriers	0	0	0	0	0	0
Groundwater Recharge	0	0	0	0	0	0
Conjunctive Use	0	0	0	0	0	0
Raw Water	0	0	0	0	0	0
Recycled Water	0	0	0	0	0	0
System losses[a,b,c]	9,670	12,400	12,100	13,200	14,400	15,700
Other	0	0	0	0	0	0
Total	9,670	12,400	12,100	13,200	14,400	15,700

[a] Unaccounted for system losses are estimated to be 15 percent of total production.
[b] System losses may include leaks, flushing, fires, flow testing, backflushing, etc.
[c] Projected system losses rounded to nearest 100 AFY.

Table 4-15 summarizes the current and projected total water demands for the City's service area through the year 2035. As described above, these future total water demands are consistent with the City's per capita water use targets for 2015 (interim target of 256 gallons per capita per day (gpcd)) and for 2020 and beyond (final target of 228 gpcd).

Table 4-15. City of Modesto Total Water Use, AFY (DWR Table 11)[a]

Water Use	2010 (actual)	2015	2020	2025	2030	2035
Total Water Deliveries	60,369[a]	70,500	68,400	74,700	81,600	89,100
Sales to Other Water Agencies	0	0	0	0	0	0
Additional Water Uses and Losses[b]	4,095[c]	12,400	12,100	13,200	14,400	15,700
Total	64,464	82,900[d]	80,500[e]	87,900[f]	96,000[f]	104,800[f]

[a] As estimated by Shibumi Consulting Services, LLC dated January 18, 2011.
[b] Future unaccounted for water is estimated to be 15 percent of total production.
[c] Total production minus estimated total water deliveries.
[d] Consistent with City's interim gpcd target of 256 gpcd per SBx7-7 (256 gpcd x 289,076 service area population = 82,900 AFY). Rounded to nearest 100 AFY.
[e] Consistent with City's final gpcd target of 228 gpcd per SBx7-7 (228 gpcd x 315,324 service area population = 80,500 AFY). Rounded to nearest 100 AFY.
[f] Consistent with City's 2020 gpcd target and projected populations for 2025, 2030 and 2035 (see Table 2-3). Rounded to nearest 100 AFY.

4.5.2 Modesto Irrigation District Additional Water Uses and Losses

As shown in Table 4-16, MID is primarily an agricultural water supplier, and currently has no other urban water uses beyond wholesale delivery to the City of Modesto.

Table 4-16. MID Additional Water Uses and Losses, AFY (DWR Table 10)

Water Use	2010 (actual)	2015	2020	2025	2030	2035
Saline Barriers	0	0	0	0	0	0
Groundwater Recharge	0	0	0	0	0	0
Conjunctive Use	0	0	0	0	0	0
Raw Water	0	0	0	0	0	0
Recycled Water	0	0	0	0	0	0
System losses	0	0	0	0	0	0
Other	0	0	0	0	0	0
Total	0	0	0	0	0	0

Table 4-17 summarizes MID's current and projected domestic water demand through the year 2035.

Table 4-17. MID Domestic Total Water Use, AFY (DWR Table 11)

Water Use	2010 (actual)	2015	2020	2025	2030	2035
Total Water Deliveries	0	0	0	0	0	0
Sales to Other Water Agencies	30,647	67,200	67,200	67,200	67,200	67,200
Additional Water Uses and Losses	0	0	0	0	0	0
Total	30,647	67,200	67,200	67,200	67,200	67,200

4.6 RETAIL AGENCY DEMAND PROJECTIONS PROVIDED TO WHOLESALE SUPPLIERS

As described above, MID provides urban water supplies to the City on a wholesale basis. Table 4-18 summarizes the City's demand projections provided to MID through 2035.

Table 4-18. Retail Agency Demand Projections Provided to Wholesale Suppliers, AFY (DWR Table 12)

Wholesaler	Contracted Volume	2010	2015	2020	2025	2030	2035
Modesto Irrigation District	67,204[(a)]	33,600	67,200	67,200	67,200	67,200	67,200

[(a)] The current contracted volume is 33,602 AFY. The contracted volume will increase to 67,204 AFY upon completion of MRWTP Phase Two (anticipated in late 2012).

4.7 COMPLIANCE WITH SBX7-7

4.7.1 Overview

SBx7-7 was one of the four policy bills enacted as part of the November 2009 Comprehensive Water Package. The Water Conservation Act of 2009 provides the regulatory framework to support the statewide reduction in urban per capita water use described in the 20x2020 Water Conservation Plan (DWR and others 2010). It also addresses agricultural water and commercial, industrial, and institutional (CII) water use.

Per SBx7-7, each urban retail water supplier must determine and report its existing baseline water consumption and establish either its own or cooperative targets. This reporting is to begin with the 2010 UWMP, which is required by the Water Conservation Act of 2009.

The City's compliance with SBx7-7 is described in detail in the January 2011 technical memorandum included in Appendix I of this 2010 UWMP. The City developed its baseline and target per capita water uses on an individual basis, and did not participate in any regional alliance. As described in the technical memorandum and summarized below, the City utilized Target Method 1 to establish an Interim (2015) Per Capita Water Use Target of 256 gpcd, and a Final (2020) Per Capita Water Use Target of 228 gpcd.

The City held a public hearing on February 22, 2011 to discuss and adopt the Target Method and resulting interim and final targets. The following issues were discussed during the public hearing:

- Allow community input regarding the urban retail water supplier's implementation plan for complying with SBx7-7;
- Consider the economic impacts of the urban retail water supplier's implementation plan for complying with SBx7-7; and

- Adopt a method, pursuant to subdivision (b) of Section 10608.20, for determining its urban water use target.

As an urban wholesale water supplier, MID is not required to comply with the urban retail water supplier requirements included in SBx7-7. However, as described below, MID supports the City in its implementation of water conservation programs to help achieve the City's per capita water use targets.

4.7.2 Determination of Baseline and Target Per Capita Water Use

As described in Appendix I, the City's baseline per capita water uses were determined based on the methodologies described in DWR's October 1, 2010 *Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use* (DWR Methodologies).

Consistent with DWR Methodology 1 (Gross Water Use), the City's gross water use is based on the metered quantity of water purchased by the City from the MID and metered quantity of groundwater pumped by the City from its municipal production wells for municipal use and the City's service area population.

Consistent with DWR Methodology 2 (Service Area Population), the City's service area population has been estimated using DOF and the United States Census Bureau to the extent that it is available. As described in Chapter 2, the City serves a number of areas located outside City limits which are County areas or areas previously served by the Del Este Water Company[3]. Where DOF or Census data were not available for a specific part of the City's service area, population estimates were based on the number of connections served by the City and the estimated number of people per household.

The City's baseline per capita water use was based on the parameters shown in Table 4-19.

[3] The City of Modesto acquired the Del Este Water Company in 1996.

Table 4-19. Base Period Ranges (DWR Table 13)

Base	Parameter	Value	Units
10- to 15-year base period	2008 total water deliveries	77,281	AFY
	2008 total volume of delivered recycled water	0	AFY
	2008 recycled water as a percent of total deliveries	0	Percent
	Number of years in base period[(a)]	10	Years
	Year beginning base period range	1999	
	Year ending base period range[(b)]	2008	
5-year base period	Number of years in base period	5	Years
	Year beginning base period range	2003	
	Year ending base period range[(c)]	2007	

Units = AFY
(a) If the 2008 recycled water percent is less than 10 percent, then the first base period is a continuous 10-year period. If the amount of recycled water delivered in 2008 is 10 percent or greater; the first base period is a continuous 10- to 15-year period.
(b) The ending year must be between December 31, 2004 and December 31, 2010.
(c) The ending year must be between December 31, 2007 and December 31, 2010.

Since the City had no recycled water deliveries in 2008, a 10-year base period was used to calculate the City's baseline per capita water use (for purposes of Water Code Section 10608.20). The calculation of this 10-year baseline per capita water use is summarized in Table 4-20.

Table 4-20. Base Daily Per Capita Water Use: 10- to 15-Year Range (DWR Table 14)

Base Period Year		Distribution System Population	Daily System Gross Water Use, MGD	Annual Daily Per Capita Water Use, gpcd
Sequence Year	Calendar Year			
Year 1	1999	231,424	71.0	307
Year 2	2000	236,080	68.2	289
Year 3	2001	242,420	72.2	298
Year 4	2002	248,704	74.3	299
Year 5	2003	253,984	74.0	291
Year 6	2004	257,562	73.0	283
Year 7	2005	258,066	70.6	274
Year 8	2006	258,595	70.2	271
Year 9	2007	259,916	70.9	273
Year 10	2008	260,850	69.0	264
			Base Daily Per Capita Water Use[(a)]	285

(a) Average of annual daily per capita water use for the 10-year period from 1999 to 2008.

The calculation of the City's 5-year baseline per capita water use (for purposes of Water Code Section 10608.22) is shown in Table 4-21.

Table 4-21. Base Daily Per Capita Water Use: 5-Year Range (DWR Table 15)

Base Period Year		Distribution System Population	Daily System Gross Water Use, MGD	Annual Daily Per Capita Water Use, gpcd
Sequence Year	Calendar Year			
Year 1	2003	253,984	74.0	291
Year 2	2004	257,562	73.0	283
Year 3	2005	258,066	70.6	274
Year 4	2006	258,595	70.2	271
Year 5	2007	259,916	70.9	273
			Base Daily Per Capita Water Use[(a)]	278

[(a)] Average of annual daily per capita water use for the 5-year period from 2003 to 2007.

Using Target Method 1, the City's interim (2015) per capita water use target is 256 gpcd (90 percent of the 10-year baseline per capita water use of 285 gpcd). The City's final (2020) per capita water use target is 228 gpcd (80 percent of the 10-year baseline per capita water use of 285 gpcd).

These interim and final targets comply with the minimum water use reduction requirement of 265 gpcd (based on 95 percent of the 5-year baseline per capita water use of 278 gpcd).

These interim and final targets have been used to project the City's future water demands (described above) using the City's projected future service area population (see Table 2-3).

4.7.3 City Programs to Achieve Water Demand Reduction Goals

As the City manages its water service area, it recognizes that water is a regional resource as well as a local one. Therefore, regional partnerships, in addition to local projects and conservation measures, play a large role in maximizing resources. The City is currently participating in the preparation of an Integrated Regional Water Management Plan (IRWMP) with other local entities. Participation in the IRWMP planning process allows the City and its partners to develop a regional plan to identify resources and develop projects to provide sustainable water resources to meet regional water needs.

As described in Chapter 5, the City has implemented, or is in the process of implementing, the foundational and programmatic Best Management Practices (BMPs) included in the California Urban Water Conservation Council (CUWCC) Memorandum of Understanding (MOU). Implementation of these water conservation programs will allow the City to achieve the water reduction goals required by SBx7-7. In particular, the City's implementation of the residential metering program and billing based on metered usage, anticipated to be completed by 2020, will help the City to monitor and track actual water use and reduce per capita water use through the City's water service area. The completion of the metering program will also allow the City to

perform system water audits and assist the City in identifying and reducing system losses due to pipeline leaks. Other key programs will be those that target the reduction of outdoor water uses, including residential landscape water surveys (BMP 3.2) and large landscape conservation programs and incentive programs (BMP 5).

The City has yet to approve the funding required to fully implement the proposed water conservation measures described in Chapter 5. However, the City does anticipate providing at least some funding to all of the proposed programs initially and then adding future funding to those programs which are the most successful in reducing water use. Because the funding has not yet been approved, and the success of the proposed programs has not yet been determined, the potential economic impacts of the City's compliance with SBx7-7 cannot be quantified at this time.

4.7.4 MID Programs to Support Water Demand Reduction Goals

Water Code 10608.36

Urban wholesale water suppliers shall include in the urban water management plans…an assessment of their present and proposed future measures, programs and policies to help achieve the water use reduction required by this part

Although MID is not directly involved with demand reduction, MID strongly supports the City's efforts through on-going and continuous operational coordination between MID and the City, support of water conservation and public outreach activities through MID's website and water use provisions contained in the *Amended and Restated Treatment and Delivery Agreement.*

4.7.5 Progress Toward Meeting the Urban Water Use Targets

Water Code 10608.40

Urban water retail suppliers shall report to the department on their progress in meeting their urban water use targets as part of their urban water management plans submitted pursuant to Section 10631.

The City will report its progress in meeting the established 2015 and 2020 per capita water use targets in the 2015 and 2020 UWMP.

5.1 BACKGROUND AND GOALS

The City has acknowledged the importance of water conservation and management, and has implemented significant water conservation efforts during the drought years of 1976-1977 and 1987-1992 in addition to maintaining ongoing conservation programs. In March 1990, the City Council approved a Water Conservation Program (Section 11-1.14 of Title XI of the Modesto Municipal Code) which combined a strong education program with watering restrictions and prohibition of water waste.

The City has recently developed a Conservation Plan, building upon the demand management measures and conservation strategies identified and documented in the 2005 UWMP Update, with the intent to better define the City's Conservation Program and to plan for conservation program implementation in the future. The City's goals are to conserve water through public relations, education, customer service, and enforcement. The City strives to meet this challenge by working in a friendly, respectful and positive manner with homeowners, businesses and property managers. In preparation of this Water Conservation Plan, the City developed the following policy statement, reflecting its belief in water conservation:

To protect, conserve, and manage all water resources for the current and future needs of the community and the environment.

The overall goal is to develop a system-wide water conservation plan containing acceptable water efficiency measures and an implementation plan which will decrease water use and water loss while using the most cost-effective methods. Furthermore, with the preparation and implementation of the Water Conservation Plan, the City aims to:

1. Be compliant with Assembly Bill 1420 (AB 1420) requiring the implementation of fourteen baseline conservation measures of BMPs;
2. Meet California Urban Water Conservation Council (CUWCC) goals as outlined in the Memorandum of Understanding Regarding Urban Water Conservation in California for the fourteen conservation measures identified in the 2005 UWMP; and
3. Create an implementation program for conservation measures based on affordability and feasibility.

A copy of the City's Conservation Plan is provided in Appendix J.

The City's Water Conservation Program, known as the "Be a Wiser Water Miser" program, is administered through the Water Operations Division of the Public Works Department. The City has implemented, or plans to implement, all of the BMPs as defined in the December 2008 CUWCC MOU (the corresponding document to the demand management measures denoted in the UWMP Guidelines and the State's AB1420 water use efficiency program).

MID has also instituted a water conservation program which includes limiting water losses through the water conveyance systems, agricultural conservation programs and public information, etc. as reported in its Agricultural Water Management Plan (AWMP). Where feasible, the City and MID have participated in joint conservation programs.

These existing and proposed water conservation programs will assist the City in meeting the per capita water use targets required by SBx7-7 as discussed in Chapter 4.

5.2 RELATIONSHIP OF THE CUWCC BMPS TO THE UWMP ACT DMMS

Water Code §10631 (f)(g)

A plan shall be adopted in accordance with this chapter and shall do all of the following:

(f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:

(A) Water survey programs for single-family residential and multifamily residential customers.

(B) Residential plumbing retrofit.

(C) System water audits, leak detection, and repair.

(D) Metering with commodity rates for all new connections and retrofit of existing connections.

(E) Large landscape conservation programs and incentives.

(F) High-efficiency washing machine rebate programs.

(G) Public information programs.

(H) School education programs.

(I) Conservation programs for commercial, industrial, and institutional accounts.

(J) Wholesale agency programs.

(K) Conservation pricing.

(L) Water conservation coordinator.

(M) Water waste prohibition.

(N) Residential ultra-low-flush toilet replacement programs.

(2) A schedule of implementation for all water demand management measures proposed or described in the plan.

(3) A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.

(4) An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand.

(g) An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following:

(1) Take into account economic and noneconomic factors, including environmental, social, health, customer impact, and technological factors.

(2) Include a cost-benefit analysis, identifying total benefits and total costs.

(3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost.

(4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.

In 2009, the CUWCC restructured the organization of its BMPs to group them according to type. The 14 CUWCC BMPs have now been reorganized into two primary categories: foundational BMPs and programmatic BMPs. Although the BMP names and organization have been modified, they still correlate to the 14 Demand Management Measures (DMMs) identified in the UWMP Act (Water Code Section 10631(f)). Table 5-1 provides an overview of the reorganization of the CUWCC BMPs.

Furthermore, these same fourteen measures have since become the primary measures by which the DWR Office of Water Use Efficiency measures compliance with AB 1420. AB 1420 amended the Urban Water Management Planning Act, Water Code Section 10610 *et seq.* to require, effective January 1, 2009, that the terms of, and eligibility for, any water management grant or loan made to an urban water supplier and awarded or administered by the DWR, State Water Resources Control Board (SWRCB) or California Bay-Delta Authority (CBDA) or its successor agency, be conditioned on the implementation of the water DMMs described in Water Code Section 10631(f). AB 1420 certification requires that each DMM be implemented to the levels of coverage as specified in the CUWCC MOU.

The City has either implemented or plans to implement all of the CUWCC BMPs. Table 5-2 provides an overview of the City's current water conservation policies and programs as they relate to the CUWCC BMPs. Descriptions of the City's water conservation policies and programs follow.

Table 5-1. CUWCC Reorganization of Best Management Practices

Previous List of Best Management Practices (BMP)	Revised List of Best Management Practices Per California Urban Water Conservation Council MOU
BMP 1: Water Survey Programs for Single-Family Residential and Multi-Family Residential Customers	**Foundational BMPs** 1. Utility Operations Programs BMP 1.1.1 Operations--Conservation Coordinator (formerly BMP 12) BMP 1.1.2 Operations--Water Waste Prevention (formerly BMP 13) BMP 1.1.3 Operations--Wholesale Agency Assistance Programs (formerly BMP 10) BMP 1.2 Water Loss Control—System Water Audits, Leak Detection and Repair (formerly BMP 3) BMP 1.3 Metering--Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections (formerly BMP 4) BMP 1.4 Pricing—Retail Conservation Pricing (formerly BMP 11) 2. Education Programs BMP 2.1 Education--Public Information Programs (formerly BMP 7) BMP 2.2 Education--School Education Programs (formerly BMP 8)
BMP 2: Residential Plumbing Retrofit	
BMP 3: System Water Audits, Leak Detection and Repair	
BMP 4: Metering with Commodity Rates for All New Connection and Retrofit of Existing Connections	
BMP 5: Large Landscape Conservation Programs and Incentives	
BMP 6: High-Efficiency Clothes Washing Machine Financial Incentive Programs	
BMP 7: Public Information Programs	
BMP 8: School Education Programs	
BMP 9: Conservation Programs for Commercial, Industrial, and Institutional (CII) Accounts	**Programmatic BMPs** 3. Residential Programs BMP 3.1 Residential Assistance Program (formerly BMPs 1 and 2) BMP 3.2 Landscape Water Survey (formerly BMP 1) BMP 3.3 High-efficiency clothes washers (HECWs) (formerly BMP 6) BMP 3.4 WaterSense Specification (WSS) toilets (formerly BMP 14) BMP 3.5 WaterSense Specifications for residential development 4. Commercial, Industrial, and Institutional Programs BMP 4 Conservation Programs for Commercial, Industrial, and Institutional (CII) Accounts (formerly BMP 9) 5. Landscape Programs BMP 5 Large Landscape Conservation Programs and Incentives (formerly BMP 5)
BMP 10: Wholesale Agency Assistance Programs	
BMP 11: Retail Conservation Pricing	
BMP 12: Conservation Coordinator	
BMP 13: Water Waste Prohibition	
BMP 14: Residential ULFT Replacement Programs	

Table 5-2. Summary of City of Modesto's Water Conservation Policies and Programs

BMP Name		BMP Description	City Implementation Status
Fundamental BMPs	Utility Operations Programs	BMP 1.1.1 Operations-Conservation Coordinator (formerly BMP/DMM 12)	• The City has fully implemented this program and has achieved the CUWCC goal.
		BMP 1.1.2 Operations-Water Waste Prevention (formerly BMP/DMM 13)	• The City has implemented this program through its adoption of a water conservation policy that supports local ordinances that prohibit water waste.
		BMP 1.1.3 Operations-Wholesale Agency Assistance Programs (formerly BMP/DMM 10)	• Because the City of Modesto is currently the only customer of MID, all wholesale agency programs are coordinated through the City by the City's Conservation Coordinator.
		BMP 1.2 Water Loss Control-System Water Audits, Leak Detection and Repair (formerly BMP/DMM 3)	• The City is currently implementing this program, but has not yet achieved the CUWCC goal (see Chapter 5 and Appendix J for discussion of future program).
		BMP 1.3 Metering-Metering with Commodity Rates for All New Connection and Retrofit of Existing Connections (formerly BMP/DMM 4)	• The City is currently implementing this program, but has not yet achieved the CUWCC goal (see Chapter 5 and Appendix J for discussion of future program).
		BMP 1.4 Pricing-Retail Conservation Pricing (formerly BMP/DMM 11)	• The City is currently implementing this program, but has not yet achieved the CUWCC goal (see Chapter 5 and Appendix J for discussion of future program).
	Education Programs	BMP 2.1 Education-Public Information Programs (formerly BMP/DMM 7)	• The City has fully implemented this program and has achieved the CUWCC goal for Public Information Programs beginning in 1987.
		BMP 2.2 Education-School Education Programs (formerly BMP/DMM 8)	• The City has fully implemented this program and has achieved the CUWCC goal for Public Information Programs beginning in 1987.
Programmatic BMPs	Residential Programs	BMP 3.1 Residential Assistance Program (formerly BMP/DMMs 1 and 2)	• Water Survey Programs: The City has not yet implemented this program (see Chapter 5 and Appendix J for discussion of future program). • Residential Plumbing Retrofit: The City is currently implementing this program, but has not yet achieved the CUWCC goal (see Chapter 5 and Appendix J for discussion of future program).
		BMP 3.2 Landscape Water Survey (formerly BMP/DMM 1)	• The City has not yet implemented this program (see Chapter 5 and Appendix J for discussion of future program).
		BMP 3.3 High-efficiency clothes washers (HECWs) (formerly BMP/DMM 6)	• The City has not yet implemented this program (see Chapter 5 and Appendix J for discussion of future program).
		BMP 3.4 WaterSense Specification (WSS) toilets (formerly BMP/DMM 14)	• The City has not yet implemented this program (see Chapter 5 and Appendix J for discussion of future program).
		BMP 3.5 WaterSense Specifications for residential development	• The City has not yet implemented this program (see Chapter 5 and Appendix J for discussion of future program).
	Commercial, Industrial, and Institutional Programs	BMP 4 Conservation Programs for Commercial, Industrial, and Institutional (CII) Accounts (formerly BMP/DMM 9)	• The City has not yet implemented this program (see Chapter 5 and Appendix J for discussion of future program).
	Landscape Programs	BMP 5 Large Landscape Conservation Programs and Incentives (formerly BMP/DMM 5)	• The City has not yet implemented this program (see Chapter 5 and Appendix J for discussion of future program).

5.3 CURRENT AND PLANNED IMPLEMENTATION OF THE FOUNDATIONAL BMPS

The Foundational BMPs are considered to be essential water conservation activities by any utility and are summarized in Table 5-3.

Table 5-3. Summary of Foundational BMPs

Foundational BMP Name	Foundational BMP Program	Former BMP/DMM Number
1. Utility Operations Programs	BMP 1.1.1 Conservation Coordinator	formerly BMP/DMM 12
	BMP 1.1.2 Water Waste Prevention	formerly BMP/DMM 13
	BMP 1.1.3 Wholesale Agency Assistance Programs	formerly BMP/DMM 10
	BMP 1.2 Water Loss Control	formerly BMP/DMM 3
	BMP 1.3 Metering with Commodity Rates for All New Connection and Retrofit of Existing Connections	formerly BMP/DMM 4
	BMP 1.4 Retail Conservation Pricing	formerly BMP/DMM 11
2. Education Programs	BMP 2.1 Public Information Programs	formerly BMP/DMM 7
	BMP 2.2 School Education Programs	formerly BMP/DMM 8

The City's current and planned activities related to these Foundational BMPs are described below.

5.3.1 BMP 1.1.1 Conservation Coordinator (formerly BMP/DMM 12: Water Conservation Coordinator)

5.3.1.1 Existing Program

A full-time water conservation coordinator position was authorized by the City Council and was filled in 2001. This position remains filled today. The Water Conservation Coordinator's role is to develop, implement and manage the City's water conservation program and to coordinate with on-going conservation programs in other departments and other agencies. Specifically, the Water Conservation Coordinator performs the following tasks:

- Runs school education outreach programs;
- Trains and directs activities of other staff assigned to water conservation functions;
- Provides conservation information to residents and commercial businesses, coordinates the development of uniform conservation policies and enforcement;
- Develops, recommends and maintains various media sources for providing conservation information to both internal and external customers;
- Plans, coordinates and administers various day-to-day activities pertaining to the City's Water Conservation Program;

- Promotes the efficient use of the City's water supply by residential, irrigation, industrial, commercial public agencies and other customers to ensure sufficient pressure throughout the system for fire protection and other essential City services; and
- Investigates and identifies compliance issues; and communicates with regulatory agencies as required.

5.3.1.2 Future Program

The City will continue to keep the position of the Conservation Coordinator filled. Additionally, the City has budgeted for an additional technical position in which a person could be hired to provide assistance to the Water Conservation Coordinator, most likely with the specific implementation of the residential assistance programs (formerly BMP/DMM 1 and 2).

5.3.1.3 Effectiveness Evaluation

The effectiveness of this program will be evaluated through the development of effective working relationships between conservation programs. This program has been successful since its inception in 2001, judging by the increase in school programs (number of children reached 5,000 from 1,700) and the increase in active and planned conservation programs.

5.3.2 BMP 1.1.2 Water Waste Prevention (formerly BMP/DMM 13: Water Waste Prohibitions)

5.3.2.1 Existing Program

On March 25, 2003, City Council adopted Resolution No. 2003-162 which approved the implementation of Stage I of the City's Drought Contingency Plan (see Chapter 10 and Appendix K). Any violations of the rules and regulations established as part of Stage I Drought Contingency Plan are considered water waste. The rules and regulations are as follows:

1) Outdoor water use shall be prohibited daily from 12:00 p.m. to 7:00 p.m.
2) Odd-numbered addresses shall water outdoors only on Wednesdays, Fridays, and Sundays.
3) Even-numbered addresses shall water outdoors only on Tuesdays, Thursdays, and Saturdays.
4) No outdoor water use is permitted on Mondays.
5) City residents shall not wash cars without the use of a quick-acting positive shut-off nozzle or permit others to do so on their behalf. In addition, car washing must be done in compliance with the schedule for outdoor water use. There shall be no washing of building exteriors, mobile home exteriors, recreational vehicle exteriors, sidewalks, patios, driveways, gutters, or other exterior surfaces unless a permit is issued by the Public Works Director or his designee and the washing is done with a quick-acting positive shut-off nozzle on the hose.

6) City residents shall not have leaky faucets or plumbing fixtures on their premises for more than 24 hours after the leak has been identified or notice has been received from the City, whichever comes first.

7) Eating establishments are encouraged to serve water only at the customer's request.

8) New landscaping installations must comply with all applicable landscape ordinances.

9) Exceptions to the regulations set forth herein may be made by the Public Works Director or his authorized designee upon a showing of good cause and necessity.

10) The following penalties may be added to the utility service customer's account upon violation of the above regulations:

    a) A penalty in the sum of $50 upon the second violation within one year after having received a Notice of Violation.

    b) A penalty of $200 upon the third violation within said one-year period.

        i) Upon the third violation within one year of having received a Notice of Violation, the resident shall also have a water meter installed if one is not present and metered billing shall commence.

    c) A penalty of $250 upon the fourth and any subsequent violations within said one-year period.

    d) The customer shall be advised of these charges through a Notice of Intention to Impose a Penalty.

5.3.2.1 Future Program

The City will continue to enforce its water waste ordinance by having the Public Works Department perform site visits, as shown in Table 5-4.

Table 5-4. Water Waste Ordinance Enforcement

	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
Waste ordinance in effect?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# on-site visits	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500

5.3.2.2 Effectiveness Evaluation

The effectiveness of this program will be evaluated based on the number of violations observed, as well as the overall demand reduction associated with invoking drought restrictions. Presently, the City's Public Works Department employs four part-time water patrols. They patrol during the summer hours enforcing outdoor water restrictions.

5.3.3 BMP 1.1.3 Wholesale Agency Assistance Programs (formerly BMP/DMM 10: Wholesale Agency Programs)

Because the City is currently the only customer of MID, all wholesale agency programs are coordinated through the City by the City's Conservation Coordinator. Conservation programs include residential audits, certified landscape audits, rebate programs, school education programs, outreach (public information) programs, and plumbing and ULFT retrofit programs, as described in this chapter and in the City's Water Conservation Plan (see Appendix J).

Although MID is not directly involved with demand reduction, MID strongly supports the City's efforts through on-going and continuous operational coordination between MID and the City, support of water conservation and public outreach activities through MID's website and water use provisions contained in the October 2005 *Amended and Restated Treatment and Delivery Agreement* between the City and MID.

5.3.4 BMP 1.2 Water Loss Control (formerly BMP/DMM 3: System Water Audits, Leak Detection and Repair)

5.3.4.1 Existing Program

Repair and maintenance of the water distribution systems are priorities for the City. In addition to the City's Water Conservation Program, the City also has Capital Improvement Projects that provide for maintenance programs that maximize efficiency of water distribution system operations and minimize water losses. These programs include using SCADA systems to monitor groundwater and surface water production, quick responses to water main leak detection and repair, recalibration of each well meter every four years, annual pump efficiency testing, and water quality efforts including main flushing and water quality testing.

Daily water production from the City's wells and the MRWTP is recorded and used to monitor water use. Additionally, the City maintains records of main breaks which are used to identify mains to be replaced and estimate system water loss. Water Line workers (four servicemen and one supervisor) are responsible for identifying excessive water waste, standing water and system leaks. At the customer's request, City staff will investigate and, where appropriate, repair leaks within the City's right-of-way. In addition, staff conducts repairs of water line leaks and replaces or repairs meters. A repair crew will repair leaks in areas where leak detection equipment has pinpointed hidden leaks.

Each year, 25 percent of well sites are serviced and meters are recalibrated as routine maintenance. Pump efficiency tests are completed annually. Repairs are promptly made on pumps showing decreased efficiency, and well meters found to be inaccurate or exhibiting signs of wear are promptly replaced. Well efficiency is consistently tracked through the City's SCADA System.

A Maintenance Avoidance Program was implemented in 1995 to analyze motor well vibration using a probe and recorder. This program allows the City to schedule maintenance on motors and pumps based on predictive trends calculated by the vibration analysis instruments. As a result, motors and pumps can be repaired or parts replaced before their complete failure, extending their useful life.

The City's Water Division uses Geographical Information Systems (GIS) and Global Positioning Systems (GPS) to record fire hydrant locations, valves, water meters, and map water lines of all water distribution systems. The GIS data is organized in a database of the water system. In conjunction with the data assembled through SCADA, the database aids in hydraulic modeling of the water system. Additionally, the City uses CassWorks, a maintenance management system. The management system benefits the City by improving efficiency in completing work orders, managing imported records and scheduling maintenance. These programs are effective tools for providing customers with an efficiently operated and dependable water distribution system.

In the past, the City has contracted out a leak detection crew to complete a visual inspection of the system. The City Engineering staff work with City Operations crews to identify old pipelines that are leaking, and provide follow-up in replacing those lines. This is, and will continue to be, conducted as part of the City's Annual Pipe Replacement Program.

5.3.4.2 Future Program

The City's work on its Annual Pipe Replacement Program has allowed them to identify six large areas within its service area that are problematic with high percentages of leaking. A schedule and budget are being developed to systematically replace the pipes in these identified areas. In addition to the City's existing program, the City will also begin conducting an annual pre-screening audit in which they will determine metered sales and other verifiable uses (in acre-feet). These amounts will be summed and divided by the total supply into the system. If the number is less than 0.9, a full water system audit will be conducted; if the number is greater than or equal to 0.9, then nothing more will be completed as part of this DMM. For the purposes of budgeting for this program, it was assumed that a detailed water audit will be conducted every five years.

5.3.4.3 Effectiveness Evaluation

Concurrent with completion of the City's metering plan, the City will track effectiveness of implementation of this program based on reductions in water loss throughout the system.

5.3.5 BMP 1.3 Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections (formerly BMP/DMM 4: Metering with Commodity Rates for all New Connections and Retrofit of Existing Connections)

5.3.5.1 Existing Program

The City's water system is not fully metered. The City has been installing meters on new homes since the City Council enacted the Modesto Municipal Code 11-1 on May 14, 1991. Of the total 70,960 residential connections, 32,035 are unmetered (as of July 2010). All but one of the City's non-residential services are metered, and all new development in the City since 1991 has had meters installed.

As accounts are converted to metered accounts, the City implements the rate structure shown in Table 5-5. This rate structure encourages conserving behavior by incorporating a uniform volume charge in addition to the fixed meter charge. In this way, water usage reductions directly reduce cost to the user, while excessive water use results in increased costs.

Table 5-5. City of Modesto Current Water Rates and Charges

Customer Class	Rate[a]
Flat Rate Residential – Monthly Service Charges[b]	
0 –5,000 sq. ft. lot	$40.29
5,011 – 7,000 sq. ft. lot	$45.79
7,001 – 11,000 sq. ft. lot	$54.34
11,001 – 17,000 sq. ft. lot	$57.69
Over 17,000 sq. ft. lot	$67.82
Metered Charges (Residential & Commercial)	
Uniform Volume Charge ($/hcf)	$1.31
Fixed Meter Charges	
5/8" – 3/4"	$14.00
1"	$19.86
1 ½"	$34.37
2"	$51.86
3"	$98.54
4"	$150.99
6"	$296.61
8"	$471.45
10"	$675.47
12"	$1,258.19

(a) City of Modesto Current Water Rate (as of November 1, 2010) from City of Modesto website.
(b) Flat rates shown include tax.

5.3.5.2 Future Program

Table 5-6 summarizes the planned commodity rate metering and retrofits for the next ten fiscal years; the City anticipates being fully metered by 2025. By developing and implementing the on-going meter installation and replacement program, the City is developing a more focused and direct monitoring tool allowing them to detect high water usages.

In 2009, the City budgeted two new positions in the billing division of the Finance Department, one of which is currently filled. In the future, the City will fill the other position and plans to have both positions supporting the City's meter program in a customer service role, taking phone calls, answering questions and comments, and providing information on water usage, meter installation schedule, conservation measures, and leak detection by communicating directly with homeowners. These two finance positions will also support the Water Conservation Coordinator.

Table 5-6. Planned Commodity Rate Metering and Retrofits										
	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
# of meter conversions	5,300	3,400	2,250	2,250	2,250	2,250	2,250	2,250	2,250	2,250
# of accounts converted from flat to volumetric use	5,300	3,400	2,250	2,250	2,250	2,250	2,250	2,250	2,250	2,250

5.3.5.3 Effectiveness Evaluation

Effectiveness of the metering program will be monitored by tracking the number of retrofits installed per year.

5.3.6 BMP 1.4 Retail Conservation Pricing (formerly BMP/DMM 11: Conservation Pricing)

5.3.6.1 Existing Program

The Modesto City Council adopted Resolution 2000-45, which established charges for metered and unmetered services as of February 1, 2000. The rate structure was designed to promote conservation, with metered services paying a flat monthly service charge if water usage was kept below 1,680 cubic feet per month, or approximately 419 gallons per day. Water usage over this amount was charged an additional 82 cents for every 100 cubic feet (25 gallons) used. In addition, administrative fees were assessed upon second violations of restricted outdoor water use and repair of identified water leaks within 24 hours. The third and all subsequent violations required mandatory meter installation in addition to the administrative fee.

In 2005, the City converted from a three-zone structure that was adopted when the City purchased Del Este Water Company in 1995 to a uniform rate structure across all zones. Under this revised rate structure, metered accounts pay a uniform volume charge of $1.31/hundred cubic feet. The City's current rate structure is shown in Table 5-5.

Conservation pricing requires volumetric rates, so metered service is a necessary condition. The City is implementing its Meter Conversion Program in which it is installing meters at unmetered accounts. Once the meter has been installed, the City begins charging volumetrically, using a uniform volume charge as shown in Table 5-5.

5.3.6.2 Future Program

The City will continue to charge volumetric pricing and increase the volumetric component until full coverage is achieved, estimated to occur in 2014. As required, the City will evaluate the need to readjust rates in order to ensure continued compliance for this DMM.

5.3.6.3 Effectiveness Evaluation

The City will evaluate the effectiveness of conservation rates by tracking changes in unit water use resulting from rate increases.

5.3.7 BMP 2.1 Public Information Programs (formerly BMP/DMM 7: Public Information Programs)

5.3.7.1 Existing Program

The City's water conservation program is called the "Be a Wiser Water Miser" program. The program distributes information to the public through a variety of methods including personal contact, brochures, radio and television public service announcements, a dedicated conservation website, bill inserts, exhibits at community events, school presentations and videos. A water conservation telephone line is available to provide residents with any additional information they might request regarding water conservation. This same telephone number is kept open after business hours to create a 24-hour water waste hotline.

The City has available, upon request, numerous brochures and informational handouts on both indoor and outdoor water conservation, as well as landscape ideas incorporating the use of drought-tolerant landscaping and irrigation systems. Many of these handouts are available at the City Utility Payment Division and the Department of Public Works at 1010 Tenth Street, and the Public Works Department Water Division at the Corporation Yard located at 501 North Jefferson Street. They are also available at the Neighborhood Preservation Unit office at 1010 Tenth Street and at each of the four Modesto Police Department Area Command offices. In addition, the City's monthly utility bill has inserts which periodically offer water conservation tips and articles about water conservation programs. These inserts also remind citizens of the City's outdoor watering restrictions. The City also provides water conservation information at public facilities, such as the library and City Hall, and at community gatherings such as neighborhood watering meetings, Earth Day in the Park and the Stanislaus County Home Show.

Media coverage of the City's water conservation program is provided through public service announcements on television and radio in both English and Spanish, live interviews and taped cable television. The City's local newspaper, the *Modesto Bee*, also provides frequent and extensive coverage of current water conditions within the Modesto area.

The City has asked restaurants to serve water only upon request. Restaurants participating in the City's Water Conservation Program receive free table tent cards explaining what the program is and why it helps to save water. "Precious," the water conservation mascot, is a water drop that has participated with City staff and other local agencies in the annual Stanislaus County Home and Garden Show, Earth Day activities and the dedication of the MRWTP. City staff continue to be very active in the promotion of Water Awareness Month by having displays at the local minor league baseball team, the Modesto Nuts', games. In addition, City staff speak to numerous community service organizations such as Kiwanis, Lions Club, Boy's and Girls' Cub Scout troops, neighborhood water meetings, and Empire Municipal's Advisory Board. City staff has also conducted training sessions on water conservation to members of the Parks Operations Division and the communities of Grayson, Hickman and Salida.

Videotapes on water conservation and efficient landscaping practices are available from the Modesto Public Works Department, Water Division for use by the public. Copies of these tapes have also been donated to the Stanislaus County Library and several landscape nurseries in the City. Available films include "Water Follies" and "Beautiful Gardens with Less Water."

Within the last two years, the City has attended the Home and Garden show, Home Improvement Show, Stanislaus County Annual Retreat, Earth Day, Stanislaus County Fair, Jaycees 4th of July Parade, Public Works Week, March of Dimes Walk-a-thon, made a presentation at the Kiwanis Club and all water systems municipal advisory councils. At these events, the City provides conservation kits for both children and adults providing a total of approximately 250 kits per event. There are three conservation kits the City distributes for different purposes. These include:

- Childs Water Conservation Kit
  - A Water Wise bag
  - BE WATER WISE coloring book with crayons and stickers
  - A NIAGARA water conservation "showering Coach" timer
  - Water conservation website links for parents
- Use Water Wisely Kit
  - Five Tips to Save Water bag
  - A Use Water Wise Wheel
  - Our World of Water activity book
  - 6" Use Water Wisely Ruler
  - Water Conservation website links
- Water Conservation Adult Kit
  - 15 Ways to Use Water Wisely bag
  - Leak detection dye tablets
  - Water Conservation slide guide
  - Use Water Wisely note pad.
  - Water Conservation Brochures
  - Water conservation website links

The City has also coordinated with the media to better inform the public. For example, the City publishes an article in the City Beat every other month, and had various campaigns with Stott Outdoor Buses, Citadel (2 radio stations: KAT 103.3 FM Country and the HAWK 104.1 FM) and Clear Channel Radio (2 stations: Sunny 102 FM and 96.7 FM). The City also attends County Municipal Advisor meetings, some of which are televised, and provides information. The City will continue these efforts into the future.

5.3.7.2 Future Program

The City will continue to implement public outreach strategies as described above. The number of each planned activity per fiscal year is shown in Table 5-7.

Table 5-7. Planned Public Education Programs										
	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
Public Presentations/ Demos	6	6	6	6	6	6	6	6	6	6
Contacts with Media	12	12	12	12	12	12	12	12	12	12
Commercial/Radio Ads	650	650	650	650	650	650	650	650	650	650
Update website	4	4	4	4	4	4	4	4	4	4

5.3.7.3 Effectiveness Evaluation

This program is an essential component of developing water conservation awareness; however it is qualitative and cannot be defined in quantitative terms.

5.3.8 BMP 2.2 School Education Programs (formerly BMP/DMM 8: School Education Programs)

5.3.8.1 Existing Program

Each year, City staff gives school presentations to students at elementary schools in Modesto's service area. Also, in past years, the Water Conservation Coordinator has met with school district principals to encourage participation in the program as it focuses on water conservation while incorporating state content standards. Two American Water Works Association (AWWA) publications, "Splash" and the "Story of Water," as well as the video "Water Follies," are used in conjunction with school programs and other community events. Elementary school students are particularly receptive to the conservation message and they share that message with their parents. Though fifth graders are targeted with the school presentations, similar presentations are given to junior and high school students upon request. As part of the program, Water Conservation Kits are distributed to the students. In the last two years, the City has distributed over 250 kits to classrooms.

5.3.8.2 Future Program

The City will continue to implement their School Education Program as described above. Each student will be given a conservation kit that also includes a low-flow showerhead (in conjunction with DMM 2) to install in their own homes with their parents' permission. Table 5-8 summarizes the planned school education presentations to fifth grade classes and the estimated water savings that may result from the low-flow showerhead distribution.

Table 5-8. Planned School Education Presentations										
	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
# of kit giveaways	125	125	125	125	125	125	125	125	125	125
# presentations	5	5	5	5	5	5	5	5	5	5
Total water savings	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8

5.3.8.3 Effectiveness Evaluation

This program is an essential component of developing water conservation awareness; however it is qualitative and cannot be defined in quantitative terms.

5.4 CURRENT AND PLANNED IMPLEMENTATION OF THE PROGRAMMATIC BMPS

The Programmatic BMPs are summarized in Table 5-9.

Table 5-9. Summary of Programmatic BMPs

Programmatic BMP Name	Programmatic BMP Program	Former BMP/DMM Number
1. Residential Programs	BMP 3.1 Residential Assistance Program	formerly BMP/DMMs 1 and 2
	BMP 3.2 Landscape Water Survey	formerly BMP/DMM 1
	BMP 3.3 High-efficiency clothes washers (HECWs)	formerly BMP/DMM 6
	BMP 3.4 WaterSense Specification (WSS) toilets	formerly BMP/DMM 14
	BMP 3.5 WaterSense Specifications for residential development	
2. Commercial, Industrial, and Institutional Programs	BMP 4 Commercial, Industrial, and Institutional (CII)	formerly BMP/DMM 9
3. Landscape Programs	BMP 5 Landscape	formerly BMP/DMM 5

The City's activities related to these Programmatic BMPs are described below.

5.4.1 BMP 3.1 Residential Assistance Program (formerly BMP/DMM 1: Water Survey Programs for Single Family and Multi-Family Residential Customers and BMP/DMM 2: Residential Plumbing Retrofit)

5.4.1.1 Water Survey Programs

5.4.1.1.1 Existing Program

Water surveys for residential users help raise awareness of water conservation in the home and help conserve water during everyday use. The City's Water Conservation Program was established in 1990, and during that first year, 1,732 contacts were made at residences and businesses to explain the program. The number of contacts made each year continues to grow, with more than 7,800 contacts made in the summer of 2004 alone. Program staff members are available to set sprinkler timers upon request, adjust sprinkler heads, and provide minor advice on sprinkler systems. Staff members agree that the small amount of extra time spent assisting customers creates goodwill, ultimately reducing the likelihood of enforcement staff having to return in the future. In the past, the City has offered these free services upon request, but has not has not had a formal surveying program.

5.4.1.1.2 Future Program

The City has formalized its program for residential water surveys and landscape water surveys. Table 5-10 summarizes the estimated number of surveys to be completed over the next 10 years. The City will identify the high water users in its service and focus on those areas; service technicians and/or City interns will visit the residential users to provide leak detection assistance by performing surveys that include both indoor and outdoor investigations and to offer suggestions for both single-family and multi-family residences to improve water use efficiency. Surveys are offered via mailers, bill inserts and/or the City's website.

Table 5-10. Projected Water Survey Program

	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
Surveys Offered	14,192	14,192	14,192	14,192	14,192	14,192	14,192	14,192	14,192	14,192
# of single family surveys	990	990	990	990	990	990	990	990	990	990
# of multi-family surveys	72	72	72	72	72	72	72	72	72	72

5.4.1.2 Residential Plumbing Retrofit

5.4.1.2.1 Existing Program

The City requires water efficient equipment to be installed in all new construction and remodels. In addition, Water Conservation Kits are distributed by the City through its Water Conservation Program. Conservation kits are also distributed after each water conservation presentation to both adults and children. Over 30,000 kits have been distributed since 1983. Each kit contains one toilet displacement bag, dye tablets to detect toilet leaks, general conservation information, and installation instructions. When using the displacement bag in a standard toilet, approximately one gallon of water is saved with each flush. It is estimated that 20 percent of all toilets leak, and that the average leak wastes nearly 47 gallons a day. Using the dye tablet will help citizens detect those leaks. The water savings from using lawn watering guides is estimated to be 20 percent per household with automatic sprinklers and 10 percent for manual systems.

5.4.1.2.2 Future Program

In addition to the distribution of the Water Conservation Kits, implementation of this program will be combined with the school education program. As part of the school education programs, the City will distribute low-flow showerheads to the fifth-grade classes targeted for presentations each year. Under this program, the City will aim to distribute approximately 6,000 WSS showerheads each year.

In addition to providing low-flow showerheads to the fifth grade classes, the City will also distribute additional low-flow showerheads as giveaways at other public events. Table 5-11 summarizes the total number of planned low-flow showerhead giveaways provided for residential plumbing retrofits each fiscal year.

Table 5-11. Planned Residential Showerhead Retrofits										
	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
# of Showerheads to SF Accounts	4,583	4,583	4,583	4,583	4,583	4,583	4,583	4,583	0	0
# of Showerheads to MF Accounts	1,554	1,554	1,554	1,554	1,554	1,554	1,554	1,554	0	0
AFY savings Showerheads	85.9	85.9	85.9	85.9	85.9	85.9	85.9	85.9	0	0

5.4.1.3 Effectiveness Evaluation

The effectiveness of the water survey programs will be measured by monitoring the number of completed assistance requests. With conversion to metered usage, the City will monitor changes in water use and track water demands to target high use accounts.

The effectiveness of the plumbing retrofit programs will be measured by monitoring the number of new residential, commercial, institutional and industrial establishments constructed with high efficiency equipment as well as the number of establishments remodeled with efficient equipment. In addition, the number of water conservation kits distributed will be tracked.

5.4.2 BMP 3.2 Landscape Water Survey (formerly BMP/DMM 1)

The numbers included in Table 5-10 assume residential landscape surveys will be conducted at the same time as indoor residential surveys.

5.4.3 BMP 3.3 High-Efficiency Clothes Washers (HECWs) (formerly BMP/DMM 6: High-Efficiency Washing Machine Rebate Programs)

5.4.3.1 Existing Program

MID offers $35 rebates for energy-efficient washing machines for its qualifying electric customers and similarly, Pacific Gas & Electric (PG&E) offers $50 rebates for energy-efficient clothes washers. Because MID and PG&E customers are also City of Modesto water customers, in the past the City has referred water users to PG&E and MID rebates available for clothes washers but did not provide their own rebates.

5.4.3.2 Future Program

The City will provide $100 rebates to users towards the purchase of HECWs meeting the average WSS water factor value of 5.0 or better. As part of the implementation of this program, the City will develop and maintain a list of qualifying HECWs for residents to use. Table 5-12 summarizes program implementation and water savings.

Table 5-12. HECWs Rebate Program										
	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
# of rebates	600	660	660	660	660	660	660	660	660	660
Projected Water Savings, AFY[(a)]	14.7	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.2

[(a)] Assumes 400 loads/household/year with non-conserving washing machines using 40 gal/load and HECWs using 20 gal/load.

5.4.3.3 Effectiveness Evaluation

The effectiveness of the high-efficiency washer program will be evaluated by tracking the number of requested and reimbursed rebates.

5.4.4 BMP 3.4 WaterSense Specification (WSS) Toilets (formerly BMP/DMM 14: Residential Ultra-Low Flush Toilet Replacement Programs)

5.4.4.1 Existing Program

The State of California passed legislation requiring all toilets sold and installed after January 1, 1994 to be ultra-low flush toilets (ULFT) using no more than 1.6 gallons per flush. There have been approximately 9,000 homes built in the City water service area since January 1994 equipped with ultra-low flush toilets. In addition to the new home construction, an unknown number of pre-1994 toilets have been replaced with ultra-low flush toilets. The City has not implemented a formal rebate program to provide financial incentive for customers to meet the WaterSense Specifications.

5.4.4.2 Future Program

The City's future WSS toilet replacement program may take one or more forms. Two potential options include the City offering $50 rebates on customer purchases of qualifying toilets and/or the City hiring a firm to manage implementation of this program in coordination with the City. The program could also include the use of city facilities and/or schools for drop-off and distribute sites for the WSS toilets. Coordination with other organizations may come in the form of utilizing volunteers. Furthermore, in the future, the City may adopt a retrofit-on-resale ordinance, but at this time the City is looking to provide $50 rebates as incentives instead. Table 5-13 summarizes the planned program costs and water savings.

Table 5-13. Single Family WSS Toilet Replacement Program										
	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
# of rebates	50	75	100	125	150	175	200	225	250	275
Projected Water Savings, AFY[(a)]	1.5	2.2	2.9	3.6	4.4	5.1	5.8	6.6	7.3	8.0

[(a)] Assumes 2.5 people per household with non-conserving toilets using 18.7 gal/day/person and WSS toilet using 8.3 gal per day per person.

5.4.4.3 Effectiveness Evaluation

The effectiveness of this program will be measured by recording the number of ULFTs incorporated into new construction and remodels in future years.

5.4.5 BMP 3.5 WaterSense Specification for Residential Development

5.4.5.1 Current/Planned Program

On December 7, 2010, the Modesto City Council adopted revisions to the City's Building Code. The 2010 revisions included the mandatory provisions of the California Green Building Standards (CalGreen), including requirements for the installation of water-efficient plumbing fixtures and weather- or soil moisture-based irrigation controllers in new residential construction.

5.4.5.2 Effectiveness Evaluation

The effectiveness of this program will be measured by recording the number of new buildings and landscapes using water-efficient fixtures and appliances in future years.

5.4.6 BMP 4 Commercial, Industrial, and Institutional (CII) (formerly BMP/DMM 9: Conservation Programs for Commercial, Industrial and Institutional Accounts)

5.4.6.1 Existing Program

Historically, the City has provided water use audits to any CII customer upon request as an informal service, but historical records have not been kept. The City implements two different strategies, one for new CII accounts and one for existing CII accounts. For new users, the City works to inform the user of potential wastewater saving measures by having them conduct a self-audit of their operations and equipment. This effort can save the user wastewater connection charges in addition to reducing their water consumption per square foot of operation. The City plans to develop tools and information sources to inform new CII customers of these potential savings. For existing CII users, a similar effort can be developed to display the economic savings through self-audits. It is estimated the savings on both the water and wastewater side will offset the cost of the self-audit in a short time. In the future, the City may have staff attend training that would increase their knowledge of such water saving measures. Currently, the City's Environmental Compliance Division, who handles wastewater discharge permits among other regulatory tasks, is instrumental in assisting larger CII users with water savings measures to reduce wastewater discharge impacts.

5.4.6.2 Future Program

Under this program, the City will develop a formal survey program for CII accounts that will consist of free water use surveys (performed upon request) and evaluations of water using apparatus and processes, as well as recommended efficiency measures. Table 5-14 summarizes the projected CII conservation program. Rebates will be provided for some water saving devices such as those included in Table 5-15. Also, in the future, the City anticipates adopting the Commercial Green Building Code which will provide for higher water use efficiency standards (i.e. 20 percent reduction).

Table 5-14. Estimated Commercial, Industrial and Institutional Programs

	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
# of on-site surveys	100	100	100	100	100	100	100	100	100	100
# of rebates provided	30	75	150	255	200	220	220	220	270	295
# of follow-up visits	30	30	30	30	30	30	30	30	30	30
Projected water savings, AFY	23.4	58.5	117.0	198.9	156.0	171.6	171.6	1714.6	210.6	230.1

Table 5-15. City of Modesto CII Rebates

Device	Incentive Amount
High Efficiency (HE) Toilets	$200
HE Urinals	$200
Ultra Low Volume Urinals	$200
Zero Consumption Urinals	$200
Commercial HE Single Load Clothes Washers	$200
Cooling Tower Conductivity Controllers	$400
Cooling Tower pH Controllers	$400
Connectionless Food Steamers	$400
Medical Equipment Steam Sterilizers	$400
Water-Efficient Ice Machines	$250
Pressurized Water Brooms	$125
Dry Vacuum Pumps	$125

5.4.6.3 Effectiveness Evaluation

The effectiveness of the commercial application of the rebate programs will be evaluated by tracking the number of requested and reimbursed rebates.

5.4.7 BMP 5 Landscape (formerly BMP/DMM 5: Large Landscape Conservation Programs and Incentives)

5.4.7.1 Existing Program

The City Public Works Water Division has implemented an efficient, ET_o-based irrigation system at eleven City parks. The ET_o-based irrigation systems involve irrigating parks using field computers connected by modem to a weather station. The weather station relays weather forecasts and evapotranspiration data to the field computers and the irrigation is adjusted according to incoming weather forecasts. Currently, there are plans to expand the system to

include more parks and public land. The City's three certified landscape auditors oversee landscaping maintenance of the City's parks and golf courses.

The City also strives to match water quality with use. For example, the shallower aquifers in the area are generally not tapped for potable water uses due to the presence of contaminants that require treatment. The City has been converting older, shallower wells or developing new shallow wells to be used exclusively for park landscaping irrigation instead of using the treated surface and groundwater sources for these demands. This strategy serves as both a cost savings to the Parks Department and as a means by which available potable water supply sources can be conserved for potable uses. Irrigation conservation measures are still utilized at the parks, regardless of water source; but using the shallower water-bearing aquifer zones puts a supply to use that would otherwise go unused in highly urban areas. In the future, this strategy may be applied to local schools within the service area.

5.4.7.2 Future Program

In addition to the actions the City is already taking (as described above), the City also intends to begin a program to formally offer surveys to large landscape accounts. Under this program, the City will visit customers who irrigate and recommend an efficient irrigation schedule and improvements. The City will provide each dedicated irrigation account with an ET_o-based water use budget equal to no more than an average of 70 percent of ET_o of annual average local ET_o per square foot of landscape area. The recreational areas, such as parks, may require additional water than allotted in the budget, but their use still may not exceed 100 percent of ET_o on an annual basis.

To aid the customer in tracking their water use, the City will provide notices each billing cycle to the accounts with water use budgets showing the relationship between the budget and actual water consumption. The City will offer technical assistance to customers that are 20 percent over budget. Surveys will also be provided to CII accounts. There is currently only one CII account that is not metered; this account will have a meter installed part of the City's meter conversion program (DMM 4). Finally, the City will implement a weather-based irrigation controller (WBIC) rebate program, offering a $50 rebate per WBIC purchased.

Table 5-16 summarizes the projected number of the large landscape surveys and rebates to be offered to customers under this program. Also shown below is the projected water savings resulting from the program implementation.

Table 5-16. Planned Large Landscape Conservation Programs										
	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
# of budgets created	84	84	84	84	84	84	84	84	84	84
# of surveys completed	71	71	71	71	71	71	71	71	71	71
# of follow-up visits	21	21	21	21	21	21	21	21	21	21
# of rebates	5	5	5	5	5	5	5	5	5	5
Projected Water Savings, AFY	164.3	164.3	164.3	164.3	164.3	164.3	164.3	164.3	164.3	164.3

5.4.7.3 Effectiveness Evaluation

The effectiveness of this program will be evaluated by comparing water use at parks equipped with efficient, ET_o–based irrigation systems with water use at parks not equipped with irrigation systems. In addition, the City will track the increasing number of parks equipped with efficient irrigation systems and track the number of surveys and rebates for other large landscape customers.

5.5 BMPS NOT BEING IMPLEMENTED OR SCHEDULED FOR IMPLEMENTATION

Water Code §10631 (g),(h)

(g) An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following:

(1) Take into account economic and noneconomic factors, including environmental, social, health, customer impact, and technological factors.

(2) Include a cost-benefit analysis, identifying total benefits and total costs.

(3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost.

(4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.

As described above, the City has either already implemented or plans to implement all of the CUWCC BMPs.

Water Code §10631 (c)

(c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:

(1) An average water year.

(2) A single dry water year.

(3) Multiple dry water years.

For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.

6.1 RELIABILITY AND VULNERABILITY

As described in Chapter 3, the City relies on two primary sources of water supplies: wholesale Tuolumne River surface water deliveries from MID and local groundwater pumping. In general, the City's and MID's water supplies are most vulnerable to climatic variability and chemical contamination (due to natural and/or man-made constituents). Drought conditions can significantly reduce available surface water supplies. The reliability of the surface water supply is dependent on hydrologic variations and the ability to store and extract water from available storage reservoirs.

Precipitation, river flows and the incidental recharge of applied irrigation water are the primary sources of groundwater recharge to the groundwater basin. While drought conditions can reduce available groundwater supplies by reducing available recharge, this effect is less pronounced for groundwater than for surface water supplies, and is not expected to result in a reduction in pumping in dry years.

Rather, by using surface water in lieu of groundwater in normal years, the City will bank groundwater supplies for use in meeting dry year and peak period demands. The City's future water supply planning incorporates sufficient future surface water supplies to allow the City to meet demands primarily through the use of surface water, allowing the in-lieu banking of groundwater for future use, thereby protecting the groundwater basin from overdraft and water quality degradation. The water supply, demand and shortfall estimates presented herein assume that the City will use surface water from MRWTP as its primary supply source for meeting demands north of the Tuolumne River, allowing the City to do in-lieu groundwater banking for future use in meeting demands in excess of available surface water supplies in dry years. For the City's service area south of the Tuolumne River, groundwater will continue to serve as the source of supply. However, the City is evaluating participation in the RSWSP, which would provide additional supply reliability and allow the City to implement an in-lieu groundwater banking strategy in this portion of the City's service area.

In contrast to surface supply reliability, reliability of local groundwater supplies is threatened by poor water quality. In the past, contamination from arsenic, uranium, perchloroethylene (PCE), trichloroethylene (TCE), dibromochloropropane (DBCP) and nitrate has resulted in the need for wellhead treatment to keep wells from being taken out of service. The City has developed a strategy to keep existing wells on-line and bring selected out of service wells back on-line through a combination of wellhead treatment, blending, and aggressive monitoring. As a result,

and as described further in Chapter 7, the City does not anticipate groundwater quality to threaten the City's ability to pump and deliver groundwater supplies as needed to meet current and future demands.

Legal issues, including place of use and water rights issues, are also not anticipated to limit supply reliability for the City in future years. In certain situations, environmental factors can sometimes limit the reliability of surface water supplies, such as during a drought when dry year supply cutbacks are necessary to maintain the health of aquatic species and the environment in general. This issue is of particular concern for Delta water users, where dry year supplies can be greatly reduced to maintain adequate water supplies for environmental purposes. Although environmental issues to date have not been a limiting factor in available water supplies to the City, the regulatory process under FERC relicensing introduces potential uncertainties. Additionally, backup power and transmission/distribution system redundancies add reliability to the extraction, treatment and distribution of surface and groundwater supplies to existing and future customers.

Table 6-1 summarizes the factors contributing to vulnerability of the City and MID supplies.

Table 6-1. Factors Resulting in Inconsistency of Supply (DWR Table 29)

Name of Supply	Specific Source Name, if any	Limitation Quantification	Legal	Environmental	Water Quality	Climatic
MID Wholesale Supply	Tuolumne River Diversions	None		X		X
Local Groundwater[(a)]	Modesto, Turlock and Delta Mendota Subbasins	None			X	X

[(a)] Local groundwater is vulnerable to climate and water quality events. However, the City plans to maintain current groundwater supply availability through well monitoring for early detection, well rehabilitation, wellhead treatment, and blending.

6.2 PROJECTED WATER SUPPLIES

6.2.1 City of Modesto Projected Water Supplies

The City/MID *Amended and Restated Treatment and Delivery Agreement* specifies a maximum delivery of 42 inches of water or the amount calculated as (**y**/42) times 33,602 AFY, whichever is less (where **y** is the actual number of inches of water allocated by MID to agricultural water users for the irrigation season)[1]. Although the Agreement specifies a formula for water allocations during shortages, the reduction in supply is not determined until the time of the

[1] As described in the *Amended and Restated Treatment and Delivery Agreement*, upon completion of MRWTP Phase Two (anticipated in late 2012), the treated water quantity shall be changed from 33,602 AFY to 67,204 AFY.

shortage (*Amended and Restated Treatment and Delivery Agreement*, Section 17.2 Formula for Water Allocation).

The *Amended and Restated Treatment and Delivery Agreement* provides the opportunity for the City to purchase additional water from MID or to trade groundwater for agricultural use for treated surface water to achieve the full entitlement during drought years if such supplemental supplies are available. For example, in 1991, base supply was defined as 33 inches of the total 42-inch water allocation. MID made the remaining 9 inches available as an optional supply at a higher rate than base supply, resulting in a possible 100 percent allotment. If the remaining 9 inches had not been available, there would have been a surface water supply shortage.

For the purpose of estimating supply reductions during droughts, estimated MID delivery cutbacks were based on the 1991 condition. It was assumed that 1991 was the fifth year of a five-year drought (for the 1987 to 1992 drought as documented by the California Department of Water Resources), with equally proportioned shortages for the five years (or 9 inch reduction/5 years for a 1.8-inch effective reduction per year). Therefore, the MID delivery cutbacks experienced in each successive drought year would be as follows:

- First year cutback: 1.8/42 inches (4.3 percent)
- Second year cutback: 3.6/42 inches (8.6 percent)
- Third year cutback: 5.4/42 inches (12.9 percent)
- Fourth year cutback: 7.2/42 inches (17.1 percent)
- Fifth year cutback: 9/42 inches (21.4 percent)

It was assumed that, for a single dry year, MID delivery cutbacks would be equal to those experienced in 1991 (9/42 inches, or 21.4 percent).

In dry years, the City will supplement reduced surface water supplies with banked groundwater supplies, as necessary, to meet demands. Groundwater basin storage beneath the City is stable, and is not in any type of overdraft condition, as supported by stable long-term ground-water levels from wells located throughout the service area.

The basis for calculating projected demands and supply availability for each water year type are presented in Table 6-2.

Table 6-2. Basis for City of Modesto & MID Water Year Data (DWR Table 27)

Water Year Type	Base Year(s)	Assumed Water Supply Availability		
		MID Deliveries	Groundwater Pumping	Total Supply
Average/Normal Water Year	1984[a]	Current MID supply of 33,602 AFY as described in *Treatment and Delivery Agreement*. MID supply will increase to 67,204 AFY with completion of MRWTP Phase Two.	Assumed to be equal to total demand minus MID deliveries north of the Tuolumne River.	Assumed to be equal to MID deliveries plus groundwater pumping
Single Dry Water Year	1991	Assumes 21.4 percent reduction in surface water supplies (equal to last year of multi-year drought)	Assumed to be equal to total demand minus MID deliveries north of the Tuolumne River.	Assumed to be equal to MID deliveries plus groundwater pumping
Multiple Dry Water Years	1987-1991	Assumes 4.3 percent reduction in surface and other water supplies per year (based on 1991 MID cutbacks of 9 inches spread equally over 5 years)	Assumed to be equal to total demand minus MID deliveries north of the Tuolumne River.	Assumed to be equal to MID deliveries plus groundwater pumping

[a] 1984 is representative of normal conditions for the area, based on the characterization of the year as an above normal year using the San Joaquin Valley Water Year Type Index. The index characterizes water year type based on the unimpaired flow at the following four locations: Stanislaus River below Goodwin Reservoir, Tuolumne River below La Grange, Merced River below Merced Falls, and San Joaquin River inflow to Millerton Lake. The unimpaired runoff for 1984 was 3.69 million AF. Above normal flow is characterized as flows greater than 3.1 MAF and less than 3.8 MAF.

Table 6-3 shows the historical supply reliability of the City's supplies in the base years shown in Table 6-2. It should be noted that the City was not purchasing water supplies from MID in the base years shown (deliveries from MID to the City began in 1995 with the completion of the MRWTP); therefore, the quantities shown are based on what the available supplies would have been based on given hydrologic conditions.

Table 6-3. City of Modesto Historical Supply Reliability, AFY (DWR Table 28)

Supply	Average/ Normal Year	Single Dry Water Year	Multiple Dry Water Years				
			Year 1	Year 2	Year 3	Year 4	Year 5
	1984	1991	1987	1988	1989	1990	1991
MID Supply—Urban Base Supply[a]	33,600	26,400	32,200	30,700	29,300	27,800	26,400
MID Supply—Total Urban Supply[b]	33,600	33,600	33,600	33,600	33,600	33,600	33,600
Groundwater[c]	53,500	53,500	53,500	53,500	53,500	53,500	53,500
Percent of Average/Normal Year		100%	100%	100%	100%	100%	100%

[a] Hypothetical supply available to the City if the MRWTP had been available in the base years shown. Phase 1 of the MRWTP was completed in 1995. Assumes only Phase 1 of the MRWTP was available.
[b] Assumes that optional supply would be made available by MID to the City, as was available from MID in 1991.
[c] Based on the estimated "operational yield" of the groundwater basin underlying the City's service area.

Based on the criteria described above, Table 6-4 shows the City's minimum supply reliability for the next three years based on its current available supplies.

Table 6-4. City of Modesto Current Supply Reliability, AFY (DWR Table 31)

Source	Average/ Normal Water Year Supply (2011)	Multiple Dry Water Year Supply		
		Year 1 (2011)	Year 2 (2012)	Year 3 (2013)
MID Supply via the MRWTP[(a)]	33,600	33,600[(b)]	33,600	67,200[(c)]
Local Groundwater[(d)]	53,500	53,500	53,500	53,500
Total	87,100	87,100	87,100	120,700

(a) MID may make additional water beyond base supply available to the City at an additional cost. The City may also deliver groundwater to MID's irrigation canal system in exchange for an equal amount of raw surface water to be treated at the MRWTP during dry years in order to eliminate shortfall that would otherwise occur.
(b) Based on Total Urban Supply assumed to be available from MID (assumes optional supply will be available from MID).
(c) Assumes MRWTP Phase Two will be completed in late 2012.
(d) Based on the estimated "operational yield" of the groundwater basin underlying the City's service area.

6.2.2 Modesto Irrigation District Projected Water Supplies

As described above, MID surface water supplies are subject to cutbacks based on climatic variability. However, as described above, even in 1991, MID was able to make optional supplies available to its irrigation customers resulting in a 100 percent allotment. It is anticipated that MID would continue to maintain this supply reliability in conjunction with the completion of MRWTP Phase Two.

6.3 WATER MANAGEMENT TOOLS AND OPTIONS TO MAXIMIZE RESOURCES AND MINIMIZE THE NEED TO IMPORT WATER FROM OTHER REGIONS

10620(f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

6.3.1 City of Modesto Management Tools and Options

The City's current supply mix of local Tuolumne River water from MID and groundwater provides considerable flexibility in maximizing local resources. MID supply is treated at the MRWTP. The California Department of Public Health operating permit for the MRWTP does not allow treatment of supply other than from the Tuolumne River. Design of specific treatment methods at the plant are also based on the water chemistry of that local source.

The City currently maximizes the use of its surface water supply from MID in normal and wetter years. Currently, the City can receive 33,600 AFY from MID, increasing to 67,200 AFY, upon completion of MRWTP Phase Two, anticipated in late 2012. Use of this surface water supply gives the City the flexibility to preserve its groundwater supplies, through in-lieu banking.

The City is also pursuing participation in the Regional Surface Water Supply Project, which would provide local Tuolumne River water from TID in areas of south Modesto, south of the Tuolumne River.

To minimize the City's vulnerability to groundwater quality issues, the City has also developed strategies to maintain and enhance its groundwater extraction capacity through a combination of well monitoring for early detection, well rehabilitation, wellhead treatment and blending.

With these available management tools, the City does not currently foresee a need to import water from other regions.

6.3.2 Modesto Irrigation District Management Tools and Options

MID is primarily an agricultural water supplier. Through its service agreements with agricultural users, MID has the ability to reduce deliveries in drought years when surface water supplies are reduced. MID also has more than 100 groundwater wells that it owns and maintains that are used to supplement surface water supplies during dry conditions when surface water supplies are limited. Groundwater wells are used for agricultural supply and are not used for drinking water purposes. MID does not currently foresee a need to import water from other regions.

6.4 POTENTIAL FUTURE WATER SUPPLY PROJECTS

6.4.1 City of Modesto Potential Future Water Supply Projects

As described in Chapter 3, the City is also evaluating potential participation in other surface water supply projects, including a potential future MRWTP Phase Three, which could result in additional treated water deliveries north of the Tuolumne River, as well as potential participation in the RSWSP, which would provide treated surface water using water supplied by Turlock Irrigation District to areas south of the Tuolumne River.

The City has engaged in very preliminary discussions with MID regarding the possibility of implementing a MRWTP Phase Three Expansion project, but at this time, this project is speculative. For the RSWSP, some project planning, environmental review and design have previously been completed. The RSWSP project is currently under review by a steering committee made up of elected city council representatives of the four cities potentially participating in the project (Modesto, Ceres, Hughson and Turlock). The steering committee is anticipated to make a recommendation on whether and how to proceed with the project sometime in late 2011. Since water sales agreements have not yet been negotiated for either project, projected start and completion dates and anticipated supplies are listed as 'TBD,' or 'to be determined.' These potential projects are summarized in Table 6-5.

Table 6-5. City of Modesto Potential Future Water Supply Projects (DWR Table 26)

Project Name	Projected Start Date	Projected Completion Date	Potential Project Constraints	Normal Year Supply	Single Dry Year Supply	Multiple Dry Year Supply (Year 1)	Multiple Dry Year Supply (Year 2)	Multiple Dry Year Supply (Year 3)
MRWTP Phase Three	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
RSWSP	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

6.4.2 Modesto Irrigation District Potential Future Water Supply Projects

As shown in Table 6-6, the potential future MRWTP Phase Three may provide additional urban supplies in the future.

Table 6-6. MID Potential Future Water Supply Projects (DWR Table 26)

Project Name	Projected Start Date	Projected Completion Date	Potential Project Constraints	Normal Year Supply	Single Dry Year Supply	Multiple Dry Year Supply (Year 1)	Multiple Dry Year Supply (Year 2)	Multiple Dry Year Supply (Year 3)
MRWTP Phase Three	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

6.5 CLIMATE CHANGE

It should be noted that currently there are no specific requirements related to addressing the potential impacts of future climate change on water supplies or water supply reliability included in either the UWMP Act or the Water Conservation Act of 2009. However, within the next 20 years, DWR expects that water supplies, water demand, sea level rise, and the occurrence and severity of natural disasters will be affected by climate change as follows:

- Water Demand: Hotter days and nights, as well as a longer irrigation season, will increase landscaping and irrigation water needs, and power plants and industrial processes will have increased cooling water needs. Peak water demands may also be impacted.
- Water Supply and Quality: Reduced snowpack, shifting spring runoff to earlier in the year, increased potential for algal bloom, and increased potential for seawater intrusion—each has the potential to impact water supply, supply reliability and water quality.
- Sea Level Rise: It is expected that sea level will continue to rise, resulting in near shore ocean changes such as stronger storm surges, more forceful wave energy, and more extreme tides. This will also affect levee stability in low-lying areas and increase flooding.
- Natural Disaster: Natural disasters are expected to become more frequent as climate change brings increased climate variability, resulting in more extreme droughts and floods. This will challenge water supplier operations in several ways as wildfires are expected to become larger and hotter, droughts will become deeper and longer, and floods can become larger and more frequent.

California is addressing the causes and impacts of climate change in a number of different forums. The Global Warming Solutions Act of 2006 (AB 32) clearly identified climate change as a "serious threat to the economic well-being, public health, natural resources, and the environment of California". The California Air Resources Board completed the Climate Change Scoping Plan (2008) to support implementation of AB 32 and the California Natural Resources

Agency issued the Climate Change Adaptation Strategy (2009) to identify how California will adapt to expected climate changes.

Responding to climate change generally takes two forms: mitigation and adaptation. Mitigation is taking steps to reduce the contribution to the causes of climate change by reducing greenhouse gas (GHG) emissions. Adaptation is the process of responding to the effects of climate change by modifying systems and behaviors to function in a warmer climate.

In the water sector, climate change mitigation is generally achieved by reducing energy use, becoming more efficient with energy use, and/or substituting fossil fuel-based energy sources for renewable energy sources. Because water requires energy to move, treat, use, and discharge, water conservation results in energy conservation. As each water supplier implements DMM/BMPs and determines its water conservation targets, it can calculate the conserved energy and the GHGs not-emitted as a side benefit. Additionally, water suppliers may want to reconsider DMM/BMPs that conserve water if they do so at a significant increase in GHG emissions. Also, water suppliers can adapt to climate change through the diversification of its water supply portfolio, increased conjunctive use and introduction or expansion of recycled water use.

For the City, the implementation of its proposed overall water conservation program (described in Chapter 5), particularly the completion of the residential metering program, will help to reduce water demands, and also conserve energy as a result of decreased treatment, conveyance and pumping requirements. The City's compliance with SBx7-7 and its interim and final per capita water use targets will also ensure continued water conservation and energy conservation in the future. The City's increased use of surface water supplies from MID's MRWTP Phase Two will help to further diversify the City's water supplies and enhance the City's water supply reliability to "adapt" to the changing hydrologic conditions associated with climate change.

Water Code §10634

The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.

7.1 WATER QUALITY IMPACTS

Variable water quality can restrict the quantity of supplies available to meet urban demands. The City's water supply currently consists of wholesale MID supplies and local groundwater. MID supplies originate as Sierra snowmelt, and are diverted from the Tuolumne River at the La Grange Dam. MID supplies are of good quality, and surface water quality is not expected to affect future water supply availability.

The City has experienced some issues related to groundwater quality. Concentration levels of arsenic, uranium, PCE, TCE, DBCP or nitrate in excess of drinking water regulatory maximum contaminant levels (MCLs) have resulted in approximately 21 of the City's production wells to be taken out of service. These well outages have reduced the City's hydraulic pumping capacity. As of December 2010, the City had a total of 113 available wells located throughout the City's entire water service area. Of these wells, 21 were out of service for water quality reasons, and 92 wells were operational. The total production capacity of the City's available wells is approximately 160 MGD, and the capacity of the operational wells is approximately 130 MGD.

In 2015, with completion of MRWTP Phase Two, the City's average annual demand met from groundwater is projected to be 15,700 AFY (14 MGD average daily equivalent). By 2035, the City's average annual demand projected to be met from groundwater is projected to be 37,600 AFY (34 MGD average daily equivalent). Wells are also used to provide supply capacity during high demand periods, and by 2035, the maximum day supply capacity required from wells will be about 84 MGD.[1]

The City conducts routine water quality sampling and well monitoring for early identification of water quality problems. The City's capital improvement program also includes three on-going programs that directly or indirectly address on-going water quality issues. These programs are:

- Water quality studies;
- The new wells program; and
- The wellhead treatment program.

The water quality studies program provides funding for a variety of system-wide water quality studies and activities, including future wellhead treatment methods, groundwater blending, modifying well operations, screening off problematic water strata, installing monitoring wells,

[1] The 2035 projected maximum day demand is 164 MGD. The pump station that supplies water from the MID terminal reservoirs has a capacity of about 80 MGD. Thus 84 MGD must be met from wells.

aquifer recharge and recovery wells, and actions to protect deterioration of the groundwater supply and quality.

The new wells program provides wells to: (1) replace wells previously taken out of service due to water quality concerns and that are deemed unsuitable for rehabilitation; (2) replace older, low producing wells that are reaching the end of their service life; (3) add new wells to help alleviate low flow problems and/or maintain adequate system pressures for existing customers; and (4) provide additional capacity to meet increasing demands for new growth. The program is expected to produce approximately one new well every two years as funding is available.

A number of the City's wells have wellhead treatment systems which allow the City to take full advantage of available groundwater supplies. The wellhead treatment 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 MCLs. This program also includes funding for site specific groundwater studies, pilot-plan projects, etc.

Through its well monitoring and capital improvement programs, the City expects to maintain sufficient well capacity to meet future annual and peak demands. Therefore, as shown in Table 7-1, water quality is not expected to contribute to long-term changes in available water supplies.

Table 7-1. Current and Projected Water Supply Changes due to Water Quality (DWR Table 30)

Water Source	Description of Condition	2010	2015	2020	2025	2030	2035
MID – Tuolumne River	None	0	0	0	0	0	0
Local Groundwater	None	0	0	0	0	0	0

7.2 IMPLICATIONS FOR WATER MANAGEMENT

The City has developed a strategy incorporating monitoring for early identification, well rehabilitation, wellhead treatment, and blending to allow pumping and delivery of groundwater as necessary to meet demands in future and dry years. Because the annual groundwater yield is not projected to be reduced due to water quality considerations, there are no implications for water management associated with reductions in available groundwater supplies.

Water Code § 10633

The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

(b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

(c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(e) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

(f) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

(g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

8.1 COORDINATION

The City currently recycles secondary effluent and applies it on a 2,500 acre City-owned ranch south of the City. This recycled use is expected to continue in the future. The City has recently implemented tertiary treatment for a portion of its wastewater flow, and will be expanding its tertiary treatment capability in the future.

Regional recycled water opportunities to beneficially use the tertiary treated recycled water are being evaluated in the Northern San Joaquin Valley Regional Recycled Water Project. In 2005, the City completed the first phase of this project, a feasibility study that included assessment of recycled water markets, review of regulatory requirements, development and evaluation of alternatives for regional water recycling and wastewater treatment, selection of a recommended alternative(s), and development of an implementation plan. As part of the study, regional stakeholder workshops were held to discuss and obtain input on regional recycled water opportunities. Seventeen local communities and agencies were invited to participate in the workshops, and nine cities and agencies participated.

The feasibility study identified water sales to agricultural purveyors outside of the MID and TID service areas (the City of Modesto covers portions of both MID and TID service areas) as the most cost-effective alternative. Since completion of the feasibility study, agricultural reuse

concepts have been refined. The City is currently evaluating alternatives to supply tertiary treated recycled water to the Del Puerto Water District (DPWD), an agricultural district located west of the San Joaquin River. The agency is in close proximity to the City's wastewater treatment plant where tertiary treated water is produced, providing an opportunity to deliver recycled water and improve DPWD's water supply reliability. While this project would not provide potable water offset in the Modesto area, it would make beneficial use of the wastewater and provide numerous benefits in addition to improved water supply reliability, such as public safety, enhanced property values and increased educational opportunities.

The City of Modesto, along with the cities of Hughson, Ceres and Turlock are currently funding the development of an IRWMP. The North Valley Regional Recycled Water Project is one of the regional projects included in the IRWMP. As part of the IRWMP planning process, the City will be holding regional stakeholder workshops in summer 2011 to present projects that are included in the IRWMP, and seek regional input on ranking projects included in the IRWMP. Although potential stakeholders are still being identified, it is anticipated that stakeholders will include local cities, the county, water purveyors, local groundwater associations, environmental interest groups and other interested citizens.

8.2 WASTEWATER QUANTITY, QUALITY AND CURRENT ISSUES

Water Code § 10633 (a)

The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

The City's Wastewater Treatment facilities are located on two sites, separated by approximately seven miles. The Sutter Avenue Primary Plant is adjacent to the Tuolumne River, within a residential area within the City. The Jennings Street Plant provides secondary treatment and tertiary treatment of a portion of its wastewater flow and is within an agricultural region adjacent to the San Joaquin River, approximately seven miles south of the City.

Domestic wastewater is initially treated at the Sutter Avenue primary treatment plant. Primary treatment includes bar screening, grit removal, and primary clarification. After primary treatment, effluent from the primary plant is pumped approximately seven miles to the Jennings treatment plant through twin 60-inch outfall pipelines. There, the primary effluent is treated further and either used for irrigation on City-owned ranchlands or discharged to the San Joaquin River.

The Jennings treatment plant includes both secondary and tertiary treatment facilities. Secondary treatment includes biological treatment with fixed film reactors, recirculation, aerated recirculation, and oxidation ponds. The City is allowed to discharge secondary effluent from October 1 through May 31 when certain dilution ratios can be achieved. To meet more stringent wastewater disposal requirements, the City is phasing in tertiary treatment at the Jennings plant. In the fall of 2010, the City brought facilities on-line to provide 2.3 MGD of tertiary treatment

capacity. The tertiary treatment process includes oxidation, de-nitrification, membrane filtration and ultraviolet disinfection facilities. The City is currently planning to bring another 12.6 MGD of tertiary treatment capacity on-line by 2016.

Historically, roughly 20 MGD of wastewater generated by Modesto's canneries was sent to the primary treatment plant. This wastewater contained extremely high concentrations of organic vegetable solids that caused the treatment plant to operate inefficiently and expensively. In the late 1990's, the Cannery Segregation Project was implemented and currently, up to 40 MGD of wastewater from seasonal canneries is segregated allowing cannery wastewater to bypass treatment. These cannery discharges are applied directly to city-owned ranchlands as a soil supplement.

Current and projected City wastewater flows are presented in Table 8-1. The wastewater treatment plants serve the City of Modesto's sanitary service area and a small northern portion of the City of Ceres. Influent consists primarily of domestic, commercial, industrial, food processing, and winery waste. Depending on the time of year and weather conditions, secondary effluent is either discharged to the San Joaquin River or recycled for irrigation. When physical or regulatory constraints prevent land application or discharge of secondary effluent, effluent is stored on site until river discharge or irrigation is possible, or treated at the tertiary treatment facility and discharged to the river.

Table 8-1. Wastewater Collection and Treatment, AFY[(a)] (DWR Table 21)

Type of Wastewater	2005	2010	2015	2020	2025	2030	2035
Wastewater collected & treated in service area	29,100	27,100	28,900	32,500	36,400	40,300	44,400
Volume that meets recycled water standards[(b)]	29,100	27,100	28,900	32,500	36,400	40,300	44,400

(a) Flow projections from City of Modesto Phase 2 BNR/Tertiary Treatment Project Final Draft Preliminary Design Report, May 2009.

(b) Title 22 of the California Code of Regulations (CCR) defines the quality of Modesto's secondary-treated recycled water as "undisinfected secondary recycled water." Allowable uses for this type of recycled water include irrigating fodder, fiber, seed crops, and pasture for non-milking animals. Modesto's tertiary-treated recycled water meets the Title 22 tertiary treatment requirements of filtration and disinfection. Allowable uses for this type of recycled water include irrigation use for food crops, or irrigation of landscaped areas, including parks and playgrounds, school yards, residential landscaping and golf courses.

8.3 WASTEWATER DISPOSAL AND POTENTIAL RECYCLED WATER USES

Water Code § 10633 (b)(c)(d)

The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

(b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

(c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

8.3.1 Wastewater Disposal

The City's wastewater disposal operations are regulated under the National Pollutant Discharge Elimination System (NPDES) and Waste Discharge Requirement (WDR) permit systems. Currently, disposal of the City's secondary effluent is achieved through San Joaquin River discharge, pond system evaporation, and pond system percolation. As discussed in Section 8.3.2, the City also recycles secondary effluent for agricultural irrigation use at a City-owned ranch. Discharge of secondary effluent to the San Joaquin River between October 1 and May 31 is limited by a dilution requirement of 20 parts river water to one part secondary effluent in the City's NPDES permit. Discharge of secondary effluent and cannery waste to the ranch is limited by organic loading limitations of the NPDES permit, allowable pasture irrigation rates (5 acre-feet per year per acre), and available acreage. Other weather and soil-related factors that affect disposal capacity include evaporation rates and percolation. Disposal of the City's tertiary effluent is achieved through San Joaquin River discharge. Discharge of tertiary treated water is allowed on a year-round basis.

Prior to 2009, the City had a disposal capacity shortfall. In 2009, the City brought dissolved air flotation (DAF) treatment on-line that expanded disposal capability. In fall 2010, the City brought 2.3 MGD of tertiary treatment facilities on-line, allowing year-round disposal of up to 2,600 AFY. As part of the City's *Wastewater Master Plan Phase 2* program, the City is planning to provide additional tertiary treatment capacity to allow for discharge of treated effluent or additional recycled water use. The City's current and projected wastewater disposal methods are presented in Table 8-2.

Table 8-2. Disposal of Wastewater (Non-recycled water, AFY)[a] (DWR Table 22)

Method of Disposal	Treatment Level	Time of Use	2010	2015	2020	2025	2030	2035
Rivers	Secondary	October 1 – May 31	14,800	14,800	0	0	0	0
Rivers	Tertiary or better	All Year	2,600	2,600	21,400	26,100	30,800	30,800
Net evaporation loss	Secondary	All Year	6,600	6,600	6,600	6,600	6,600	6,600
		Total	24,000	24,000	28,000	32,700	37,400	37,400

[a] Disposal capacity estimates from Phase 2 BNR/Tertiary Treatment Project Final Draft Preliminary Design Report (May 2009). Net evaporation loss estimates from City of Modesto's Wastewater Master Plan Phase 2 Update (2007). The City also recycles approximately 9,100 AFY of its secondary treated effluent for agricultural irrigation of City-owned ranch lands. This use is expected to continue in the future.

8.3.2 Current Recycled Water Use

As discussed in Section 8.3.1, the City recycles some of its secondary effluent for agricultural irrigation uses. Title 22 of the California Code of Regulations (CCR) defines the quality of Modesto's recycled secondary effluent as "undisinfected secondary recycled water." Allowable uses for this type of recycled water include irrigating fodder, fiber, seed crops, and pasture for non-milking animals. Modesto has been supplying recycled water for irrigation since 1969 and currently irrigates roughly 2,500 acres of fodder and feed crops on City-owned land.

Table 8-3 summarizes current 2010 recycled water use, as projected in 2005, and 2010 actual use.

Table 8-3. 2005 UWMP Recycled Use Projection Compared to 2010 Actual, AFY) (DWR Table 24)

Use Type	Actual 2010	2005 Projection for 2010
Agricultural irrigation	9,100	9,100 [a]
Landscape irrigation	0	0
Commercial irrigation	0	0
Golf course irrigation	0	0
Wildlife habitat	0	0
Wetlands	0	0
Industrial re-use	0	0
Groundwater recharge	0	0
Seawater barrier	0	0
Geothermal/Energy	0	0
Indirect potable reuse	0	0
Indirect potable reuse	0	0
Total	9,100	9,100

[a] The 2005 Urban Water Management Plan reported a total of 24,100 AFY for land application. This total included percolation losses, net evaporative losses from its pond system at the wastewater treatment plant and land application of cannery wastes as a soil supplement. The total secondary effluent used for land application is estimated to be 9,100 AFY.

8.3.3 Potential Recycled Water Uses

As described in Section 8.3.2, the City currently uses its secondary-treated recycled water supplies for agricultural irrigation where available. Additional recycled water uses would require tertiary treatment. Potential tertiary-treated recycled water opportunities identified for the City in the Northern San Joaquin Valley Water Reclamation Project include agricultural irrigation (tertiary treated), urban reuse (landscape and industrial), environmental use, groundwater recharge, and water sale. Based on assessments to date, water sales to agricultural users outside of the MID or TID service area is the most cost-effective use for the City's tertiary recycled water. Urban irrigation and industrial cooling water have also been identified for future evaluation as potential recycled water markets, should recycled water sales not be feasible or additional recycled wastewater facilities are developed in closer proximity to urban and industrial uses.

The use of recycled water for local agricultural irrigation (in either MID or TID service areas) is limited due to a number of issues, primarily the availability, reliability and low cost of irrigation water available to water users from both MID and TID. The San Joaquin River National Wildlife Refuge is a potential opportunity for wetlands enhancement. Groundwater recharge projects do not appear feasible at this time due to treatment requirements and associated project costs. Recycled water potential uses are presented in Table 8-4 with descriptions of potential recycled water options and associated constraints provided below.

Table 8-4. Potential Recycled Water Use, AFY (DWR Table 23)

User Type	Description	Feasibility	2015	2020	2025	2030	2035
Agriculture	Agricultural irrigation using secondary treated recycled water	Feasible. Currently being implemented.	9,100	9,100	9,100	9,100	9,100
Water sale (agricultural)	Sale of recycled water to agricultural users outside of the MID/TID service area	Technically and economically feasible. Unit costs for recommended alternatives range from $400 to $1000/AFY (2011$), depending on alternative and potential for grant funding. Currently being evaluated for implementation.	0	16,700	21,200	21,200	21,200
Urban irrigation (landscape irrigation for parks, golf courses and schools) and industrial use[a]	Recycled water production at satellite treatment facilities for urban landscape irrigation and industrial reuse in future Comprehensive Development Plan areas	Technically feasible. Economic feasibility uncertain. Specific projects evaluated range from $2,200/AFY to $5,100/AFY for transmission and treatment (2005 dollars). Cost of dual distribution system not included.	0	0	16,000	16,000	16,000
Environmental (includes wildlife habitat and wetlands)[b]	Streamflow augmentation, wildlife habitat restoration, wetland enhancement or other related environmental purposes	Technical and economic feasibility uncertain.	0	0	TBD	TBD	TBD
Groundwater recharge (includes indirect potable reuse)	Groundwater recharge through percolation or direct injection into the groundwater basin. Requires advanced treatment	Currently not feasible, due to treatment requirements and associated project costs	0	0	0	0	0
Seawater barrier	Injection of recycled water to the groundwater basin to prevent seawater intrusion	Not applicable	0	0	0	0	0
Geothermal/Energy	Use of recycled water for cooling or process water for energy generation applications	Technical and economic feasibility uncertain	TBD	TBD	TBD	TBD	TBD
		TOTAL[c]	9,100	25,800	36,400	40,300	44,400

TBD – To Be Determined

(a) Water use estimates are based on 2005 market study that assumed all future Comprehensive Planning District (CPD's) would develop recycled water facilities, with satellite treatment and dual piping systems installed at the time of development. Costs shown do not include distribution system facility costs. Timing for development not provided in 2005 study. For this UWMP, potential development assumed to be 2025 or later.

(b) Environmental includes wildlife habitat and wetlands uses. Additional analysis would be required to quantify this potential use.

(c) For 2025 through 2035, totals are based on total wastewater flow projections, since, potential use totals exceed available supply.

8.3.3.1 Agricultural Irrigation

Secondary treated recycled water is currently used for fodder and fiber crops, seed crops, orchards, vineyards, nursery stock, sod farms, and animal pastures on city-owned ranch land south of the City of Modesto. Expansion of secondary treated recycled water use to other areas within the MID or areas served by neighboring irrigation districts such as the TID, is unlikely to be viable since secondary treated recycled water uses are restricted in use and agricultural lands in the region east of the San Joaquin River are served by either MID or TID, both of which have rights to good quality and highly reliable Tuolumne River water. Similarly, opportunities for agricultural water sales of tertiary treated recycled water within the MID or TID service area are limited due to the inexpensive cost of Tuolumne River water. For potential agricultural sales opportunities outside of the MID or TID service area, see *Section 8.3.3.2 Water Sale to Agricultural Users.*

8.3.3.2 Water Sale to Agricultural Users

Concepts under current evaluation include potential treatment and delivery of tertiary treated recycled water from the cities of Modesto and Turlock to DPWD. DPWD is located along the west side of the San Joaquin Valley and extends from Vernalis to Santa Nella. Currently, DPWD's only source of water is through a contract with U.S. Bureau of Reclamation for Central Valley Project (CVP) supply. Since the 1990's, DPWD has experienced reduction in CVP entitlements due to drought conditions and regulatory restrictions imposed on CVP operations. The geographic proximity of DPWD to the City of Modesto's treatment facilities provides an opportunity for recycled water to supplement DPWD's existing water supply and improve water reliability.

In 2010, project partners prepared a feasibility study to review alternative recycled water delivery options. Five alternative conveyance options were evaluated – two of the alternatives could be implemented in the near-term with adequate funding. These alternatives are: pipeline conveyance of recycled water directly to DPWD lands, and San Joaquin River conveyance of recycled water to existing diversion facilities. These alternatives have unit costs for water delivery ranging from $100/AF to $1,000/AF depending upon the specific conveyance facilities and level of treatment required. Project proponents are currently seeking grant funding from the federal State and Tribal Assistance Grants infrastructure grants program.

8.3.3.3 Urban Irrigation

The Northern San Joaquin Valley Regional Recycled Water Project feasibility study (2005), identified areas with new housing developments (Comprehensive Planning Districts or CPD's) where the area could be dual-plumbed for recycled water use and served by satellite treatment facilities. Non-potable water use for these dual-plumbed CPD's was evaluated based on estimated total demands for these areas (assuming all would be developed with dual systems), and assuming that 50 percent of the total demands, or 16,000 AFY could be developed as a recycled water supply. This estimate represents the overall recycled water demand of the City's CPD areas and did not consider cost constraints and other limitations.

The study also identified potential urban recycled uses in the vicinity of the City's Sutter Primary Wastewater Treatment Plant, and recommended further investigation of a 6 to 10 MGD recycled water facility at the plant and distribution to irrigation users in the vicinity of the plant. Subsequent investigation by the City found that due to the small potential recycled water market and the high cost of installing facilities to distribute recycled water made this alternative economically infeasible.

8.3.3.4 Environmental Use

Environmental use of recycled water is generally driven by the anticipated environmental benefit as opposed to actual water demand. Potential opportunities for environmental uses include stream flow augmentation, wildlife habitat restoration, wetland enhancement and other related environmental purposes. One potential environmental use identified in the 2005 feasibility study is augmentation of summer flow in the San Joaquin River with disinfected tertiary recycled water. This could enhance habitat in the San Joaquin River and the Delta during the summer months. Environmental uses of recycled water would require evaluation in future studies to assess the potential impacts to local groundwater supplies, agricultural lands, and other environmental habitats. Based on correspondence with the Central Valley RWQCB as part of the 2005 feasibility study, augmentation of flow in the San Joaquin River is not currently viewed as a benefit.

Another potential opportunity identified for environmental enhancement identified in the 2005 study is potential delivery of recycled water to the San Joaquin River National Wildlife Refuge (SJRNWR) for wetlands enhancement. The U.S. Fish and Wildlife Service (USFWS) has a program to restore historic wetlands that are located adjacent to the San Joaquin River as land is acquired. The SJRNWR is located approximately 10 miles west of the City of Modesto and is part of the Pacific Flyway that supports migratory waterfowl. Additional coordination with the USFWS would be necessary to identify opportunities for recycled water use in the SJRNWR.

Recycled water could also be used to develop constructed wetlands to provide habitat for endangered species and other wildlife. Constructing/developing wetlands in the Modesto area would probably require conversion of agricultural land or modification of other land uses.

Recycled water quality is a significant consideration for environmental use since pharmaceuticals, trace elements, pesticides, and other constituents could potentially result in adverse impacts to aquatic and other wetland species. The quality of recycled water required for environmental use is dependent on the specific uses of the water (i.e., treatment wetlands have different needs than stream flow augmentation projects). Treatment requirements and water quality goals should be evaluated in the future as specific environmental projects are identified.

8.3.3.5 Groundwater Recharge

Using municipal recycled water as a recharge source for groundwater subbasins used for municipal and industrial water supply purposes is an approved practice in California. Water Factory 21 in Orange County and the Montebello Forebay project operated by the Los Angeles County Sanitation District have been in operation since the late 1970's, recharging over 50,000 acre-feet per year to the local groundwater subbasins. However, advanced treatment technologies (reverse osmosis (RO), ultraviolet (UV) disinfection, etc.) are necessary to remove pathogens,

organics, trace elements, and other impurities prior to recharge. These technologies are expensive to construct and operate, and typically reduce the project yield by as much as 25 percent (due to residuals and brine byproduct). Brine byproduct disposal would be an additional challenge for a groundwater recharge project. It is unlikely that the brine byproduct would be an allowable discharge to any inland surface water. Evaporation/crystallization process, blending and use for irrigation, or some other disposal process would need to be implemented in conjunction with the RO facilities.

Groundwater recharge using recycled water can be accomplished by percolation or direct injection. Recharge could be practiced year round or seasonally, and could be implemented with other potential recycled water uses. With recharge, recycled water would commingle with groundwater and be transported via the aquifer system to existing wells. Percolation basins would be located in areas with high recharge potential. Injection wells could also be constructed, but would need to be spaced to reduce groundwater mounding and would require a distribution header system.

Groundwater is a major potable supply component for the City and surrounding communities. While the combined operational yield of the Modesto and Turlock groundwater subbasins is currently unknown, a groundwater recharge project could supplement and increase the annual groundwater basin operational yield. Water quality constituents of concern in any domestic groundwater supply include salinity, nitrates, certain trace elements, hardness, iron, and manganese. The use of reverse osmosis for water treatment prior to recharge would probably enhance basin groundwater quality.

Regulatory requirements governing groundwater recharge differ based on such factors as method of recharge, effluent quality, groundwater depth, soil percolation capacity, and groundwater basin volume. All of these variables would need to be seasonally defined before a recharge project could be implemented. The coliform concentration of Modesto's recycled water exceeds the maximum concentration allowed to recharge through settling basins. Tertiary treated recycled water would be necessary for direct groundwater injection. Therefore, groundwater recharge is not feasible until Modesto's recycled water quality is improved.

8.3.3.6 Seawater Barrier

Because of the City's interior valley location, the City does not experience seawater intrusion, and there is no potential use of recycled water for seawater barrier application.

8.3.3.7 Geothermal/Energy

The 2005 North San Joaquin Valley Recycled Water Project feasibility study evaluated potential recycled water use as a cooling water application for a proposed co-generation facility, but plans for this project are no longer under consideration.

There are a number of energy facilities in the area that have the potential to use recycled water for cooling water. However, given relatively low cost sources of water for cooling water application, the economic feasibility of using recycled water for cooling water is uncertain.

8.4 POTENTIAL AND PROJECTED USE, OPTIMIZATION PLAN WITH INCENTIVES

Water Code § 10633 (e)(f)

The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

(e) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

(f) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

8.4.1 Potential and Projected Use

As described above, the City completed the Northern San Joaquin Valley Water Reclamation Project in 2005. Since that time, the project has focused on near-term regional recycled water use opportunities for agricultural reuse of tertiary treated water in areas outside of the MID and TID service area, as the City implements tertiary treatment. Other regional recycling strategies recommended in the 2005 study are being considered as longer-term opportunities. Each of these potential programs is summarized below.

8.4.1.1 Water Sale to Agricultural Users Outside of MID and TID Service Area

In 2010, project partners prepared a feasibility study and are currently seeking grant funding for the North Valley Regional Recycled Water Project (NVRRWP). Current concepts include treatment and delivery of tertiary treated recycled water from the cities of Modesto and Turlock to DPWD through either pipeline conveyance directly to the district or conveyance via the San Joaquin River. It is anticipated that Modesto could supply to DPWD up to 16,600 AFY by 2016, and 21,200 AFY by 2025. These delivery quantities are based on planned tertiary treatment facilities treatment capacity at the Jennings Wastewater Treatment Plant.

8.4.1.2 Regionalization Alternatives

Current regionalization opportunities are focusing on areas south of the Tuolumne River. The City of Ceres is exploring future disposal alternatives that include exporting wastewater to the City of Turlock or the City of Modesto's Jennings Wastewater Treatment Plant.

Longer-term, two regionalization options identified in the 2005 study are: conveyance of wastewater to the City's wastewater treatment plants (WWTPs) and/or development of satellite treatment and reclamation facilities with conveyance of recycled water to the City service area. These options would require additional input from potential stakeholders to identify interests and goals. Cost sharing agreements for these evaluations would need to be developed prior to initiating work on these options. MOU or other agreements could be developed with each stakeholder to layout project goals, and project cost sharing.

8.4.1.3 Regional Water Recycling Facility

For the long-term, cities north and south of Modesto have expressed interest in a regional treatment facility or disposal strategy to address future wastewater flows. Potential options include conveyance of raw, partially treated, or disinfected tertiary wastewater to a central location for additional treatment or distribution.

Disinfected tertiary recycled water is assumed to be the minimum treatment required. The value of recycled water is expected to increase as future water demands increase. As the value of recycled water increases, water sale opportunities with customers further away from Modesto may be more viable. In addition, expanding urban use and/or groundwater recharge could become economically feasible.

Recycled water use projections are included in Table 8-5. Since project elements of the North Valley Recycled Water Project are still undergoing feasibility evaluation, only recycled water uses already implemented are shown in Table 8-5.

Table 8-5. Current and Projected Recycled Water Use, AFY

User Type	Minimum Treatment Level	2010	2015	2020	2025	2030	2035
Agriculture	Secondary	9,100	9,100	9,100	9,100	9,100	9,100
	Total	9,100	9,100	9,100	9,100	9,100	9,100

8.4.2 Optimization Plan with Incentives

The 2005 North San Joaquin Valley Recycling Study identified a multi-phased implementation strategy for recycled water, with sale to agricultural users outside of the MID and TID service areas as the most cost-effective recycled water use opportunity, which Modesto has been pursuing as a near-term recycled water strategy. Since completion of the 2005 study, further feasibility analysis has been performed, and the concept has been refined to focus on delivery options to DPWD, a CVP contractor that has experienced reductions in CVP entitlements since the early 1990's and is proximate to Modesto and Turlock's wastewater treatment facilities. The use of recycled water by DPWD would provide multiple benefits, including increased supply reliability for over 10,000 acres of prime agricultural land. The City is conducting the following steps to implement the project:

- Seek grant funding for project implementation (federal grant application submitted in 2011).
- Submit the 2010 Feasibility Study to the Bureau of Reclamation for review
- Construct Modesto's Recycled Water Treatment Facility Expansion to enable production of up to 16,600 AFY. This project is currently in design, and is anticipated to be on-line by 2016.

- Prepare Phase 2 of the North Valley Regional Recycled Water Project, which includes additional engineering, permitting and funding studies for project alternatives.
- Prepare Phase 3 of the North Valley Regional Recycled Water Project, to finalize institutional agreements and permitting requirements necessary for the implementation of the near-term phase of the project.

On a long-term basis, the City will also continue to explore regionalization options and regional wastewater treatment opportunities, as identified in Section 8.4.1.

Table 8-6 describes potential measures that can be taken to increase recycled water use. Other incentives have not been identified for the 2010 UWMP, but may be evaluated in future plan updates. Although public education of the benefits of recycled water use and beautification of areas using recycled water supplies are important components to developing positive public perception surrounding recycled water and encouraging widespread recycled water usage, due to the qualitative nature of these measures, it is not possible to project the quantity of recycled water usage that will result from implementation of these measures.

Table 8-6. Measures to Encourage Recycled Water Use (DWR Table 25)

Measure to Promote Recycled Water Usage	Projected Resulting Recycled Water Use, AFY[(a)]
Public Education of the Benefits of Recycled Water Usage	N/A
Beautification of Areas with Recycled Water Usage	N/A

N/A = Not Applicable

Water Code § 10635 (a),(c)

(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

(c) Nothing in this article is intended to create a right or entitlement to water service or any specific level of water service.

9.1 NORMAL YEAR SUPPLY AND DEMAND COMPARISON

9.1.1 City of Modesto

9.1.1.1 City of Modesto Normal Year Supply

As discussed in Chapter 3, until about 2013, the City will continue to conjunctively use groundwater and surface water supplies to meet demands (average groundwater use over the last 10 years is approximately 57 percent of demand). In late 2012, MRWTP Phase Two is anticipated to be completed, and groundwater production will be offset by increased treated surface water use, which will increase groundwater storage. Therefore, the City will meet near-future demands primarily through treated surface water supplies. Reductions in groundwater pumpage will allow groundwater currently in storage to remain in the groundwater basin for future use. As shown in Table 9-1, the City's normal year water supply is projected to grow to a buildout normal year water supply of approximately 104,800 AFY. This represents a 63 percent growth in supply as compared to 2010.

Table 9-1. City of Modesto Normal Year Water Supply, AFY

Supply	2010 (actual)	2015	2020	2025	2030	2035
MID Supply	30,647	67,200	67,200	67,200	67,200	67,200
Groundwater Pumping	33,817	15,700	13,300	20,700	28,800	37,600
Total	64,464	82,900	80,500	87,900	96,000	104,800
% of 2010		129%	125%	136%	149%	163%

9.1.1.2 City of Modesto Normal Year Demand

As shown in Table 9-2, the City's buildout water demand is projected to reach approximately 104,800 AFY in the year 2035. As described in Chapter 4, this water demand projection is based on the City's compliance with its SBx7-7 per capita water use targets (interim target of 256 gpcd in 2015 and final target of 228 gpcd in 2020 and in subsequent years). This represents a demand increase of approximately 63 percent as compared to 2010 demands.

Table 9-2. City of Modesto Normal Year Water Demands, AFY

Supply	2010 (actual)	2015	2020	2025	2030	2035
Demand[(a)]	64,464	82,900	80,500	87,900	96,000	104,800
% of 2010		129%	125%	136%	149%	163%

[(a)] Water demand projection is based on the City's compliance with its SBx7-7 per capita water use targets (interim target of 256 gpcd in 2015 and final target of 228 gpcd in 2020 and in subsequent years) (see Chapter 4).

9.1.1.3 City of Modesto Normal Year Comparison

As shown in Table 9-3, the City is projected to successfully meet demands through 2035.

Table 9-3. City of Modesto Supply and Demand Comparison—Normal Year, AFY (DWR Table 32)

Supply	2010 (actual)	2015	2020	2025	2030	2035
Supply Totals (from Table 9-1)	64,464	82,900	80,500	87,900	96,000	104,800
Demand Totals (from Table 9-2)	64,464	82,900	80,500	87,900	96,000	104,800
Difference	0	0	0	0	0	0
Difference as % of Supply	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Difference as % of Demand	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

9.1.2 Modesto Irrigation District

9.1.2.1 MID Normal Year Urban Supply

MID's total urban supply is projected to increase from the current 33,602 AFY supplied to the City to approximately 67,204 AFY in 2015 and remain at this level during subsequent years as shown in Table 9-4. This assumes that MRWTP Phase Two will be completed in late 2012. This represents a 119 percent growth in urban supply as compared to 2010.

Table 9-4. MID Normal Year Water Supply, AFY

Supply	2010 (actual)	2015	2020	2025	2030	2035
Urban Base Supply	30,647	67,200	67,200	67,200	67,200	67,200
Total Urban Supply	30,647	67,200	67,200	67,200	67,200	67,200
% of 2010		219%	219%	219%	219%	219%

9.1.2.2 MID Normal Year Urban Demand

As shown in Table 9-5, MID's urban water demand is projected to reach approximately 67,204 AFY in the year 2015 and remain at this level during subsequent years. This represents a demand increase of approximately 119 percent as compared to 2010 demands.

Table 9-5. MID Normal Year Water Demands, AFY

Supply	2010 (actual)	2015	2020	2025	2030	2035
Demand	30,647	67,200	67,200	67,200	67,200	67,200
% of 2010		219%	219%	219%	219%	219%

9.1.2.3 MID Normal Year Comparison

As shown in Table 9-6, projected normal year total urban supply is expected to equal or exceed demand in all years.

Table 9-6. MID Supply and Demand Comparison—Normal Year, AFY (DWR Table 32)

	2010 (actual)	2015	2020	2025	2030	2035
Supply Totals	30,647	67,200	67,200	67,200	67,200	67,200
Demand Totals	30,647	67,200	67,200	67,200	67,200	67,200
Difference	0	0	0	0	0	0
Difference as % of Supply	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Difference as % of Demand	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

9.2 SINGLE DRY YEAR SUPPLY AND DEMAND COMPARISON

9.2.1 City of Modesto

9.2.1.1 City of Modesto Single Dry Year Supply

As shown in Table 9-7, the City's projected supply in a single dry year is expected to increase from 64,464 AFY in 2010 to approximately 104,800 AFY in 2035. Assumed MID supplies in a single dry year are based on a 9/42 inch cutback of MID supplies in dry years (equivalent to a 21.4 percent decrease in supplies) as described in Chapter 6. Because groundwater supplies are used to meet demands not met by MID supplies (up to the estimated operational yield of the groundwater supply of 53,500 AFY), total supplies are 100 percent of total demands in all years.

Table 9-7. City of Modesto Single Dry Year Water Supply, AFY

	2010 (actual)	2015	2020	2025	2030	2035
MID Supply[(a)]	30,647	52,800	52,800	52,800	52,800	52,800
Groundwater Pumping	33,817	30,100	27,700	35,100	43,200	52,000
Total	64,464	82,900	80,500	87,900	96,000	104,800
% of Normal	100%	100%	100%	100%	100%	100%

[(a)] Reduction in MID supply as compared to a normal year is based on a 9/42 inch cutback of MID supplies in dry years (equivalent to a 21.4 percent decrease in supplies).

9.2.1.2 City of Modesto Single Dry Year Demand

As shown in Table 9-8, the City's water demand is projected to increase from 64,464 AFY in 2010 to 104,800 AFY in a single dry year at buildout (assumed to occur in 2035 for purposes of this 2010 UWMP). Demands for all single dry year scenarios are equal to normal year demands. Although supplies are reduced in dry years, the City is already implementing the demand management measures associated with Stage 1 of the Water Shortage Contingency Plan. As such, additional demand reductions are not projected unless MID supplies are cut back by more than 25 percent. Given the assumption of a 9/42 inch cutback of MID supplies in dry years (equivalent to a 21.4 percent decrease in supplies), the City's demands are not projected to be reduced through demand management in a single dry year.

Table 9-8. City of Modesto Single Dry Year Water Demands, AFY

	2010 (actual)	2015	2020	2025	2030	2035
Demand	64,464	82,900	80,500	87,900	96,000	104,800
% of Normal	100%	100%	100%	100%	100%	100%

9.2.1.3 City of Modesto Single Dry Year Comparison

As shown in Table 9-9, projected single dry year demand is projected to be met through a combination of surface water and groundwater in all years.

Table 9-9. City of Modesto Supply and Demand Comparison—Single Dry Year, AFY (DWR Table 33)

	2010 (actual)	2015	2020	2025	2030	2035
Supply Totals	64,464	82,900	80,500	87,900	96,000	104,800
Demand Totals	64,464	82,900	80,500	87,900	96,000	104,800
Difference	0	0	0	0	0	0
Difference as % of Supply	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Difference as % of Demand	0%	0%	0%	0%	0%	0%

9.2.2 Modesto Irrigation District

9.2.2.1 MID Single Dry Year Urban Supply

As shown in Table 9-10, in single dry years, MID total urban supply is projected to be equal to normal year total urban supply. Base supply is projected to be approximately 21.4 percent less in single dry years than in normal years (as a result of reduced surface water deliveries). However, it is assumed that the difference between dry year base supply and normal year supply will be available as an allocation on an optional basis at additional cost to the retail supplier.

Table 9-10. MID Single Dry Year Urban Water Supply, AFY

Supply	2010 (actual)	2015	2020	2025	2030	2035
Urban Base Supply	30,647	52,800	52,800	52,800	52,800	52,800
Total Urban Supply	30,647	67,200	67,200	67,200	67,200	67,200
% of Normal Year	100%	100%	100%	100%	100%	100%

9.2.2.2 MID Single Dry Year Urban Demand

As shown in Table 9-11, MID's urban water demand is projected to reach approximately 67,204 AFY by the year 2015 and remain at this level during subsequent years. Due to MID's status as a wholesale supplier, the demand on MID supplies is not expected to decrease in dry years.

Table 9-11. MID Single Dry Year Urban Water Demands, AFY

Demand	2010 (actual)	2015	2020	2025	2030	2035
Demand	30,647	67,200	67,200	67,200	67,200	67,200
% of Normal	100%	100%	100%	100%	100%	100%

9.2.2.3 MID Single Dry Year Urban Comparison

As shown in Table 9-12, projected single dry year total urban supply is expected to meet or exceed demand in all years.

Table 9-12. MID Urban Supply and Demand Comparison – Single Dry Year, AFY (DWR Table 33)

	2010 (actual)	2015	2020	2025	2030	2035
Supply Totals	30,647	67,200	67,200	67,200	67,200	67,200
Demand Totals	30,647	67,200	67,200	67,200	67,200	67,200
Difference	0	0	0	0	0	0
Difference as % of Supply	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Difference as % of Demand	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

9.3 MULTIPLE DRY YEARS SUPPLY AND DEMAND COMPARISON

9.3.1 City of Modesto

9.3.1.1 City of Modesto Multiple Dry Year Supply

As shown in Table 9-13, the City's projected multiple dry year supply is sufficient to meet demands in all years.

Table 9-13. City of Modesto Multiple Dry Year Water Supply, AFY

		5-Year Dry Period Beginning				
		2015	2020	2025	2030	2035
Multiple-dry year first year supply	MID Deliveries[a]	64,320	64,320	64,320	64,320	64,320
	Groundwater Pumpage	18,580	16,180	23,580	31,680	40,480
	Total Supply	82,900	80,500	87,900	96,000	104,800
Multiple-dry year second year supply	MID Deliveries[a]	61,440	61,440	61,440	61,440	[b]
	Groundwater Pumpage	20,980	20,540	28,080	36,320	[b]
	Total Supply	82,420	81,980	89,520	97,760	[b]
Multiple-dry year third year supply	MID Deliveries[a]	58,560	58,560	58,560	58,560	[b]
	Groundwater Pumpage	23,380	24,900	32,580	40,960	[b]
	Total Supply	81,940	83,460	91,140	99,520	[b]
Multiple-dry year fourth year supply	MID Deliveries[a]	55,680	55,680	55,680	55,680	[b]
	Groundwater Pumpage	25,780	29,260	37,080	45,600	[b]
	Total Supply	81,460	84,940	92,760	101,280	[b]
Multiple-dry year fifth year supply	MID Deliveries[a]	52,800	52,800	52,800	52,800	[b]
	Groundwater Pumpage	28,180	33,620	41,580	50,240	[b]
	Total Supply	80,980	86,420	94,380	103,040	[b]

[a] MID deliveries in the 5-year drought periods are based on a 4.3% percent increase in reductions each year up to a 21.4% reduction in the fifth year of the drought.
[b] Supply beyond 2035 has not been evaluated for this 2010 UWMP. These supplies will be evaluated in the 2015 UWMP.

9.3.1.2 City of Modesto Multiple Dry Year Demand

As shown in Table 9-14, water demands for the City in multiple dry year conditions are expected to be equal to normal year demands. Again, because the City is currently in Stage 1 of the Water Shortage Contingency Plan, no additional demand reductions are projected to occur unless MID supplies are cut back by more than 25 percent. Assuming 9/42 inches is the greatest cutback experienced (21.4 percent reduction in MID deliveries), no additional demand reductions are projected to result from implementation of the Water Shortage Contingency Plan (Chapter 10 of this document) in multiple dry years. A cutback of MID by 21.4 percent is the greatest cutback currently expected to occur.

Table 9-14. City of Modesto Multiple Dry Year Water Demands, AFY

	5-Year Dry Period Beginning				
	2015	2020	2025	2030	2035
Multiple-dry year first year demand	82,900	80,500	87,900	96,000	104,800
Multiple-dry year second year demand	82,420	81,980	89,520	97,760	[a]
Multiple-dry year third year demand	81,940	83,460	91,140	99,520	[a]
Multiple-dry year fourth year demand	81,460	84,940	92,760	101,280	[a]
Multiple-dry year fifth year demand	80,980	86,420	94,380	103,040	[a]

[a] Demand beyond 2035 has not been evaluated for this 2010 UWMP. These demands will be evaluated in the 2015 UWMP.

9.3.1.3 City of Modesto Multiple Dry Year Comparison

As shown in Table 9-15, projected multiple dry year supply is sufficient to met demands in all years.

Table 9-15. City of Modesto Supply and Demand Comparison-- Multiple Dry Year, AFY (DWR Table 34)

		5-Year Dry Period Beginning				
		2015	2020	2025	2030	2035
Multiple-dry year first year supply	Supply Totals	82,900	80,500	87,900	96,000	104,800
	Demand Totals	82,900	80,500	87,900	96,000	104,800
	Difference	0	0	0	0	0
	Difference as % of Supply	0%	0%	0%	0%	0%
	Difference as % of Demand	0%	0%	0%	0%	0%
Multiple-dry year second year supply	Supply Totals	82,420	81,980	89,520	97,760	[a]
	Demand Totals	82,420	81,980	89,520	97,760	[a]
	Difference	0	0	0	0	0
	Difference as % of Supply	0%	0%	0%	0%	0%
	Difference as % of Demand	0%	0%	0%	0%	0%
Multiple-dry year third year supply	Supply Totals	81,940	83,460	91,140	99,520	[a]
	Demand Totals	81,940	83,460	91,140	99,520	[a]
	Difference	0	0	0	0	0
	Difference as % of Supply	0%	0%	0%	0%	0%
	Difference as % of Demand	0%	0%	0%	0%	0%
Multiple-dry year fourth year supply	Supply Totals	81,460	84,940	92,760	101,280	[a]
	Demand Totals	81,460	84,940	92,760	101,280	[a]
	Difference	0	0	0	0	0
	Difference as % of Supply	0%	0%	0%	0%	0%
	Difference as % of Demand	0%	0%	0%	0%	0%
Multiple-dry year fifth year supply	Supply Totals	80,980	86,420	94,380	103,040	[a]
	Demand Totals	80,980	86,420	94,380	103,040	[a]
	Difference	0	0	0	0	0
	Difference as % of Supply	0%	0%	0%	0%	0%
	Difference as % of Demand	0%	0%	0%	0%	0%

[a] Supply and demand beyond 2035 has not been evaluated for this 2010 UWMP. These supplies and demands will be evaluated in the 2015 UWMP.

9.3.2 Modesto Irrigation District

9.3.2.1 MID Multiple Dry Year Supply

As shown in Table 9-16, the MID's projected multiple full urban supply is expected to equal full urban normal year supply for all years. MID urban base supply is expected to be reduced by approximately 4.3 percent per year during an extended drought, based on the 1991 cutback of 9/42 inches.

Table 9-16. MID Multiple Dry Year Water Supply, AFY

		5-Year Dry Period Beginning				
		2015	2020	2025	2030	2035
Multiple-dry year first year supply	MID Base Supply[a]	64,320	64,320	64,320	64,320	64,320
	MID Full Supply	67,200	67,200	67,200	67,200	67,200
Multiple-dry year second year supply	MID Base Supply[a]	61,440	61,440	61,440	61,440	[b]
	MID Full Supply	67,200	67,200	67,200	67,200	[b]
Multiple-dry year third year supply	MID Base Supply[a]	58,560	58,560	58,560	58,560	[b]
	MID Full Supply	67,200	67,200	67,200	67,200	[b]
Multiple-dry year fourth year supply	MID Base Supply[a]	55,680	55,680	55,680	55,680	[b]
	MID Full Supply	67,200	67,200	67,200	67,200	[b]
Multiple-dry year fifth year supply	MID Base Supply[a]	52,800	52,800	52,800	52,800	[b]
	MID Full Supply	67,200	67,200	67,200	67,200	[b]

[a] MID base supply in the 5-year drought periods are based on a 4.3% percent increase in reductions each year up to a 21.4% reduction in the fifth year of the drought.
[b] MID supply beyond 2035 has not been evaluated for this 2010 UWMP. These supplies will be evaluated in the 2015 UWMP.

9.3.2.2 MID Multiple Dry Year Demand

Due to MID's status as a wholesale water supplier, demands on MID supplies are not projected to decrease during extended drought, as shown in Table 9-17.

Table 9-17. MID Multiple Dry Year Water Demands, AFY

	5-Year Dry Period Beginning				
	2015	2020	2025	2030	2035
Multiple-dry year first year demand	33,600	67,200	67,200	67,200	67,200
Multiple-dry year second year demand	67,200	67,200	67,200	67,200	[a]
Multiple-dry year third year demand	67,200	67,200	67,200	67,200	[a]
Multiple-dry year fourth year demand	67,200	67,200	67,200	67,200	[a]
Multiple-dry year fifth year demand	67,200	67,200	67,200	67,200	[a]

[a] MID demand beyond 2035 has not been evaluated for this 2010 UWMP. These demands will be evaluated in the 2015 UWMP.

9.3.2.3 MID Multiple Dry Year Comparison

As shown in Table 9-18, projected multiple dry year total urban supply is expected to equal total urban demand for all years. Base urban supplies are expected to decrease by approximately 4.3 percent each year. However, it is assumed that the difference between base supply and normal year supply will be available as an allocation on an optional basis at additional cost to the retail supplier.

Table 9-18. MID Supply and Demand Comparison – Multiple Dry Year, AFY (DWR Table 34)

		5-Year Dry Period Beginning				
		2015	2020	2025	2030	2035
Multiple-dry year first year supply	Supply Totals	67,200	67,200	67,200	67,200	67,200
	Demand Totals	67,200	67,200	67,200	67,200	67,200
	Difference	0	0	0	0	0
	Difference as % of Supply	0%	0%	0%	0%	0%
	Difference as % of Demand	0%	0%	0%	0%	0%
Multiple-dry year second year supply	Supply Totals	67,200	67,200	67,200	67,200	[a]
	Demand Totals	67,200	67,200	67,200	67,200	[a]
	Difference	0	0	0	0	0
	Difference as % of Supply	0%	0%	0%	0%	0%
	Difference as % of Demand	0%	0%	0%	0%	0%
Multiple-dry year third year supply	Supply Totals	67,200	67,200	67,200	67,200	[a]
	Demand Totals	67,200	67,200	67,200	67,200	[a]
	Difference	0	0	0	0	0
	Difference as % of Supply	0%	0%	0%	0%	0%
	Difference as % of Demand	0%	0%	0%	0%	0%
Multiple-dry year fourth year supply	Supply Totals	67,200	67,200	67,200	67,200	[a]
	Demand Totals	67,200	67,200	67,200	67,200	[a]
	Difference	0	0	0	0	0
	Difference as % of Supply	0%	0%	0%	0%	0%
	Difference as % of Demand	0%	0%	0%	0%	0%
Multiple-dry year fifth year supply	Supply Totals	67,200	67,200	67,200	67,200	[a]
	Demand Totals	67,200	67,200	67,200	67,200	[a]
	Difference	0	0	0	0	0
	Difference as % of Supply	0%	0%	0%	0%	0%
	Difference as % of Demand	0%	0%	0%	0%	0%

[a] MID supply and demand beyond 2035 has not been evaluated for this 2010 UWMP. These supplies and demands will be evaluated in the 2015 UWMP.

10.1 OVERVIEW

Water Code § 10632

The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

(a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.

(b) An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.

(c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.

(d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.

(e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.

(f) Penalties or charges for excessive use, where applicable.

(g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.

(h) A draft water shortage contingency resolution or ordinance.

(i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

In 1991, the City adopted its current Drought Contingency Plan. A copy of the City's Drought Contingency Plan is provided in Appendix K. This chapter describes the plan, including the following:

- Stages of action,
- Catastrophic supply interruption plan,
- Prohibitions, consumption reduction methods and penalties,
- Analysis of revenue impacts, and
- Draft ordinance and use monitoring.

Because MID is a wholesale supplier and does not directly serve any urban customers, MID does not have a separate Water Shortage Contingency Plan.

10.2 STAGES OF ACTION

The stages of action in the City's Drought Contingency Plan specify reduction objectives ranging from 10 to 50 percent of normal demand, depending on the water shortage stage declared. Modesto's Director of Public Works is responsible for declaring a particular stage and reduction percentage. This declaration is based on his/her judgment as to the degree of the immediate or future supply deficiency. Triggers for water shortage stage determination were created to aid in declaring a particular water shortage stage. All three stages prohibit certain water uses at specific times, with prohibitions becoming stricter as supplies continue to decrease. Table 10-1 summarizes the three stages, their triggers and their corresponding reduction objectives.

Table 10-1. Rationing Stages to Address Water Supply Shortages (DWR Table 35)

Stage Number	Water Supply Condition	Water Supply Condition Triggers for Stage Determination	Supply Shortage (%) (Demand Reduction Objective % from baseline)
I	Minor Shortage Potential	• Below average rainfall in the previous 12 to 24 months • 10% or more municipal wells out of service due to noncompliance with drinking water standards • Irrigation allotments by local irrigation districts reduced by 10% • Warm weather patterns typical of summer months	10% to 20%
II	Moderate Shortage Potential	• Below average rainfall in the previous 24 to 36 months • Prolonged periods of low water pressure • 10% or more of municipal wells out of service • Irrigation allotments by local irrigation districts reduced by 25% • Warm weather patterns typical of summer months	20% to 35%
III	Critical Shortage Potential	• Below average rainfall in the previous 24 to 48 months • Prolonged periods of low water pressure • 10% or more of municipal wells out of service due to noncompliance with drinking water standards. • Irrigation allotments by local irrigation districts reduced by 50% • Warm weather patterns typical of summer months	35% to 50%

In the summer of 2002, water pressures in the City dipped below City and State water system standards. In response, the Modesto City Council adopted Stage I restrictions of the Drought Contingency Plan on March 25, 2003. Those restrictions went into effect on May 1, 2003 and are still in effect.

10.3 CATASTROPHIC SUPPLY INTERRUPTION PLAN

The City has prepared an *Emergency Operations Manual* which presents specific actions and procedures to follow during a catastrophic event interrupting either the City's supplies or MID's urban supplies. These procedures include the immediate establishment of an Emergency Operations Center (EOC) which can direct actions to maintain an emergency water supply and announce water reduction orders. Table 10-2 details preparation actions to be taken in event of a catastrophe.

Table 10-2. Preparation Actions for a Catastrophe

Possible Catastrophe	Preparation Actions
Regional Power Outage	Establish Emergency Operations Center to: • Implement Emergency Operations Manual. • Direct actions to maintain an emergency water supply. • Announce water reduction order.
Earthquake	
Other	

10.4 PROHIBITIONS, CONSUMPTION REDUCTION METHODS AND PENALTIES

Once the Director of Public Works declares a particular water shortage stage, a series of requested consumer actions is announced to the community. Many of these requested actions are voluntary, but the majority are required by the City. Table 10-3 summarizes the City's Requested Consumer Actions listed by water shortage stage. Stage III (the most restrictive stage) includes the requested consumer actions that have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.

During a declared water shortage stage, penalties for excess water use exist in the form of administrative fees or fines. These fines are assessed based on the number of violations a particular customer accumulates during a particular stage. The penalty for the first violation for all three stages consists of a warning only, requiring no fine. However, a fine is issued for a second violation, and increasingly expensive fines are issued for any subsequent violations thereafter (all penalties are assessed for violations occurring within 12 months of first violation). Table 10-4 summarizes the administrative fines for excessive water use.

Table 10-3. Requested and Mandatory Water Use Prohibitions and Consumption Reduction Methods (DWR Tables 36 and 37)		
Stage	Requested and Mandatory Consumer Actions	Water Use Reduction (%)
I	• Outdoor water use prohibited daily from 12:00 noon to 7:00 pm (implemented through City-wide rotation schedule). • Car washing subject to above-cited limitations with use of a positive shutoff nozzle. • Hosing concrete areas, building exteriors, etc., may only be done with a City-issued permit and only with the use of a positive shutoff nozzle. • Water leaks, once identified, must be repaired within 24 hours. • Restaurants encouraged to serve water only on request. • New landscaping to comply with existing and future landscape ordinances. • Water meter installation on all new single-family homes.	10% - 20%
II	• Outdoor water use prohibited daily from 9:00 am to 7:00 pm (implemented through City-wide rotation schedule). • No watering of front yards except for trees and shrubs by hand; and vegetation maintained through drip irrigation, back yard watering subject to above-cited limitations. • Car washing subject to above-cited limitations with use of a positive shutoff nozzle. • Hosing concrete areas, building exteriors, etc., is prohibited except for health and safety concerns. • Water leaks, once identified, must be repaired within 24 hours. • Restaurants prohibited from serving water except upon request. • New landscaping to comply with existing and future landscape ordinances. • Mandatory retrofit of low flow showerheads in homes when building remodeling occurs. • No use of outdoor fountains except for maintenance purposes. • Water meter installation on all new single-family homes. • Creation of community-based task force to deal with possible implementation of Stage III restrictions.	20% - 35%
III	• No outdoor water use except for trees and shrubs by hand, and vegetation maintained through drip irrigation. • Car washing permitted at car wash facilities only. • Hosing concrete areas, building exteriors, etc., is prohibited except for health and safety concerns. • Water leaks, once identified, must be repaired within 24 hours. • Restaurants prohibited from serving water except upon request. • Mandatory retrofit of low flow showerheads and toilets in homes when building remodeling occurs. • No use of outdoor fountains except for maintenance purposes. • Moratorium on all new landscaping. • Building moratorium on all new water connections, including new swimming pools.	35% - 50%

Table 10-4. Penalties and Charges for Excessive Water Use (DWR Table 38)	
Stage	Penalties and Charges
I	$50 Administrative fee assessed upon second violation $200 Administrative fee assessed upon third violation (includes meter installation) $250 Administrative fee assessed for each subsequent violation
II	$150 Administrative fee assessed upon second violation $250 Administrative fee assessed upon third violation (includes meter installation) $300 Administrative fee assessed for each subsequent violation
III	$200 Administrative fee assessed upon second violation $300 Administrative fee assessed upon third violation (includes meter installation) $400 Administrative fee assessed for each subsequent violation

10.5 ANALYSIS OF REVENUE IMPACTS OF REDUCED SALES DURING SHORTAGES

Water operations are organized as an Enterprise Fund in which the costs of providing goods or services to the general public on a continuing basis are financed or recovered primarily through user charges. The water funds have historically brought in enough revenue to allow inter-fund transfers for repayment of contributed capital or to fund capital improvement projects and information and technology projects.

Water shortages that result in the implementation of the Water Shortage Contingency Plan are expected to result in reduced water usage, and accordingly, reduced operating revenues. Table 10-5 presents the projected revenue impacts resulting from implementation of the Water Shortage Contingency Plan based on projected FY 2010/11 revenue and expenses.

Table 10-5. Projected Revenue Impacts from Water Shortage Contingency Plan

	Projected FY 2010/11 [a]	FY 2010/2011 Stage I [b]	FY 2010/11 Stage II [c]	FY 2010/11 Stage III [d]
Expenditures				
Operating Expenses	$33,562,270	$33,562,270	$33,562,270	$33,562,270
Total Debt Services	$15,123,805	$15,123,805	$15,123,805	$15,123,805
Total Expenditures	$48,686,075	$48,686,075	$48,686,075	$48,686,075
Revenue Sources				
Charges for Services	$1,353,521	$1,353,521	$1,353,521	$1,353,521
Water Sales– Flat Rates	$22,921,886	$22,921,886	$22,921,886	$22,921,886
Water Sales – Metered Rates	$28,015,639	$28,015,639	$21,011,729	$14,007,820
Misc Revenue	$52,200	$52,200	$52,200	$52,200
Development Fees	$308,237	$308,237	$308,237	$308,237
Interest Income	$265,698	$265,698	$265,698	$265,698
Rental Income	$31,200	$31,200	$31,200	$31,200
Service Credits	$2,106,146	$2,106,146	$2,106,146	$2,106,146
GFParks Loan Interest	$52,020	$52,020	$52,020	$52,020
Service Credits for Meter Crew	$449,800	$449,800	$449,800	$449,800
Gross Operating Revenues	$55,556,347	$55,556,347	$48,552,437	$41,548,528
Net Operating Revenue[e]	$21,994,077	$21,994,077	$14,990,167	$7,986,258

(a) Projected FY 2010/11 expenditures and revenue sources provided by the City of Modesto Finance Department on 01/27/11.
(b) FY 2010/11 projected revenue and expenses assume continuation of current Stage I water shortage classification. Therefore, no revenue reductions projected as compared to "normal."
(c) Assumes 25% water use reduction for metered accounts from "normal" where "normal" is equal to projected FY 2010/11.
(d) Assumes 50% water use reduction for metered accounts from "normal" where "normal" is equal to projected FY 2010/11.
(e) Net Operating Revenue = Gross Operating Revenues – Operating Expenses.

The City is currently in Stage I of the Water Shortage Contingency Plan. As such, the Stage I revenue and expenditures are equal to those projected for FY 2010/11. Implementation of Stage II and Stage III restrictions are expected to have the following impacts on revenues:

- Water sales based on metered rates are expected to decrease by 25 percent under Stage II;
- Water sales based on metered rates are expected to decrease by 50 percent under Stage III; and
- Water sales based on flat rates are anticipated to remain the same as the projected FY 2010/11 flat rate water sales under all three stages due to the nature of the flat rate structure.

It should be noted that operating expenses may also be impacted under Stages II or III due to lower customer water demands which may result in a need to purchase less surface water and/or pump less groundwater; however, the potential decrease in operating expenses has not been estimated for the purposes of this analysis. As shown in Table 10-5, although new operating revenue is anticipated to decrease under Stage II and III, the net operating revenue is still positive, and does not result in a revenue shortfall. The primary reason for this is that the revenue

for flat rate water sales provides a level of financial stability, even when water uses are reduced. However, in the future, as the City converts more of its flat rate accounts to metered accounts, it will become more vulnerable to revenue impacts as a result of water use reductions.

If needed, funding for water shortages will come through a temporary rate increase and/or fund reserves. Other potential funding sources and/or shortage management options include close monitoring, managing the short-term water reduction plan, initiating a water contingency fund and/or temporary deferral of capital improvement projects. There may be additional outside funding sources made available to water agencies under a water emergency situation (Stage III).

Expenditure impacts resulting from implementation of the Water Shortage Contingency Plan, if any, will be addressed through implementation of the same measures identified to address revenue impacts: rate adjustments, water shortage contingency fund, temporary deferral of CIP projects, and additional outside funding sources. Proposed measures for overcoming revenue and expenditure impacts are summarized in Table 10-6.

Table 10-6. Proposed Measures to Overcome Revenue and Expenditure Impacts

Measure	Check if Discussed
Rate Adjustment	✓
Water Shortage Contingency Fund	✓
Temporary Deferral of CIP Projects	✓
Additional Outside Funding Sources	✓

10.6 WATER USE MONITORING

The City's water system is supplied from surface water and from 92 operational groundwater wells. MID's MRWTP and the City's wells have flow monitoring devices that record the amount of water entering the City's distribution system. The flow devices are connected to the City's SCADA System, allowing past and real-time flow trends to be analyzed at the Control Center and actual water use reductions to be determined. Further, the City is in the process of converting all customers to meters. Once the conversion to meters is complete, the City will be able to determine reductions in demand based on metered usage. Table 10-7 summarizes the City's water use monitoring mechanisms.

Table 10-7. Water Use Monitoring Mechanisms

Mechanism for Determining Actual Reductions	Type of Data Expected
MRWTP and Groundwater Monitoring	Production Volume
Water Meters	Demand

10.7 DRAFT RESOLUTIONS

In March 2003, the City adopted Resolution 2003-162 implementing Stage I of the City's Drought Contingency Plan as of May 1, 2003. A copy of Resolution 2003-162 is included in Appendix K. The City is currently still in Stage 1 of the Water Shortage Contingency Plan. If the City needed to implement another stage of the Drought Contingency Plan in the future, a similar resolution would be drafted for City Council consideration and approval.

MID does not have a specific Water Shortage Contingency Plan; however, water shortage provisions are included in the *Amended and Restated Treatment and Delivery Agreement Between Modesto Irrigation District and City of Modesto.* Those provisions will be implemented by MID as needed if a shortage of MID's supplies were to occur. A draft resolution citing and implementing these provisions is provided in Appendix K.

11.1 PLAN ADOPTION

Water Code §10642

After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

This Joint City of Modesto/MID 2010 UWMP was adopted by the Modesto City Council and by the MID Board of Directors on May 24, 2011. Resolutions for adoption by the Modesto City Council and MID Board of Directors are included in Appendix B.

11.2 PLAN SUBMITTAL TO DWR AND CALIFORNIA STATE LIBRARY

Water Code §10644(a)

An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.

Within 30 days of adoption of the 2010 UWMP, the adopted 2010 UWMP will be provided to the Department of Water Resources and the California State Library.

In addition, the City and MID will submit the adopted 2010 UWMP to DWR using the DWR Online Submittal Tool (DOST) when the DOST system becomes available.

11.3 PROVISION OF ADOPTED PLAN TO CITIES, COUNTIES AND OTHER STAKEHOLDERS

Water Code §10635(b)

The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.

Water Code §10644(a)

An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.

Within 30 days of adoption of the 2010 UWMP, the adopted 2010 UWMP, including the Water Supply Reliability section, will be provided to the following agencies:

- City of Ceres,
- City of Turlock,
- City of Waterford,
- Stanislaus County[1], and
- Turlock Irrigation District.

11.4 PLAN AMENDMENTS AND CHANGES

Should this 2010 UWMP be amended or changed, copies of amendments or changes to the plan shall be submitted to DWR, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.

11.5 PLAN AVAILABILITY

Water Code §10645

Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

Within 30 days of submitting the adopted 2010 UWMP to DWR, copies of the adopted 2010 UWMP will be made available during normal business hours at the following locations:

- City of Modesto, Public Works Department, 1010 Tenth Street, 4th Floor, Modesto
- MID Secretary's Office, 1231 Eleventh Street, Modesto

Copies of the adopted 2010 UWMP will also be available on the City and MID websites:

- City of Modesto Public Works Department website (http://www.ci.modesto.ca.us/pwd)
- MID website (http://www.mid.org/water/uwmp)

[1] Stanislaus County is the governing agency for the communities of Del Rio, Empire, Hickman, Grayson and Salida.

11.6 PLAN IMPLEMENTATION

Water Code §10643

An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.

Both the City of Modesto and MID are committed to the implementation of the programs discussed in this 2010 UWMP. In particular, the City, with assistance from MID as appropriate, will implement the conservation programs outlined in the City's Conservation Plan (as summarized in Chapter 5) to reduce per capita water use and meet the City's SBx7-7 per capita water use targets for 2015 and 2020. Also, the City will continue to pursue potential future water supplies, such as the proposed RSWSP, to enhance the reliability of the City's water supply portfolio to meet the future needs of the City's water service area.