



City of Modesto



Modesto Irrigation District



City of Modesto / Modesto Irrigation District

## **Joint Urban Water Management Plan 2005 Update**

May 2007

*Final Report*



## **Table of Contents**

<b>Executive Summary</b> .....	<b>ES-1</b>
<b>ES-1 Introduction and Background</b> .....	<b>ES-1</b>
ES-1.1 Background: City of Modesto .....	ES-1
ES-1.2 Background: Modesto Irrigation District .....	ES-2
ES-1.3 City of Modesto/MID Service Area .....	ES-5
ES-1.4 Agency Coordination, Notification, & Participation.....	ES-8
<b>ES-2 Summary of Supply and Demand</b> .....	<b>ES-10</b>
<b>ES-3 Supply Reliability</b> .....	<b>ES-14</b>
ES-3.1 Projected Water Supplies.....	ES-15
<b>ES-4 Demand Management, Conservation, and Future Water Supply Projects</b> .	<b>ES-20</b>
ES-4.1 Future Water Supply Options.....	ES-21
<b>ES-5 Wastewater and Recycled Water</b> .....	<b>ES-22</b>
ES-5.1 Wastewater Quantity, Quality and Current Issues .....	ES-22
<b>ES-6 Water Shortage Contingency Plan</b> .....	<b>ES-25</b>
ES-6.1 Draft Ordinance and Use Monitoring.....	ES-26
<b>Chapter 1 Introduction</b> .....	<b>1-1</b>
1.2 Note to Reviewer .....	1-1
1.3 Background and Anticipated Benefits .....	1-1
1.4 Agency Coordination, Notification, & Participation.....	1-9
1.5 Plan Updates .....	1-10
1.6 Public Participation .....	1-11
<b>Chapter 2 Supplier Service Area</b> .....	<b>2-1</b>
2.1 City of Modesto Service Area .....	2-1
2.2 Modesto Irrigation District Service Area.....	2-1
2.3 Surface Water Facilities .....	2-2
2.4 Raw Water Reservoirs .....	2-2
2.5 Climate .....	2-4
2.6 Other Demographic Factors.....	2-5
2.7 Population Projections .....	2-5
<b>Chapter 3 Water Supply</b> .....	<b>3-1</b>
3.1 Groundwater .....	3-1
3.2 Exchange or Transfer Opportunities .....	3-5
3.3 Desalinated Water .....	3-6
3.4 Wholesale Supplies .....	3-6
3.5 Summary of Current and Future Water Supplies.....	3-8
<b>Chapter 4 Water Demand</b> .....	<b>4-1</b>
4.1 Overview of Water Use .....	4-1
4.2 Past, Current and Projected Water Use.....	4-1
4.3 Sales to Other Agencies .....	4-5
<b>Chapter 5 Demand Management and Conservation</b> .....	<b>5-1</b>
5.1 Background.....	5-1
5.2 Demand Management Measures.....	5-2
5.3 Summary and Potential Options .....	5-13
<b>Chapter 6 Water Supply Reliability</b> .....	<b>6-1</b>
6.1 Reliability and Vulnerability .....	6-1
6.2 Projected Water Supplies .....	6-2

6.3 Supply Inconsistencies .....	6-8
<b>Chapter 7 Water Quality Impacts on Reliability .....</b>	<b>7-1</b>
7.1 Water Quality Impacts.....	7-1
7.2 Implications for Water Management .....	7-2
<b>Chapter 8 Wastewater and Recycled Water .....</b>	<b>8-1</b>
8.1 Coordination.....	8-1
8.2 Wastewater Quantity, Quality and Current Issues .....	8-2
8.3 Wastewater Disposal and Potential Recycled Water Uses.....	8-4
8.4 Potential and Projected Use, Optimization Plan with Incentives.....	8-10
<b>Chapter 9 Supply and Demand Comparison.....</b>	<b>9-1</b>
9.1 Normal Year.....	9-1
9.2 Single Dry Year.....	9-4
9.3 Multiple Dry Years.....	9-6
<b>Chapter 10 Water Shortage Contingency Plan .....</b>	<b>10-1</b>
10.1 Stages of Action.....	10-1
10.2 Estimate of Minimum Supply for Next Three Years .....	10-2
10.3 Catastrophic Supply Interruption Plan .....	10-3
10.4 Prohibitions, Consumption Reduction Methods, and Penalties .....	10-4
10.5 Analysis of Revenue Impacts of Reduced Sales During Shortages .....	10-6
10.6 Draft Ordinance and Use Monitoring .....	10-8
<b>Chapter 11 Adoption and Implementation of UWMP.....</b>	<b>11-1</b>
11.1 Provision of Water Service Reliability Section .....	11-1
11.2 Adoption.....	11-1
11.3 Implementation .....	11-2
<b>References .....</b>	<b>R-1</b>

**List of Tables**

<b>Table ES-1: Amount of Groundwater Projected to be Pumped in Modesto and Outlying Areas<sup>a</sup> – Normal Average Annual Demands</b>	<b>ES-7</b>
<b>Table ES-2: Coordination with Appropriate Agencies</b>	<b>ES-9</b>
<b>Table ES-3: Current and Planned Water Supplies in City of Modesto and Outlying Areas (AFY) – Normal Average Annual Demands</b>	<b>ES-10</b>
<b>Table ES-4: Past, Current and Projected Number of Accounts and Water Deliveries (AFY)<sup>a,b,c,d,e</sup></b>	<b>ES-11</b>
<b>Table ES-5 City of Modesto Total Water Use (AFY)</b>	<b>ES-12</b>
<b>Table ES-6 City of Modesto Wholesale Supply Reliability (% of Normal AFY)</b>	<b>ES-14</b>
<b>Table ES-7 Projected Normal and Dry Year Supply and Demand for the City of Modesto and Outlying Areas (AFY)<sup>a,b,c</sup></b>	<b>ES-16</b>
<b>Table ES-8 Projected MID Normal and Dry Year Urban Supply and Demand (AFY)</b>	<b>ES-18</b>
<b>Table ES-9: Summary of Demand Management Measures</b>	<b>ES-20</b>
<b>Table ES-10 Future City of Modesto Water Supply Projects (AFY)<sup>a</sup></b>	<b>ES-21</b>
<b>Table ES-11 Wastewater Collection and Treatment (AFY)<sup>a</sup></b>	<b>ES-23</b>
<b>Table ES-12 Disposal of Wastewater (Non-recycled water - AFY)<sup>a</sup></b>	<b>ES-23</b>
<b>Table ES-13 Actual and Potential Recycled Water Use (AFY)</b>	<b>ES-24</b>
<b>Table ES-14 Phasing Criteria and Demand Reductions for Water Shortage Stages</b>	<b>ES-25</b>
<b>Table ES-15 Proposed Measures to Overcome Revenue and Expenditure Impacts</b>	<b>ES-26</b>
<b>Table ES-16 Water Use Monitoring Mechanisms</b>	<b>ES-27</b>
<b>Table 1-1: Coordination with Appropriate Agencies</b>	<b>1-9</b>
<b>Table 2-1: MID Irrigation Facilities</b>	<b>2-2</b>

Table 2-2: Modesto Climate	2-5
Table 2-3: Basis for Population Assumptions for City of Modesto and Outlying Areas Served by the City of Modesto	2-6
Table 2-4: Population Served by the City of Modesto – Current and Projected <sup>a</sup>	2-7
Table 3-1: Amount of Groundwater Pumped (AFY) <sup>a</sup>	3-1
Table 3-2: Amount of Groundwater Projected to be Pumped in the City of Modesto and Outlying Areas <sup>a</sup> - Normal Average Annual Demands <sup>a</sup>	3-3
Table 3-3: City of Modesto Transfer and Exchange Opportunities	3-5
Table 3-4: MID Transfer and Exchange Opportunities	3-5
Table 3-5: City of Modesto Opportunities for Desalinated Water <sup>a</sup>	3-6
Table 3-6: MID Opportunities for Desalinated Water <sup>a</sup>	3-6
Table 3-7: City of Modesto Demand Projections Provided to Wholesale Suppliers (AFY) 7	3-7
Table 3-8: City of Modesto Wholesalers Identified and Quantified (AFY)	3-8
Table 3-9: City of Modesto Current and Planned Water Supplies (AFY)	3-9
Table 3-10: MID Current and Planned Water Supplies (AFY)	3-9
Table 4-1: Unit Water Use Factor by Water Use Sector <sup>a</sup>	4-2
Table 4-2: City of Modesto Past, Current and Projected Number of Accounts	4-2
Table 4-3: MID Past, Current and Projected Number of Accounts and Water Deliveries (AFY)	4-4
Table 4-4: Sales to Other Agencies (AFY)	4-5
Table 4-5: Sales to Other Agencies (AFY)	4-5
Table 4-6 City of Modesto Additional Water Uses and Losses (AFY)	4-5
Table 4-7 City of Modesto Total Water Use (AFY) <sup>a</sup>	4-6
Table 4-8 MID Additional Water Uses and Losses (AFY)	4-6
Table 4-9 MID Domestic Total Water Use (AFY)	4-6
Table 5-1: Summary of Demand Management Measures	5-1
Table 5-2: City of Modesto Metered Usage Rates and Charges	5-5
Table 5-3: City of Modesto Current Water Rates and Charges	5-10
Table 5-4 Evaluation of Non-Implemented DMMs and Planned Water Supply Projects (AFY) <sup>a</sup>	5-13
Table 5-5 Future City of Modesto Water Supply Projects (AFY)	5-14
Table 5-6 Future MID Urban Water Supply Projects (AFY)	5-14
Table 6-1 Factors Resulting in Inconsistency of Supply	6-2
Table 6-2 MID Supply Shortages and Corresponding Demand Reductions	6-3
Table 6-3 Basis for City of Modesto & MID Water Year Data	6-4
Table 6-4 Projected City of Modesto Normal and Dry Year Supply and Demand (AFY) <sup>a,b</sup>	6-5
Table 6-5 Projected MID Normal and Dry Year Urban Supply and Demand (AFY)	6-7
Table 6-6 City of Modesto Wholesale Supply Reliability (% of Normal AFY)	6-8
Table 6-7 Factors Resulting in Inconsistency of Wholesaler’s Supply	6-9
Table 7-1 Current and Projected Water Supply Changes due to Water Quality (%)	7-2
Table 8-1 Northern San Joaquin Valley Water Reclamation Project Participating Agencies	8-2
Table 8-2 Wastewater Collection and Treatment (AFY) <sup>a</sup>	8-4
Table 8-3 Disposal of Wastewater (Non-recycled water - AFY)	8-5
Table 8-4 Actual and Potential Recycled Water Use (AFY)	8-6
Table 8-5 Current and Projected Recycled Water Use (AFY)	8-11
Table 8-6 Recycled Water Use – 2000 Projection Compared with Actual 2005 Use (AFY) 12	8-12
Table 8-7 Measures to Promote Recycled Water Usage	8-13

Table 9-1 City of Modesto Normal Water Supply (AFY)	9-1
Table 9-2 City of Modesto Normal Year Water Demands (AFY)	9-1
Table 9-3 City of Modesto Supply and Demand Comparison (AFY)	9-2
Table 9-4 MID Normal Water Supply (AFY)	9-2
Table 9-5 MID Normal Year Water Demands (AFY)	9-2
Table 9-6 MID Supply and Demand Comparison (AFY)	9-4
Table 9-7 City of Modesto Single Dry Year Water Supply (AFY)	9-4
Table 9-8 City of Modesto Single Dry Year Water Demands (AFY)	9-5
Table 9-9 City of Modesto Single Dry Year Supply and Demand Comparison (AFY)	9-5
Table 9-10 MID Single Dry Year Urban Water Supply (AFY)	9-5
Table 9-11 MID Single Dry Year Urban Water Demands (AFY)	9-6
Table 9-12 MID Single Dry Year Urban Supply and Demand Comparison (AFY)	9-6
Table 9-13 City of Modesto Multiple Dry Year Water Supply (AFY)	9-6
Table 9-14 City of Modesto Multiple Dry Year Water Demands (AFY)	9-8
Table 9-15 City of Modesto Multiple Dry Year Supply and Demand Comparison (AFY)	9-9
Table 9-16 MID Multiple Dry Year Water Supply (AFY)	9-10
Table 9-17 MID Multiple Dry Year Water Demands (AFY)	9-11
Table 9-18 MID Multiple Dry Year Supply and Demand Comparison (AFY)	9-12
Table 10-1 Phasing Criteria for Water Shortage Stage Determination	10-2
Table 10-2 Water Supply Shortage Stages of Action	10-2
Table 10-3 Three-Year Estimated Minimum Water Supply (AFY)	10-3
Table 10-4 Preparation Actions for a Catastrophe	10-3
Table 10-5 Requested and Mandatory Water Use Prohibitions	10-5
Table 10-6 Stage-Wise Administrative Fines for Excessive Water Use	10-6
Table 10-7: Projected Revenue Impacts from Water Shortage Contingency Plan	10-7
Table 10-8 Proposed Measures to Overcome Revenue and Expenditure Impacts	10-8
Table 10-9 Water Use Monitoring Mechanisms	10-8

**List of Figures**

Figure ES-1: City of Modesto Service Area	ES-3
Figure ES-2: MID Service Area	ES-4
Figure ES-3: City of Modesto Current and Projected Supply and Demand	ES-13
Figure 1-1: Modesto Vicinity Map	1-3
Figure 1-2: Groundwater Subbasins underlying the City of Modesto	1-5
Figure 1-3: City of Modesto Service Area	1-6
Figure 1-4: MID Service Area	1-8
Figure 2-1: Major Water Facilities in the City of Modesto Service Area	2-3
Figure 8-1: City of Modesto WWTP Schematic	8-3
Figure 9-1: City of Modesto Current and Projected Supply and Demand	9-3

**Appendices**

Appendix A – UWMP Reviewer’s Guide	
Appendix B – Water Supply Projections Assuming SWSP PhaseThree MRWTP	
Appendix C – Resolutions for UWMP Adoption	
Appendix D – Urban Water Management Planning Act	
Appendix E – Treatment and Delivery Agreement	
Appendix F – SWRCB Order Approving MID Transfer to City of Modesto	
Appendix G – Notice of Public Hearings	
Appendix H – Integrated Groundwater Management Plan for the Modesto Subbasin	
Appendix I – Water Conservation Education and Literature	
Appendix J – Water Shortage Contingency Plan	
Appendix K – Emergency Operations Manual	
Appendix L – Public Review Comments	
Appendix M – Modesto City Council Resolution 2006-508 (SB 1087 Resolution)	
Appendix N – Discussion on Operational Yield for the 2005 Urban Water Management Plan	

## **List of Abbreviations**

AF	Acre-feet
AFY	Acre-feet per year
CCR	California Code of Regulations
CWC	California Water Code
Contingency Plan	Urban Water Shortage Contingency Plan
DWR	California Department of Water Resources
EIR	Environmental Impact Report
EOC	Emergency Operations Center
FY	Fiscal Year
GAC	Granular Activated Carbon
GIS	Geographical Information Systems
GMP	Groundwater Management Plan
GPA	General Plan Amendments
gpd	Gallons per day
GPCD	Gallons per capita per day
MCL	Maximum Contaminant Level
MID	Modesto Irrigation District
MDWP	Modesto Domestic Water Project
MGD	Million gallons per day
MRWTP	Modesto Regional Water Treatment Plant
msl	Mean Sea Level
NPDES	National Pollutant Discharge Elimination System
NPU	Neighborhood Preservation Unit
SCADA	Supervisory Control and Data Acquisition
SWRCB	State Water Resources Control Board
SWSP	Surface Water Supply Project (with TID)
TDA	The Treatment and Delivery Agreement Among the Modesto Irrigation District, City of Modesto, and Del Este Water Company
TID	Turlock Irrigation District
ULFT	Ultra Low Flow Toilet
UWMP	Urban Water Management Plan
WDR	Waste Discharge Requirements



## **Executive Summary**

## Executive Summary

### ES-1 Introduction and Background

The Urban Water Management Planning Act was 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 Urban Water Management Plan every five years.

In recognition of the State's requirements, the City of Modesto (City) and the Modesto Irrigation District (MID) have prepared this joint Urban Water Management Plan (UWMP) for 2005. 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 of Modesto's water service area.<sup>1</sup> The signed Resolutions of Plan Adoption for this UWMP were attached to the cover letter addressed to the Department of Water Resources, and copies are included in Appendix C. This plan includes all information necessary to meet the requirements of the Urban Water Management Planning Act, included as Appendix D of this document.

#### ES-1.1 Background: City of Modesto

The City of Modesto 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. Groundwater levels have declined from 1924 through current years, particularly in the downtown area, due to increasing urban uses. 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 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 and storage and delivery facilities, which were completed in January 1995. Phase Two of this project includes expansion of the Modesto Regional Water Treatment Plant (MRWTP), built and operated by MID, to treat an additional 30 MGD.

In July of 1995, the City of Modesto acquired the 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 of Modesto 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, Salida, Grayson, Empire 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 from groundwater. TID currently serves only agricultural customers and does not supply water for municipal uses. The City recently entered into an agreement with TID to participate in design of a TID Surface Water Supply Project (SWSP) to be located east of Modesto on the south side of the Tuolumne River. Modesto intends to enter into a future Treatment and Delivery Agreement (TDA) for delivery of 12,881 AFY (11.5 MGD) of TID surface water to the south Modesto area. This will enhance Modesto's ability to manage its surface and groundwater supplies conjunctively. For the purposes of this study, the SWSP is assumed to be operational in the year 2011.

Figure ES-1 shows the City of Modesto's water service area. The City of Modesto is currently dependent on groundwater for up to 60 percent of its total supply during summer and fall months. The City will

---

<sup>1</sup> MID has projected deliveries to additional urban areas outside the City of Modesto in future years. These deliveries will be addressed in subsequent sections of this UWMP.

continue to use groundwater pumping to meet demands until construction of Phase Two of the MRWTP is completed in 2009. Upon completion of Phase Two of the MRWTP, the City will increase surface water use and reduce groundwater pumping to below current usage, allowing groundwater supplies to accumulate (or be “bank” or saved) in the aquifer for use in meeting normal and dry year demands in the future. This methodology is known as ‘in-lieu’ groundwater banking. Additional groundwater supplies would be banked if the City opts to participate in the construction of the SWSP project.

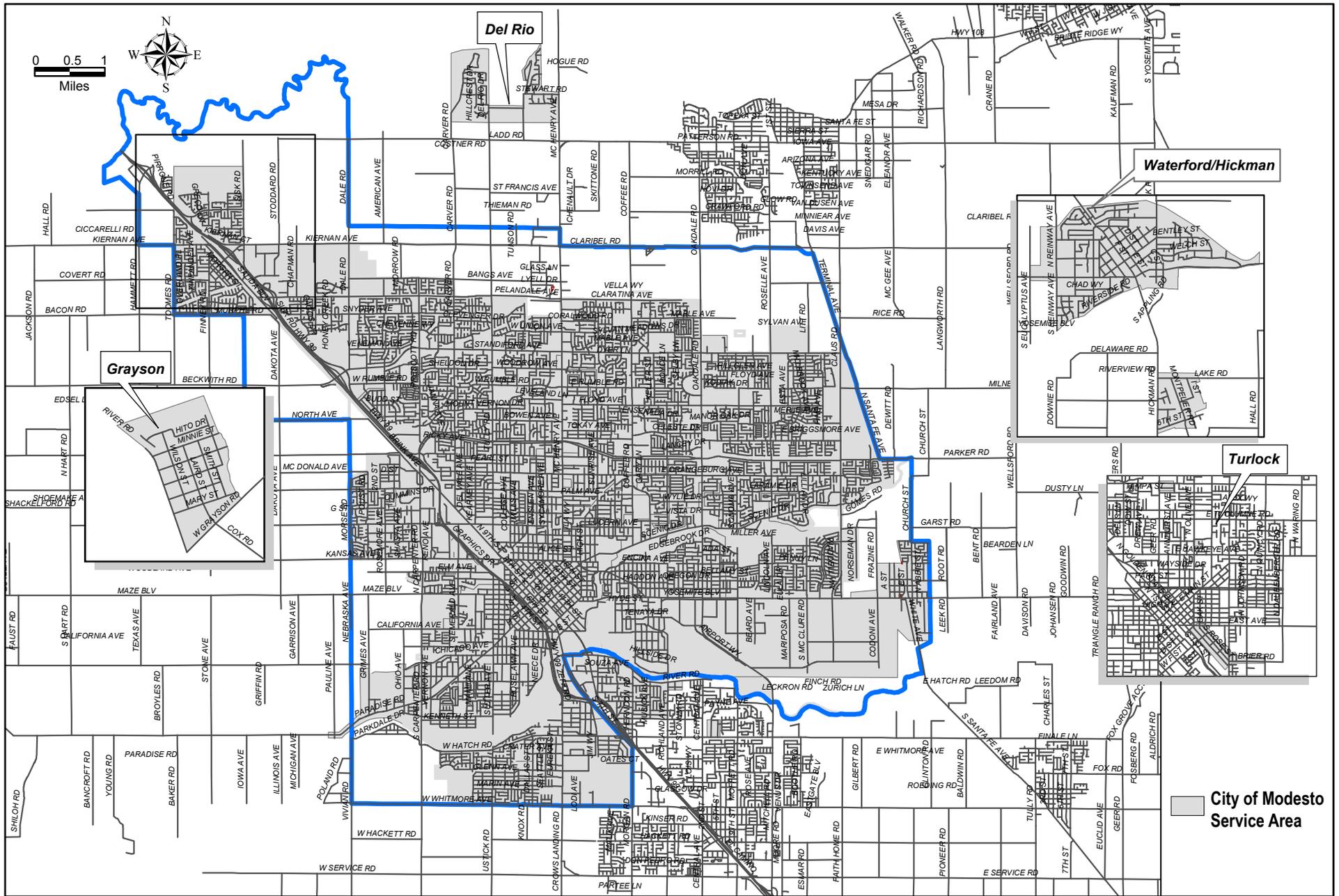
## ES-1.2 Background: Modesto Irrigation District

Modesto Irrigation District (MID) was formed as the second irrigation district in California in 1887. MID developed numerous water rights and facilities for providing agricultural irrigation water from the Tuolumne River as well as groundwater supplies for agricultural uses. Figure ES-2 shows MID’s service area.

MID is primarily an agricultural water supplier, and though treated water is provided to the City of Modesto’s Municipal Water System for urban delivery, MID does not directly serve any domestic water customers at this time. The treated water place of use is defined by the overlap of the MID water service boundary with the City of Modesto Municipal Water System service area north of the Tuolumne River. The common City of Modesto and MID water service area excludes those areas served by the City of Modesto with groundwater which lie outside the MID water service boundary, and includes the communities of Hickman, Grayson, and parts of Ceres and Turlock. All of the other communities served by the City of Modesto (Salida and Waterford) lie within the MID service area.

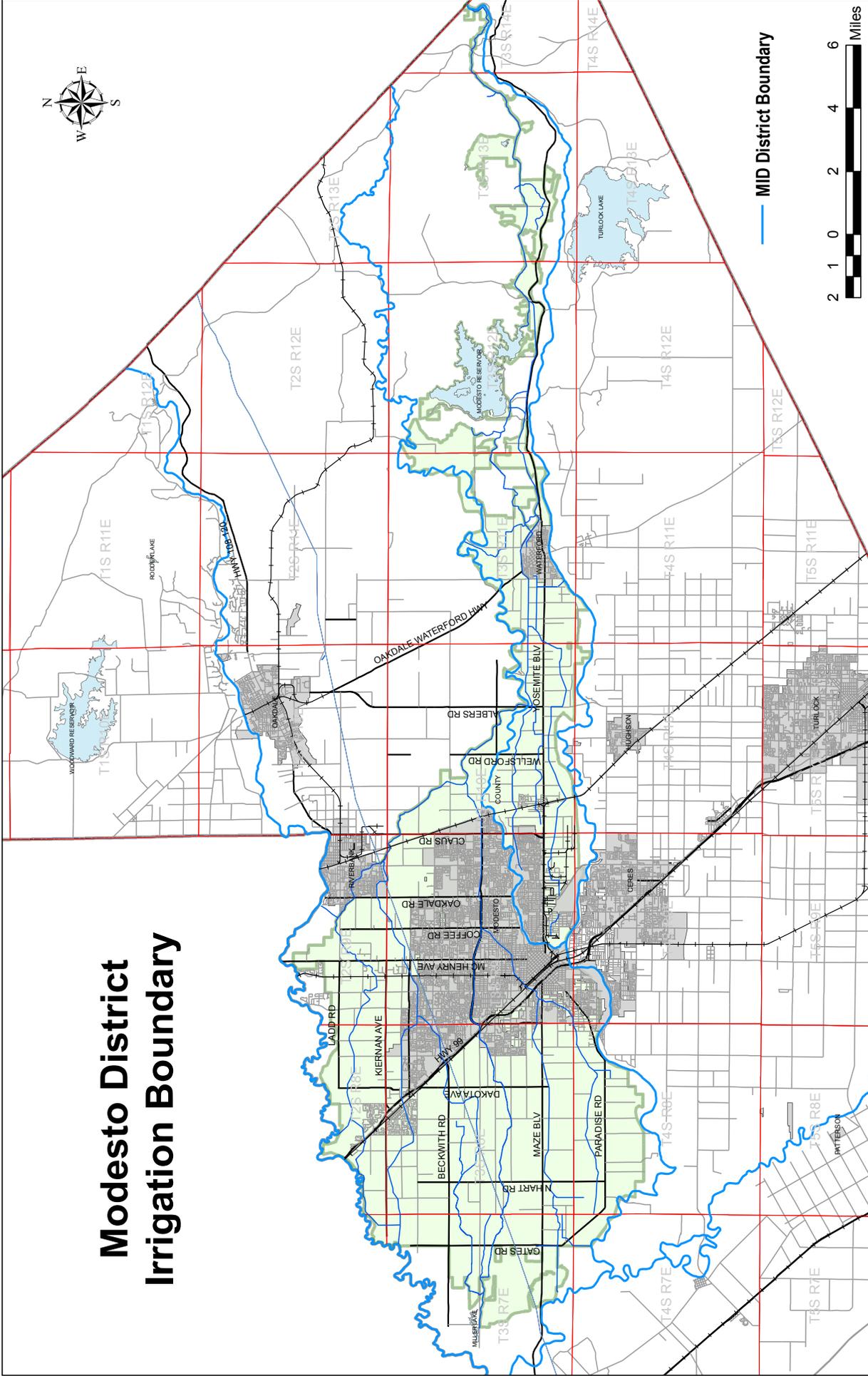
The original *Treatment and Delivery Agreement Among the Modesto Irrigation District, City of Modesto, and Del Este Water Company* (Treatment and Delivery Agreement) was the document controlling the delivery of domestic treated water from MID to the City. Originally signed in 1992 by the City, MID, and the former Del Este Water Company, the *Treatment and Delivery Agreement* obligates MID to deliver 33,602 AFY or 30 MGD of treated surface water, commencing on May 1 and ending the following April 30, during normal years. The *Treatment and Delivery Agreement* included 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 Phase Two expansion of the MRWTP. 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. In September 2005, the State Water Resources Control Board (SWRCB) has approved an order for a long-term transfer through 2054 for 67,204 AFY of water from MID to the City of Modesto. A copy of the SWRCB order approving this transfer has been included as Appendix F of this document.



**Figure ES-1**  
**City of Modesto Service Area**

# Modesto District Irrigation Boundary



**Figure ES-2**  
**Modesto Irrigation**  
**District Service Area**

## **ES-1.3 City of Modesto/MID Service Area**

### **ES-1.3.1 Surface Water**

MID delivers a combination of Tuolumne River water and groundwater via a network of canals, pipelines, pumps, drainage features, and control structures. The La Grange Dam is used to divert water into MID's Upper Main irrigation canal from the Tuolumne River. Surface water is treated at the MRWTP prior to distribution in the City of Modesto's Municipal Water System to areas north of the Tuolumne River.

### **ES-1.3.2 Raw Water Reservoirs**

There are two raw water reservoirs serving the Modesto area: the Modesto Reservoir and Don Pedro Reservoir.

Completed in 1911, Modesto Reservoir 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 jointly 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 is a flood control facility 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. When full, the reservoir water level is 830 feet above sea level.

### **ES-1.3.3 Exchange or Transfer Opportunities**

During supply shortage years, MID surface water supplies to the City of Modesto may be reduced in equal proportion to deliveries to agricultural customers. In these situations, the City 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 could be explored with TID to exchange Tuolumne River water for groundwater supplies south of the River.

### **ES-1.3.4 Groundwater**

The City of Modesto supplies approximately 60 percent, on average, of its water from city-owned and operated wells. As of 2005, the City of Modesto had 118 wells located throughout the City's entire water service area, 97 of which were operational. The wells are in the Modesto and Turlock subbasins of the San Joaquin Valley Groundwater Basin. In general, the City of Modesto and its contiguous service areas (Salida and Empire) located north of the Tuolumne River, rely on treated surface water year-round. Surface water supplies are augmented with groundwater to meet increased demands in summer months. Demands originating south of the Tuolumne River are met with groundwater supplies year-round.

Prior to the construction of the MRWTP by MID, the City of Modesto and the surrounding communities relied solely on groundwater for domestic supply. The 1990 MRWTP EIR noted that groundwater levels were declining, particularly near the center of the City, and that water quality degradation was also occurring as a result of increasing groundwater use. The effect of long-term groundwater pumping by the City (and the former Del Este Water Company) prior to the MRWTP formed a cone of depression, primarily under downtown Modesto, and resulted in an overdraft condition in the Modesto subbasin. Constituents of concern identified in local groundwater sources include arsenic, uranium, organics and nitrate. Declining water quality combined with increasingly strict drinking water standards from the state

and federal regulatory agencies has forced the City to take several wells out of service. However, the City is currently evaluating alternatives such as GAC and/or arsenic treatment, well blending and depth-dependent sampling for well screening to bring wells back on-line.

The current design capacity of the City of Modesto's groundwater wells is 129 MGD. However, this capacity must be reduced to account for the following factors:

- Well pump and motor efficiency (total pumping efficiency);
- Reliable pumping capacity.

A recent study performed by the City estimated total pumping efficiency of the City's groundwater wells to be approximately 90%. According to the City's SCADA system, annual groundwater production for the City of Modesto and outlying areas has averaged approximately 46,275 AFY from 2000 to 2005.

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). According to 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 that observed 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<sup>2</sup>. Water levels in the Turlock subbasin, similarly, rose about seven feet from 1994 to 2000<sup>2,3</sup>. The rising water levels suggest that the groundwater subbasin has started to recover and that the current level of pumping in each subbasin is less than the previously assumed "safe yields" of the two subbasins.

A sustainable yield is defined as the average annual amount of groundwater that can be extracted from a groundwater basin, while maintaining a non-overdraft condition. The sustainable yields of the Modesto and Turlock subbasins are currently unknown, and the City of Modesto is participating in a study with the United States Geological Survey (USGS) to model the Modesto and Turlock subbasins and quantify sustainable yields for both subbasins. In the interim, the City has prepared an estimate of its 'operational yield' for use in managing groundwater. 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 (40 ft ASL; City of Modesto, 2007). At any given time, the quantity of water that can be pumped by the City of Modesto 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.

Although the City has recently increased its groundwater pumping to meet current growth demands, current groundwater production are still less than historic highs and overdraft conditions have not occurred in either subbasin. Using historic groundwater level and pumping data from the past 25 years, the City of Modesto 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 (City of Modesto, 2007). This operational yield, or ultimate amount of groundwater extraction, represents the amount of groundwater that can be extracted from the two groundwater subbasins without lowering groundwater levels below 40 feet ASL and potentially affecting long-term sustainability of the basin. Therefore, it can be assumed that the City of

---

<sup>2</sup> Modesto subbasin description:

[http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/basins/pdfs\\_desc/5-22.02.pdf](http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/basins/pdfs_desc/5-22.02.pdf); Turlock subbasin description: [http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/basins/pdfs\\_desc/5-22.03.pdf](http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/basins/pdfs_desc/5-22.03.pdf), accessed October 2, 2006.

<sup>3</sup> The Modesto groundwater subbasin has been referred to as the Tuolumne subbasin in previous documents.

Modesto could potentially increase its annual groundwater extraction rates to volumes greater than are currently being pumped without adversely affecting the basin. The methodology for deriving this operational yield can be found in Appendix N. However, the City’s current operational capacity for groundwater production is limited by the reliable pumping capacity of its existing wells.

The City of Modesto has elected to continue to diversify its water supply alternatives by developing additional surface water supplies to offset groundwater pumping. Phase Two of the MRWTP will provide an additional 33,602 AFY of surface water supplies to offset groundwater pumping to meet demands north of the Tuolumne River. The groundwater that is not pumped will be stored or “banked” in the groundwater basin to be used by the City of Modesto for meeting future demands in normal and dry years. This conjunctive use arrangement will allow the City to optimize its water supplies to best meet demands. The City of Modesto is also evaluating a potential Surface Water Supply Project (SWSP) with TID and a Phase Three MRWTP expansion with MID which could result in additional treated water deliveries. For example, the SWSP could provide up to 12,881 AFY of surface water supplies to offset groundwater pumping to meet demands south of the Tuolumne River. Appendix B presents water supply projections assuming the SWSP and/or Phase Three MRWTP expansion are pursued.

Current and projected future groundwater pumping can be seen in Table ES-1. The City has developed a groundwater budget that conservatively assumes that pumping at current levels (approximately 46,275 AFY) will result in constant groundwater levels over time. Because demands are first met with surface water supplies and groundwater is used only to meet demands in excess of the surface water delivered, the Phase Two MRWTP will result in reductions in groundwater pumping. In years in which groundwater pumping falls below the current average pumping volume of 46,275 AFY, it is assumed that the unused groundwater is stored or “banked” in the basin for later use.

**Table ES-1: Amount of Groundwater Projected to be Pumped in Modesto and Outlying Areas<sup>a</sup> – Normal Average Annual Demands**

Basin Name	2005 <sup>b</sup>	2010	2015 <sup>c</sup>	2020	2025	2030
Modesto and Turlock subbasins <sup>c</sup> (Total)	46,581	19,104	28,804	39,759	52,133	66,109
% of Total Supply	59%	22%	30%	37%	44%	50%

Footnotes:

- a. Total groundwater pumped is calculated as demand minus MID surface water supply. In 2009, completion of Phase Two of the MRWTP yields an additional 33,602 AFY MID surface supply. Demands for years 2010, 2015, 2020, 2025, and 2030 are projected to be 86,308; 96,008; 106,963; 119,337; 133,313 AFY, respectively, as shown in Table ES-5.
- b. Actual groundwater pumped in 2005.
- c. Includes groundwater pumped in Salida, Waterford, Empire, Del Rio, North Ceres, Hickman, Turlock.

**Groundwater Management Planning**

The City of Modesto and MID participated in groundwater management studies initiated by the 1992 California State Assembly Bill 3030 (AB 3030). This 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.

In late 2003, the City of Modesto and MID participated in development of an Integrated Regional Groundwater Management Plan as part of the Stanislaus and Tuolumne Rivers’ Groundwater Basin Association. The *Final Draft Integrated Regional Groundwater Management Plan* was completed in June of 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 *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. A draft *Turlock Groundwater Basin Management Plan* is also currently being completed for the Turlock Subbasin.

As described above, the City of Modesto currently uses its surface water and groundwater supplies conjunctively. Additional future surface water supplies provided from the Phase Two MRWTP will provide the City with the opportunity to use surface water to meet demands in lieu of groundwater, while banking unused groundwater in the basin for future use. In order to effectively manage the groundwater basin and optimize conjunctive use of its surface water and groundwater supplies, the City of Modesto is planning a ten-year program through which extensive groundwater monitoring will be conducted and an AB 3030-compliant groundwater management plan will be developed for management of both subbasins. 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 of Modesto 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. This will allow the City of Modesto to continue to effectively manage its surface water and groundwater supplies conjunctively, while optimizing the available groundwater basin capacity. Due to the extensive nature of the proposed project, the City of Modesto is expected to seek funding assistance for the project in future years.

#### **ES-1.4 Agency Coordination, Notification, & Participation**

A variety of agency and public interests participated in the coordination and preparation of this UWMP, and are described in Table ES-2.

A meeting was held at the City of Modesto offices on September 8, 2005, to encourage stakeholder input during the preparation of the UWMP. Attending this meeting were representatives from the City of Modesto, Stanislaus County, Oakdale Irrigation District (OID), the City of Riverbank, MID, the City of Waterford, the City of Turlock, Manufacturers Council, and Building Industry Association (BIA). The format of the UWMP, options for meeting shortfalls, and the potential for regional water management planning were discussed during this meeting.

Following completion of the draft UWMP, a notification of public review will be placed in the local newspaper about the 2005 UWMP update process and draft report, and copies of the documents will be made available at the City's Public Works Department and MID's Board Secretary's Office with an electronic version placed on the City's website. Public notification materials will be included in Appendix G.

**Table ES-2: Coordination with Appropriate Agencies**

Agency	Partic. in Plan Develop.	Commented on Draft	Attended Public Meetings	Contacted for Input	Sent Copy of Draft Plan	Sent Notice of Intention to Adopt	Not Involved/ No Info.
Ceres/ Walnut Manor				✓	✓		
Del Rio/ Hillcrest				✓	✓		
Empire				✓	✓		
Hickman				✓	✓		
Grayson				✓	✓		
Salida				✓	✓		
Turlock	✓			✓	✓		
Waterford	✓			✓	✓		
Stanislaus County	✓			✓	✓		
Oakdale Irrigation District	✓						
Turlock Irrigation District				✓	✓		
Manufacturers Council	✓			✓	✓		
Building Industry Association	✓			✓	✓		

The cities and county entities served by the City and MID will be notified of the UWMP draft release and will be invited to review the document prior to finalization and submittal. A full 30-day comment period following a 14-day public noticing period will be held during which the cities and counties served by MID, as well as the general public, are encouraged to comment on the draft document. Copies of the draft UWMP will be sent directly to the following entities for review:

- Ceres
- Turlock
- Waterford
- Stanislaus County (Hickman, Grayson, Empire, Salida, County Municipal Advisory Committee)
- Turlock Irrigation District
- Manufacturers Council
- Building Industry Association

The public comment period on the UWMP will begin March 12, 2007 and will conclude April 6, 2007. A public hearing will be held on April 10, 2007, in conjunction with the Modesto City Council meeting prior to formal adoption of the UWMP. A public hearing will also be held on the same date in conjunction with the MID Board of Directors meeting. Noticing for these public hearings will occur during the fourteen day preceding the 30-day public comment period, pursuant to Section 6066 of the Government Code. Public hearing notices will be included in Appendix G.

## ES-2 Summary of Supply and Demand

### ES-2.1.1 Current and Future Water Supplies

Table ES-3 summarizes the current and projected future water supplies for the City of Modesto. Increased future water purchases from MID are projected to occur in 2009 coinciding with completion of the Phase Two MRWTP expansion.

**Table ES-3: Current and Planned Water Supplies in City of Modesto and Outlying Areas (AFY) – Normal Average Annual Demands**

Supply	2005	2010	2015	2020	2025	2030
Wholesale Water Providers						
Modesto Irrigation District	32,507	67,204	67,204	67,204	67,204	67,204
Supplier produced groundwater <sup>a</sup>	46,581	19,104	28,804	39,759	52,133	66,109
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 <sup>b</sup>	79,088	86,308	96,008	106,963	119,337	133,313

Footnotes:

- a. Groundwater pumping is increased to meet demands until the Phase Two MRWTP is operational in 2009, allowing an additional 33,602 AFY of demand to be met with surface water supplies.
- b. Buildout demand for the entire Modesto Water Service area is 133,313 AFY per WYA HMP TM “Final Water Demand Evaluation”, pg 25. Projected buildout date assumed to be 2030 (vs. 2024 from the HMP) to be consistent with 2005 WWMP. Annual average water demands were extrapolated from current demands to 2030 buildout assuming number of accounts increase at an annual compounded rate of 2.5% for all sectors except industrial, with number of industrial accounts increasing at an annual compound rate of 0.2%.

### ES-2.1.2 Current and Projected Water Demand

Table ES-4 summarizes the City of Modesto’s past, current and project number of water accounts and deliveries by customer type. These customers are within the City of Modesto and its Sphere of Influence (SOI) with the total in 2030 representing the City and SOI at build out.

The City of Modesto is currently in the process of converting to all metered water usage. Currently, all commercial, industrial and institutional water accounts are metered. Since 1991, meters have been installed for most new construction, but are not necessarily billed on a metered rate. Starting in 2005, the City of Modesto began retrofitting single-family flat-rate customers to meters at a rate of approximately 5,000 EDU per year. Based on the City’s metering plan, existing single-family flat-rate customers will be gradually converted to meters once all non-metered flat-rate customers are converted to metered use.

The number of water accounts was assumed to increase linearly over time at an annual compounded rate of approximately 2.5 percent for all customer classes except industrial to reach projected buildout demands in 2030 of approximately 133,313 AFY.<sup>4</sup> Institutional projections include churches and schools. No agricultural customers were identified. The total number of industrial accounts was assumed to

<sup>4</sup> Buildout demand of 133,313 based on *City of Modesto Hydraulic Model Update* (West Yost & Associates, 2005) TM “Final Water Demand Evaluation”, pg 25.

increase by 5% from 2005 through buildout, or an annual compounded rate of 0.2%. For additional information on calculation of water use per sector, including unit water use factors for each customer classification, please refer to Chapter 4.2.

**Table ES-4: Past, Current and Projected Number of Accounts and Water Deliveries (AFY)<sup>a,b,c,d,e</sup>**

		Water Use Sectors	Single Family	Multi-Family	Commercial	Industrial	Inst/Gov	Landscape	Total
2000	Metered <sup>h</sup>	Accounts	8,863	4,502	3,762	160	283	0	17,570
		Deliveries	0	6,797	13,324	5,440	1,001	0	26,561
	Unmetered <sup>f</sup>	Accounts	50,535	0	0	0	0	798	5,133
		Deliveries	40,589	0	0	0	0	1,274	41,863
2005	Metered <sup>i</sup>	Accounts	65,189	4,514	3,672	76	445 <sup>g</sup>	883 <sup>g</sup>	74,779
		Deliveries	89,989	7,532	9,695	6,262	866	273	115,557
	Unmetered <sup>f</sup>	Accounts	50,812	0	0	0	0	0	50,812
		Deliveries	34,719	0	0	0	0	0	34,719
2010	Metered	Accounts	49,272	7,423	5,046	82	379	752	62,952
		Deliveries	30,926	12,376	13,323	6,739	736	232	64,332
	Unmetered	Accounts	32,162	0	0	0	0	0	32,162
		Deliveries	21,976	0	0	0	0	0	21,976
2015	Metered	Accounts	78,523	8,389	5,703	83	428	849	93,975
		Deliveries	49,832	13,987	15,057	6,804	832	263	86,775
	Unmetered	Accounts	13,512	0	0	0	0	0	13,512
		Deliveries	9,233	0	0	0	0	0	9,233
2020	Metered	Accounts	104,017	9,481	6,446	83	484	960	121,470
		Deliveries	66,030	15,808	17,018	6,870	941	297	106,963
	Unmetered	Accounts	0	0	0	0	0	0	0
		Deliveries	0	0	0	0	0	0	0
2025	Metered	Accounts	117,558	10,715	7,285	84	547	1,085	137,273
		Deliveries	73,902	17,866	19,233	6,937	1,063	335	119,337
	Unmetered	Accounts	0	0	0	0	0	0	0
		Deliveries	0	0	0	0	0	0	0
2030	Metered	Accounts	132,862	12,110	8,233	85	618	1,226	155,134
		Deliveries	82,799	20,192	21,737	7,004	1,201	379	133,313
	Unmetered	Accounts	0	0	0	0	0	0	0
		Deliveries	0	0	0	0	0	0	0

Footnotes:

- a. Institutional projections include churches and schools. Agricultural customers not identified.
- b. Assumes conversion to metered water use as described in the *Engineer’s Report: Justification and Cost Allocation for Proposed Water System Improvement*, prepared for the City of Modesto (September 2, 2004). Estimated numbers of 2005 single and multi-family accounts were increased from projections cited in the Engineer’s Report by 40% to reflect actual 2005 water demands.
- c. Buildout demand for the entire Modesto Water Service area is 133,313 AFY, from *City of Modesto Hydraulic Model Update* (West Yost & Associates, 2005) TM “Final Water Demand Evaluation”, pg 25.

- d. Projected buildout date assumed to be 2030 (vs. 2024 from the HMP) to be consistent with 2005 WWMP.
- e. Annual average water demands were extrapolated from current demands to 2030 buildout assuming number of accounts increase at an annual compounded rate of 2.5% for all sectors except industrial, with number of industrial accounts increasing at an annual compound rate of 0.2%.
- f. The number of unmetered accounts is from the *Water Utility Cost of Service Rate Study* (Foresight Consulting Services September 3, 2004). Per Table 3-1 of this report “After 2003, all new residential is metered. Also, based on the City’s metering plan existing single-family flat rate customers are converted to meters only after all metered-flat rate customers are converted to metered use.” This is expected to occur in 2008. Therefore, the number of unmetered accounts is not expected to change until after 2008.
- g. Estimated values; number of accounts proportioned from “other accounts” as tracked by the City of Modesto.
- h. Data from City of Modesto, Public Water System Statistics. In Calendar Year 2000, 8863 single family homes were metered and 50535 single family homes were unmetered, however all account were charged unmetered (flat) rates.
- i. Data from City of Modesto do not match table categories. Institutional, government and landscape numbers were distributed proportionally to other data and reports available from the City.

**Other Uses**

“Other uses” are water deliveries to non-urban retail or wholesale customers. Examples of other uses may include water injected as a saline barrier or recycled water. Also included in this category are system water losses during delivery.

Because water use was estimated using per capita unit demand factors which were developed based on production, system losses are included in the demand projections above. Unaccounted for water and system losses have been estimated to comprise approximately 15 percent of total production<sup>5</sup>. This assumption is intended to provide a conservative estimate of water losses throughout the conveyance system. Actual water losses cannot be confirmed until the City has completed its current efforts to implement metering City-wide. Water demand and unaccounted for water are documented in Table ES-5.

**Table ES-5 City of Modesto Total Water Use (AFY)**

Water Use	2000	2005	2010	2015	2020	2025	2030
Water Demand	76,428	79,088	86,308	96,008	106,963	119,337	133,313
Unaccounted-for system losses <sup>a,b</sup>	13,487	13,956	15,231	16,943	18,876	21,059	23,526

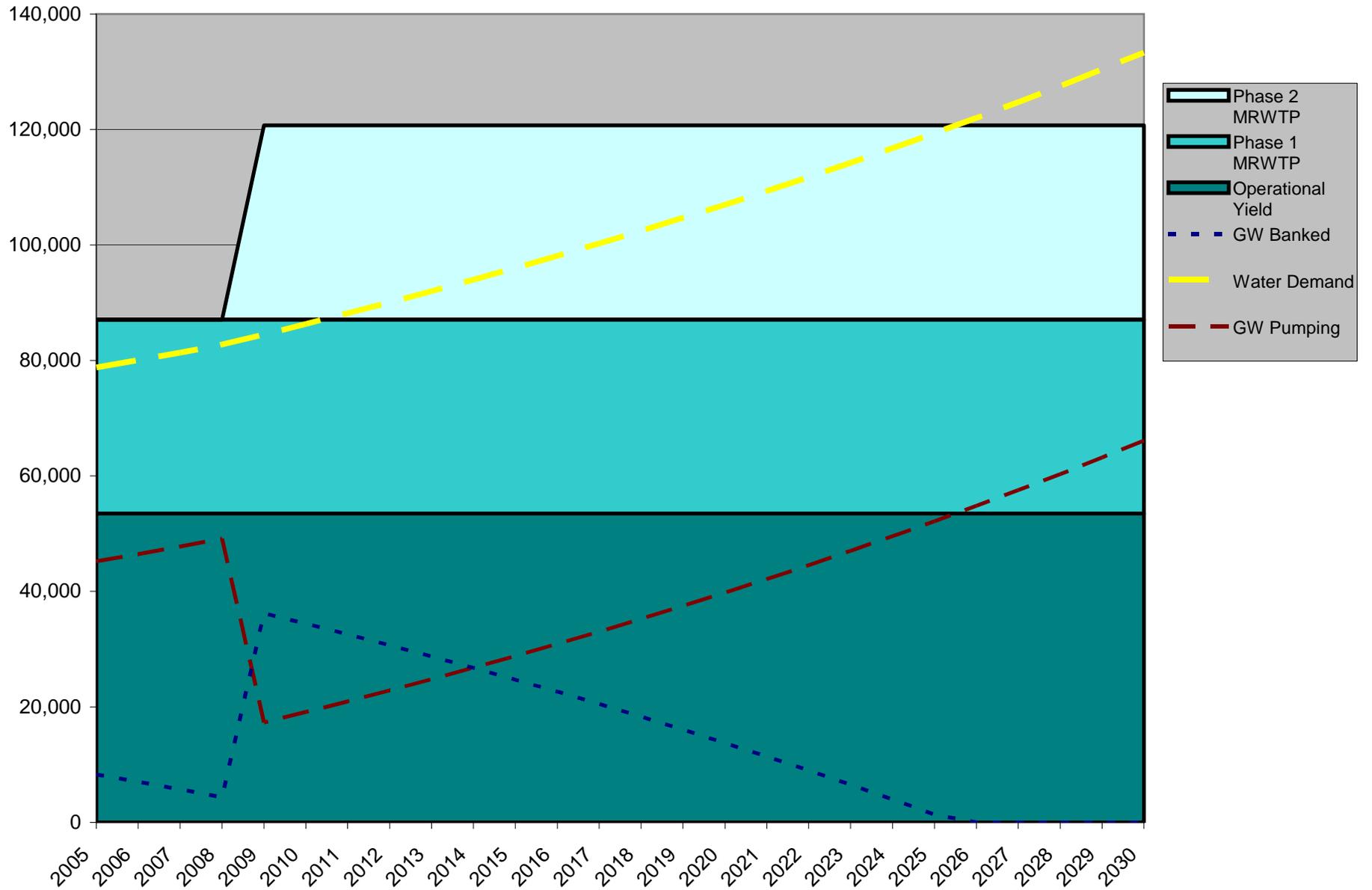
Footnotes:

- a. Unaccounted for system losses are estimated as 15% of total supply, and are included in total demand projections.
- b. Losses may include leaks, flushing, fires, flow testing, backflushing, etc.

Table ES-3 presents future water supplies and demands for the City of Modesto. Figure ES-3 presents the same information in graphical form.

<sup>5</sup> The assumptions for unaccounted water and system losses were based on the *City of Modesto Hydraulic Model Update* (West Yost & Associates, 2005)

Figure ES-3: City of Modesto Current and Projected Supply and Demand



## ES-3 Supply Reliability

### Surface Supplies

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.

The base wholesale surface water supply provided by MID may be reduced in dry years. Potential dry year reductions are outlined, in writing, in the *Amended and Restated Treatment and Delivery Agreement* (Appendix E). Base supply was reduced by approximately 9 out of 42 inches of water in 1991, or 21.4 percent. Assuming this cutback was applied over a five-year interval, the annual cutbacks would be 4.3, 8.6, 12.9, 17.1, and 21.4 percent, respectively for each of the five years. It is assumed that cutbacks for the single dry year condition are equal to cutbacks in the final year of the multiple dry year condition, or 21.4 percent. Wholesale supply reliability is shown in Table ES-6 below.

**Table ES-6 City of Modesto Wholesale Supply Reliability (% of Normal AFY)**

Wholesaler Sources	Single Dry Year	Multiple Dry Water Years				
		Year 1	Year 2	Year 3	Year 4	Year 5
MID – Tuolumne River	79%	96%	91%	87%	83%	79%

It should be noted that, although base supply is projected to be reduced in dry years according to the percentages identified above, MID may make additional water available to retail water suppliers at an additional cost. In addition, the City of Modesto may opt 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. To date, the City of Modesto has not experienced a water supply shortfall and this trend is expected to continue in coming years.

### Groundwater Supplies

River flows and the incidental recharge of applied irrigation water are the primary sources of groundwater recharge to the groundwater basin. Because drought conditions can reduce available groundwater supplies by reducing available recharge, groundwater is not entirely drought-resistant. However, dry year supply reductions are less pronounced for groundwater than for surface water supplies, and are 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 of Modesto will bank groundwater supplies for use in meeting dry year demands.

The City of Modesto's future water supply planning incorporates sufficient future surface water supplies to allow the City of Modesto to meet demands primarily through the use of surface water, banking groundwater for future and dry year 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 of water levels), short-term 'overpumping' of the groundwater subbasins (such that groundwater levels drop below the 40 feet ASL 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 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.

The water supply, demand and shortfall estimates presented herein assume that the City of Modesto will use surface water from the MRWTP as a primary supply source for meeting demands north of the river, and will reserve groundwater pumping to meet demands in excess of available surface water supplies.

In contrast to surface supply reliability, reliability of local groundwater supplies is threatened by water quality. In the past, contamination from arsenic, uranium, perchloroethylene (PCE), trichloroethylene (TCE), dibromochloropropane (DBCP) and nitrate has resulted in the need for additional treatment to keep wells from being taken offline. The City of Modesto has developed a strategy to keep existing wells online and bring previously abandoned wells back online through a combination of well monitoring for early detection, well rehabilitation, wellhead treatment, and blending. As a result, the City of Modesto 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.

### ES-3.1 Projected Water Supplies

The City of Modesto-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). Although the Agreement specifies a formula for water allocations during shortages, the reduction in supply is not determined until the time of the shortage (*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 of Modesto to purchase water options from MID at market rates 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, the base allocation was defined as 33 inches of the total 42-inch typical allocation. MID made the remaining 9 inches available as optional 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 "worst case" 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:  $1.8/42$  (4.3 percent)
- Second year cutback:  $3.6/42$  (8.6 percent)
- Third year cutback:  $5.4/42$  (12.9 percent)
- Fourth year cutback:  $7.2/42$  (17.1 percent)
- Fifth year cutback:  $9/42$  (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 of Modesto will supplement reduced surface water supplies with groundwater supplies, as necessary to meet demands. Groundwater supplies above current average production will be taken from water banked in the groundwater basin. Groundwater basin storage is dynamic, however, and future studies will determine the storage volume of the basin.

The City of Modesto's Water Shortage Contingency Plan, described in Chapter 10 of this document, sets forth target demand reduction ranges based on percent reductions in MID base supplies. The target demand reductions for each water shortage stage and the demand assumptions used in calculating future dry year demands, are presented in Table 6-2 of this report. The City of Modesto has been in Stage I of the Water Shortage Contingency Plan since March of 2003 (for more information on the City of

Modesto’s Water Shortage Contingency Plan, refer to Chapter 10 of this document). As such, no additional demand reductions have been projected unless MID surface water supplies are reduced by more than 25 percent.

Table ES-7 contains estimated City of Modesto water supply shortfalls for normal years, as well as single and multiple dry years, through 2030. As shown in this table, the City of Modesto will continue to increase groundwater pumping until 2009, when the Phase Two MRWTP will be operational. At that time, groundwater pumping will decrease as demands north of the Tuolumne River are met by surface water in lieu of groundwater. These banked groundwater supplies are then available for use in meeting future demands.

The City is currently investigating the feasibility of additional future surface water supplies. Currently, the City is working with Turlock Irrigation District (TID) to bring additional treated surface water to augment the City’s water supplies by 12,881 AFY (11.5 MGD). Preliminary estimates by TID project the future Surface Water Supply Project (SWSP) will be operational by 2011. Since the City and TID have not entered into a treatment and delivery agreement (TDA) as of the preparation of this document, treated water from the TID SWSP is not considered an assured water supply and is therefore not considered a supply at this time. Appendix B presents future water supply projections for the TID SWSP (Option A), as well as projections for a possible Phase Three of the MRWTP (Option B). The City will continue to pursue additional water resources to augment its water supplies to meet future demands.

**Table ES-7 Projected Normal and Dry Year Supply and Demand for the City of Modesto and Outlying Areas (AFY)<sup>a,b,c</sup>**

Year	Scenario	Demand	MID Deliveries	Groundwater Pumping	Operational Yield	Supply Deficit
2005	Normal	79,088	32,507	46,581	53,500	None
	Single Dry	79,088	26,402	52,686	53,500	None
	Multiple Dry					
	2006	80,057	32,162	47,895	53,500	None
	2007	81,353	20,722	50,631	53,500	None
	2008	82,746	29,282	53,464	53,500	None
	2009 <sup>d</sup>	84,505	55,683	28,822	53,500	None
	2010	86,308	52,803	33,505	53,500	None
2010	Normal	86,308	67,204	19,104	53,500	None
	Single Dry	86,308	52,803	33,505	53,500	None
	Multiple Dry					
	2011 <sup>e</sup>	88,154	64,324	23,830	53,500	None
	2012	90,047	61,444	28,603	53,500	None
	2013	91,986	58,563	33,423	53,500	None
	2014	93,972	55,683	38,289	53,500	None
	2015	96,008	52,803	43,205	53,500	None

Year	Scenario	Demand	MID Deliveries	Groundwater Pumping	Operational Yield	Supply Deficit
2015	Normal	96,008	67,204	28,804	53,500	None
	Single Dry	96,008	52,803	43,205	53,500	None
	Multiple Dry					
	2016	98,094	64,324	33,770	53,500	None
	2017	100,231	61,444	38,787	53,500	None
	2018	102,421	58,563	43,858	53,500	None
	2019	104,664	55,683	48,981	53,500	None
	2020	106,963	52,803	54,160	53,500	660
2020	Normal	106,963	67,204	39,759	53,500	None
	Single Dry	106,963	52,803	54,160	53,500	660
	Multiple Dry					
	2021	109,319	64,324	44,995	53,500	None
	2022	111,733	61,444	50,289	53,500	None
	2023	114,206	58,563	55,643	53,500	2,143
	2024	116,740	55,683	61,057	53,500	7,557
	2025 <sup>e</sup>	119,337	52,803	66,534	53,500	13,034
2025	Normal	119,337	67,204	52,133	53,500	None
	Single Dry	119,337	52,803	66,534	53,500	13,034
	Multiple Dry					
	2026	121,997	64,324	57,673	53,500	4,173
	2027	124,724	61,444	63,280	53,500	9,780
	2028	127,517	58,563	68,954	53,500	15,454
	2029	130,380	55,683	74,697	53,500	21,197
	2030	133,313	52,803	80,510	53,500	27,010
2030	Normal	133,313	67,204	66,109	53,500	12,609
	Single Dry	133,313	52,803	80,510	53,500	27,010
	Multiple Dry					
	2031	133,313	64,324	68,989	53,500	15,489
	2032	133,313	61,444	71,869	53,500	18,369
	2033	133,313	58,563	74,750	53,500	21,250
	2034	133,313	55,683	77,630	53,500	24,130
	2035	133,313	52,803	80,510	53,500	27,010

Footnotes:

- a. Demands for each year of a multiple year drought are calculated by reducing projected annual demand for each year by the percentage dictated by MID supply reductions, as described in Table 6-2.
- b. Water demand projections from the City of Modesto's 2005 Hydraulic Model Update Project by West Yost and Associates (WYA).
- c. Actual MID water delivery for 2005.

- d. Phase 2 of the MRWTP expected to be operational by mid-2009.
- e. Based on projected demands and estimated Operational Yield, the City will require new water supplies by 2025, based on multiple drought years. However, future studies will be required to determine the feasibility of whether demands will be met with only surface water, only groundwater, or a combination of both.

Table ES-8 presents the projected future retail urban demand and wholesale MID surface water supplies provided to urban customers under normal, single dry year, and multiple dry year conditions. Because MID is a wholesale water supplier, demand for MID supply is not expected to decrease in dry years. Although base MID supplies are reduced during dry years, the volume of water allocated to urban suppliers is a very small percentage of total available supply. As a result, while base supply allotments may be reduced in dry years, total supply available to urban customers is expected to meet the total urban demand for MID supplies. The difference between base supply and total supply is assumed to be available as an allocation on an optional basis at additional cost to the retail supplier.

**Table ES-8 Projected MID Normal and Dry Year Urban Supply and Demand (AFY)**

Year	Scenario	Modesto Urban Demand	Total Urban Demand	Available Urban Base Supply	Total Available Urban Supply	Supply Deficit
2005	Normal	32,507	32,507	32,507	32,507	None
	Single Dry	32,507	32,507	26,402	32,507	None
	Multiple Dry					
	2006	33,602	33,602	32,162	33,602	None
	2007	33,602	33,602	30,722	33,602	None
	2008	33,602	33,602	29,282	33,602	None
	2009	67,204	67,204	55,683	67,204	None
	2010	67,204	67,204	52,803	67,204	None
2010	Normal	67,204	67,204	67,204	67,204	None
	Single Dry	67,204	67,204	52,803	67,204	None
	Multiple Dry					
	2011	67,204	67,204	64,324	67,204	None
	2012	67,204	67,204	61,444	67,204	None
	2013	67,204	67,204	58,563	67,204	None
	2014	67,204	67,204	55,683	67,204	None
	2015	67,204	67,204	52,803	67,204	None
2015	Normal	67,204	67,204	67,204	67,204	None
	Single Dry	67,204	67,204	52,803	67,204	None
	Multiple Dry					
	2016	67,204	67,204	64,324	67,204	None
	2017	67,204	67,204	61,444	67,204	None
	2018	67,204	67,204	58,563	67,204	None
	2019	67,204	67,204	55,683	67,204	None
	2020	67,204	67,204	52,803	67,204	None

Year	Scenario	Modesto Urban Demand	Total Urban Demand	Available Urban Base Supply	Total Available Urban Supply	Supply Deficit
2020	Normal	67,204	67,204	67,204	67,204	None
	Single Dry	67,204	67,204	52,803	67,204	None
	Multiple Dry					
	2021	67,204	67,204	64,324	67,204	None
	2022	67,204	67,204	61,444	67,204	None
	2023	67,204	67,204	58,563	67,204	None
	2024	67,204	67,204	55,683	67,204	None
	2025	67,204	67,204	52,803	67,204	None
2025	Normal	67,204	67,204	67,204	67,204	None
	Single Dry	67,204	67,204	52,803	67,204	None
	Multiple Dry					
	2026	67,204	67,204	64,324	67,204	None
	2027	67,204	67,204	61,444	67,204	None
	2028	67,204	67,204	58,563	67,204	None
	2029	67,204	67,204	55,683	67,204	None
	2030	67,204	67,204	52,803	67,204	None
2030	Normal	67,204	67,204	67,204	67,204	None
	Single Dry	67,204	67,204	52,803	67,204	None
	Multiple Dry					
	2031	67,204	67,204	64,324	67,204	None
	2032	67,204	67,204	61,444	67,204	None
	2033	67,204	67,204	58,563	67,204	None
	2034	67,204	67,204	55,683	67,204	None
	2035	67,204	67,204	52,803	67,204	None

## ES-4 Demand Management, Conservation, and Future Water Supply Projects

Both the City of Modesto and MID acknowledge the importance of water conservation and management and implemented significant water conservation efforts during the drought years of 1976-1977 and 1987-1992. In March of 1990, the Modesto 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. This ordinance was revised in August 1990 to restrict outdoor water use year-round. Appendix J contains the City's Water Shortage Contingency Plan.

The City's Water Conservation Program is administered through the City's Water Operations Division of the Public Works Department. 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. Examples of the City's commitment to conservation are the initiation of metering in high use areas within its water system (such as the communities of Grayson and Del Rio), and implementation of a meter installation/retrofit program for the contiguous water service areas. The operating budget for water code enforcement is \$166,531 for FY 2005-06. MID has also instituted a water conservation program which includes limiting water losses through the water conveyance systems, agricultural conservation programs and public information. Where feasible, the City and MID have participated in joint conservation programs.

The City of Modesto and MID, together, either implement or plan to implement all of the California Urban Water Conservation Council (CUWCC) Conservation Best Management Practices (BMPs). The 14 Conservation Demand Management Measures (DMMs) evaluated as part of this Plan are presented in Table ES-9.

**Table ES-9: Summary of Demand Management Measures**

DMM No.	DMM Description	Implemented or Planned by City of Modesto/MID
1	Water Survey Programs for Single Family and Multi-Family Residential Customers	✓
2	Residential Plumbing Retrofit	✓
3	System Water Audits, Leak Detection and Repair	✓
4	Metering with Commodity Rates for all New Connections and Retrofit of Existing Connections	✓
5	Large Landscape Conservation Programs and Incentives	✓
6	High Efficiency-Washing Machine Rebate Programs	✓
7	Public Information Programs	✓
8	School Education Programs	✓
9	Conservation Programs for Commercial, Industrial, and Institutional Accounts	✓
10	Wholesale Agency Programs	✓
11	Conservation Pricing	✓
12	Water Conservation Coordinator	✓
13	Water Waste Prohibitions	✓
14	Residential Ultra-Low Flush Toilet Replacement Program	✓

## ES-4.1 Future Water Supply Options

The City of Modesto and MID are continuing the process of implementing a Phase Two MRWTP Expansion, projected to be completed in 2009. This project will provide an additional 30 MGD of treated surface water, thereby reducing dependence on groundwater supplies. The City has also started pursuing additional surface water supplies from the Turlock Irrigation District (TID) through implementation of a Surface Water Supply Project (SWSP), which would provide 11.5 MGD to the customers in South Modesto and parts of Ceres. Currently, the SWSP is in pre-design and is projected to be operational in 2011. Additional potential water supply alternatives available to the City for meeting future demand in both normal and dry years include:

- Additional MID surface supply, potentially in conjunction with a Phase Three MRWTP Expansion;
- Recycled water implementation.

Table ES-10 contains a summary of future planned water supply projects for the City of Modesto.

**Table ES-10 Future City of Modesto Water Supply Projects (AFY)<sup>a</sup>**

Project Name	Projected Date of Operation	Normal Year Yield (AFY)	Single Dry Year Yield	Multiple Dry Year Yield		
				Year 1	Year 2	Year 3
Phase Three MRWTP <sup>b</sup>	2018	11,202	8,802	10,402	9,602	8,802
SWSP <sup>c</sup>	2011	12,881	10,121	11,961	11,041	10,121

Footnotes:

- a. Single dry year base supply reduction assumed to be 9/42 inches (or 21.5%), based on 1991 “worst case” condition. Assumes the 9/42 inch reduction is divided over three years for multiple dry year annual cutback of 3/42 inches (or 7.1%) per year.
- b. The Phase Three MRWTP expansion is currently being considered to provide additional water supply. This project’s yield may change in the future.
- c. The TID SWSP is projected to be operational by 2011.

## ES-5 Wastewater and Recycled Water

The City of Modesto completed the Northern San Joaquin Valley Water Reclamation Project study in June of 2005. The study 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.

A number of the cities surrounding the City of Modesto provide municipal wastewater services in their service areas. These cities, plus local irrigation districts in the region and other agencies such as Stanislaus County government, were identified as potential stakeholders for the Northern San Joaquin Valley Water Reclamation Project. The following potential regional participants were contacted regarding their interest in participating in a regional treatment and recycled water project:

- City of Ceres
- City of Delhi
- City of Denair
- City of Escalon
- City of Hilmar
- City of Hughson
- Community of Keyes
- City of Manteca
- City of Oakdale
- City of Patterson
- City of Ripon
- City of Riverbank
- Community of Salida
- City of Turlock
- City of Waterford
- Turlock Irrigation District
- Stanislaus County

Oakdale, Riverbank, Grayson, Westley, Hughson, and Waterford did not engage in the process or express interest in the project; however these cities are located in the vicinity of Modesto and may have interest in the future.<sup>6</sup> Hilmar expressly stated they did not have interest in the project.

### ES-5.1 Wastewater Quantity, Quality and Current Issues

The City of Modesto Wastewater Treatment Facilities are located on two sites, separated by approximately seven miles. The Sutter Avenue Primary Plant (headworks, primary clarification, and solids handling) is adjacent to the Tuolumne River, within a residential area. The Jennings Road Secondary Plant (oxidation ponds, storage, and ranchlands) is within an agricultural region adjacent to the San Joaquin River. The wastewater treatment plants serve the City of Modesto 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, the secondary effluent is either discharged to the San Joaquin River (9,300 AFY) or recycled for irrigation (21,400 AFY). Effluent is stored on site until river discharge or irrigation is possible. Current and projected City wastewater flows are presented in Table ES-11.

---

<sup>6</sup> Representatives from Riverbank and Waterford participated in the first stakeholder workshop but did not attend the second workshop.

**Table ES-11 Wastewater Collection and Treatment (AFY)<sup>a</sup>**

Type of Wastewater	2005	2010	2015	2020	2025	2030
Wastewater collected & treated in service area	28,900	31,028	34,276	38,085	42,229	46,486
Volume that meets recycled water standards <sup>b</sup>	28,900	31,028	34,276	38,085	42,229	46,486

Footnotes:

- a. Projected wastewater flows from City of Modesto Wastewater Master Plan Phase Two Update Master Plan Report (Draft), July 2006..
- b. Title 22 of the California Code of Regulations (CCR) defines the quality of Modesto’s 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.

### ES-5.1.1 Wastewater Disposal and Potential Recycled Water Uses

Title 22 of the California Code of Regulations (CCR) defines the quality of Modesto’s 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 has been supplying recycled water for irrigation since 1969 and currently irrigates roughly 2,526 acres of fodder and feed crops on city-owned ranchlands at roughly 21,400 AFY.

Currently, disposal of the City of Modesto’s secondary effluent is achieved through land reclamation, San Joaquin River discharge, pond system evaporation, and pond system percolation. The City’s disposal operations are regulated under the National Pollutant Discharge Elimination System (NPDES) and Waste Discharge Requirement (WDR) permit systems. 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 ranchlands 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.

Per the City’s *Wastewater Master Plan Phase 2 Update (2007)*, the City of Modesto is planning to upgrade its wastewater treatment facilities from secondary to tertiary treatment to allow for year-round discharges of effluent. The City of Modesto’s current and projected wastewater disposal methods are presented in Table ES-12.

**Table ES-12 Disposal of Wastewater (Non-recycled water - AFY)<sup>a</sup>**

Method of Disposal	Treatment Level	Time of Use	2005	2010	2015	2020	2025	2030
Rivers	Secondary	Oct – May	11,426	11,426	11,426	0	0	0
Rivers	Tertiary or better	All Year	0	2,577	5,377	25,205	30,806	30,806
Land Application	Secondary or better	All Year	15,683	15,683	15,683	15,683	15,683	15,683
TOTAL			27,109	29,686	32,486	40,888	46,489	46,489

Source: City of Modesto *Wastewater Master Plan Phase 2 Update (2007)*.

### ES-5.1.2 Potential Recycled Water Uses

As described above, the City of Modesto currently uses its 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 of Modesto 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, urban irrigation, industrial cooling water, and water sales have been identified for future evaluation as potential recycled water markets. However, before water recycling can be pursued in these areas, Modesto’s level of wastewater treatment must be increased. Recycled water potential is presented in Table ES-13.

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. The City of Modesto is currently updating its Wastewater Master Plan, wherein the City documents its intention of ultimately upgrade its existing treatment to tertiary levels for disposal into the San Joaquin River. Once the plan is finalized, the City can begin the process of reviewing the recommendations established in the Northern San Joaquin Valley Water Reclamation Project and continue to pursue reasonable options for recycled water implementation.

**Table ES-13 Actual and Potential Recycled Water Use (AFY)**

User Type	Minimum Treatment Level	2005	2010	2015	2020	2025	2030
Agriculture	Secondary	21,400	21,400	21,400	21,400	21,400	21,400
Agriculture <sup>a</sup>	Tertiary	18,171	25,264	25,264	25,264	25,264	25,264
Urban <sup>b</sup>	Tertiary	25,600	25,600	25,600	25,600	25,600	25,600
Environmental <sup>c</sup>	Tertiary	TBD	TBD	TBD	TBD	TBD	TBD
Groundwater Recharge <sup>d</sup>	Tertiary	TBD	TBD	TBD	TBD	TBD	TBD
Water Sale <sup>e</sup>	Tertiary	80,000	80,000	80,000	80,000	80,000	80,000
TOTAL		145,171	152,264	152,264	152,264	152,264	152,264

Footnotes:

- a. Agriculture demand represents potential demand in MID and TID service areas.
- b. Urban includes urban landscape irrigation and industrial cooling uses.
- c. Environmental includes wildlife habitat and wetlands uses. Additional analysis would be required to quantify this potential use.
- d. Due to current constraints on water quality for groundwater recharge, this is not currently considered a viable alternative. Additional groundwater basin analyses would be required to quantify the potential for groundwater recharge of recycled water.
- e. Projected demand for water sales is greater than 80,000 AFY and has not been quantified. 80,000 AFY represents estimated water sale potential to an irrigation district outside of the MID and TID service areas. Recycled water conveyance to outside districts is not currently considered a viable alternative.

## ES-6 Water Shortage Contingency Plan

To manage a potential water supply deficiency, the City of Modesto has defined three water shortage stages pursuant to their current Urban Water Shortage Contingency Plan, adopted by the City in 1991 (Appendix J). The stages 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. Phasing criteria for water shortage stage determination and corresponding demand reduction objectives (Table ES-14) were created to aid in declaring a particular water shortage stage.

In the summer of 2002, water pressures in the City of Modesto 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. The City of Modesto is currently still in Stage 1 of the water shortage contingency plan.

**Table ES-14 Phasing Criteria and Demand Reductions for Water Shortage Stages**

Stage No.	Phasing Criteria for Stage Determination	Demand Reduction Objective
1	Below average rainfall in the previous 12-24 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%
2	Below average rainfall in the previous 24-36 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%
3	Below average rainfall in the previous 24-48 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%

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. Stage 3 (the most restrictive stage) includes the following requested consumer actions that have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply:

- 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

During a declared water shortage stage, penalties for excess water use in violation of the water use prohibitions outlined above are assessed 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).

Expenditure impacts resulting from implementation of the Water Shortage Contingency Plan 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 ES-15.

**Table ES-15 Proposed Measures to Overcome Revenue and Expenditure Impacts**

Measure
Rate adjustment
Water Shortage Contingency Fund
Temporary Deferral of CIP Projects
Additional Outside Funding Sources

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 of Modesto has passed resolution 2006-508 on August 8, 2006, adopting written procedures to uphold this legislation. This resolution is provided as Appendix M.

### **ES-6.1 Draft Ordinance and Use Monitoring**

In 1991, the Modesto City Council adopted its current *Urban Water Shortage Contingency Plan*. Prior to the adoption of the Plan, the City made available a draft of the plan for public review and held a public hearing.

The City’s water system is supplied from surface water and from 97 operating groundwater wells. The water treatment plant and 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 of Modesto is in the process of converting all customers to meters. Once the conversion to meters is complete, the City of Modesto will be able to determine reductions in demand based on metered usage. Table ES-16 summarizes the City of Modesto’s water use monitoring mechanisms.

**Table ES-16 Water Use Monitoring Mechanisms**

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



Chapter 1

## Introduction

## Chapter 1 Introduction & Background

### 1.1 Introduction

The Urban Water Management Planning Act was 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 every five years. This plan describes their current and future water use, sources of supply and its reliability, and existing conservation measures. In recognition of the State's requirements, the City of Modesto (City) and the Modesto Irrigation District (MID) have prepared this joint Urban Water Management Plan (UWMP) for 2005. The 2000 UWMP was also prepared as a joint plan by the City and MID.

Several changes to the Urban Water Management Planning Act have been approved since 2000, resulting in significant revisions to the City of Modesto's 2000 UWMP. Revisions to the act include requiring a robust supply and demand comparison, as well as detailed discussion of groundwater resources, water recycling and desalination. In addition, changes to the City of Modesto's existing population projections, demands, and supplies as well as the approach to meeting future demands are reflected in this document. Changes to the City of Modesto's population projections are based upon updated projections developed by the City. Demand projections have similarly been updated based on land use updates. Changes to the City's future supplies and approach to meeting demands include securing future surface water supplies from MID to support a conjunctive use approach to managing surface water and groundwater supplies and in-lieu groundwater banking.

### 1.2 Note to Reviewer

The City of Modesto/MID Urban Water Management Plan contains the appropriate sections and tables required per California Water Code Division 6, Part 2.6 (Urban Water Management Planning Act). Throughout this document, the City of Modesto and MID sections reference each other extensively. This is because MID delivers treated water supplies to the City of Modesto, and the City of Modesto 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 of Modesto oversees demand management measures and other public outreach activities. To facilitate review and navigation of this document, the Completeness Review Sheets prepared by the Department of Water Resources for the 2005 UWMP Update have been recreated herein with appropriate references inserted. Two sets of review sheets have been included: one containing references and information for the City of Modesto and one containing appropriate references and information for MID. The pre-populated review sheets are included in Appendix A of this document.

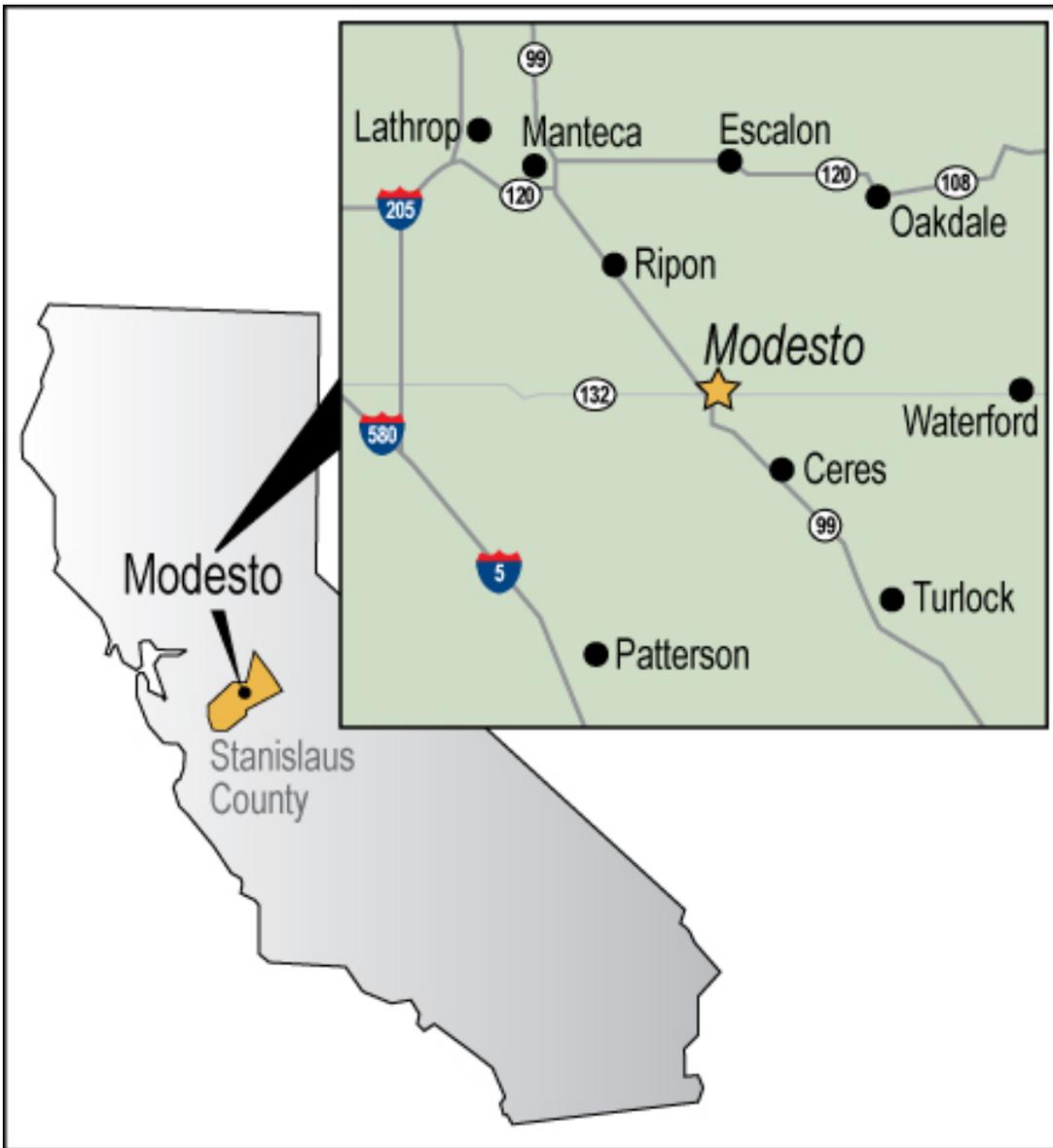
### 1.3 Background and Anticipated Benefits

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 of Modesto's water service area.<sup>7</sup> The signed Resolutions of Plan Adoption for this UWMP were attached to the cover letter addressed to the Department of Water Resources, and copies are included in Appendix C. This plan includes all information necessary to meet the requirements of California Water Code Division 6, Part 2.6 (Urban Water Management Planning Act), included as Appendix D of this document. The general vicinity

---

<sup>7</sup> MID has projected deliveries to additional urban areas outside the City of Modesto in future years. These deliveries will be addressed in subsequent sections of this UWMP.

addressed in this UWMP can be seen in Figure 1-1.



**Figure 1-1**  
**Modesto Vicinity Map**

### 1.3.1 Background: City of Modesto

The City of Modesto is the primary 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 (shown in Figure 1-2).<sup>8</sup>

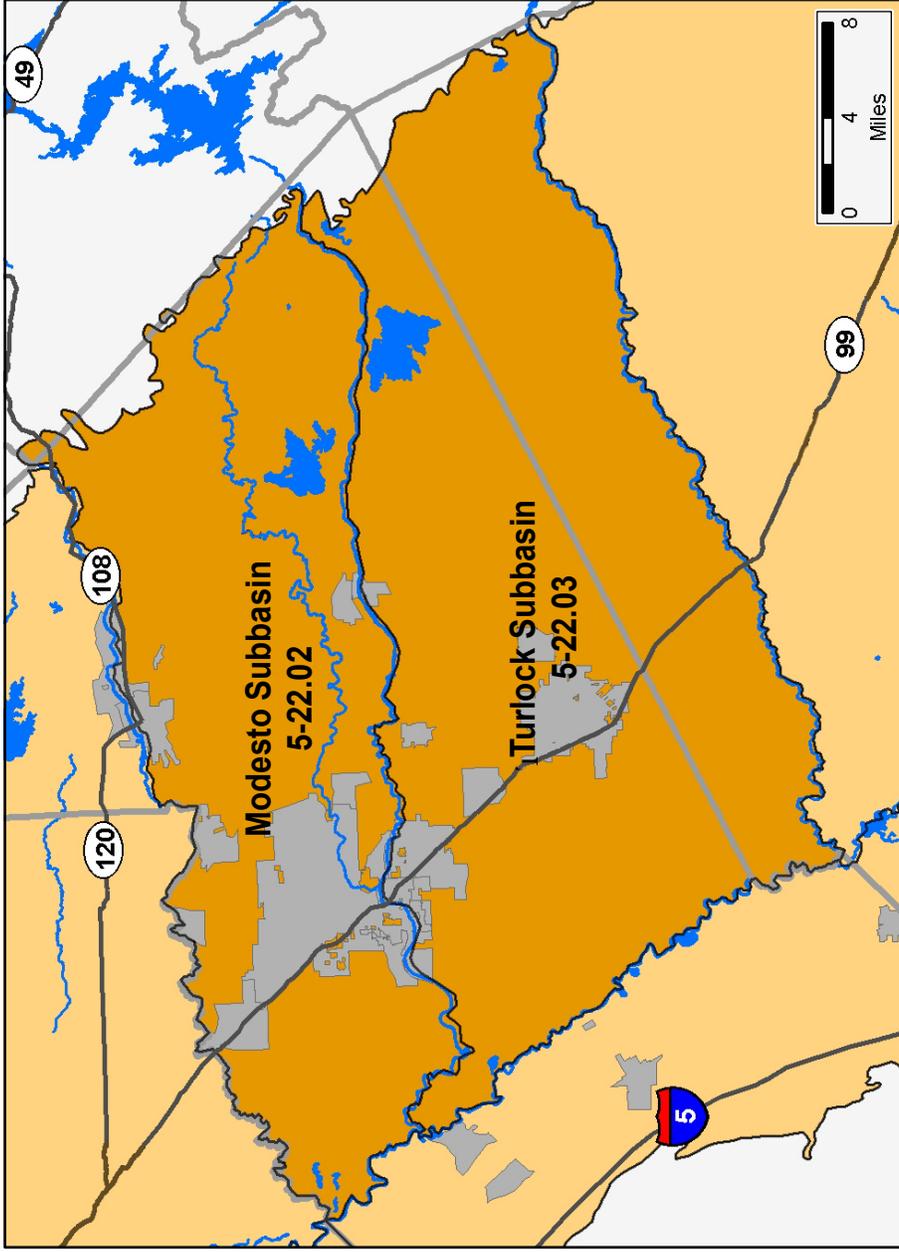
The City completed UWMPs for 1985 and 1990 without MID's participation since MID did not supply domestic water to the City during that time. In the early 1990s, the City of Modesto, MID and the former Del Este Water Company formed a partnership to use of a portion of MID's surface water supplies for 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. Phase Two of the MRWTP, scheduled to be completed in 2009, 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 will allow additional groundwater recovery, as well as groundwater banking via the in-lieu conjunctive use of surface water supplies.

The Modesto Domestic Water Project's Environmental Impact Report (EIR) was completed in March of 1990. The Phase One EIR identified increased surface water supply for current and future urban uses as water that has been made available from the urban development of agricultural land. It was anticipated at that time that the proposed Modesto Regional Water Treatment Plant (MRWTP) for treating these increased water supplies would be constructed in two phases of 30 MGD each. Phase One was expected to be completed by 1993 but was actually completed in January 1995. The EIR for Phase Two of the MRWTP was completed in July of 2005, and Phase Two is projected to be operational in the 2009 timeframe.

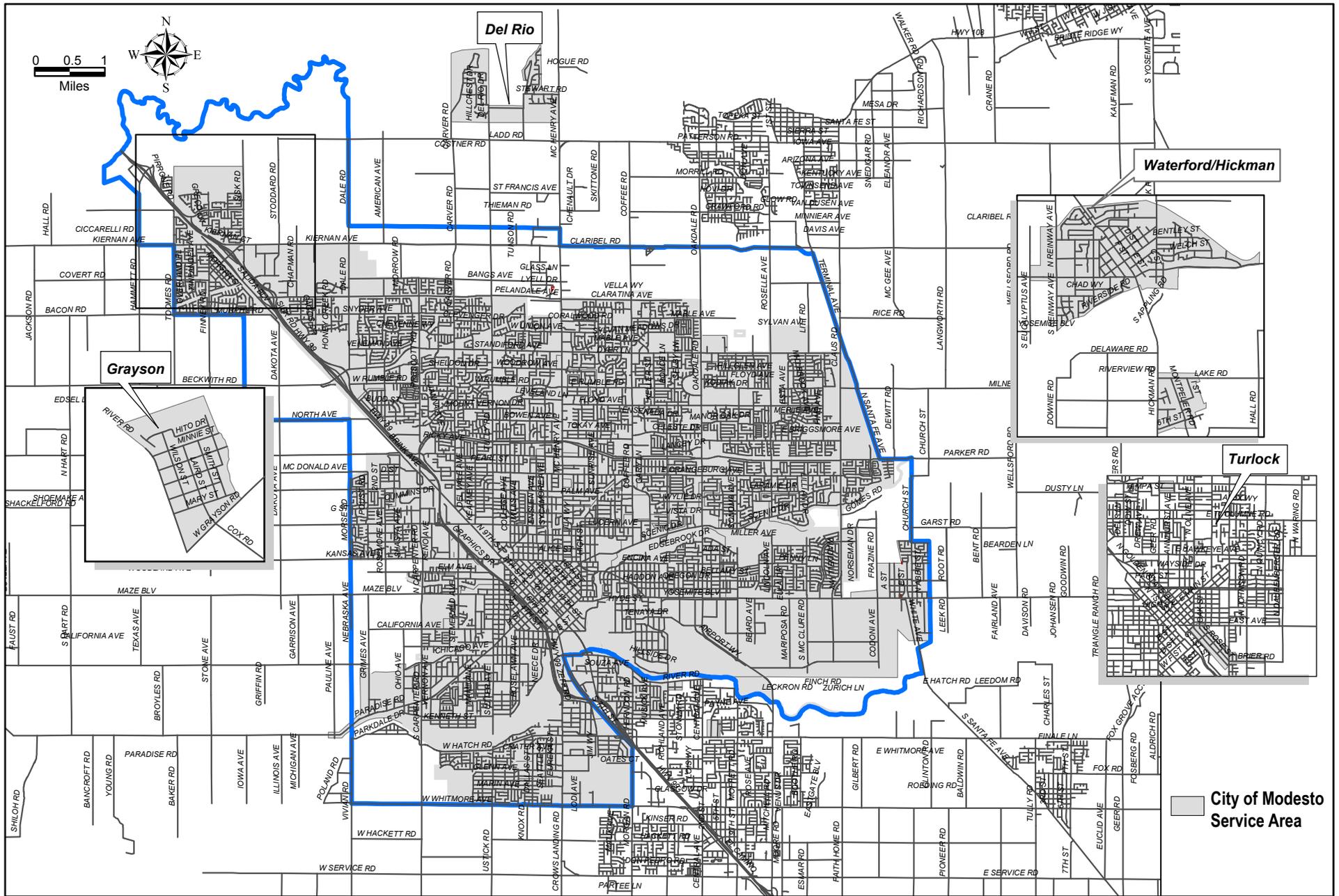
In July of 1995, the City acquired the former Del Este Water Company, which had previously served approximately 30 percent of the municipal customers in the Modesto area. As a result of this acquisition, the City also became the primary domestic water purveyor in Stanislaus County, serving not only the 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. The City recently entered into an agreement with TID to participate in design of a TID Surface Water Supply Project (SWSP) to be located east of Modesto on the south side of the Tuolumne River. Modesto intends to enter into a future Treatment and Delivery Agreement (TDA) for delivery of 12,881 AFY (11.5 MGD) of TID surface water to the south Modesto area. For the purposes of this document, it is assumed that the SWSP will be operational in the year 2011. The SWSP will further enhance Modesto's ability to manage its surface and groundwater supplies conjunctively by providing surface water south of the Tuolumne River. Because a TDA has not yet been developed, however, the SWSP has been treated as a potential future supply. The potential effect of the SWSP on the City's supply and demand outlook is presented in Appendix B. Figure 1-3 shows the City of Modesto's water service area.

---

<sup>8</sup> The Modesto groundwater subbasin has been referred to as the Tuolumne subbasin in previous documents.



**Figure 1-2**  
**Groundwater Basins**  
**Underlying the City of Modesto**



**Figure 1-3**  
**City of Modesto Service Area**

The Modesto and Turlock groundwater subbasins are both unadjudicated groundwater basins. 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 up to 60 percent of its total supply during summer and fall months, and will continue to use groundwater pumping to meet demands until construction of Phase Two of the MRWTP is complete in 2009. Once Phase Two is completed, there will be sufficient surface water treatment capacity to deliver an additional 30 MGD of MID supplies to the City of Modesto, allowing the City to meet all but peak demands using surface water and reducing the City’s dependence on groundwater supplies for servicing areas north of the Tuolumne River.

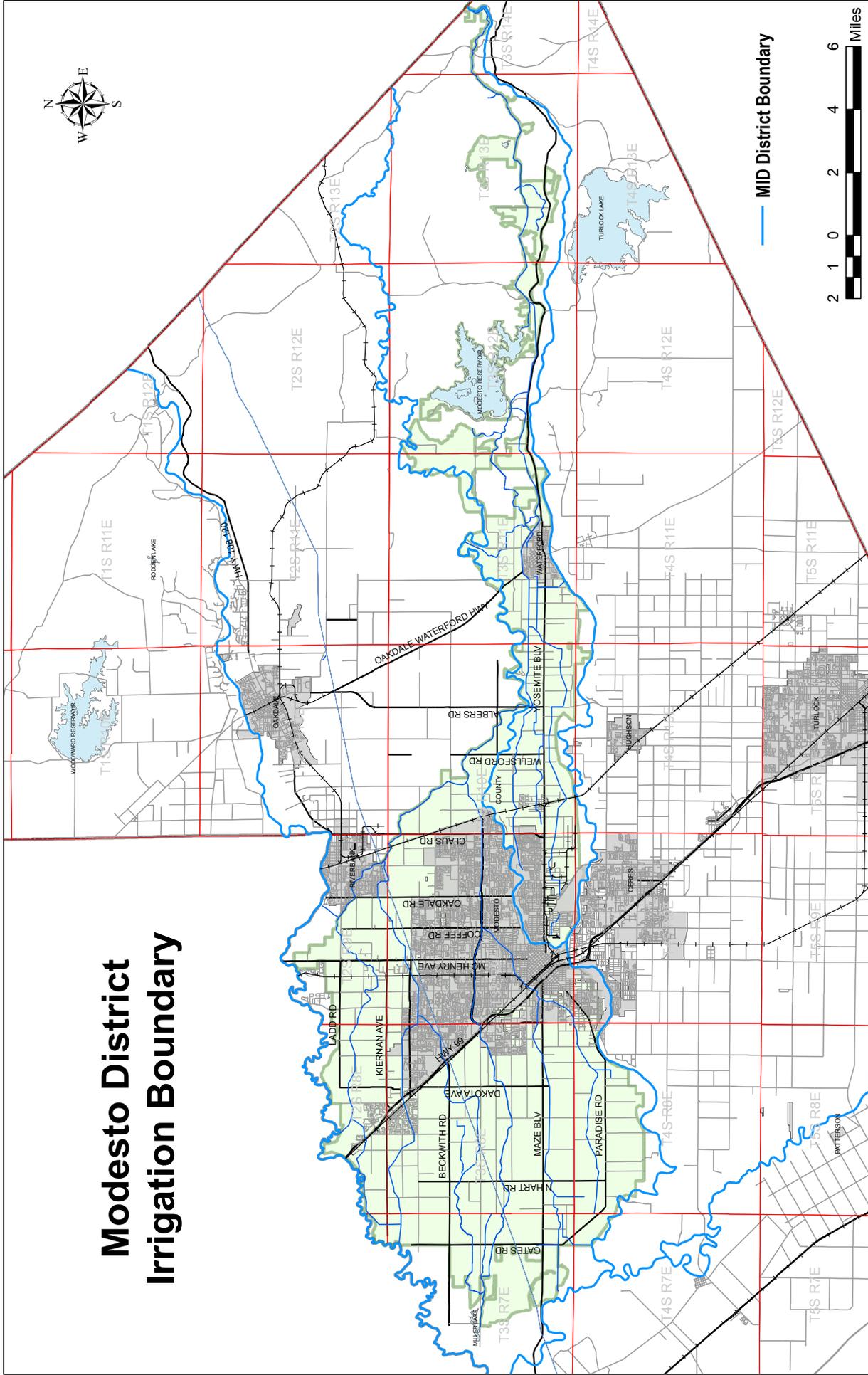
### **1.3.2 Background: Modesto Irrigation District**

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. Figure 1-4 shows MID’s service area.

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 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 or 30 MGD of treated surface water, commencing 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 Phase Two expansion of the Modesto Regional Water Treatment Plant (MRWTP). 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 of Modesto. A copy of the SWRCB order approving this transfer has been included as Appendix F of this document.

# Modesto District Irrigation Boundary



**Figure 1-4**  
**Modesto Irrigation**  
**District Service Area**

### 1.3.3 Anticipated Plan Benefits

This joint UWMP will benefit both the City of Modesto and MID by providing a planning tool for treating and delivering municipal water supplies to the City of Modesto’s water service area.<sup>9</sup> 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.*

### 1.4.1 Coordination, Notification and Participation

A variety of agency and public interests participated in the coordination and preparation of this UWMP, and are described in Table 1-1. At the onset, MID was invited to participate in the preparation of the UWMP as the City of Modesto is their only wholesale water purchaser. As a result, MID participated fully in the document preparation and review process.

**Table 1-1: Coordination with Appropriate Agencies**

Agency	Partic. in Plan Develop.	Commented on Draft	Attended Public Meetings	Contacted for Input	Sent Copy of Draft Plan	Sent Notice of Intention to Adopt	Not Involved/ No Info.
Ceres/ Walnut Manor				✓	✓		
Del Rio/ Hillcrest				✓	✓		
Empire				✓	✓		
Hickman				✓	✓		
Grayson				✓	✓		
Salida				✓	✓		
Turlock	✓			✓	✓		
Waterford	✓			✓	✓		
Stanislaus County	✓			✓	✓		
Oakdale Irrigation District	✓						
Turlock Irrigation District				✓	✓		

<sup>9</sup> MID has projected deliveries to additional urban areas outside the City of Modesto in future years. These deliveries will be addressed in subsequent sections of this UWMP.

Agency	Partic. in Plan Develop.	Commented on Draft	Attended Public Meetings	Contacted for Input	Sent Copy of Draft Plan	Sent Notice of Intention to Adopt	Not Involved/ No Info.
Manufacturers Council	✓			✓	✓		
Building Industry Association	✓			✓	✓		

A meeting was held at the City of Modesto offices on September 8, 2005, to encourage stakeholder input during the preparation of the UWMP. Attending this meeting were representatives from the City of Modesto, Stanislaus County, Oakdale Irrigation District (OID), the City of Riverbank, MID, the City of Waterford, the City of Turlock, Manufacturers Council, and Building Industry Association (BIA). The format of the UWMP, options for meeting shortfalls, and the potential for regional water management planning were discussed during this meeting.

Following completion of the draft UWMP, a notification of public review will be placed in the City’s newspaper about the 2005 UWMP update process and draft report, and copies of the documents will be made available at the City’s Public Works Department with an electronic version placed on the City’s website. Public notification materials will be included in Appendix G of this document. The cities and county entities served by the City and MID will be notified of the UWMP draft release and invited to review the document prior to finalization and submittal. A full 30-day comment period following a 14-day public noticing period will be held, during which the local cities and County served by MID, as well as the general public, will be encouraged to comment on the draft document. Copies of the draft UWMP will be sent directly to the following entities for review:

- Ceres
- Turlock
- Waterford
- Stanislaus County
- Turlock Irrigation District
- Manufacturers Council
- Building Industry Association

A public hearing will be held on April 10, 2007, in conjunction with the Modesto City Council meeting prior to formal adoption of the UWMP. A public hearing will also be held by MID on the same day. Noticing for this public hearing will occur during the fourteen day period (February 26, 2007 to March 12, 2007) preceding the 30-day public comment period, pursuant to Section 6066 of the Government Code. Public hearing notices will be included in Appendix G.

## 1.5 Plan Updates

### Water Code § 10621(a)

*(a) Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640).*

Previous UWMPs developed by the City of Modesto and MID were submitted for public review prior to approval by the Modesto City Council and MID Board of Directors. Public hearings were held for each prior plan to elicit public comment. Prior to each hearing, the time and place of the hearing was published within the jurisdiction of the publicly-owned water suppliers pursuant to Section 6066 of the

Government Code. The 2000 UWMP was adopted by MID's Board of Directors and the City of Modesto Council in September of 2001 and submitted to the California Department of Water Resources within 30 days of approval by MID and the City.

The 2005 UWMP will be adopted by MID's Board of Directors and the Modesto City Council in April of 2007 and submitted to the California Department of Water Resources within 30 days of approval by MID and the City. Public hearing notices are included in Appendix G of this document. The MID Board and City of Modesto resolutions adopting the UWMP are provided in Appendix C.

## 1.6 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 of Modesto and MID have 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 web site describes major multi-year water projects for extending water lines and installing wells and updating and rebuilding existing facilities. The web site 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 web site solicits public comment on water projects as well as providing public information.

As part of development of this 2005 UWMP update, the City of Modesto and MID will allow 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, will be conducted prior to commencement of the public comment period. During the public comment period, the draft UWMP update will be made available at the City of Modesto's Public Works Department and at the MID Board Secretary's Office, as well as on the City of Modesto Public Works Department website.



Chapter 2

## Supplier Service Area

## Chapter 2 Supplier Service Area

### 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 of Modesto and Modesto Irrigation District are located in the heart of the San Joaquin Valley, approximately 90 miles southeast of the San Francisco Bay Area and 77 miles south of the City of Sacramento. Both the City of Modesto and MID are located in Stanislaus County

### 2.1 City of Modesto Service Area

The City of Modesto's service area is shown in Figure 1-3. The City of Modesto obtains its water supply from two sources: groundwater from the Modesto and Turlock groundwater subbasins and treated Tuolumne River water from MID.

The City of Modesto Public Works Department, Water Division is the governing agency for the City's Sphere of Influence (SOI). The City of Modesto's water service area includes former Del Este Water Company systems in Empire, Salida, Waterford, Hickman, Grayson, Del Rio, and portions of Ceres and Turlock and in Stanislaus County. There are over 77,000 water connections, 927 miles of water lines in the water system, 118 groundwater wells, and seven water tanks.

The City of Modesto adopted its Urban Area General Plan in 1995 identifying the policies directing future growth. The Urban Area General Plan was amended in 2003, outlining appropriate development over the next five years. The amendment was adopted by the Modesto City Council in March of 2003 as Resolution No. 2003-122.

Three general areas of the City of Modesto are defined in the Urban Area General Plan:

1. Redevelopment Area - located in the downtown area of Modesto;
2. Baseline Development Area - generally that portion of Modesto that is already developed;
3. Planned Urbanizing Area - the portion of the community which extends beyond city limits to the City of Modesto's Sphere of Influence (SOI) and encompasses the area in which the City of Modesto would likely extend urban services at buildout.

The City of Modesto does not exercise land use jurisdiction in the areas it serves which were formerly within the Del Este system and are outside of the City's SOI. Most of these areas are assumed to be near buildout.

### 2.2 Modesto Irrigation District Service Area

MID's service area is shown in Figure 1-4. MID is primarily an agricultural water supplier, and though treated water is provided to the City of Modesto Municipal Water System for urban delivery, MID does not directly serve any domestic water customers. The MID treated water place of use is defined by the overlap of the MID water service boundary with the City of Modesto Municipal Water System service area north of the Tuolumne River. The common City of Modesto 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 and includes the communities of Hickman and Grayson and parts of Ceres and Turlock. All of the other communities served by the City of Modesto (Salida, Empire and Waterford) lie within the MID service area.

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 of Modesto. However, the area currently served by MID treated water supplies does not extend beyond the City of Modesto Municipal Water System.

### 2.3 Surface Water Facilities

MID delivers a combination of Tuolumne River water and groundwater via a network of canals, pipelines, pumps, drainage features, and control structures. The La Grange Dam is used to divert water into MID's main irrigation canal from the Tuolumne River. Table 2-1 provides a summary of MID's existing irrigation facilities.

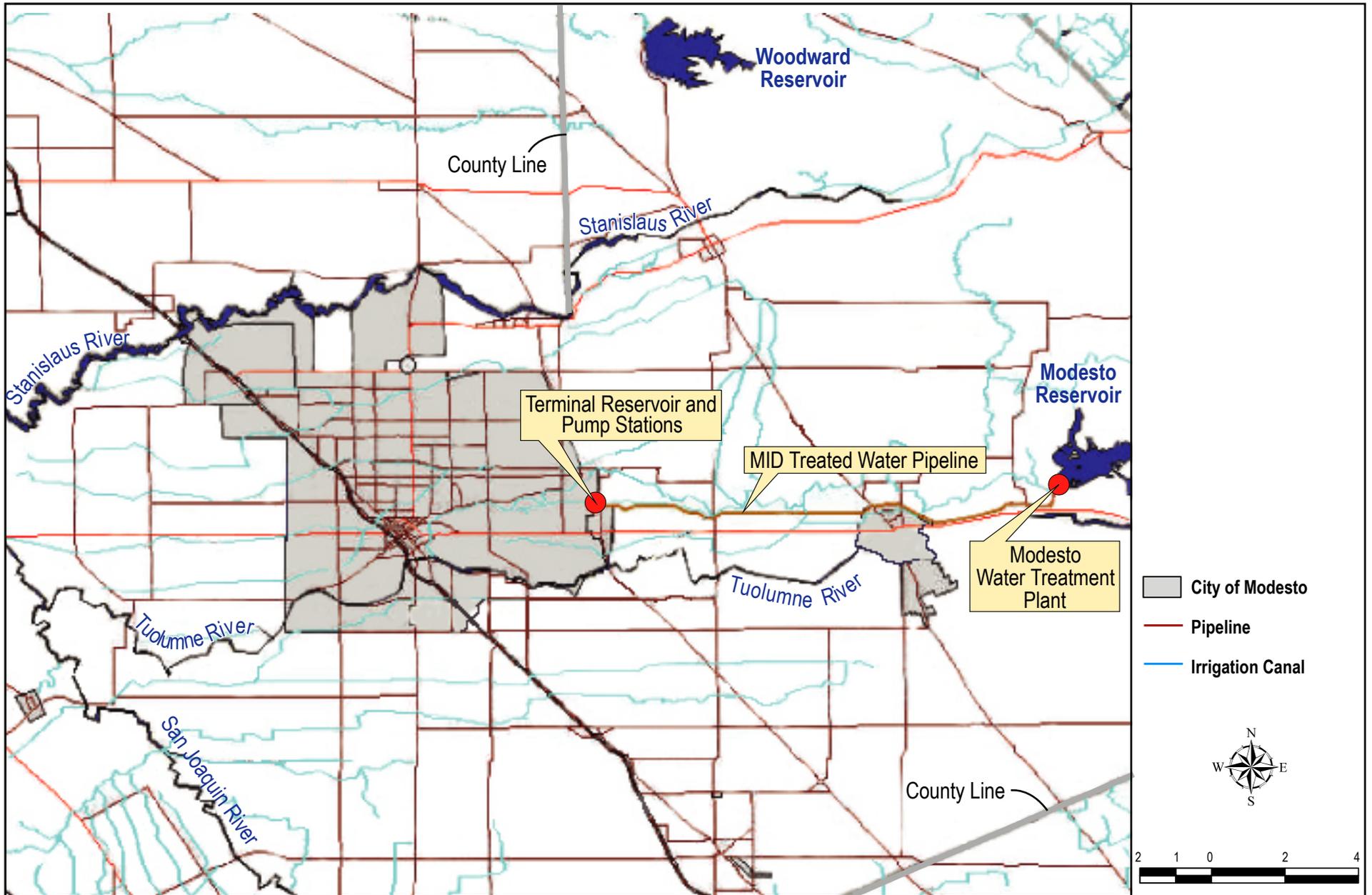
**Table 2-1: MID Irrigation Facilities**

Facility Type	MID Facilities	Improvement District and Private Facilities
Canals (Lined)	140 miles	10 miles
Canals (Unlined)	24 miles	--
Pipelines	44 miles	153 miles
Wells/Deep Well Pumps	96 each	--
Canal Sidegates	1317 each	--
Structures, SCADA Monitored/Controlled	14 headgates, 5 spillways, and 4 flow measurement	0
Structures, Chart Monitored/Manually Controlled	13 spills and 4 flow measurement	0

### 2.4 Raw Water Reservoirs

Figure 2-1 shows the major water facilities in the City of Modesto service area. There are two raw water reservoirs serving the Modesto area: the Modesto Reservoir and New Don Pedro Reservoir.

Completed in 1911, owned and operated by MID, Modesto Reservoir 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.



**Figure 2-1**  
**Major Water Facilities in the**  
**City of Modesto Service Area**

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. When full, the reservoir water level is 830 feet above sea level.

### 2.4.1 Groundwater Facilities

The City of Modesto supplies approximately 60 percent of its water use from city-owned and operated wells. As of 2005, the City of Modesto had 118 wells located throughout the City's entire water service area, 97 of which were operational. The wells are in the Modesto and Turlock subbasins of the San Joaquin Valley Groundwater Basin. In general, residents north of the Tuolumne River (North Modesto, Salida and Empire) rely on treated surface water year-round. Surface water supplies are augmented with groundwater to meet increased demands in summer months. Demands originating south of the Tuolumne River (South Modesto) are met with groundwater supplies year-round.

Prior to completion of the MRWTP by MID, the City of Modesto and the surrounding communities relied solely on groundwater for domestic supply. The 1990 MDWP EIR noted that groundwater levels were declining, particularly near the center of the City. *California's Groundwater*, the California Department of Water Resources (DWR) Bulletin 118 (most recently updated in October of 2003) describes groundwater basins and subbasins throughout the State. According to Bulletin 118, the water levels in the Modesto subbasin rose approximately six feet from 1996 to 2000. Water levels in the Turlock subbasin, similarly, rose about seven feet from 1994 to 2000<sup>10</sup>. This rise in groundwater levels is likely due to a reduced reliance on groundwater resulting from completion of the MRWTP in 1995.

The MDWP EIR also noted degradation in groundwater quality. Constituents of concern identified in local groundwater sources include arsenic, uranium, organics and nitrate. Declining water quality combined with increasingly strict drinking water standards from the state and federal regulatory agencies has forced the City to take several wells out of service. The City has, however, developed a strategy to keep existing wells online and bring previously-abandoned wells back online through a combination of well monitoring for early detection, well rehabilitation, wellhead treatment (e.g., arsenic treatment, GAC), and blending.

## 2.5 Climate

Water use within Modesto 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 January 1, 1931 through December 31, 2004.

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<sub>o</sub>) is given for turf grass, and then corrected for a specific crop type. Local ET<sub>o</sub> data was obtained from California Irrigation Management Information System (CIMIS) station #71, located west of Modesto, California and operated by DWR.

---

<sup>10</sup> Modesto subbasin description: [http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/basins/pdfs\\_desc/5-22.02.pdf](http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/basins/pdfs_desc/5-22.02.pdf); Turlock subbasin description: [http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/basins/pdfs\\_desc/5-22.03.pdf](http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/basins/pdfs_desc/5-22.03.pdf), accessed October 2, 2006.

The exact location of the station is:

Elevation (ft): 35  
Latitude: N37° 38' 43"  
Longitude: W121° 11' 16"

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

**Table 2-2: Modesto Climate**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann.
Monthly Average ETo <sup>(a)</sup> (in)	0.87	1.71	3.43	5.24	6.7	7.4	7.85	6.75	4.93	3.37	1.66	0.87	50.78
Average Total Precipitation <sup>(b)</sup> (in)	2.37	2.13	1.94	1.07	0.46	0.09	0.03	0.04	0.2	0.64	1.36	2.1	12.42
Average Max Temperature <sup>(b)</sup> (°F)	53.7	60.8	66.9	73.4	81.1	88.2	94.1	92.1	87.7	78	64.4	54.2	74.5
Average Min Temperature <sup>(b)</sup> (°F)	37.7	40.9	43.4	46.8	51.7	56.4	59.8	58.7	56	49.7	41.7	37.8	48.4

Footnotes:

- a. Data from CIMIS Station #71. DWR requests that information be based on the last 30 years. The CIMIS information 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?camode+nca>) for Modesto, CA. Period of record is 1/1/1931 through 12/31/04.

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 obtained from the CIMIS station website at: <http://www.cimis.water.ca.gov/>.

## 2.6 Other Demographic Factors

No additional demographic factors affecting water use in the City of Modesto 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 Urban Water Management Plan.

## 2.7 Population Projections

The City of Modesto is among the fastest growing areas in California, with a projected service area population of 387,486 by the year 2030. The City of Modesto is expected to grow at a rate of 1.60% through 2011, increasing to 1.75% from 2012 through buildout. This growth rate was assumed both for the City of Modesto as well as in the outlying areas of Empire, Salida, Waterford, Del Rio, and Hickman. In addition, Bret Harte, Shackelford, West Modesto, and North Ceres (Bystrom) are assumed to experience slower growth than the City of Modesto. An average annual growth rate of 0.45 percent was assumed for these areas. The communities of Grayson and Turlock were assumed to be at buildout. Base population assumptions for the City of Modesto and outlying areas are presented in Table 2-3. Current and projected population (through 2030) is presented in Table 2-4.

**Table 2-3: Basis for Population Assumptions for City of Modesto and Outlying Areas Served by the City of Modesto**

	City of Modesto	Empire	Salida	Waterford	Del Rio	Hickman	Grayson	Turlock	Bret Harte	Shackelford	West Modesto	North Ceres (Bystrom)
Base Population	192,468	3,903	17,168	8,265	2,970	822	1,874	2,057	5,161	5,170	6,096	4,518
Year of Base Population	2005	2000	2003	2003	2003	2003	2003	2003	2000	2000	2000	2000
Source of Base Population <sup>a</sup>	City of Modesto	2000 Census	2005 Hydraulic Model Update	2000 Census	2000 Census	2000 Census	2000 Census					
Annual Growth Rate <sup>b</sup>	1.6% - 1.75%	1.6% - 1.75%	1.6% - 1.75%	1.6% - 1.75%	1.6% - 1.75%	1.6% - 1.75%	0%	0%	0.45%	0.45%	0.45%	0.45%
Buildout Population <sup>c</sup>	344,910	N/A	21,373	13,775	4,652	1,784	1,874	2,057	N/A	N/A	N/A	N/A
Source of Buildout Population <sup>d</sup>	CEDD Memo	N/A	2005 Hydraulic Model Update	Zero growth assumption	Zero growth assumption	N/A	N/A	N/A	N/A			

Footnotes:

- a. City of Modesto 2005 population provided by William Wong/City of Modesto. Base populations from 2000 Census accessed using [www.wikipedia.com](http://www.wikipedia.com). North Ceres projections based on Community and Economic Development Department May 4, 2006 “Final memo on Projected General Plan Buildout Population of the SOI” by Miguel Galvez (CEDD Memo). Projections for Ceres area were halved, as water service does not extend to all of Ceres. Base population for Waterford, Del Rio, Hickman, Grayson, and Turlock base don adjusted developed acreage in the City of Modesto Hydraulic Model Update (West Yost & Associates, 2005). Acreage converted to population assuming 5 homes per acre and 2.9 people per home.
- b. Annual growth rate assumed to be 1.6% through 2011, increasing to 1.75% in 2012 through buildout. Assumption based on July 27, 2006 “Estimated Sewer Flow Projections Technical Memorandum” by William Wong. Outlying areas assumed to grow at same rate as City of Modesto with the exception of Grayson and Turlock, which are assumed to be at buildout.
- c. City of Modesto buildout population based on CEDD Memo, which presents range from 333,640 to 356,843 people.
- d. Buildout populations from City of Modesto Hydraulic Model Update (West Yost & Associates, 2005) are based on total buildout acreage, converted to population assuming 5 homes per acre and 2.9 people per home.

**Table 2-4: Population Served by the City of Modesto – Current and Projected<sup>a</sup>**

Area Served	2005	2010	2015	2020	2025	2030
City of Modesto	204,461	221,350	241,052	262,895	286,718	312,699
Empire	4,225	4,574	4,982	5,433	5,925	6,462
Salida	17,722	19,186	20,893	21,373	21,373	21,373
Waterford	8,532	9,236	10,058	10,970	11,964	13,048
Del Rio	3,066	3,319	3,614	3,942	4,299	4,688
Hickman	848	918	1,000	1,091	1,189	1,297
Grayson	1,874	1,874	1,874	1,874	1,874	1,874
Turlock	2,057	2,057	2,057	2,057	2,057	2,057
Bret Harte	5,279	5,400	5,523	5,649	5,778	5,910
Shackelford	5,288	5,409	5,533	5,659	5,788	5,921
West Modesto	6,235	6,378	6,524	6,673	6,825	6,981
North Ceres (Bystrom)	4,621	4,727	4,835	4,945	5,058	5,174
<b>TOTAL</b>	<b>264,209</b>	<b>284,428</b>	<b>307,945</b>	<b>332,561</b>	<b>358,850</b>	<b>387,486</b>

Footnotes:

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



Chapter 3

## Water Supply

## Chapter 3 Water Supply

### 3.1 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.

#### 3.1.1 City of Modesto Groundwater

The City of Modesto has historically relied on groundwater from the San Joaquin Valley Groundwater Basin as a major source of supply. The City of Modesto spans two subbasins: the Modesto Subbasin north of the Tuolumne River, and the Turlock Subbasin south of the river. In 2005, the City of Modesto operated 97 of its 118 groundwater wells located throughout the City’s entire water service area (81 wells in the contiguous area and 16 wells in outlying areas). The wells within the City’s contiguous service area discharge directly into the distribution system or into one of the City’s water storage tanks. Wells within outlying areas discharge into separate distribution systems for each outlying area. Historical groundwater pumping is shown in Table 3-1 below. Based on the historic groundwater pumping shown in this table, average groundwater pumping between 2000 and 2005 was 46,470 AFY.

**Table 3-1: Amount of Groundwater Pumped (AFY)<sup>a</sup>**

Basin Name	2000	2001	2002	2003	2004	2005
Modesto Subbasin	37,498	40,860	43,538	42,251	41,962	41,441
Turlock Subbasin <sup>b</sup>	4,958	4,837	5,445	4,979	4,479	4,903
Delta-Mendota Subbasin <sup>c</sup>	261	297	324	287	261	237
Groundwater Pumped (Total)	42,717	45,995	49,307	47,517	46,702	46,581
% of Total Supply <sup>d</sup>	56%	57%	59%	57%	57%	59%

Footnotes:

a. Based on City of Modesto SCADA records.

b. Includes South Modesto, Hickman, portions of North Ceres and Turlock.

- c. The Community of Grayson is within the Delta-Mendota Subbasin
- d. Surface water production for 2000 through 2004 was 33,711; 34,927; 33,923; 35,329; and 35,090 AFY, respectively. The MRWTP is capable of delivering more than 33,602 AFY of treated water on a short-term basis.

The current design capacity of the City of Modesto's groundwater wells is 129 MGD. However, this capacity must be reduced to account for the following factors:

- Well pump and motor efficiency (total pumping efficiency);
- Reliable pumping capacity.

Reliable pumping capacity accounts for wells that are out of service at any given time due to mechanical breakdowns, maintenance or other operational issues. Based on the maximum total pumping capacity observed in the field by the City's Supervisory Control and Data Acquisition (SCADA) system in July 2003, the City's actual maximum total pumping capacity for the contiguous service area is 118 MGD, compared to the design capacity of 129 MGD. Therefore, the total pumping efficiency of the City's groundwater wells was calculated to be approximately 90% (118 MGD divided by 129 MGD).

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). According to 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 that observed 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<sup>2</sup>. Water levels in the Turlock subbasin, similarly, rose about seven feet from 1994 to 2000<sup>11,12</sup>. The rising water levels suggest that the groundwater subbasin has started to recover and that the current level of pumping in each subbasin is less than the previously assumed "safe yields" of the two subbasins.

A sustainable yield is defined as the average annual amount of groundwater that can be extracted from a groundwater basin, while maintaining a non-overdraft condition. The sustainable yields of the Modesto and Turlock subbasins are currently unknown, and the City of Modesto is participating in a study with the United States Geological Survey (USGS) to model the Modesto and Turlock subbasins and quantify sustainable yields for both subbasins. In the interim, the City has prepared an estimate of its 'operational yield' for use in managing groundwater. 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 (40 ft ASL; City of Modesto, 2007). At any given time, the quantity of water that can be pumped by the City of Modesto 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.

Although the City has recently increased its groundwater pumping to meet current growth demands, current groundwater production is still less than historic highs and overdraft conditions have not occurred in either subbasin. Using historic groundwater level and pumping data from the past 25 years, the City of Modesto 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

---

<sup>11</sup> Modesto subbasin description:

[http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/basins/pdfs\\_desc/5-22.02.pdf](http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/basins/pdfs_desc/5-22.02.pdf); Turlock subbasin description: [http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/basins/pdfs\\_desc/5-22.03.pdf](http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/basins/pdfs_desc/5-22.03.pdf), accessed October 2, 2006.

<sup>12</sup> The Modesto groundwater subbasin has been referred to as the Tuolumne subbasin in previous documents.

modeling being conducted by the USGS (City of Modesto, 2007). This operational yield, or ultimate amount of groundwater extraction, represents the amount of groundwater that can be extracted from the two groundwater subbasins without lowering groundwater levels below 40 feet ASL and potentially affecting long-term sustainability of the basin. Therefore, it can be assumed that the City of Modesto could potentially increase its annual groundwater extraction rates to volumes greater than are currently being pumped without adversely affecting the basin. The methodology for deriving this operational yield can be found in Appendix N. However, the City’s current operational capacity for groundwater production is limited by the reliable pumping capacity of its existing wells.

The City of Modesto has elected to continue to diversify its water supply alternatives by developing additional surface water supplies to offset groundwater pumping. Phase Two of the MRWTP will provide an additional 33,602 AFY of surface water supplies to offset groundwater pumping to meet demands north of the Tuolumne River. The SWSP, similarly, could provide up to 12,881 AFY of surface water supplies to offset groundwater pumping to meet demands south of the Tuolumne River. The groundwater that is not pumped will be stored in the groundwater subbasins to be used by the City of Modesto 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. The City of Modesto is also evaluating a potential Phase Three MRWTP expansion, which could result in additional treated water deliveries. Appendix B presents water supply projections assuming the SWSP and/or Phase Three MRWTP expansion are pursued.

Current and projected future groundwater pumping can be seen in Table 3-2. The City has developed a groundwater budget that conservatively assumes that pumping at current levels (approximately 46,275 AFY, based on average pumping from 2000 through 2005 – see Table 3-1) will result in constant groundwater levels over time. Because demands are first met with surface water supplies and groundwater is used only to meet demands in excess of the surface water delivered, the Phase Two MRWTP 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<sup>a</sup> - Normal Average Annual Demands<sup>a</sup>**

Basin Name	2005 <sup>b</sup>	2010	2015	2020	2025	2030
Modesto and Turlock Subbasins (Total) <sup>c</sup>	46,581	19,104	28,804	39,759	52,133	66,109
% of Total Supply	59%	22%	30%	37%	44%	50%

Footnotes:

- a. Total groundwater pumped is calculated as demand minus MID surface water supply. In 2009, completion of Phase Two of the MRWTP yields an additional 33,602 AFY of MID surface supply. Demands for years 2010, 2015, 2020, 2025, and 2030 are projected to be 87,539; 97,246; 108,028; 120,006; 133,313 AFY, respectively, as shown in Table ES-5.
- b. Actual groundwater pumped in 2005.
- c. Includes groundwater pumped in Salida, Waterford, Empire, Del Rio, North Ceres, Hickman, Turlock.

The City of Modesto’s future water supply planning incorporates sufficient future surface water supplies to allow the City of Modesto 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 ‘overpumping’ of the groundwater subbasins (such that groundwater levels drop below the 40 feet ASL 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 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.

### 3.1.2 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.

### 3.1.3 Groundwater Management Plans

The City of Modesto 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 *Final Draft Integrated Regional Groundwater Management Plan* in June of 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 of Modesto is also participating in the preparation of the draft *Turlock Groundwater Basin Management Plan*. This Plan is being prepared by the Turlock Groundwater Basin Association and is currently under review. 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 of Modesto currently uses its surface water and groundwater supplies conjunctively. Additional future surface water supplies provided from the Phase Two MRWTP will provide the City with the opportunity to use surface water to meet demands in lieu of groundwater, while banking unused groundwater in the Modesto and Turlock subbasins for future use. In order to effectively manage the groundwater subbasins and optimize conjunctive use of its surface water and groundwater supplies, the City of Modesto is planning a ten-year program through which extensive groundwater monitoring will be conducted and an AB 3030-compliant groundwater management plan will be developed for management of both subbasins. 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 of Modesto 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. This will allow the City of Modesto to continue to effectively manage its surface water and groundwater supplies conjunctively, while optimizing the available groundwater basin capacity. Due to the extensive nature of the proposed project, the City of Modesto is expected to seek funding assistance for the project in future years.

### 3.2 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.*

#### 3.2.1 City of Modesto Exchange or Transfer Opportunities

During supply shortage years, MID surface water supplies to the City of Modesto 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. City of Modesto transfer and exchange opportunities are shown in Table 3-3, below. Finally, the City may also seek following agreements with farmers growing annual crops on the MID system to allow additional water to be transferred to the City.

**Table 3-3: City of Modesto Transfer and Exchange Opportunities**

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

#### 3.2.2 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 of Modesto, 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 3-4.

**Table 3-4: MID Transfer and Exchange Opportunities**

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

### 3.3 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.

#### 3.3.1 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 of Modesto (Table 3-5).

**Table 3-5: City of Modesto Opportunities for Desalinated Water<sup>a</sup>**

Sources of Water	Check if Yes
Ocean Water	NA
Brackish ocean water	NA
Brackish groundwater	NA

Footnotes:

- a. NA = not applicable.

#### 3.3.2 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 (Table 3-6).

**Table 3-6: MID Opportunities for Desalinated Water<sup>a</sup>**

Sources of Water	Check if Yes
Ocean Water	NA
Brackish ocean water	NA
Brackish groundwater	NA

Footnotes:

- a. NA = not applicable.

### 3.4 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).

### 3.4.1 City of Modesto Wholesale Supplies

The City of Modesto purchases wholesale surface water supplies from MID. 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 33,602 acre-feet (30 MGD) of treated surface water to the City of Modesto, commencing on May 1 and ending the following April 30 during normal years. The City of Modesto 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 of Modesto’s demand for MID water and the reliability and vulnerability of the MID supplies to the City of Modesto.

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 Phase Two expansion of the Modesto Regional Water Treatment Plant (MRWTP). 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. In September 2005, the State Water Resources Control Board approved an order for a long-term transfer through 2054 for up to 67,204 AFY of water from MID to the City of Modesto. 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 Modesto Regional Water Treatment Plant (MRWTP) was completed in January 1995. The Phase Two EIR for the MRWTP was completed in July of 2005. The Phase Two Water Treatment Plant Expansion is expected to be completed and operational by 2009. The increased water treatment capacity provided by the Phase Two treatment plant expansion will allow the City to treat more surface water, thereby reducing their long-term dependence on groundwater.

In addition, the City recently entered into an agreement with TID to participate in design of a TID Surface Water Supply Project (SWSP) to be located east of Modesto on the south side of the Tuolumne River. The City of Modesto intends to enter into a future Treatment and Delivery Agreement for delivery of 12,881 AFY (11.5 MGD) of TID surface water to the south Modesto area. This will further enhance Modesto’s ability to manage its surface and groundwater supplies conjunctively. For the purposes of this document, it is assumed that the SWSP may be operational in 2011. The effects of the SWSP and/or a potential Phase Three MRWTP expansion can be seen in Appendix B.

City of Modesto demand for MID supplies is shown in Table 3-7.

**Table 3-7: City of Modesto Demand Projections Provided to Wholesale Suppliers (AFY)**

Wholesaler	2005 <sup>a</sup>	2010	2015	2020	2025	2030
Modesto Irrigation District	32,507	67,204	67,204	67,204	67,204	67,204
Total	32,507	67,204	67,204	67,204	67,204	67,204

Footnotes:

- a. Year 2005 supplies reflect actual MID deliveries.

Table 3-8 displays the existing and planned sources for MID and TID urban water supplies.

**Table 3-8: City of Modesto Wholesalers Identified and Quantified (AFY)**

Wholesaler	2005	2010	2015	2020	2025	2030
MID - Tuolumne River	32,507	67,204	67,204	67,204	67,204	67,204
Total	32,507	67,204	67,204	67,204	67,204	67,204

### 3.4.2 Modesto Irrigation District Wholesale Supplies

MID does not purchase wholesale water supplies.

## 3.5 Summary of Current and Future Water Supplies

### Water Code § 10631 (b)

*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.*

### 3.5.1 Current and Future Supplies: City of Modesto

Table 3-9 summarizes the current and projected future water supplies for the City of Modesto. Increased future water purchases from MID are projected to occur in 2009 coinciding with completion of the Phase Two MRWTP expansion.

**Table 3-9: City of Modesto Current and Planned Water Supplies (AFY)**

Supply	2005	2010	2015	2020	2025	2030
Wholesale Water Providers						
Modesto Irrigation District	32,507	67,204	67,204	67,204	67,204	67,204
Supplier produced groundwater <sup>a</sup>	46,581	19,104	28,804	39,759	52,133	66,109
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
<b>Total<sup>c</sup></b>	<b>79,088</b>	<b>86,308</b>	<b>96,008</b>	<b>106,963</b>	<b>119,337</b>	<b>133,313</b>

Footnotes:

- a. Groundwater pumping is increased to meet demands until the Phase Two MRWTP is operational in 2009, allowing an additional 33,602 AFY of demand to be met with surface water supplies.
- b. Buildout demand for the entire Modesto Water Service area is 133,313 AFY per WYA HMP TM “Final Water Demand Evaluation”, pg 25. Projected buildout date assumed to be 2030 (vs. 2024 from the HMP) to be consistent with 2005 WWMP. Annual average water demands were extrapolated from current demands to 2030 buildout assuming number of accounts increase at an annual compounded rate of 2.5% for all sectors except industrial, with number of industrial accounts increasing at an annual compound rate of 0.2%.

### 3.5.2 Current and Future Supplies: Modesto Irrigation District

Table 3-10 summarizes the current and projected future wholesale water supplies from MID to urban suppliers. In 2009, MID urban supplies are projected to double with the completion of Phase Two of the MRWTP.

**Table 3-10: MID Current and Planned Water Supplies (AFY)**

Water Purchased From	2005	2010	2015	2020	2025	2030
Wholesale Water Providers	0	0	0	0	0	0
Supplier produced groundwater	0	0	0	0	0	0
Supplier surface diversions	32,507	67,204	67,204	67,204	67,204	67,204
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
<b>Total</b>	<b>32,507</b>	<b>67,204</b>	<b>67,204</b>	<b>67,204</b>	<b>67,204</b>	<b>67,204</b>



Chapter 4

## Water Demand

## Chapter 4 Water Demand

### 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).*

### 4.1 Overview of Water Use

The City of Modesto is currently in the process of converting all residential unmetered accounts to metered usage. Commercial, industrial and institutional usage is currently metered. All new development is metered. Since 1991, water meters have been installed for most new residential development, but are not necessarily billed at a metered rate.

In general, the majority of water use within the City of Modesto is attributable to commercial, industrial, and single family residential usage.

### 4.2 Past, Current and Projected Water Use

#### 4.2.1 Past, Current and Projected Water Use: City of Modesto

The number of water accounts in the City of Modesto's sphere of influence was assumed to increase linearly over time at an annual compounded rate of approximately 2.5 percent for all customer classes except industrial to reach projected buildout demands in 2030 of approximately 133,313 AFY. Institutional projections include churches and schools. No agricultural customers were identified, and no industrial growth was assumed.

The City of Modesto is currently in the process of converting to all metered water usage. Currently, all commercial, industrial and institutional water accounts are metered. Since 1991, meters have been installed for all new construction, but all accounts are not necessarily being billed at metered rates. Starting in 2005, the City of Modesto began retrofitting single family flat-rate customers to meters at a rate of approximately 5,000 EDU per year. Based on the City's metering plan, existing single-family flat-rate customers will be gradually converted to metered rates once all non-metered, flat-rate customers have been converted to metered use.

Unit water demand factors expressing water use in gallons per day (gpd) per account were applied to the estimated number of accounts in each customer class for the years 2005 through 2030. Unit water demands per customer class are presented in Table 4-1. It was assumed that conversion from flat-rate to metered-rate pricing would result in a decrease in unit residential water use.

**Table 4-1: Unit Water Use Factor by Water Use Sector<sup>a</sup>**

Water Use Sector	Unit Water Use Factor (gpd/account)
Single Family Residential (flat-rate)	610
Single Family Residential (metered-rate)	519
Multi-Family (2-4 units)	828
Multi-Family (5+ units)	5907
Commercial	2357
Industrial	73554
Churches	1933
Schools	1281
Landscape	276

Footnotes:

- a. Water use factors from City of Modesto *Water Utility Cost of Service Rate Study*, Foresight Consulting Services, September, 2004.

Table 4-2 summarizes the City of Modesto’s past, current and projected number of water accounts and deliveries by customer type. These customers are within the City of Modesto and its Sphere of Influence (SOI) with the total in 2030 equal to projected demands for the City and SOI at buildout. It should be noted that the year of buildout has not been determined. Water demands for 2030 are assumed to equal buildout demands as a conservative planning assumption; buildout may actually occur later than 2030.

**Table 4-2: City of Modesto Past, Current and Projected Number of Accounts and Water Deliveries (AFY)<sup>a,b,c,d,e</sup>**

		Water Use Sectors	Single Family	Multi-Family	Commercial	Industrial	Inst/Gov	Landscape	Total
2000	Metered <sup>h</sup>	Accounts	8,863	4,502	3,762	160	283	0	17,570
		Deliveries	0	6,797	13,324	5,440	1,001	0	26,561
	Unmetered <sup>f</sup>	Accounts	50,535	0	0	0	0	798	5,133
		Deliveries	40,589	0	0	0	0	1,274	41,863
2005	Metered <sup>i</sup>	Accounts	65,189	4,514	3,672	76	445 <sup>g</sup>	883 <sup>g</sup>	74,779
		Deliveries	89,989	7,532	9,695	6,262	866	273	115,557
	Unmetered <sup>f</sup>	Accounts	50,812	0	0	0	0	0	50,812
		Deliveries	34,719	0	0	0	0	0	34,719
2010	Metered	Accounts	49,272	7,423	5,046	82	379	752	62,952
		Deliveries	30,926	12,376	13,323	6,739	736	232	64,332
	Unmetered	Accounts	32,162	0	0	0	0	0	32,162
		Deliveries	21,976	0	0	0	0	0	21,976
2015	Metered	Accounts	78,523	8,389	5,703	83	428	849	93,975
		Deliveries	49,832	13,987	15,057	6,804	832	263	86,775
	Unmetered	Accounts	13,512	0	0	0	0	0	13,512
		Deliveries	9,233	0	0	0	0	0	9,233

		Water Use Sectors	Single Family	Multi-Family	Commercial	Industrial	Inst/Gov	Landscape	Total
2020	Metered	Accounts	104,017	9,481	6,446	83	484	960	121,470
		Deliveries	66,030	15,808	17,018	6,870	941	297	106,963
	Unmetered	Accounts	0	0	0	0	0	0	0
		Deliveries	0	0	0	0	0	0	0
2025	Metered	Accounts	117,558	10,715	7,285	84	547	1,085	137,273
		Deliveries	73,902	17,866	19,233	6,937	1,063	335	119,337
	Unmetered	Accounts	0	0	0	0	0	0	0
		Deliveries	0	0	0	0	0	0	0
2030	Metered	Accounts	132,862	12,110	8,233	85	618	1,226	155,134
		Deliveries	82,799	20,192	21,737	7,004	1,201	379	133,313
	Unmetered	Accounts	0	0	0	0	0	0	0
		Deliveries	0	0	0	0	0	0	0

Footnotes:

- a. Institutional projections include churches and schools. Agricultural customers not identified.
- b. Assumes conversion to metered water use as described in the *Engineer’s Report: Justification and Cost Allocation for Proposed Water System Improvement*, prepared for the City of Modesto (September 2, 2004). Estimated numbers of 2005 single and multi-family accounts were increased from projections cited in the Engineer’s Report by 40% to reflect actual 2005 water demands.
- c. Buildout demand for the entire Modesto Water Service area is 133,313 AFY, from *City of Modesto Hydraulic Model Update* (West Yost & Associates, 2005) TM “Final Water Demand Evaluation”, pg 25.
- d. Projected buildout date assumed to be 2030 (vs. 2024 from the HMP) to be consistent with 2005 WWMP.
- e. Annual average water demands were extrapolated from current demands to 2030 buildout assuming number of accounts increase at an annual compounded rate of 2.5% for all sectors except industrial, with number of industrial accounts increasing at an annual compound rate of 0.2%.
- f. The number of unmetered accounts is from the *Water Utility Cost of Service Rate Study* (Foresight Consulting Services September 3, 2004). Per Table 3-1 of this report “After 2003, all new residential is metered. Also, based on the City’s metering plan existing single-family flat rate customers are converted to meters only after all metered-flat rate customers are converted to metered use.” This is expected to occur in 2008. Therefore, the number of unmetered accounts is not expected to change until after 2008.
- g. Estimated values; number of accounts proportioned from “other accounts” as tracked by the City of Modesto.
- h. Data from City of Modesto, Public Water System Statistics. In Calendar Year 2000, 8863 single family homes were metered and 50535 single family homes were unmetered, however all account were charged unmetered (flat) rates.
- i. Data from City of Modesto do not match table categories. Institutional, government and landscape numbers were distributed proportionally to other data and reports available from the City.

**4.2.2 Past, Current and Projected Water Use: Modesto Irrigation District**

MID does not deliver water directly to urban customers, as shown in Table 4-3.

**Table 4-3: MID Past, Current and Projected Number of Accounts and Water Deliveries (AFY)**

Year	Type of Account	Water Use Sectors	Single Family	Multi-Family	Commercial	Industrial	Inst/Gov	Landscape	Total
2000	Metered	Accounts	0	0	0	0	0	0	0
		Deliveries	0	0	0	0	0	0	0
	Unmetered	Accounts	0	0	0	0	0	0	0
		Deliveries	0	0	0	0	0	0	0
2005	Metered	Accounts	0	0	0	0	0	0	0
		Deliveries	0	0	0	0	0	0	0
	Unmetered	Accounts	0	0	0	0	0	0	0
		Deliveries	0	0	0	0	0	0	0
2010	Metered	Accounts	0	0	0	0	0	0	0
		Deliveries	0	0	0	0	0	0	0
	Unmetered	Accounts	0	0	0	0	0	0	0
		Deliveries	0	0	0	0	0	0	0
2015	Metered	Accounts	0	0	0	0	0	0	0
		Deliveries	0	0	0	0	0	0	0
	Unmetered	Accounts	0	0	0	0	0	0	0
		Deliveries	0	0	0	0	0	0	0
2020	Metered	Accounts	0	0	0	0	0	0	0
		Deliveries	0	0	0	0	0	0	0
	Unmetered	Accounts	0	0	0	0	0	0	0
		Deliveries	0	0	0	0	0	0	0
2025	Metered	Accounts	0	0	0	0	0	0	0
		Deliveries	0	0	0	0	0	0	0
	Unmetered	Accounts	0	0	0	0	0	0	0
		Deliveries	0	0	0	0	0	0	0
2030	Metered	Accounts	0	0	0	0	0	0	0
		Deliveries	0	0	0	0	0	0	0
	Unmetered	Accounts	0	0	0	0	0	0	0
		Deliveries	0	0	0	0	0	0	0

### 4.3 Sales to Other Agencies

#### 4.3.1 City of Modesto Sales to Other Agencies

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

**Table 4-4: Sales to Other Agencies (AFY)**

Water Distributed	2000	2005	2010	2015	2020	2025	2030
Total	0	0	0	0	0	0	0

#### 4.3.2 Modesto Irrigation District Sales to Other Agencies

Although MID is primarily an agricultural supplier, MID currently sells water to the City of Modesto for urban use only, as shown in Table 4-5.

**Table 4-5: Sales to Other Agencies (AFY)**

Water Distributed	2000 <sup>a</sup>	2005 <sup>a</sup>	2010	2015	2020	2025	2030
City of Modesto	33,711	32,507	67,204	67,204	67,204	67,204	67,204
Total	33,711	32,507	67,204	67,204	67,204	67,204	67,204

Footnotes:

- a. Years 2000 and 2005 reflect actual deliveries to the City of Modesto.

#### 4.3.3 City of Modesto Other Uses

“Other uses” are water deliveries to non-urban retail or wholesale customers. Examples of other uses may include water injected as a saline barrier or system water losses during delivery. Because water use was estimated using per capita unit demand factors which are based on production information, system losses are included in the demand projections. 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 conveyance system. Actual water losses cannot be confirmed until the City has completed its current efforts to implement metering City-wide. Estimates of unaccounted-for system losses are documented in Table 4-6.

**Table 4-6 City of Modesto Additional Water Uses and Losses (AFY)**

Water Use	2000	2005	2010	2015	2020	2025	2030
Unaccounted-for system losses <sup>a,b</sup>	13,487	13,956	15,231	16,943	18,876	21,059	23,526
Total	13,487	13,956	15,231	16,943	18,876	21,059	23,526

Footnotes:

- a. Unaccounted for system losses are estimated as 15% of total production, and are included in total demand projections.
- b. Losses may include leaks, flushing, fires, flow testing, backflushing, etc.

Table 4-7 summarizes the current and projected total water demands for the City’s service area through the year 2030.

**Table 4-7 City of Modesto Total Water Use (AFY)<sup>a</sup>**

Water Use	2000	2005	2010	2015	2020	2025	2030
Total of Water Demand and Unaccounted for Water	76,428	79,088	86,308	96,008	106,963	119,337	133,313

Footnotes:

- a. These numbers include an estimated 15% unaccounted for system losses.

#### 4.3.4 Modesto Irrigation District Other Uses

MID is primarily an agricultural water supplier, and currently has no other urban water uses beyond wholesale delivery to the City of Modesto.

**Table 4-8 MID Additional Water Uses and Losses (AFY)**

Water Use	2000	2005	2010	2015	2020	2025	2030
Total	N/A						

Table 4-9 summarizes MID’s current and projected domestic water demand through the year 2030.

**Table 4-9 MID Domestic Total Water Use (AFY)**

Water Use	2000	2005 <sup>a</sup>	2010	2015	2020	2025	2030
Total Water Use	33,711	32,507	67,204	67,204	67,204	67,204	67,204

Footnotes:

- a. Unaccounted for system losses are estimated as 15% of total production, and are included in total demand projections.



Chapter 5

## **Demand Management and Conservation**

## Chapter 5 Demand Management and Conservation

### 5.1 Background

Both the City of Modesto and MID acknowledge the importance of water conservation and management and implemented significant water conservation efforts during the drought years of 1976-1977 and 1987-1992. In March of 1990, the Modesto 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. This ordinance was revised in August 1990 to restrict outdoor water use year-round. Appendix J contained the City’s Water Shortage Contingency Plan.

The City’s Water Conservation Program is administered through the City's Neighborhood Preservation Unit (NPU), the Parks Operation Division, and the Water Operations Division of the Public Works Department. 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. The operating budget for water code enforcement is \$166,531 for FY 2005-06. The operating budget for water conservation is \$362,599 for that same fiscal period.

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.

The City of Modesto has either implemented or plans to implement all of the California Urban Water Conservation Council (CUWCC) Conservation Best Management Practices (BMPs). Table 5-1 summarizes the 14 Conservation Demand Management Measures (DMMs) evaluated as part of this Plan.

**Table 5-1: Summary of Demand Management Measures**

DMM Number	DMM Description	Implemented or Planned
1	Water Survey Programs for Single Family and Multi-Family Residential Customers	✓
2	Residential Plumbing Retrofit	✓
3	System Water Audits, Leak Detection and Repair	✓
4	Metering with Commodity Rates for all New Connections and Retrofit of Existing Connections	✓
5	Large Landscape Conservation Programs and Incentives	✓
6	High Efficiency-Washing Machine Rebate Programs	✓
7	Public Information Programs	✓
8	School Education Programs	✓
9	Conservation Programs for Commercial, Industrial, and Institutional Accounts	✓
10	Wholesale Agency Programs	✓
11	Conservation Pricing	✓
12	Water Conservation Coordinator	✓
13	Water Waste Prohibitions	✓
14	Residential Ultra-Low Flush Toilet Replacement Program	✓

## 5.2 Demand Management Measures

### 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.

### 5.2.1 DMM 1: Water Survey Programs for Single-Family Residential and Multi-Family Residential Customers

#### Program Description

The City of Modesto's Water Conservation Program was established in March of 1990. During the first calendar year, 1,732 contacts were made at residences and businesses to explain the program. The number of contacts made each year continues to grow over time, with more than 7,800 contacts made in the summer of 2004 alone. Program staff members are available to set 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.

### **Implementation Schedule**

The City of Modesto will continue to assist single-family and multi-family residential customers with setting timers, adjusting sprinkler heads, and provide minor advice on sprinkler systems, on request.

### **Effectiveness Evaluation**

The effectiveness of DMM 1 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.

### **Conservation Savings**

According to a 2004 California Urban Water Agencies (CUWA) report,<sup>13</sup> estimated costs are \$140 for a survey of a single-family residence. This includes approximately \$110 in direct costs and \$30 in program administration. Approximately 14 gpd of water is conserved per survey at single-family residences, with an average decay rate of approximately 15 percent per year due to equipment failure, customer use error, and customer turnover.

#### **5.2.2 DMM 2: Residential Plumbing Retrofit**

The City of Modesto 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.

### **Implementation Schedule**

The City of Modesto will continue to require high efficiency equipment in all new construction and remodels. In addition, the City of Modesto will continue to distribute kits at an estimated rate of 1,300 kits per year.<sup>14</sup>

### **Effectiveness Evaluation**

The effectiveness of DMM 2 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.

### **Conservation Savings**

Over 30,000 kits have been distributed since 1983. When using the displacement bag in a standard toilet, approximately one gallon of water is saved per flush. Approximately 20 percent of all toilets leak and the average leak wastes nearly 47 gallons per day. Use of dye tablets helps citizens detect those leaks. The kits also contain lawn watering guides. Water savings from using lawn watering guides is estimated to be 20 percent per household with automatic sprinklers and 10 percent for manual systems.

---

<sup>13</sup> 2004 California Urban Water Agencies (CUWA) report: Urban Water Conservation Potential: 2003 Technical Update.

<sup>14</sup> Approximately 30,000 kits distributed over the 20-year program life suggests an average distribution rate of 30,000 kits/23 years = 1,300 kits/year.

### 5.2.3 DMM 3: System Water Audits, Leak Detection, and Repair

#### Description

The City of Modesto's Water Operations Division has an annual budget for water conservation of \$362,599<sup>15</sup>. The City of Modesto 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 response in 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.

Since not all services are metered, it is not possible at this time to conduct a direct system water audit. However, daily water production from the City of Modesto's wells and water treatment plant is recorded and used to monitor water use. Additionally, the City of Modesto 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 replace and repair 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 of Modesto'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.

#### Implementation Schedule

The City will continue to conduct system water auditing, leak detection and repair/replacement on an ongoing basis.

#### Effectiveness Evaluation

Concurrent with completion of the City of Modesto's metering plan, the City will track effectiveness of DMM 3 implementation based on reductions in water loss throughout the system.

#### Conservation Savings

Projected expenditures by the City are approximately \$1,810 per AF of annual savings (CUWA, 2004). Estimated average savings in system losses are 10 percent (CUWA, 2004).

---

<sup>15</sup> Water conservation annual budget does not include SCADA and system repairs.

### 5.2.4 DMM 4: Metering with Commodity Rates for All New Connections and Retrofit for Existing Connections

#### Description

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 71,796 residential services, 20,984 are anticipated to have meters by the end of 2005. All of the City’s non-residential services are metered, and all new development in the City since 1991 has had meters installed.

According to the City’s metering plan, all metered flat-rate customers will be converted to metered rates beginning in fiscal year 2005/2006 and completing in fiscal year 2008/2009. Once all metered flat-rate customers have been converted to metered usage, existing unmetered single family accounts will be retrofitted with meters. Once all accounts have been converted to metered usage, the City will implement the rate structure shown in Table 5-2. This rate structure will encourage 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 5-2: City of Modesto Metered Usage Rates and Charges**

Customer Class	Rate <sup>a</sup>
Metered Charges (Residential & Commercial)	
Uniform Volume Charge (\$/hcf)	\$1.01
Fixed Meter Charges	
5/8" – 3/4"	\$10.82
1"	\$15.34
1 1/2"	\$26.55
2"	\$40.06
3"	\$76.12
4"	\$116.63
6"	\$229.14
8"	\$364.19
10"	\$521.80
12"	\$971.95

Footnotes:

- a. City of Modesto Water Utility Cost of Service Rate Study rate projections for FY 2005-2006.

#### Implementation Schedule

According to the City’s metering plan, all metered flat-rate customers will be converted to metered rates at a rate of about 5,000 EDU per year, starting in fiscal year 2005/2006. This will result in conversion of all existing metered flat-rate single family accounts to metered usage by fiscal year 2008/2009. Once all metered flat-rate customers have been converted to metered usage, existing unmetered single family accounts will be retrofitted with meters. Beginning in fiscal year 2008/2009, unmetered single family residential accounts will be retrofitted at an equivalent rate. At this rate, all residential accounts will be metered by buildout (year 2025).

### **Effectiveness Evaluation**

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

### **Conservation Savings**

Existing and new commercial, industrial and institutional establishments within the City of Modesto service area are metered. It is estimated that unit single family residential water usage will decrease from 610 gpd per account to approximately 519 gpd per account. In 2005, there are approximately 50,812 unmetered accounts within the City of Modesto's service area. Converting these to metered accounts is projected to result in approximately 4.6 million gallons per day (MGD) of conservation savings.

## **5.2.5 DMM 5: Large Landscape Conservation Programs and Incentives**

### **Description**

The City of Modesto Parks Operations Division has implemented an efficient, ETo-based irrigation system at eleven city parks. The system involves 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.

### **Implementation Schedule**

The City of Modesto will continue to evaluate the feasibility of converting additional city parks and schools to high efficiency, ETo-based irrigation systems. As opportunities become available, additional parks will be converted to high efficiency irrigation systems.

### **Effectiveness Evaluation**

The effectiveness of this program will be evaluated by comparing water use at parks equipped with efficient, ETo-based irrigation systems with water use at parks not equipped with irrigation systems. In addition, the City of Modesto will track the increasing number of parks equipped with efficient irrigation systems.

### **Conservation Savings**

A study at one site revealed that this irrigation system lowers water use by approximately 35 percent.

## **5.2.6 DMM 6: High-Efficiency Washing Machine Rebate Programs**

### **Description**

Water conservation rebate programs offer fiscal rebates (some up to \$80) to homeowners who purchase and install high-efficiency washing machines in their homes. The City of Modesto will be researching and reviewing these water conservation programs for qualifying customers in their service area. In early 2007, MID will implement an energy-efficient washing machine rebate program for its qualifying electric residential customers. The rebate will pay up to \$35 for each qualifying washing machine. A high percentage of MID's electrical customers are also City of Modesto water customers.

In the future, the City will consider additional water efficiency programs such as high-efficiency (HE) washing machine rebate programs for laundromats, apartment complexes, and commercial applications. The City of Modesto is currently investigating potential grant funding sources (e.g., Proposition 50, etc.) to allow program implementation prior to the current 2010 schedule.

### **Implementation Schedule**

The MID residential rebate program for energy-efficient washing machines will commence in early 2007. The City of Modesto's high-efficiency washer rebate program is expected to commence in 2010. However, the City of Modesto is exploring potential grant funding opportunities that would allow program implementation prior to the 2010 schedule.

### **Effectiveness Evaluation**

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

### **Conservation Savings**

Estimated expenditures for this DMM (water-efficient washing machines) are anticipated to be \$110 per rebate (50 rebates = \$5500/year). This includes approximately \$30 in administration costs for each \$80 rebate. The projected water conservation savings is estimated to be 14.4 gpd per rebate. Assuming 50 rebates per year, this would translate to approximately 720 gallons conserved per year (CUWA, 2004).

## **5.2.7 DMM 7: Public Information Programs**

### **Description**

The City of Modesto's water conservation 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 phone number is kept open after business hours to create a 24-hour water waste hotline.

The City of Modesto 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 of Modesto Utility Payment Division and the Department of Public Works at 1010 Tenth Street, and the Operations and Maintenance Department located at 115 Elm 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 local Modesto Bee newspaper 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 A's, 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.”

### **Implementation Schedule**

The City of Modesto will continue to administer the public education component of its water conservation program indefinitely.

### **Effectiveness Evaluation**

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

### **Conservation Savings**

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

## **5.2.8 DMM 8: School Education Programs**

### **Description**

City staff give school presentations to an average of 5,000 students per year at fourteen elementary schools. In addition, the Water Conservation Coordinator has meet with five school district principals to encourage participation in the program which focuses 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 third graders are targeted with the school presentations, similar presentations are given to junior and high school students upon request. As part of the program, shower timers, positive shut-off nozzles, dye-tabs, and water cycle posters are handed out to students.

The “Captain Hydro” educational program is also used to educate school children on water conservation.

### **Implementation Schedule**

The City of Modesto will continue to administer the public education component of its water conservation program indefinitely.

### **Effectiveness Evaluation**

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

### **Conservation Savings**

Similar to DMM 7, outreach is considered essential, however not measured quantitatively.

### **5.2.9 DMM 9: Conservation Programs for Commercial, Industrial, and Institutional Accounts**

#### **Description**

The City of Modesto is currently planning to implement a program to improve water use efficiency of commercial, industrial and institutional accounts. All commercial, industrial and institutional accounts are metered and charged based on the quantity of water used. The City of Modesto is currently planning to implement a rebate program for energy and water efficient washers for use in laundromats, apartment complexes, and other commercial applications. In addition, the City of Modesto is exploring the feasibility of implementing additional conservation programs targeted at assisting commercial, industrial and institutional users in reducing their overall water consumption. The City of Modesto is investigating potential grant funding sources (e.g., Proposition 50, etc) to assist in financing these programs.

#### **Implementation Schedule**

The high-efficiency washer rebate program for commercial applications is expected to commence in 2010. However, the City of Modesto is exploring potential grant funding opportunities that would allow program implementation prior to the 2010 schedule.

#### **Effectiveness Evaluation**

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

#### **Conservation Savings**

Estimated expenditures for this DMM are anticipated to be \$110 per rebate (50 rebates = \$5500/year). This includes approximately \$30 in administration costs for each \$80 rebate. The projected water conservation savings is estimated to be 14.4 gpd per rebate. Assuming 50 commercial washer rebates per year, this would translate to approximately 720 gallons conserved per year (CUWA, 2004).

### **5.2.10 DMM 10: Wholesale Agency Programs**

#### **Description**

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. 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 the DMMs in this chapter.

#### **Implementation Schedule**

The City of Modesto will continue to administer water conservation programs as described herein.

#### **Effectiveness Evaluation**

The City of Modesto will continue to evaluate the effectiveness of its water conservation programs as described herein.

#### **Conservation Savings**

Estimated conservation savings associated with the City of Modesto's water conservation programs are as described in the associated DMMs.

### 5.2.11 DMM 11: Conservation Pricing

#### Description

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. In this revised rate structure, metered accounts pay a uniform volume charge of \$1.01/hundred cubic feet. The City’s current rate structure is shown in Table 5-3.

#### Implementation Schedule

The City of Modesto began retrofitting unmetered units in 2003. The conversion to metered rates and conservation pricing will occur through a series of rate increases beginning in 2005 and ending in 2025.

**Table 5-3: City of Modesto Current Water Rates and Charges**

Customer Class	Rate <sup>a</sup>
Flat Rate Residential – Monthly Service Charges	
0 –5,000 sq. ft. lot	\$29.36
5,001 – 10,000 sq. ft. lot	\$33.37
10,001 – 14,000 sq. ft. lot	\$39.60
14,001 – 17,000 sq. ft. lot	\$42.04
Over 17,000 sq. ft. lot	\$49.42
Metered Charges (Residential & Commercial)	
Uniform Volume Charge (\$/hcf)	\$1.01
Fixed Meter Charges	
5/8” – 3/4”	\$10.82
1”	\$15.34
1 ½”	\$26.55
2”	\$40.06
3”	\$76.12
4”	\$116.63
6”	\$229.14
8”	\$364.19
10”	\$521.80
12”	\$971.95

Footnotes:

- a. City of Modesto Water Utility Cost of Service Rate Study rate projections for FY 2005-2006.

### **Effectiveness Evaluation**

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

### **Conservation Savings**

This DMM is only beginning to be implemented and therefore no actual conservation savings can be determined as yet. Conservation savings will be evaluated in future UWMPs when savings data have become available.

## **5.2.12 DMM 12: Water Conservation Coordinator**

### **Description**

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 of Modesto's water conservation program and to coordinate with ongoing conservation programs in other departments and other agencies. The Water Conservation Coordinator 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; evaluates internal water conservation efforts including metering, meter testing, system leak detection and management; manages computer software for irrigation control purposes; develops and implements incentives to alter water practices, maintains various media sources and accurate records. The City of Modesto is currently looking to add additional full-time staff in the water conservation role.

### **Implementation Schedule**

The Water Conservation Coordinator position was filled in 2001 and continues to be filled.

### **Effectiveness Evaluation**

The effectiveness of this DMM will be evaluated through the development of effective working relationships between conservation programs. This DMM 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.

### **Conservation Savings**

Conservation savings associated with the Water Conservation Coordinator position, as with public outreach, is considered essential and not measured quantitatively.

## **5.2.13 DMM 13: Water Waste Prohibition**

### **Description**

The City Council adopted Ordinance No. 22725-C.5., amending Section 11-1.14 of Chapter 1 of Title XI of the Modesto Municipal Code relating to Water Rules and Regulations, on August 7th, 1990. The Ordinance prohibits water waste through excessive watering of lawns or gardens, washing cars without a quick-acting, positive shut-off nozzle, washing down driveways, and failing to promptly fix leaky faucets.

### **Implementation Schedule**

The City of Modesto has adopted a Water Waste Prohibition ordinance, and will invoke its provisions as necessary. On May 14, 1991, the City Council adopted resolution No. 91-666 which established guidelines for water use during the Stage I drought condition. The City has been enforcing Stage I drought restrictions since 1991. The resolution expanded water waste prohibitions to the 1990 Ordinance (Ordinance No. 2725-C.5.) and added penalties for noncompliance including fines.

### **Effectiveness Evaluation**

The effectiveness of this DMM 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 of Modesto's Water Department employs four part-time water patrols. They patrol during the summer hours enforcing outdoor water restrictions. The City of Modesto also contributes to the Neighborhood Preservation Unit, who are given cases of water use violations for assessment of monetary penalties. For FY 2005/06, \$166,531 has been directed for this unit.

### **Conservation Savings**

The City of Modesto has targeted demand reductions associated with each stage of demand reduction in its Water Shortage Contingency plan. Total demand reduction targets range from 10 percent for Stage 1 to up to 50 percent for Stage 3.

## **5.2.14 DMM 14: Residential Ultra-Low-Flush Toilet Replacement Programs**

### **Description**

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 of Modesto 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 Water Conservation Coordinator is also looking into ULFT replacement rebate programs for the City of Modesto.

### **Implementation Schedule**

All toilets included in new construction after 1994 have been required to be ULFTs. The City of Modesto will continue to require all new construction and remodels to incorporate ULFTs. The ULFT replacement rebate program is expected to commence in 2010, however, the City of Modesto is exploring potential grant funding opportunities that would allow program implementation prior to the 2010 schedule.

### **Effectiveness Evaluation**

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

### **Conservation Savings**

An estimated 25.6 gpd is conserved by each ULFT installed in new buildings throughout the City of Modesto (CUWA, 2004).

### 5.3 Summary and Potential Options

#### 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.*

*(h) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.*

The City of Modesto is currently implementing or plans to implement all 14 DMMs. No new water supply projects have been planned since the 2000 UWMP, as shown in Table 5-4.

**Table 5-4 Evaluation of Non-Implemented DMMs and Planned Water Supply Projects (AFY)<sup>a</sup>**

Non-implemented/Not Scheduled DMM & Planned Water Supply Projects	Cost per AF (\$)
N/A	N/A

Footnotes:

- a. The City of Modesto and MID are currently in the process of implementing a Phase Two MRWTP expansion. This expansion is not a new water supply project, and has been planned since before development of the 2000 UWMP.

The City of Modesto and MID are continuing the process of implementing a Phase Two MRWTP Expansion, projected to be completed in 2009. This will enhance Modesto's ability to manage its surface and groundwater supplies in a conjunctive manner. Additional potential water supply alternatives available to the City for meeting future demand in both normal and dry years include:

- Additional supply from the Turlock Irrigation District (TID) through the Surface Water Supply Project (SWSP);
- Additional MID surface supply, potentially in conjunction with a Phase Three MRWTP Expansion;
- Recycled water implementation.

Currently, the City is working with the TID to bring 12,881 AFY (11.5 MGD) of additional treated surface water to augment the City's water supplies. Preliminary estimates by TID project that the future SWSP will be operational by 2011. Since the City and TID have not entered into a treatment and delivery agreement (TDA) as of the preparation of this document, treated water from the TID SWSP is not considered an assured water supply and is therefore not considered a supply at this time. Appendix B

presents future water supply projections for the TID SWSP (Option A), as well as projections for a possible Phase Three of the MRWTP (Option B). The City will continue to pursue additional water resources to augment its water supplies to meet future demands. Table 5-5 contains a summary of future planned water supply projects for the City of Modesto.

**Table 5-5 Future City of Modesto Water Supply Projects (AFY)**

Project Name	Projected Date of Operation	Normal Year Yield	Single Dry Year Yield <sup>a</sup>	Multiple Dry Year Yield <sup>a</sup>		
				Year 1	Year 2	Year 3
Phase Three MRWTP <sup>b</sup>	2018	11,202	8,802	10,402	9,602	8,802
SWSP <sup>c</sup>	2011	12,881	10,121	11,961	11,041	10,121

Footnotes:

- a. Single dry year base supply reduction assumed to be 9/42 inches (or 21.5%), based on 1991 “worst case” condition. Assumes the 9/42 inch reduction is divided over three years for multiple dry year annual cutback of 3/42 inches (or 7.1%) per year.
- b. The City of Modesto is currently considering a Phase Three MRWTP expansion. This project’s yield may change in the future.
- c. The TID SWSP is projected to be operational by 2011.

**Table 5-6 Future MID Urban Water Supply Projects (AFY)**

Project Name	Projected Start Date	Projected End Date	Normal Year Yield	Single Dry Year Yield <sup>a</sup>	Multiple Dry Year Yield		
					Year 1	Year 2	Year 3
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A



Chapter 6

## Water Supply Reliability

## Chapter 6 Water Supply Reliability

### 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

The City of Modesto relies on two primary sources of water supplies: wholesale Tuolumne River surface water deliveries from MID and local groundwater pumping. In general, the City of Modesto's and MID's water supplies are most vulnerable to climatic variability. 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.

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 of Modesto will bank groundwater supplies for use in meeting dry year demands. The City of Modesto's future water supply planning incorporates sufficient future surface water supplies to allow the City of Modesto to meet demands primarily through the use of surface water, the banking of groundwater for future use, and by protecting the groundwater basin from overdraft and water quality degradation. The water supply, demand and shortfall estimates presented herein assume that the City of Modesto will use surface water from MRWTP as a primary supply source for meeting demands north of the Tuolumne River during normal years, and will bank groundwater via in-lieu surface water use and future direct recharge to meet demands in excess of available surface water supplies in normal years and for supplemental water in dry years.

In contrast to surface supply reliability, reliability of local groundwater supplies is threatened by water quality. In the past, contamination from arsenic, uranium, perchloroethylene (PCE), trichloroethylene (TCE), dibromochloropropane (DBCP) and nitrate has resulted in the need for additional treatment to keep wells from being taken offline. The City of Modesto has developed a strategy to keep existing wells online and bring previously abandoned wells back online through a combination of well monitoring for early detection, well rehabilitation, wellhead treatment, and blending. As a result, the City of Modesto 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 not projected to limit supply reliability for the City of Modesto in future years. Environmental factors can limit the reliability of surface water supplies in the event that 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. Historically, this has not been a concern for the Tuolumne River, and environmental issues are not projected to be a limiting factor in available water supplies to the City of Modesto. Additionally, backup power and system redundancies add reliability to the extraction, treatment and distribution of surface and groundwater supplies.

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

**Table 6-1 Factors Resulting in Inconsistency of Supply**

Name of Supply	Legal	Environmental	Water Quality	Climatic
MID Wholesale Supply		X		X
Local Groundwater <sup>a</sup>			X	X

Footnotes:

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

## 6.2 Projected Water Supplies

Groundwater, which is less prone to short-term variability than surface water, now provides a "safety net" during dry years when surface water supplies are limited. To increase the reliability of water supplies, the City of Modesto and MID drafted the *Amended and Restated Treatment and Delivery Agreement*, formally recognizing the importance of promoting and encouraging both urban and agricultural water users to utilize water conservation practices that are effective, practical, and economical. The City of Modesto may also enter a similar Treatment and Delivery Agreement with TID in the future.

### 6.2.1 City of Modesto Projected Water Supplies

The City of Modesto-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). Although the Agreement specifies a formula for water allocations during shortages, the reduction in supply is not determined until the time of the 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 of Modesto 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 optional 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:  $1.8/42$  (4.3 percent)
- Second year cutback:  $3.6/42$  (8.6 percent)
- Third year cutback:  $5.4/42$  (12.9 percent)
- Fourth year cutback:  $7.2/42$  (17.1 percent)
- Fifth year cutback:  $9/42$  (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 of Modesto will supplement reduced surface water supplies with banked groundwater supplies, as necessary, to meet demands. Groundwater basin storage is dynamic and future studies will determine the storage volume of the basin.

The City of Modesto’s Water Shortage Contingency Plan, described in Chapter 10 of this document, sets forth target demand reduction ranges based on percent reductions in MID base allocation. The target demand reductions for each water shortage stage and the demand assumptions used in calculating future dry year demands, are presented in Table 6-2. The City of Modesto has been in Stage I of the Water Shortage Contingency Plan since March of 2003 (for more information on the City of Modesto’s Water Shortage Contingency Plan, refer to Chapter 10 of this document). As such, no additional demand reductions have been projected unless MID surface water supplies are reduced by more than 25 percent.

**Table 6-2 MID Supply Shortages and Corresponding Demand Reductions**

Water Shortage Contingency Plan Stage	MID Base Supply Reduction	Water Shortage Contingency Plan Target Demand Reduction	Assumed Demand Reduction <sup>a</sup>
-	0% – 10%	0%	0%
1 <sup>b</sup>	10% – 25%	10% - 20%	0%
2	25%-50%	20% - 35%	20%
3	>50%	35% - 50%	35%

Footnotes:

- a. To be conservative, it was assumed that the demand reduction would be equal to the minimum value of the target demand reduction range identified in the Water Shortage Contingency Plan (Chapter 10).
- b. The Water Shortage Contingency Plan dictates a 10-20 percent demand reduction in Stage 1. The City of Modesto has been in Stage 1 since March of 2003. As such, it was assumed that the ten percent reduction is already incorporated into existing demands. Additional demand reductions are not projected unless MID supplies are reduced by more than 25 percent.

The basis for calculating projected demands and supply availability for each water year type are presented in Table 6-3.

Table 6-3 Basis for City of Modesto & MID Water Year Data

Water Year Type	Demands <sup>a</sup>	MID and SWSP Deliveries	Groundwater Pumping	Total Supply
Average/ Normal Water Year	Based on projected build-out demands for General Plan plus Sphere of Influence. Includes 15 percent unaccounted for water. Demand reductions resulting from conversion to metered usage included. Assumes 9% of demand is south of the Tuolumne River, and 91% is north of the Tuolumne River.	Current MID supply of 33,602 AFY as described in <i>Treatment and Delivery Agreement</i> . Beginning in 2009, increase to 67,204 AFY with completion of Phase Two MRWTP.	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	Same as average/normal water year. Demand reductions from Water Shortage Contingency Plan not projected until MID reduction of more than 25%. MID reduction of 25 - 50% generates 20% demand reduction. MID reduction of greater than 50% generates 35% demand reduction.	Assumes 21.4 percent reduction in surface and other 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	Same as average/normal water year. Demand reductions from Water Shortage Contingency Plan not projected until MID reduction of more than 25%. MID reduction of 25 - 50% generates 20% demand reduction. MID reduction of greater than 50% generates 35% demand reduction..	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 available supply plus groundwater pumping

Footnotes:

- a. The City of Modesto has been in Stage 1 of the Water Shortage Contingency Plan since March of 2003. No additional demand reductions are projected unless the City enters Stage II, which would result from MID surface water supply cutbacks of 25 percent or more.

Table 6-4 contains estimated City of Modesto water supply shortfalls for normal years, as well as single and multiple dry years, through 2030. As shown in this table, supplies are sufficient to meet demands in all years and year types.

**Table 6-4 Projected City of Modesto Normal and Dry Year Supply and Demand (AFY)<sup>a,b</sup>**

Year	Scenario	Demand <sup>c</sup>	MID Deliveries	Groundwater Pumping	Operational Yield	Supply Deficit
2005	Normal	79,088	32,507	46,295	53,500	None
	Single Dry	79,088	26,402	52,686	53,500	None
	Multiple Dry					
	2006	80,057	32,162	47,895	53,500	None
	2007	81,353	30,722	50,631	53,500	None
	2008	82,746	29,282	53,464	53,500	None
	2009 <sup>d</sup>	84,505	55,683	28,822	53,500	None
	2010	86,308	52,803	33,505	53,500	None
2010	Normal	86,308	67,204	19,104	53,500	None
	Single Dry	86,308	52,803	33,505	53,500	None
	Multiple Dry					
	2011 <sup>e</sup>	88,154	64,324	23,830	53,500	None
	2012	90,047	61,444	28,603	53,500	None
	2013	91,986	58,563	33,423	53,500	None
	2014	93,972	55,683	38,289	53,500	None
	2015	96,008	52,803	43,205	53,500	None
2015	Normal	96,008	67,204	28,804	53,500	None
	Single Dry	96,008	52,803	43,205	53,500	None
	Multiple Dry					
	2016	98,094	64,324	33,770	53,500	None
	2017	100,231	61,444	38,787	53,500	None
	2018	102,421	58,563	43,858	53,500	None
	2019	104,664	55,683	48,981	53,500	None
	2020	106,963	52,803	54,160	53,500	660
2020	Normal	106,963	67,204	39,759	53,500	None
	Single Dry	106,963	52,803	54,160	53,500	660
	Multiple Dry					
	2021	109,319	64,324	44,995	53,500	None
	2022	111,733	61,444	50,289	53,500	None
	2023	114,206	58,563	55,643	53,500	2,143
	2024	116,740	55,683	61,057	53,500	7,557
	2025 <sup>e</sup>	119,337	52,803	66,534	53,500	13,034

Year	Scenario	Demand <sup>c</sup>	MID Deliveries	Groundwater Pumping	Operational Yield	Supply Deficit
2025	Normal	119,337	67,204	52,133	53,500	None
	Single Dry	119,337	52,803	66,534	53,500	13,034
	Multiple Dry					
	2026	121,997	64,324	57,673	53,500	4,173
	2027	124,724	61,444	63,280	53,500	9,780
	2028	127,517	58,563	68,954	53,500	15,454
	2029	130,380	55,683	74,697	53,500	21,197
	2030	133,313	52,803	80,510	53,500	27,010
2030	Normal	133,313	67,204	66,109	53,500	12,609
	Single Dry	133,313	52,803	80,510	53,500	27,010
	Multiple Dry					
	2031	133,313	64,324	68,989	53,500	15,489
	2032	133,313	61,444	71,869	53,500	18,369
	2033	133,313	58,563	74,750	53,500	21,250
	2034	133,313	55,683	77,630	53,500	24,130
	2035	133,313	52,803	80,510	53,500	27,010

Footnotes:

- a. Demands for each year of a multiple year drought are calculated by reducing projected annual demand for each year by the percentage dictated by MID supply reductions, as described in Table 6-2.
- b. Water demand projections from the City of Modesto’s 2005 Hydraulic Model Update Project by West Yost and Associates (WYA).
- c. Actual MID water delivery for 2005.
- d. Phase Two of the MRWTP expected to be operational by mid-2009.
- e. Based on projected demands and estimated Operational Yield, the City will require new water supplies by 2025, based on normal and drought year scenarios. However, future studies will be required to determine the feasibility of whether demands will be met with only surface water, only groundwater, or a combination of both.

### 6.2.2 Modesto Irrigation District Projected Water Supplies

As described above, MID surface water supplies are subject to cutbacks based on climatic variability. Table 6-3 describes the assumptions for cutback of MID supplies to the City of Modesto. Table 6-5 presents the projected future retail urban demand and wholesale MID and TID surface water supplies provided to urban customers under normal, single dry year, and multiple dry year conditions. Because MID is a wholesale water supplier, demand for MID supply is not expected to decrease in dry years. Although base MID supplies are reduced during dry years, the percentage of water allocated to urban suppliers is a small percentage of total available supply.

**Table 6-5 Projected MID Normal and Dry Year Urban Supply and Demand (AFY)**

Year	Scenario	Modesto Urban Demand	Total Urban Demand	Available Urban Base Supply	Total Available Urban Supply	Supply Deficit
2005	Normal	32,507	32,507	33,602	33,602	None
	Single Dry	32,507	32,507	26,402	33,602	None
	Multiple Dry					
	2006	33,602	33,602	32,162	33,602	None
	2007	33,602	33,602	30,722	33,602	None
	2008	33,602	33,602	29,282	33,602	None
	2009	67,204	67,204	55,683	67,204	None
	2010	67,204	67,204	52,803	67,204	None
2010	Normal	67,204	67,204	67,204	67,204	None
	Single Dry	67,204	67,204	52,803	67,204	None
	Multiple Dry					
	2011	67,204	67,204	64,324	67,204	None
	2012	67,204	67,204	61,444	67,204	None
	2013	67,204	67,204	58,563	67,204	None
	2014	67,204	67,204	55,683	67,204	None
	2015	67,204	67,204	52,803	67,204	None
2015	Normal	67,204	67,204	67,204	67,204	None
	Single Dry	67,204	67,204	52,803	67,204	None
	Multiple Dry					
	2016	67,204	67,204	64,324	67,204	None
	2017	67,204	67,204	61,444	67,204	None
	2018	67,204	67,204	58,563	67,204	None
	2019	67,204	67,204	55,683	67,204	None
	2020	67,204	67,204	52,803	67,204	None
2020	Normal	67,204	67,204	67,204	67,204	None
	Single Dry	67,204	67,204	52,803	67,204	None
	Multiple Dry					
	2021	67,204	67,204	64,324	67,204	None
	2022	67,204	67,204	61,444	67,204	None
	2023	67,204	67,204	58,563	67,204	None
	2024	67,204	67,204	55,683	67,204	None
	2025	67,204	67,204	52,803	67,204	None

Year	Scenario	Modesto Urban Demand	Total Urban Demand	Available Urban Base Supply	Total Available Urban Supply	Supply Deficit
2025	Normal	67,204	67,204	67,204	67,204	None
	Single Dry	67,204	67,204	52,803	67,204	None
	Multiple Dry					
	2026	67,204	67,204	64,324	67,204	None
	2027	67,204	67,204	61,444	67,204	None
	2028	67,204	67,204	58,563	67,204	None
	2029	67,204	67,204	55,683	67,204	None
	2030	67,204	67,204	52,803	67,204	None
2030	Normal	67,204	67,204	67,204	67,204	None
	Single Dry	67,204	67,204	52,803	67,204	None
	Multiple Dry					
	2031	67,204	67,204	64,324	67,204	None
	2032	67,204	67,204	61,444	67,204	None
	2033	67,204	67,204	58,563	67,204	None
	2034	67,204	67,204	55,683	67,204	None
	2035	67,204	67,204	52,803	67,204	None

### 6.3 Supply Inconsistencies

#### 6.3.1 City of Modesto Supply Inconsistencies

The City of Modesto’s available water supplies are generally consistent, though the base wholesale surface water supply provided by MID may be reduced in dry years. Potential dry year reductions are outlined, in writing, in the *Amended and Restated Treatment and Delivery Agreement* (Appendix E). As described in Section 6.2, base supply was reduced by approximately 9 out of 42 inches of water in 1991, or 21.4 percent. Assuming this cutback was applied over a five-year interval, the annual cutbacks would be 4.3, 8.6, 12.9, 17.1, and 21.4 percent, respectively for each of the five years. It is assumed that cutbacks for the single dry year condition are equal to cutbacks in the final year of the multiple dry year condition, or 21.4 percent. Wholesale supply reliability is shown in Table 6-6 below.

**Table 6-6 City of Modesto Wholesale Supply Reliability (% of Normal AFY)**

Wholesaler Sources	Single Dry Year	Multiple Dry Water Years				
		Year 1	Year 2	Year 3	Year 4	Year 5
MID – Tuolumne River	79	96	91	87	83	79

Due to the potential for surface water supply cutbacks, the wholesale MID and TID surface water supplies to the City of Modesto could be construed as inconsistent. As shown in Table 6-7, climatic variations, specifically dry periods, are responsible for the inconsistency of MID’s wholesale supplies.

**Table 6-7 Factors Resulting in Inconsistency of Wholesaler’s Supply**

Name of Supply	Legal	Environmental	Water Quality	Climatic
MID – Tuolumne River				X

It should be noted that, although base supply is projected to be reduced in dry years according to the percentages identified in Table 6-6, MID may make additional water available to retail water suppliers at an additional cost. In addition, the City of Modesto may opt 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. To date, the City of Modesto has not experienced a water supply shortfall and this trend is expected to continue in coming years.

**6.3.2 Modesto Irrigation District Supply Inconsistencies**

As described above, MID urban supplies to retail water agencies may be construed as inconsistent based on the potential for supply cutbacks due to hydrologic variability. Table 6-6 displays the percentage of normal year urban MID surface water supplies expected to be available during single and multiple dry years. Table 6-7, above, displays the primary reason for the potential inconsistency of MID supplies: climatic variability.



Chapter 7

## **Water Quality Impacts on Reliability**

## Chapter 7 Water Quality Impacts on Reliability

### 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 of Modesto'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 extremely good quality, and surface water quality is not expected to affect future water supply availability.

The City of Modesto has experienced problems with groundwater quality. Contamination from arsenic, uranium, PCE, TCE, DBCP and nitrate has resulted in the need for additional treatment to keep wells from being taken offline. Recent well outages and projected future outages resulting from increasingly stringent water quality regulations have reduced the City's hydraulic pumping capacity.

In 2005, the City operated 97 groundwater wells located throughout the City's entire water service area. The *Engineer's Report Justification and Cost Allocation for Proposed System Improvements*<sup>16</sup> (Engineer's Report) prepared for the City of Modesto in 2004 cites the current design capacity of the City's groundwater wells within the contiguous service area as approximately 129 MGD. However, this capacity must be reduced to account for two factors:

- 1) Well pump and motor efficiency (total pumping efficiency)
- 2) Reliable pumping capacity.

Reliable pumping capacity accounts for wells that are out of service at any given time due to mechanical breakdowns, maintenance or other operational issues. Based on the maximum total pumping capacity observed in the field by the City's Supervisory Control and Data Acquisition (SCADA) system in July 2003, the City's actual maximum total pumping capacity for the contiguous service area is 118 MGD, compared to the design capacity of 129 MGD. Therefore, the total pumping efficiency of the City's groundwater wells was calculated to be approximately 90 percent (118 divided by 129).

Discussions with City staff indicate that the City will normally limit the number of wells down for maintenance to approximately two wells. However, it is difficult to predict the number of additional wells that will not function on any given day due to a mechanical breakdown or other temporary operational issue. During a recent power outage that occurred during a non-peak water demand period, the City lost the ability to pump from 10 wells, and as many as seven other wells were required to maintain system pressures. If this power outage had occurred during a peak demand period, the seven other wells that replaced the 10 lost wells may have already been operating to meet demands, and would not have been available. For this analysis, it was assumed that 10 percent (approximately equal to 9 wells [7 wells replacing lost wells + 2 wells assumed to be out of service for maintenance] divided by 97 total wells pumping in 2003) of the City's design well capacity is not available on a daily basis. Hence, the City's current reliable pumping capacity is 105 MGD.<sup>17</sup>

<sup>16</sup> *Engineer's Report: Justification and Cost Allocation for Proposed Water System Improvements*. Prepared for City of Modesto. West Yost & Associates, September 2004.

<sup>17</sup> 105 MGD is calculated as (129 MGD design capacity – 10% [or 13 MGD] for total pumping efficiency losses) – 10% loss [or 11 MGD] for daily loss of design capacity.

Between 1995 and 2003, the City had to shutdown nine wells due to uranium and four wells due to other water quality contaminants (i.e., PCE, TCE, and nitrates). Moreover, the City has lost, on average, 5 MGD of groundwater pumping capacity (2.3 wells per year) over the last four years. The Engineer’s Report assumed that the City would continue to lose groundwater wells at this previously observed rate.

The City can also expect to lose additional wells (wells in addition to those expected to be lost due to uranium, PCE, TCE, DBCP or nitrates) if the California Department of Health Services (DHS) were to establish a Maximum Contaminant Level or MCL for arsenic that is less than the current MCL set by the US Environmental Protection Agency (EPA) at 10 ppb. As indicated by the arsenic data presented in Attachment 3 of the *Engineer’s Report*, the range of additional wells projected to be lost because of a lower arsenic MCL ranges from 10 wells if the MCL is set at 8 ppb, to 30 wells if the MCL is set at 4 ppb. The *Engineer’s Report* assumes the MCL will be set at 8 ppb.

Based on the assumption of a 8 ppb arsenic MCL, it was estimated that the City would lose 10 wells due to arsenic, lose another 32 wells due to other water quality concerns, rehabilitate 17 existing wells (on the average of one well per year), and install 11 new wells over the next twenty years. These assumptions are consistent with current and expected constraints on the City’s groundwater supply and indicate that the City’s total reliable groundwater production capacity would stabilize at 85 MGD between 2018 and 2022.

The City of Modesto’s current practice is not to develop wells that have major water quality issues, such as uranium and nitrates. The City has developed a strategy incorporating a combination of well monitoring for early identification, well rehabilitation, wellhead treatment, and blending that will keep existing wells online and bring previously abandoned wells back online, allowing the City to maintain a reliable pumping capacity of 85 MGD. This pumping capacity is sufficient to allow the City to continue to pump as necessary to meet demands. As a result, despite reductions in pumping capacity over time, the City of Modesto does not anticipate groundwater quality to reduce the projected annual contribution of groundwater to the City’s water supply portfolio.

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 (%)**

Water Source	2005	2010	2015	2020	2025	2030
MID – Tuolumne River	0	0	0	0	0	0
Local Groundwater	0	0	0	0	0	0

## 7.2 Implications for Water Management

The City of Modesto 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.



Chapter 8

## **Wastewater and Recycled Water**

## Chapter 8 Wastewater and Recycled Water

### 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 of Modesto completed the Northern San Joaquin Valley Water Reclamation Project study in June of 2005. The study 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.

The recycled water market (both treatment and distribution) is highly dependent on coordination with and participation by other water purveyors and agencies. As water in the Modesto area is relatively inexpensive, cost recovery could be difficult in the current setting. Cost recovery is a function of regionalization, stakeholder participation, water rights, and state and federal interest. Federal and State funding can be secured by identifying a linkage between the project and Federal and/or State interest, however risks to the City of Modesto in taking in and treating regional sewage flows must be managed.

A number of the cities surrounding the City of Modesto provide municipal wastewater services in their service areas. These cities, plus local irrigation districts in the region and other agencies such as Stanislaus County government, were identified as potential stakeholders for the Northern San Joaquin Valley Water Reclamation Project. The City of Modesto held stakeholder workshops on April 9<sup>th</sup> and September 9<sup>th</sup> of 2003 to identify potential stakeholders and discuss conceptual alternatives for the regional wastewater recycling facility. Survey questionnaires were distributed to participants and responses collected and compiled by the City. Based on participation in the stakeholder meetings and survey results, the Cities of Ripon, Salida, Escalon, Patterson, Ceres, Turlock, and Manteca expressed potential interest in the project. Table 8-1 presents the list of potential regional participants contacted regarding their interest in participating in a regional treatment and recycled water project.

**Table 8-1 Northern San Joaquin Valley Water Reclamation Project Participating Agencies**

Agency	Participated
City of Ceres	X
City of Delhi	
City of Denair	
City of Escalon	
City of Hilmar	
City of Hughson	
City of Keyes	
City of Manteca	X
City of Oakdale	
City of Patterson	X
City of Ripon	X
City of Riverbank	
City of Salida	X
City of Turlock	X
City of Waterford	X
Turlock Irrigation District	X
Stanislaus County	X

Oakdale, Riverbank, Grayson, Westley, Hughson, and Waterford did not engage in the process or express interest in the project; however these cities are located in the vicinity of Modesto and may have interest in the future.<sup>18</sup> Hilmar expressly stated they did not have interest in the project.

## 8.2 Wastewater Quantity, Quality and Current Issues

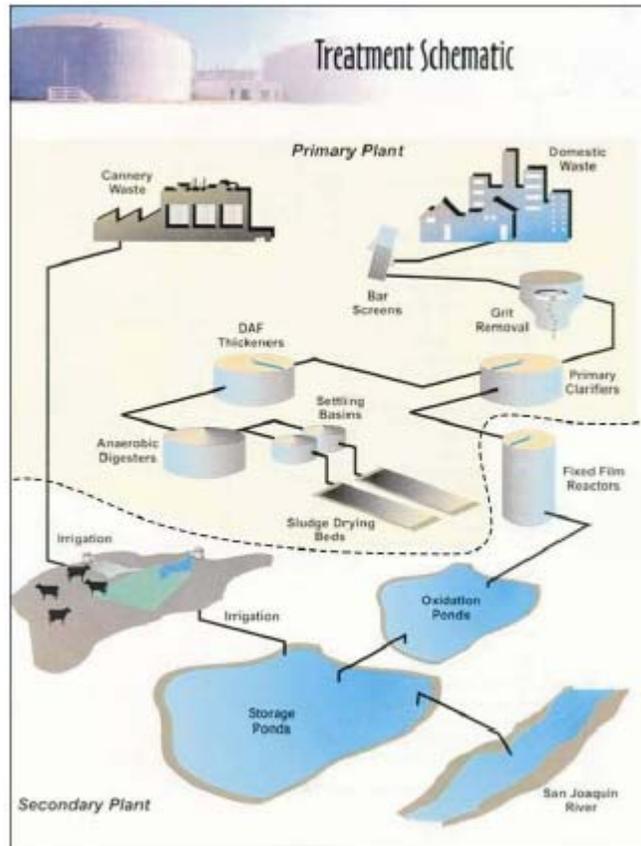
### Water Code § 10633 (a)

*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.*

Figure 8-1 presents a treatment schematic of the existing City of Modesto Wastewater Treatment Plant (WWTP). The City of Modesto Wastewater Treatment Facilities are located on two sites, separated by approximately seven miles. The Sutter Avenue Primary Plant (headworks, primary clarification, and solids handling) is adjacent to the Tuolumne River, within a residential area. The Jennings Street Secondary Plant (oxidation ponds, storage, and ranchlands) is within an agricultural region adjacent to the San Joaquin River.

<sup>18</sup> Representatives from Riverbank and Waterford participated in the first stakeholder workshop but did not attend the second workshop.



**Figure 8-1: City of Modesto WWTP Schematic**

Domestic wastewater is treated at the 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 secondary plant through twin 60-inch outfall pipelines. There, the primary effluent is treated further and either applied to the ranchland or discharged to the river within restricted months. Secondary treatment includes biological treatment with fixed film reactors, recirculation, aerated recirculation, and oxidation ponds. In past summers, roughly 20 MGD of wastewater resulting from Modesto's canning season 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. As a result, the Cannery Segregation Project was implemented and completed in 1997, 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 8-2. The wastewater treatment plants serve the City of Modesto 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, the secondary effluent is either discharged to the San Joaquin River (9,300 AFY) or recycled for irrigation (21,400 AFY). Effluent is stored on site until river discharge or irrigation is possible.

The 1995 *Wastewater Master Plan* provided estimated unit flow per capita projections for 2000 and 2015. Flow projections for 2005 and 2010 were developed using linear interpolation between the known flow factors for 2000 and 2015. Flows for 2020 and 2025 were projected using linear extrapolation from the

known flow factors. Flow for 2030 was assumed to be equal to that of 2025, with buildout projected to occur in December of 2024.

**Table 8-2 Wastewater Collection and Treatment (AFY)<sup>a</sup>**

Type of Wastewater	2005	2010	2015	2020	2025	2030
Wastewater collected & treated in service area	28,900	31,028	34,276	38,085	42,229	46,486
Volume that meets recycled water standards <sup>b</sup>	28,900	31,028	34,276	38,085	42,229	46,486

Footnotes:

- a. Flow projections from City of Modesto Wastewater Master Plan Phase Two Update Master Plan Report (Draft), July 2006.
- b. Title 22 of the California Code of Regulations (CCR) defines the quality of Modesto’s 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.

### 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

Title 22 of the California Code of Regulations (CCR) defines the quality of Modesto’s 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 has been supplying recycled water for irrigation since 1969 and currently irrigates roughly 2,526 acres of fodder and feed crops on city-owned land at roughly 21,400 AFY.

Currently, disposal of the City of Modesto’s secondary effluent is achieved through land reclamation, San Joaquin River discharge, pond system evaporation, and pond system percolation. The City’s disposal operations are regulated under the National Pollutant Discharge Elimination System (NPDES) and Waste Discharge Requirement (WDR) permit systems. 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.

Under existing disposal conditions, during a dry year, Modesto is expected to have a disposal capacity shortfall of approximately 500 million gallons (Cortinovic, 2001). The City is in the process of implementing a Dissolved Air Floatation project to increase disposal capacity to the San Joaquin River with operation expected in 2005. This is expected to meet current capacity needs but does not provide for

future wastewater flow increases in a dry year. However, as part of its *Wastewater Master Plan Phase 2 Update* (2007), the City of Modesto is planning to upgrade its wastewater treatment facilities from secondary to tertiary treatment to allow for year-round discharges of treated effluent. The City of Modesto’s current and projected wastewater disposal methods are presented in Table 8-3.

**Table 8-3 Disposal of Wastewater (Non-recycled water - AFY)**

Method of Disposal	Treatment Level	Time of Use	2005	2010	2015	2020	2025	2030
Rivers	Secondary	Oct – May	11,426	11,426	11,426	0	0	0
Rivers	Tertiary or better	All Year	0	2,577	5,377	25,205	30,806	30,806
Land Application	Secondary or better	All Year	15,683	15,683	15,683	15,683	15,683	15,683
TOTAL			27,109	29,686	32,486	40,888	46,489	46,489

Source: City of Modesto *Wastewater Master Plan Phase 2 Update* (2007)

### 8.3.2 Potential Recycled Water Uses

As described above, the City of Modesto currently uses its 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 of Modesto 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, urban irrigation, industrial cooling water, and water sales have been identified for future evaluation as potential recycled water markets.

There are a number of agencies that are potentially interested in the region’s potential recycled water supply, as shown in Table 8-1 above. 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 is presented in Table 8-4 with descriptions of potential recycled water options and associated constraints provided below.

**Table 8-4 Actual and Potential Recycled Water Use (AFY)**

User Type	Minimum Treatment Level	2005	2010	2015	2020	2025	2030
Agriculture	Secondary	21,400	21,400	21,400	21,400	21,400	21,400
Agriculture <sup>a</sup>	Tertiary	18,171	25,264	25,264	25,264	25,264	25,264
Urban <sup>b</sup>	Tertiary	25,600	25,600	25,600	25,600	25,600	25,600
Environmental <sup>c</sup>	Tertiary	TBD	TBD	TBD	TBD	TBD	TBD
Groundwater Recharge <sup>d</sup>	Tertiary	TBD	TBD	TBD	TBD	TBD	TBD
Water Sale <sup>e</sup>	Tertiary	80,000	80,000	80,000	80,000	80,000	80,000
TOTAL		145,171	152,264	152,264	152,264	152,264	152,264

Footnotes:

TBD – To Be Determined

- a. Agriculture demand represents potential demand in MID and TID service areas.
- b. Urban includes urban landscape irrigation and industrial cooling uses.
- c. Environmental includes wildlife habitat and wetlands uses. Additional analysis would be required to quantify this potential use.
- d. Due to current constraints on water quality for groundwater recharge, this is not currently considered a viable alternative. Additional groundwater basin analyses would be required to quantify the potential for groundwater recharge of recycled water.
- e. Projected demand for water sales is greater than 80,000 AFY and has not been quantified. 80,000 AFY represents estimated water sale potential to Eastside Irrigation District. Recycled water conveyance to Eastside Irrigation District is not currently considered a viable alternative.

### Urban Irrigation

The potential urban market includes landscape irrigation, industrial reuse, and other non-potable uses. Parks, golf courses, schools, the top 50 industrial water users, and dual plumbing of new developments were identified as the potential urban market. Landscape irrigation demands for the parks, golf courses, and schools were estimated based on a consumptive use methodology. The top 50 industrial water users consist primarily of food processors. Based on correspondence with Gallo wineries, cooling water is the major demand at their food processing facilities. Recycled water use for other food processors should be more thoroughly investigated to determine the actual feasibility of recycled water use. However, it was assumed that 50 percent of the industrial water use could be supplemented by recycled water.

The City’s golf courses and several of the major parks are currently irrigated by non-potable wells or with untreated surface water from MID irrigation canals. The current water source for these potential users should be factored into the cost effectiveness of proposed recycled water projects.

The City of Modesto has identified a number of new housing developments (Comprehensive Planning Districts or CPDs) that could be dual-plumbed for recycled water use. Non-potable water use for these dual-plumbed CPDs was evaluated based on previous studies, which put estimated urban recycled water demand at approximately 25,600 AFY. This estimate represents the overall recycled water demand of the City of Modesto’s sewer service area and did not consider cost constraints and other limitations. Service areas were developed during the alternatives development phase of the project when recycled water facility locations were identified.

Urban landscape irrigation is not immediately feasible because Modesto does not produce a recycled water quality that permits possible human contact. Any recycled water irrigation that occurs in the Modesto urban area must be restricted from human contact. This restriction includes any possibility of recycled water runoff or spray reaching the public. The small number of potential users that fit these

criteria and who still have need for water is very small and would not warrant financing a city-wide recycled water distribution system. Therefore, Modesto's recycled water quality requires improvement before an urban landscape irrigation program is feasible.

### **Agricultural Irrigation**

Recycled water is currently used for fodder and fiber crops, seed crops, orchards, vineyards, nursery stock, sod farms, and animal pastures. Areas benefiting from this type of use would include rural areas within the Modesto Irrigation District, as well as areas served by neighboring irrigation districts such as the Turlock Irrigation District and the West Stanislaus Irrigation District. Using existing irrigation channels to distribute recycled water would further facilitate the use of recycled water in these areas.

The Northern San Joaquin Valley region is an agriculturally rich area that grows a variety of fruit, nuts, vegetables, and other crops. Local agricultural irrigation is a significant opportunity to use recycled water beneficially. However, agricultural lands in the region east of the San Joaquin River are served by either MID or TID, both of which have rights to high quality and highly reliable Tuolumne River water.

A consumptive use methodology was used to develop annual, monthly, and peak water use factors for evaluating the potential for agricultural use of recycled water. Potential recycled water demands in the MID and TID service areas far exceed the existing recycled water flow. The estimated annual irrigation water demand ranges from about 3.52 to 3.67 AF per acre. Total estimated annual demand for the combined area is 389,365 AF, compared to total year 2030 projected wastewater discharge of only 81,200 AFY (Table 8-2).

Delivery of recycled water to local agriculture would likely necessitate the use of MID and/or TID irrigation facilities, depending on the location of the areas of identified recycled water use. Contractual agreements for water conveyance and water service would be required. The parties involved in these agreements would likely be the City of Modesto, the various water agencies/districts, and the Central Valley Region of the California Regional Water Quality Control Board (RWQCB).

Modesto's current recycled water product is suitable only for irrigating fodder and fiber plants, seed crops not eaten by humans, orchards and vineyards where recycled water does not contact edible crop, and non-food-bearing trees. Recycled water is limited to irrigating pasture and fodder. Modesto's 1995 *Wastewater Master Plan* mentioned the possibility of utilizing existing irrigation canals for the distribution of recycled water, however, the recycled water quality must be improved before the water is attractive enough (and lawful) for private landowners to purchase and use. If enough customers were found to purchase the current recycled water product, the use of existing canals for recycled water transport would be limited by very stringent RWQCB surface water regulations. Again, Modesto's current recycled water quality limits potential large-scale irrigation.

### **Water Sale**

The water market in California is becoming more active as a number of water agencies and districts are investigating alternatives to increase water supplies for communities and for irrigation. Water supply alternatives that are being evaluated include various treatment approaches (seawater desalination), and construction of new water storage and conveyance systems. High costs and environmental issues associated with these options create significant interest in securing other more cost-effective and available water supplies. Sale of recycled water represents an opportunity as a potential cost effective option.

For the purposes of identifying water sale opportunities, various irrigation districts were contacted to investigate the potential interest in recycled water. Five Central Valley Project (CVP) contractors located to the west of the San Joaquin River plus Westlands Water District (WWD) and Eastside Irrigation District (EID) were contacted. Based on the initial correspondence, several districts expressed potential interest in the recycled water supply. These districts would use recycled water for agricultural irrigation.

The West Stanislaus Irrigation District (WSID) is located in the northwest region of Stanislaus County and is a contractor with the US Bureau of Reclamation (USBR) for Central Valley Project (CVP) water. WSID has rights to San Joaquin River water in addition to its CVP contract supply. WSID does not have an identified water deficiency, but is potentially interested in recycled water because of its reliability and quality. It is thought that recycled water may have lower salinity concentrations than San Joaquin River water during the summer months.

Eastside Irrigation District (EID) is located to the east of the TID service area between the Tuolumne and Merced River. EID has no surface water rights and relies on groundwater for its entire supply. The district was formed in 1985 with the foresight that groundwater pumping was above a operational rate. EID's water needs are estimated to be between 70,000 to 80,000 AFY. Conveyance of recycled water to the EID service area is not considered a practical alternative from the City of Modesto facilities. However, a water sale-type alternative that frees up surface water in the Tuolumne or Merced River could be a viable option.

Westlands Water District (WWD) is located on the west side of Fresno and Kings Counties. The district is a CVP contractor and receives water from the San Luis and Coalinga Canals, fed by pumping from the Delta Mendota Canal (DMC). WWD has a significant water shortfall that results in annual land fallowing. Conceptually, deliveries of Modesto recycled water could occur via the Delta Mendota Canal (DMC) or through dedicated pipeline conveyance facilities constructed to provide water service to selected water users.

Other CVP contractors may be interested in recycled water as their CVP contracts contain provisions that allow for reductions in annual delivery amounts depending on the amount of water available for each water year. The USBR makes forecasts of water supply availability each spring and adjusts the actual amount of water delivered. CVP south of Delta water supply allocation for agriculture over the last six years averaged approximately 72 percent of the CVP contract amount, or a reduction of 28 percent from the contract amount.

### **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 would be 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, augmentation of flow in the San Joaquin River is not currently viewed as a benefit.

Another potential opportunity for environmental enhancement is the San Joaquin River National Wildlife Refuge (SJRNR). The US Fish and Wildlife Service (USFWS) is restoring historic wetlands that are located adjacent to the San Joaquin River. The SJRNR is located approximately 10 miles west of the City of Modesto and is part of the Pacific Flyway that supports migratory waterfowl. Currently, the USFWS plans to utilize water from the San Joaquin River to flood the wetland during periods of waterfowl migration. River water would be introduced to the wetlands passively during high flow events and through pumping. Based on correspondence with Eric Hopson of the USFWS, the pumped flow would only be about 2 cubic feet per second (cfs) starting in October or November with diversions possible continuing into early spring. Operation of the wetlands would attempt to emulate historic conditions with winter wetting cycles and summer dry cycles. Additional coordination with the USFWS would be necessary to identify opportunities for recycled water use in the SJRNR.

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.

### **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 supply for the City of Modesto and surrounding communities. While the combined operational yield of the Modesto and Turlock groundwater subbasins is currently unknown, a groundwater recharge project could 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, percolative soil 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.

## 8.4 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 of Modesto recently completed the Northern San Joaquin Valley Water Reclamation Project, which included a detailed recycled water market assessment and alternative evaluation. As a result of this project, a preferred alternative for recycled water implementation for the City of Modesto was identified. The preferred alternative consisted of a four-phase approach to regional recycled water implementation. The four phases identified were Urban Recycled Water at the Primary Treatment Plant, Regionalization Alternatives, Water Sale, and Regional Recycling Facility. These phases are described in further detail below.

***Urban Recycled Water at the Primary Treatment Plant.*** This phase includes near-term construction of recycled water facilities at the Primary Treatment Plant and associated distribution infrastructure. The goal of this project is to serve a summer time flow between 6 and 10 MGD and demonstrate the safe and effective use of recycled water. Conceptually, treatment would need to include secondary, tertiary, and disinfection facilities. The project would serve urban market customers including golf courses, parks, school yards, industrial users, and the new developments (CPDs). Recycled water use in the CPDs service area would be for landscape irrigation, toilet flushing, and other non-potable uses.

A 6- to 10-MGD recycled water project would produce approximately 3,180 to 5,360 AF annually. This would benefit the City's water supply and wastewater disposal capacity. However, this quantity of use does not, by itself, constitute a long-term disposal solution.

***Regionalization Alternatives.*** This phase would include implementation of one of two regionalization options: conveyance of wastewater to the City of Modesto wastewater treatment plants (WWTPs) and/or development of satellite treatment and reclamation facilities with conveyance of recycled water to the City of Modesto service area. These options are only in a preliminary phase of development and will require additional input and correspondence with each stakeholder to identify interests and goals. Cost sharing agreements for these evaluations should be developed prior to initiating work on these options. Memoranda of Understanding (MOU) or other agreements could be developed with each stakeholder to layout project goals, and project cost sharing.

***Water Sale to an Irrigation District and SJRNWR.*** This phase would include construction of recycled water facilities at the Secondary Treatment Plant and associated transmission infrastructure to convey recycled water to an irrigation district and/or SJRNWR. The goal of this phase would be to provide summer time supplies to an irrigation district for agricultural use, and fall and winter flows to the SJRNWR for environmental use (wetlands enhancement). Conceptually, treatment facilities would include tertiary treatment and disinfection facilities, and the irrigation district and the SJRNWR would share a common diversion channel off the San Joaquin River for each of their supplies. Based on preliminary discussions, recycled water use could be around 20,000 AFY, and the irrigation district would

have rights to the San Joaquin River water that would be augmented through implementation of this project, providing a benefit to the California Bay-Delta Program (CALFED) and the San Joaquin/Sacramento Delta.

The United States Fish and Wildlife Service (USFWS) is currently in the process of restoring wetlands in the SJRNWR and proposes to use San Joaquin River water to provide flows to the wetlands. The potential demand and desired water quality of recycled water in the SJRNWR has not been identified to date. Additional investigations with the USFWS are necessary in order to identify required criteria.

**Regional Water Recycling Facility.** In the long-term, the Cities of Turlock and Manteca have expressed interest in a regional treatment facility or disposal strategy. This phase would consist of construction of a regional water recycling facility. Potential options include conveyance of raw, partially treated, or disinfected tertiary wastewater to a central location for additional treatment or distribution. The Cities of Turlock and Manteca are thought to primarily be interested in a project to address future wastewater flows.

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.

The City of Modesto is currently updating its Wastewater Master Plan, wherein the City expresses its intention to ultimately upgrade its existing treatment to tertiary levels for disposal into the San Joaquin River. Once the plan is finalized, the City can begin the process of reviewing the recommendations established in the Northern San Joaquin Valley Water Reclamation Project and continue to pursue reasonable options for recycled water implementation. Detailed recycled water use projections are included in Table 8-5.

**Table 8-5 Current and Projected Recycled Water Use (AFY)**

User Type	Minimum Treatment Level	2005	2010	2015	2020	2025	2030
Agriculture	Secondary	21,400	21,400	21,400	21,400	21,400	21,400
Agriculture	Tertiary	0	0	0	0	0	0
Urban	Tertiary	0	0	0	0	0	0
Environmental <sup>a</sup>	Tertiary	0	0	0	0	0	0
Groundwater Recharge	Tertiary	0	0	0	0	0	0
Water Sale	Tertiary	0	0	0	0	0	0
TOTAL		21,400	21,400	21,400	21,400	21,400	21,400

Footnotes:

- a. Environmental includes wildlife habitat and wetlands uses.

The City of Modesto/MID 2000 Joint UWMP projected that recycled water would continue to be used for agricultural demand at a rate of 21,400 AFY. This is equal to the City of Modesto’s current recycled water usage, as shown in Table 8-6.

**Table 8-6 Recycled Water Use – 2000 Projection Compared with Actual 2005 Use (AFY)**

User Type	2000 Projection for 2005	Actual 2005 Use
Agriculture	21,400	21,400
Urban	0	0
Environmental	0	0
Groundwater Recharge	0	0
Total	21,400	21,400

### 8.4.2 Optimization Plan with Incentives

The City of Modesto’s 1995 *Wastewater Master Plan* compared the cost of three alternatives for addressing Modesto’s wastewater increase:

- *Expanded Treatment* - requires more land application and thus more land to be purchased by the city.
- *Year-round Discharge* - requires expanded treatment and water quality improvement so that river discharge requirements are met year-round and no land purchase is necessary.
- *Water Reclamation* - requires building a reclamation facility and possibly buying more land for irrigation.

The 1995 Plan found that if water exchange and marketing programs are incorporated, water reclamation becomes the most economic option. It was estimated that if potential supplies of recycled water were sold to an outside agency or private landowner from the year 2000 through 2015, the City could earn somewhere between \$7 million to \$71 million, depending on the price per acre-foot. Therefore, the 1995 Plan recommended large-scale reclamation for Modesto’s Long-Range Strategic Plan.

On November 5, 1996, the City of Modesto passed Resolution 96-609 stating the intent to “put recycled wastewater to the highest beneficial use.” The 1995 *Wastewater Master Plan* suggested that a 5-MGD water reclamation demonstration facility be constructed near the Primary Treatment Plant site, with the possibility of future expansion. An option was presented to build two upstream “northern tier” reclamation plants. The goals of the 5-MGD demonstration facility are to:

- Demonstrate to potential customers and outside water agencies the plant’s ability to successfully produce a reliable supply of quality irrigation water for possible marketing/exchange,
- Demonstrate the usefulness of recycled water by irrigating nearby city parks and golf courses,
- Use the plant to educate the public and gain support from local citizens,
- Enhance the city’s image as a protector of the area’s natural resources.

The reclamation plant would be instrumental for future negotiations and water exchanges with outside water agencies. The demonstration facility would supply recycled water to Tuolumne River Park, Dryden Park Municipal Golf Course, Muni Golf Course, Creekside Golf Course, John Thurman Ball Park, and various other parks located along Dry Creek. The successful beautification of these areas combined with public education would encourage recycled water expansion.

Table 8-7 describes potential measures that can be taken to increase recycled water use. Other incentives have not been identified for the 2005 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 8-7 Measures to Promote Recycled Water Usage**

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

Footnotes:

- a. N/A = not applicable.



Chapter 9

## Supply and Demand Comparison

## Chapter 9 Supply and Demand Comparison

### 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

### 9.1.1 City of Modesto Normal Year Supply, Demand and Comparison

#### City of Modesto Normal Year Supply

As described above, it is assumed that the City of Modesto will meet near-future demands primarily through surface water supplies. Reductions in groundwater pumping below the 2000 to 2005 average production of 46,275 AFY will be stored in the groundwater basin for future use. Until 2009, the City of Modesto will continue to use groundwater pumping to meet demands. In 2009, the Phase Two of the MRWTP will come online, and groundwater production will be offset by increased surface water use, and the groundwater bank balance will begin to accumulate. As shown in Table 9-1, the City of Modesto’s normal year water supply is projected to grow to a buildout normal year water supply of approximately 133,313 AFY. This represents 169 percent growth in supply as compared to 2005.

**Table 9-1 City of Modesto Normal Water Supply (AFY)**

Supply	2005	2010	2015	2020	2025	2030
MID Supply	32,507	67,204	67,204	67,204	67,204	67,204
Groundwater Pumping	46,581	19,104	28,804	39,759	52,133	66,109
Total <sup>a</sup>	79,088	86,308	96,008	106,963	119,337	133,313
% of 2005		110%	122%	136%	151%	169%

Footnotes:

- a. Total supply includes MID supply and groundwater pumping.

#### City of Modesto Normal Year Demand

As shown in Table 9-2, the City of Modesto’s General Plan plus Sphere of Influence buildout water demand is projected to reach approximately 133,313 AFY in the year 2030. This represents a demand increase of approximately 169 percent as compared to 2005 demands.

**Table 9-2 City of Modesto Normal Year Water Demands (AFY)**

Demand	2005	2010	2015	2020	2025	2030
Demand	79,088	86,308	96,008	106,963	119,337	133,313
% of 2005		110%	122%	136%	151%	169%

**City of Modesto Normal Year Comparison**

As shown in Table 9-3, the City of Modesto is projected to successfully meet demands through 2030.

**Table 9-3 City of Modesto Supply and Demand Comparison (AFY)**

	2005	2010	2015	2020	2025	2030
Supply Totals	79,088	86,308	96,008	106,963	119,337	133,313
Demand Totals	79,088	86,308	96,008	106,963	119,337	133,313
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%

Figure 9-1 presents the City of Modesto’s current and projected normal year supplies and demands.

**9.1.2 Modesto Irrigation District Normal Year Supply, Demand and Comparison**

**MID Normal Year Urban Supply**

MID’s total urban supply is projected to increase from the current 33,602 AFY supplied to the City of Modesto to approximately 67,204 AFY in 2030, as shown in Table 9-4. This represents a 200 percent growth in urban supply as compared to 2005.

**Table 9-4 MID Normal Water Supply (AFY)**

Supply	2005	2010	2015	2020	2025	2030
Urban Base Supply	33,602	67,204	67,204	67,204	67,204	67,204
Total Urban Supply	33,602	67,204	67,204	67,204	67,204	67,204
% of 2005		200%	200%	200%	200%	200%

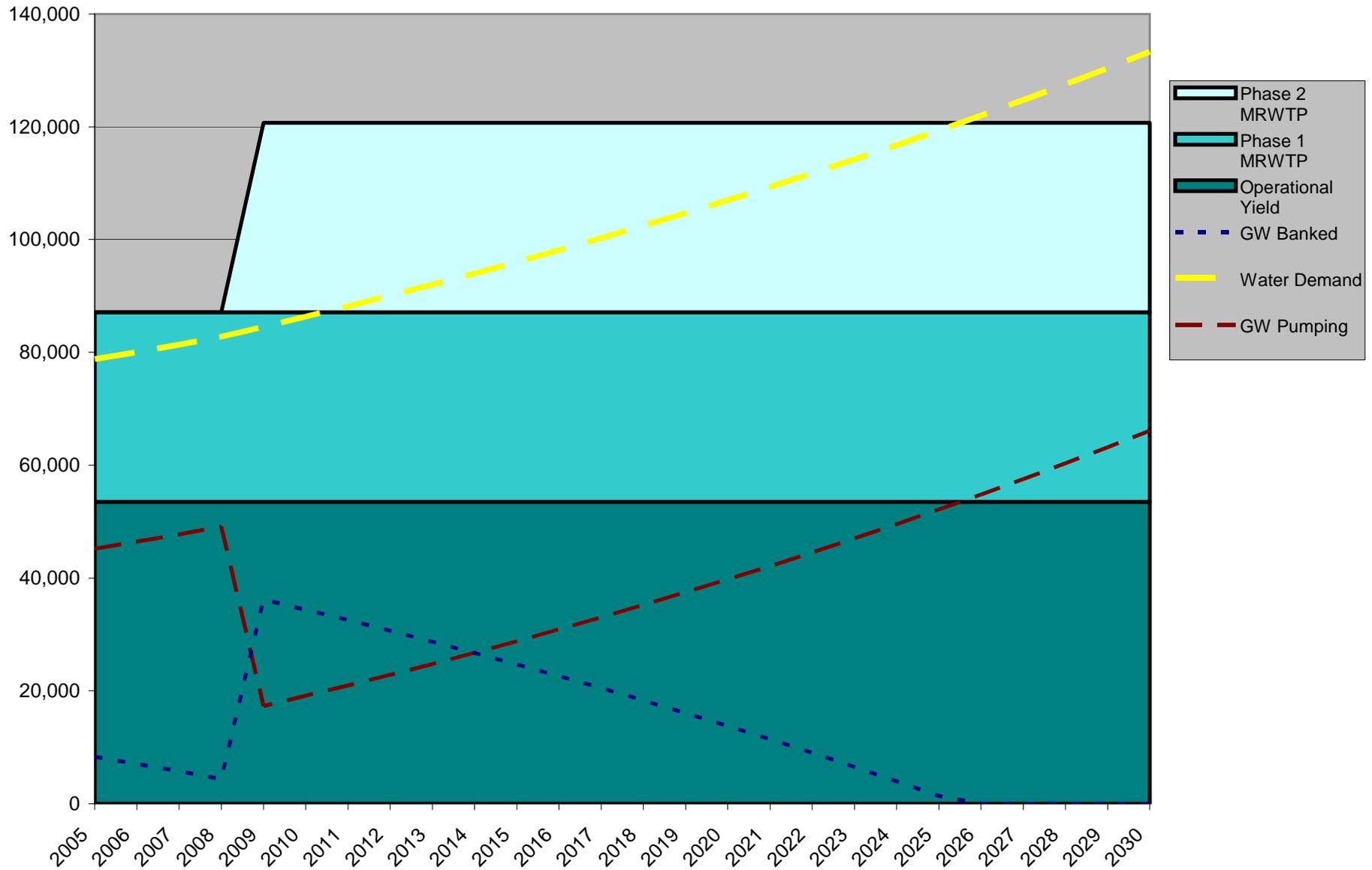
**MID Normal Year Urban Demand**

As shown in Table 9-5, MID’s urban water demand is projected to reach approximately 67,204 AFY in the year 2030. This represents a demand increase of approximately 207 percent as compared to 2005 demands.

**Table 9-5 MID Normal Year Water Demands (AFY)**

Demand	2005	2010	2015	2020	2025	2030
Demand	32,507	67,204	67,204	67,204	67,204	67,204
% of 2005		207%	207%	207%	207%	207%

Figure 9-1: City of Modesto Current and Projected Supply and Demand



**MID Normal Year Urban 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 (AFY)**

	2005	2010	2015	2020	2025	2030
Supply Totals	33,602	67,204	67,204	67,204	67,204	67,204
Demand Totals	32,507	67,204	67,204	67,204	67,204	67,204
Difference	1,095	0	0	0	0	0
Difference as % of Supply	3.3%	0.0%	0.0%	0.0%	0.0%	0.0%
Difference as % of Demand	3.4%	0.0%	0.0%	0.0%	0.0%	0.0%

**9.2 Single Dry Year**

**9.2.1 City of Modesto Single Dry Year Supply, Demand and Comparison**

**City of Modesto Single Dry Year Supply**

As shown in Table 9-7, the City of Modesto’s projected supply in a single dry year is expected to increase from 78,802 AFY in 2005 to approximately 133,313 AFY in 2030. Because groundwater supplies are used to meet demands, total supplies are 100 percent of total demands in all years.

**Table 9-7 City of Modesto Single Dry Year Water Supply (AFY)**

Supply	2005	2010	2015	2020	2025	2030
MID Supply	26,402	52,803	52,803	52,803	52,803	52,803
Groundwater Pumping	52,686	33,505	43,205	54,160	66,534	80,510
Total	79,088	86,308	96,008	106,963	119,337	133,313
% of Normal	100%	100%	100%	100%	100%	100%

Footnotes:

- a. Total supply includes MID supply, SWSP supply, and groundwater pumping.

**City of Modesto Single Dry Year Demand**

As shown in Table 9-8, the City of Modesto’s water demand is projected to increase from 78,802 AFY in a year 2005 single dry year to 133,313 AFY in a single dry year at buildout. Demands for all single dry year scenarios are equal to normal year demands. Although supplies are reduced in dry years, the City of Modesto 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 of Modesto’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)**

Demand	2005	2010	2015	2020	2025	2030
Demand	79,088	86,308	96,008	106,963	119,337	133,313
% of Normal	100%	100%	100%	100%	100%	100%

Footnotes:

- a. Demand reductions based on MID surface water supply reductions, as described in the City of Modesto’s Water Shortage Contingency Plan (Chapter 10). The minimum target demand reduction was assumed for each range of MID base supply reduction. (MID reduction of 10% to 20% generates 10% demand reduction, MID reduction of 20% - 35% generates 20% demand reduction, MID reduction of 35% to 50% generates 35% demand reduction)

**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 Single Dry Year Supply and Demand Comparison (AFY)**

	2005	2010	2015	2020	2025	2030
Demand Totals	79,088	86,308	96,008	106,963	119,337	133,313
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 Single Dry Year Supply, Demand and Comparison**

**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	2005	2010	2015	2020	2025	2030
Urban Base Supply	26,402	52,803	52,803	52,803	52,803	52,803
Total Urban Supply	33,602	67,204	67,204	67,204	67,204	67,204
% of Normal Year	100%	100%	100%	100%	100%	100%

**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 in the year 2030. 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	2005	2010	2015	2020	2025	2030
Demand	32,507	67,204	67,204	67,204	67,204	67,204
% of Normal	100%	100%	100%	100%	100%	100%

**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 Single Dry Year Urban Supply and Demand Comparison (AFY)**

	2005	2010	2015	2020	2025	2030
Supply Totals	33,602	67,204	67,204	67,204	67,204	67,204
Demand Totals	32,507	67,204	67,204	67,204	67,204	67,204
Difference	1,095	0	0	0	0	0
Difference as % of Supply	3.3%	0.0%	0.0%	0.0%	0.0%	0.0%
Difference as % of Demand	3.4%	0.0%	0.0%	0.0%	0.0%	0.0%

**9.3 Multiple Dry Years**

**9.3.1 City of Modesto Multiple Dry Year Supply, Demand and Comparison**

**City of Modesto Multiple Dry Year Supply**

As shown in Table 9-13, the City of Modesto’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)**

Year	MID Deliveries	Groundwater Pumping	Total Supply	% of Normal
Drought Ending in 2010				
2006	31,114	48,943	80,057	100%
2007	29,721	51,632	81,353	100%
2008	28,328	54,418	82,746	100%
2009 <sup>a</sup>	55,683	28,822	84,505	100%
2010	52,803	33,505	86,308	100%

Year	MID Deliveries	Groundwater Pumping	Total Supply	% of Normal
<b>Drought Ending in 2015</b>				
2011	64,324	23,830	88,154	100%
2012	61,444	28,603	90,047	100%
2013	58,563	33,423	91,986	100%
2014	55,683	38,289	93,972	100%
2015	52,803	43,205	96,008	100%
<b>Drought Ending in 2020</b>				
2016	64,324	33,770	98,094	100%
2017	61,444	38,787	100,231	100%
2018	58,563	43,858	102,421	100%
2019	55,683	48,981	104,664	100%
2020	52,803	54,160	106,963	100%
<b>Drought Ending in 2025</b>				
2021	64,324	44,995	109,319	100%
2022	61,444	50,289	111,733	100%
2023	58,563	55,643	114,206	100%
2024	55,683	61,057	116,740	100%
2025	52,803	66,534	119,337	100%
<b>Drought Ending in 2030</b>				
2026	64,324	57,673	121,997	100%
2027	61,444	63,280	124,724	100%
2028	58,563	68,954	127,517	100%
2029	55,683	74,697	130,380	100%
2030	52,803	80,510	133,313	100%
<b>Drought Ending in 2035</b>				
2031	64,324	68,989	133,313	100%
2032	61,444	71,869	133,313	100%
2033	58,563	74,750	133,313	100%
2034	55,683	77,630	133,313	100%
2035	52,803	80,510	133,313	100%

a Phase Two of the MRWTP is expected to be operational beginning 2009.

**City of Modesto Multiple Dry Year Demand**

As shown in Table 9-14, water demands for the City of Modesto 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 dry years. A cutback of MID by 22 percent is the greatest cutback currently expected to occur.

**Table 9-14 City of Modesto Multiple Dry Year Water Demands (AFY)**

Year	Demand	% of Normal Year
Drought ending in 2010		
2006	80,057	100%
2007	81,353	100%
2008	82,746	100%
2009	84,505	100%
2010	86,308	100%
Drought ending in 2015		
2011	88,154	100%
2012	90,047	100%
2013	91,986	100%
2014	93,972	100%
2015	96,008	100%
Drought ending in 2020		
2016	98,094	100%
2017	100,231	100%
2018	102,421	100%
2019	104,664	100%
2020	106,963	100%
Drought ending in 2025		
2021	109,319	100%
2022	111,733	100%
2023	114,206	100%
2024	116,740	100%
2025	119,337	100%
Drought ending in 2030		
2026	121,997	100%
2027	124,724	100%
2028	127,517	100%
2029	130,380	100%
2030	133,313	100%
Drought ending in 2035		
2031	133,313	100%
2032	133,313	100%
2033	133,313	100%
2034	133,313	100%
2035	133,313	100%

**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 Multiple Dry Year Supply and Demand Comparison (AFY)**

Year	Supply Totals	Demand Totals	Difference (Supply Minus Demand)	Difference as % of Supply	Difference as % of Demand
<b>Drought ending in 2010</b>					
2006	80,057	80,057	0	0.0%	0.0%
2007	81,353	81,353	0	0.0%	0.0%
2008	82,746	82,746	0	0.0%	0.0%
2009	84,505	84,505	0	0.0%	0.0%
2010	86,308	86,308	0	0.0%	0.0%
<b>Drought ending in 2015</b>					
2011	88,154	88,154	0	0.0%	0.0%
2012	90,047	90,047	0	0.0%	0.0%
2013	91,986	91,986	0	0.0%	0.0%
2014	93,972	93,972	0	0.0%	0.0%
2015	96,008	96,008	0	0.0%	0.0%
<b>Drought ending in 2020</b>					
2016	98,094	98,094	0	0.0%	0.0%
2017	100,231	100,231	0	0.0%	0.0%
2018	102,421	102,421	0	0.0%	0.0%
2019	104,664	104,664	0	0.0%	0.0%
2020	106,963	106,963	0	0.0%	0.0%
<b>Drought ending in 2025</b>					
2021	109,319	109,319	0	0.0%	0.0%
2022	111,733	111,733	0	0.0%	0.0%
2023	114,206	114,206	0	0.0%	0.0%
2024	116,740	116,740	0	0.0%	0.0%
2025	119,337	119,337	0	0.0%	0.0%
<b>Drought ending in 2030</b>					
2026	121,997	121,997	0	0.0%	0.0%
2027	124,724	124,724	0	0.0%	0.0%
2028	127,517	127,517	0	0.0%	0.0%
2029	130,380	130,380	0	0.0%	0.0%
2030	133,313	133,313	0	0.0%	0.0%
<b>Drought ending in 2035</b>					
2031	133,313	133,313	0	0.0%	0.0%
2032	133,313	133,313	0	0.0%	0.0%
2033	133,313	133,313	0	0.0%	0.0%
2034	133,313	133,313	0	0.0%	0.0%
2035	133,313	133,313	0	0.0%	0.0%

**9.3.2 Modesto Irrigation District Multiple Dry Year Supply, Demand and Comparison**

**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)**

Year	MID Base Supply	MID Full Supply	% of Normal
<b>Drought ending in 2010</b>			
2006	32,162	33,602	100%
2007	30,722	33,602	100%
2008	29,282	33,602	100%
2009	55,683	67,204	100%
2010	52,803	67,204	100%
<b>Drought ending in 2015</b>			
2011	64,324	67,204	100%
2012	61,444	67,204	100%
2013	58,563	67,204	100%
2014	55,683	67,204	100%
2015	52,803	67,204	100%
<b>Drought ending in 2020</b>			
2016	64,324	67,204	100%
2017	61,444	67,204	100%
2018	58,563	67,204	100%
2019	55,683	67,204	100%
2020	52,803	67,204	100%
<b>Drought ending in 2025</b>			
2021	64,324	67,204	100%
2022	61,444	67,204	100%
2023	58,563	67,204	100%
2024	55,683	67,204	100%
2025	52,803	67,204	100%
<b>Drought ending in 2030</b>			
2026	64,324	67,204	100%
2027	61,444	67,204	100%
2028	58,563	67,204	100%
2029	55,683	67,204	100%
2030	52,803	67,204	100%
<b>Drought ending in 2035</b>			
2031	64,324	67,204	100%
2032	61,444	67,204	100%
2033	58,563	67,204	100%
2034	55,683	67,204	100%
2035	52,803	67,204	100%

**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)**

Year	Demand	% of Normal Year
Drought ending in 2010		
2006	33,602	100%
2007	33,602	100%
2008	33,602	100%
2009	67,204	100%
2010	67,204	100%
Drought ending in 2015		
2011	67,204	100%
2012	67,204	100%
2013	67,204	100%
2014	67,204	100%
2015	67,204	100%
Drought ending in 2020		
2016	67,204	100%
2017	67,204	100%
2018	67,204	100%
2019	67,204	100%
2020	67,204	100%
Drought ending in 2025		
2021	67,204	100%
2022	67,204	100%
2023	67,204	100%
2024	67,204	100%
2025	67,204	100%
Drought ending in 2030		
2026	67,204	100%
2027	67,204	100%
2028	67,204	100%
2029	67,204	100%
2030	67,204	100%
Drought ending in 2035		
2031	67,204	100%
2032	67,204	100%
2033	67,204	100%
2034	67,204	100%
2035	67,204	100%

**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 Multiple Dry Year Supply and Demand Comparison (AFY)**

Year	Supply Totals	Demand Totals	Difference (Supply Minus Demand)	Difference as % of Supply	Difference as % of Demand
<b>Drought ending in 2010</b>					
2006	33,602	33,602	0	0%	0%
2007	33,602	33,602	0	0%	0%
2008	67,204	67,204	0	0%	0%
2009	67,204	67,204	0	0%	0%
2010	67,204	67,204	0	0%	0%
<b>Drought ending in 2015</b>					
2011	67,204	67,204	0	0%	0%
2012	67,204	67,204	0	0%	0%
2013	67,204	67,204	0	0%	0%
2014	67,204	67,204	0	0%	0%
2015	67,204	67,204	0	0%	0%
<b>Drought ending in 2020</b>					
2016	67,204	67,204	0	0%	0%
2017	67,204	67,204	0	0%	0%
2018	67,204	67,204	0	0%	0%
2019	67,204	67,204	0	0%	0%
2020	67,204	67,204	0	0%	0%
<b>Drought ending in 2025</b>					
2021	67,204	67,204	0	0%	0%
2022	67,204	67,204	0	0%	0%
2023	67,204	67,204	0	0%	0%
2024	67,204	67,204	0	0%	0%
2025	67,204	67,204	0	0%	0%
<b>Drought ending in 2030</b>					
2026	67,204	67,204	0	0%	0%
2027	67,204	67,204	0	0%	0%
2028	67,204	67,204	0	0%	0%
2029	67,204	67,204	0	0%	0%
2030	67,204	67,204	0	0%	0%
<b>Drought ending in 2035</b>					
2031	67,204	67,204	0	0%	0%
2032	67,204	67,204	0	0%	0%
2033	67,204	67,204	0	0%	0%
2034	67,204	67,204	0	0%	0%
2035	67,204	67,204	0	0%	0%



Chapter 10

## **Water Shortage Contingency Plan**

## Chapter 10 Water Shortage Contingency Plan

### 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.*

### 10.1 Stages of Action

To manage a potential water supply deficiency, the City of Modesto has defined three water shortage stages pursuant to their current Urban Water Shortage Contingency Plan, adopted by the City in 1991. The stages 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. Phasing criteria for water shortage stage determination (Table 10-1) were created to aid in declaring a particular water shortage stage.

In the summer of 2002, water pressures in the City of Modesto 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. The City of Modesto is currently still in Stage 1 of the Water Shortage Contingency Plan. Because MID is a wholesale supplier and does not directly serve any urban customers, MID does not have a separate Water Shortage Contingency Plan.

**Table 10-1 Phasing Criteria for Water Shortage Stage Determination**

Stage No.	Phasing Criteria for Stage Determination
1	<ul style="list-style-type: none"> <li>▪ Below average rainfall in the previous 12-24 months</li> <li>▪ 10% or more municipal wells out of service due to noncompliance with drinking water standards</li> <li>▪ Irrigation allotments by local irrigation districts reduced by 10%</li> <li>▪ Warm weather patterns typical of summer months</li> </ul>
2	<ul style="list-style-type: none"> <li>▪ Below average rainfall in the previous 24-36 months</li> <li>▪ Prolonged periods of low water pressure</li> <li>▪ 10% or more of municipal wells out of service</li> <li>▪ Irrigation allotments by local irrigation districts reduced by 25%</li> <li>▪ Warm weather patterns typical of summer months</li> </ul>
3	<ul style="list-style-type: none"> <li>▪ Below average rainfall in the previous 24-48 months</li> <li>▪ Prolonged periods of low water pressure</li> <li>▪ 10% or more of municipal wells out of service due to noncompliance with drinking water standards.</li> <li>▪ Irrigation allotments by local irrigation districts reduced by 50%</li> <li>▪ Warm weather patterns typical of summer months</li> </ul>

All three stages prohibit certain water uses at specific times, with prohibitions becoming stricter as supplies continue to decrease. Table 10-2 summarizes the three stages and their corresponding reduction objectives.

**Table 10-2 Water Supply Shortage Stages of Action**

Stage No.	Water Supply Condition	Demand Reduction Objective (from baseline)
1	Minor Shortage Potential	10% to 20%
2	Moderate Shortage Potential	20% to 35%
3	Critical Shortage Potential	35% to 50%

## 10.2 Estimate of Minimum Supply for Next Three Years

The reliability of the surface water supplies is dependent on hydrologic variations and the ability to store and extract water from available storage reservoirs. River flows and the incidental recharge of applied irrigation water are the primary sources of groundwater recharge in the basin. Groundwater, which is less prone to short-term variability, now provides a "safety net" during dry years when surface water supplies are limited. To increase this reliability, the City and MID implemented the *Amended and Restated Treatment and Delivery Agreement* formally recognizing the importance of promoting and encouraging both urban and agricultural water users to utilize water conservation practices that are effective, practical, and economical.

To estimate supply available in a severe three-year drought, 1991 is used as a model year for developing "worst case" scenarios. As described previously, MID wholesale supplies were reduced by 9/42 inches, or 21.4 percent, in 1991. Assuming that this 21.4 percent cutback represents a "worst case" scenario, and dividing the 21.4 percent supply reduction equally over the previous three year period, annual supply reductions of approximately 7.1 percent per year would be expected. Table 10-3 presents the estimated

minimum supply available over the next three years, assuming a severe drought were to occur beginning in 2005. It should be noted that in drought situations, MID may make additional water beyond base supply available to the City of Modesto at an additional cost. In addition, the City of Modesto may opt 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 order to eliminate a shortfall that would otherwise occur. The supplies shown in Table 10-3 do not reflect implementation of any alternatives for reducing potential shortfall. MID's minimum urban base water supply for the next three years is equal to the MID Tuolumne River Base Supply line item shown in Table 10-3.

**Table 10-3 Three-Year Estimated Minimum Water Supply (AFY)**

Source	Normal	Year 1	Year 2	Year 3
MID Tuolumne River Base Supply	32,506	30,184	27,863	25,541
Local Groundwater <sup>b</sup>	46,295	48,617	50,939	53,261
<b>Total</b>	<b>78,802</b>	<b>78,802</b>	<b>78,802</b>	<b>78,802</b>

Footnotes:

- a. MID may make additional water beyond base supply available to the City of Modesto at an additional cost. The City of Modesto 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. Assumes groundwater pumping is increased as necessary to meet demands.

### 10.3 Catastrophic Supply Interruption Plan

The City of Modesto has prepared an *Emergency Operations Manual* which presents specific actions and procedures to follow during a catastrophic event interrupting either the City of Modesto supplies or MID 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 10-4 details preparation actions to be taken in event of a catastrophe.

**Table 10-4 Preparation Actions for a Catastrophe**

Possible Catastrophe	Preparation Actions
Regional Power Outage	<ul style="list-style-type: none"> <li>▪ Establish Emergency Operations Center to:</li> <li>▪ Implement Emergency Operations Manual</li> <li>▪ Direct actions to maintain an emergency water supply</li> <li>▪ Announce water reduction orders</li> </ul>
Earthquake	
Other	

## **10.4 Prohibitions, Consumption Reduction Methods, and Penalties**

Once the Director of Engineering & Transportation 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 10-5 summarizes the City of Modesto's Requested Consumer Actions listed by water shortage stage. Stage 3 (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.

**Table 10-5 Requested and Mandatory Water Use Prohibitions**

Requested and Mandatory Consumer Actions	Stage	Water Use Reduction (%)
<ul style="list-style-type: none"> <li>▪ Outdoor water use prohibited daily from noon to 7pm (implemented through city-wide rotation schedule)</li> <li>▪ Car washing subject to above-cited limitations with use of a positive shutoff nozzle</li> <li>▪ 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.</li> <li>▪ Water leaks, once identified, must be repaired within 24 hours</li> <li>▪ Restaurants encouraged to serve water only on request</li> <li>▪ New landscaping to comply with existing and future landscape ordinances</li> <li>▪ Water meter installation on all new single-family homes</li> </ul>	1	10% - 20%
<ul style="list-style-type: none"> <li>▪ Outdoor water use prohibited daily from 9am to 7pm (implemented through city-wide rotation schedule)</li> <li>▪ 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</li> <li>▪ Car washing subject to above-cited limitations with use of a positive shutoff nozzle</li> <li>▪ Hosing concrete areas, building exteriors, etc., is prohibited except for health and safety concerns</li> <li>▪ Water leaks, once identified, must be repaired within 24 hours</li> <li>▪ Restaurants prohibited from serving water except upon request</li> <li>▪ New landscaping to comply with existing and future landscape ordinances</li> <li>▪ Mandatory retrofit of low flow showerheads in homes when building remodeling occurs</li> <li>▪ No use of outdoor fountains except for maintenance purposes</li> <li>▪ Water meter installation on all new single-family homes</li> <li>▪ Creation of community- based task force to deal with possible implementation of stage 3 restrictions</li> </ul>	2	20% - 305%
<ul style="list-style-type: none"> <li>▪ No outdoor water use except for trees and shrubs by hand, and vegetation maintained through drip irrigation</li> <li>▪ Car washing permitted at car wash facilities only</li> <li>▪ Hosing concrete areas, building exteriors, etc., is prohibited except for health and safety concerns</li> <li>▪ Water leaks, once identified, must be repaired within 24 hours</li> <li>▪ Restaurants prohibited from serving water except upon request</li> <li>▪ Mandatory retrofit of low flow showerheads and toilets in homes when building remodeling occurs</li> <li>▪ No use of outdoor fountains except for maintenance purposes</li> <li>▪ Moratorium on all new landscaping</li> <li>▪ Building moratorium on all new water connections, including new swimming pools</li> </ul>	3	35% - 50%

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 10-6 summarizes the administrative fines for excessive water use.

**Table 10-6 Stage-Wise Administrative Fines for Excessive Water Use**

Penalties and Charges	Stage
1. \$50 Administrative fee assessed upon second violation	1
2. \$200 Administrative fee assessed upon third violation (includes meter installation)	
3. \$250 Administrative fee assessed for each subsequent violation	
1. \$150 Administrative fee assessed upon second violation	2
2. \$250 Administrative fee assessed upon third violation (includes meter installation)	
3. \$300 Administrative fee assessed for each subsequent violation	
1. \$200 Administrative fee assessed upon second violation	3
2. \$300 Administrative fee assessed upon third violation (includes meter installation)	
3. \$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.

On January 1, 2005, the City of Modesto implemented an initial set of water rate adjustments as part of a new single water service area and uniform rate structure. Rate adjustments for flat-rate residential customers in the area previously considered Zone 1 ranged from a 14 to 43 percent increase (35 percent for the majority for lot sizes of 5,001-7,000 sq. ft.). Adjustments to previous Zone 2 flat-rate water customers ranged from a 19 percent decrease to an increase of 15 percent. Zone 3 flat-rate customers outside of the Modesto city limits saw increases ranging from 28 to 81 percent, bringing them to the same rate structure level as the rest of the water service area.

Metered customers (commercial, industrial, churches, schools) on January 1, 2005 experienced rate adjustments moving to a new single service area and uniform rate structure. Zone 1 metered rates (volume based) increased 2.7 percent, Zone 2 decreased by 16 percent, and Zone 3 experienced up to a 52 percent increase. Since that adjustment, all metered water customers pay the same per unit amount for water usage regardless of location. Fixed costs based on meter size were adjusted based on the cost of service study recommendations. Following these initial rate adjustments, all customers have additional annual rate increases adopted every July 1, starting in the summer of 2005. These future increases will be 20, 15, 5 and 5 percent over the next four years. Beginning January 1, 2009, only inflationary increases will be added based on a consumer price index.

Water shortages that result in implementation of the Water Shortage Contingency Plan are expected to result in reduced water usage, and accordingly, reduced operating revenues. Table 10-7 presents the projected revenue impacts resulting from implementation of the Water Shortage Contingency Plan.

Projected Expenditures and revenues for FY 2005/2006 are presented in the *Water Utility Cost of Service Rate Study* prepared for the City of Modesto by Foresight Consulting Services in September, 2004 (“Rate Study”). The City of Modesto is currently in Stage 1 of the Water Shortage Contingency Plan. As such, Stage 1 revenue and expenditures are equal to those projected in the Rate Study. Implementation of Stage 2 and Stage 3 restrictions were expected to reduce revenues from metered water sales, including additional revenue from rate increases. Projected water use reductions for implementation of these stages is 25 percent and 50 percent, respectively, from normal year. Because normal year in this example includes Stage 1 water shortage use reductions, Stage 2 and Stage 3 water use reductions were assessed as 17 percent (1 - 0.75/0.9) and 44 percent (1 - 0.50/0.9) reductions in water use, respectively. To be conservative, it was assumed that approximately ten percent of metered accounts achieved the targeted water use reductions. In addition to revenues lost due to reduced metered water usage, an additional \$150,000 is projected to be spent on additional administrative costs. These costs represent hiring two additional temporary administrative staff to assist in administration and implementation of a customer communication effort.

**Table 10-7: Projected Revenue Impacts from Water Shortage Contingency Plan**

	Projected FY 2005/06	FY 2005/06 Stage 1 <sup>a</sup>	FY 2005/06 Stage 2 <sup>b</sup>	FY 2005/06 Stage 3 <sup>c</sup>
<b>Expenditures</b>				
Operating Expenses	\$20,495	\$20,495	\$20,495	\$20,495
New Metering, Billing, O&M Costs	\$1,237	\$1,237	\$1,237	\$1,237
MID T&DA Debt Svc	\$7,124	\$7,124	\$7,124	\$7,124
MID T&DA O&M	\$4,998	\$4,998	\$4,998	\$4,998
Other Uses (transfers out)	\$2,010	\$2,010	\$2,010	\$2,010
Additional Administrative Fees <sup>d</sup>	\$0	\$0	\$150,000	\$150,000
Total Expenditures	\$35,864	\$35,864	\$185,864	\$185,864
<b>Revenue Sources</b>				
Operating Revenue	\$860	\$860	\$860	\$860
Water Sale – Current Flat Rates	\$17,675	\$17,675	\$17,675	\$17,675
Water Sale – Current Metered Rates	\$11,100	\$11,100	\$8,325	\$5,550
Other Sources (Transfers In)	\$2,207	\$2,207	\$2,207	\$2,207
Connection Fee Revenues	\$1,255	\$1,255	\$1,255	\$1,255
Additional Revenue from Rate Increases	\$17,841	\$17,841	\$13,381	\$8,921
Total Operating Revenue <sup>e</sup>	\$50,938	\$50,938	\$43,703	\$36,468
Net Operating Revenue <sup>e</sup>	\$22,001	\$22,001	\$14,766	\$7,531
Net Revenue <sup>e</sup>	\$15,074	\$15,074	<b>(-\$142,161)</b>	<b>(-\$149,397)</b>

Footnotes:

- a. FY 2005/06 projected revenue and expenses assume continuation of current Stage 1 water shortage classification. Therefore, no revenue reductions projected as compared to “normal.”
- b. Assumes 25% use reduction of 10 % of metered accounts from “normal” where “normal” is equal to projected FY 2005/06 use/0.9.
- c. Assumes 50% use reduction of 10 % of metered accounts from “normal” where “normal” is equal to projected FY 2005/06 use/0.9.
- d. Stages II and III include estimated cost of two temporary full-time administrative staff to assist in administration and implementation of a customer communication effort.
- e. Includes additional revenue from rate increases.

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). The negative revenue impact is moderated by the large number of residential unmetered accounts and the base charge on the residential metered accounts. Both of these revenue sources remain unchanged during water use reductions. An estimate of the reduction in revenues was made by assuming 10 percent of the metered accounts exceed the 1,680 cubic feet per month (i.e., the accounts that pay the \$0.82 per 100 cubic foot charge). The water reduction percentage by stage is then applied to only those 10 percent of total accounts in exceedence.

Expenditure impacts resulting from implementation of the Water Shortage Contingency Plan 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 10-8.

**Table 10-8 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 Draft Ordinance and Use Monitoring

In 1991, the Modesto City Council adopted its current *Urban Water Shortage Contingency Plan*. Prior to the adoption of the Plan, the City made available a draft of the plan for public review and held a public hearing. The 1991 Plan was used to describe earlier sections of this chapter.

The City’s water system is supplied from surface water and from 97 operating groundwater wells. The water treatment plant and 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 of Modesto is in the process of converting all customers to meters. Once the conversion to meters is complete, the City of Modesto will be able to determine reductions in demand based on metered usage. Table 10-9 summarizes the City of Modesto’s water use monitoring mechanisms.

**Table 10-9 Water Use Monitoring Mechanisms**

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

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 of Modesto has passed resolution 2006-508 on August 8, 2006, adopting written procedures to uphold this legislation. This resolution is provided as Appendix M.



Chapter 11

## **Adoption and Implementation of UWMP**

## Chapter 11 Adoption and Implementation of UWMP

### Water Code § 10643, § 10635(b), § 10644 (a), § 10645

*§10643 An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.*

*§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.*

*§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.*

*§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.*

### 11.1 Provision of Water Service Reliability Section

Upon completion and adoption of this UWMP, the Water Service Reliability Section will be provided to the following agencies:

- Ceres/ Walnut Manor
- Del Rio/ Hillcrest
- Empire
- Hickman
- Grayson
- Salida
- Turlock
- Waterford
- Stanislaus County
- Oakdale Irrigation District
- Turlock Irrigation District

### 11.2 Adoption

The 2005 City of Modesto/MID Joint UWMP Update will be adopted by the Modesto City Council and by the MID Board of Directors on April 10, 2007. Resolutions for adoption by the Modesto City Council and MID Board of Directors will be included in Appendix C.

To encourage public participation in development of the UWMP, and to encourage participation of social, cultural, and economic groups, a stakeholder meeting was held early in the UWMP process. On September 8, 2005, a stakeholder workshop was held to announce the UWMP update and to address any potential concerns raised by the participating stakeholders. In addition to representatives from the City of Modesto and MID, representatives from the following cities, agencies, groups and counties were in attendance:

- Riverbank
- Turlock
- Waterford
- Stanislaus County
- Oakdale Irrigation District
- Turlock Irrigation District
- Manufacturers Council
- Building Industry Association

To encourage these and other entities to provide input and comments, the City of Modesto/MID Joint UWMP 2005 Update will be made available for public comment for 30 days prior to its adoption, beginning on March 12, 2007 and ending April 10, 2007.

Copies of the UWMP will be available for public review and comment at the following locations:

- City of Modesto, Public Works Department, 1010 Tenth Street, 4<sup>th</sup> Floor, Modesto
- City of Modesto Public Works Department website (<http://www.ci.modesto.ca.us/pwd>)
- MID Secretary's Office, 1231 Eleventh Street, Modesto
- MID website (<http://www.mid.org/water/uwmp>)

Prior to the 30-day public comment period, notices will be posted in the local newspapers to indicate the beginning of the public comment period and the upcoming public hearing. The public notices can be found in Appendix G. Public comments received are included in Appendix L.

Notice of the forthcoming public comment period, public hearing, and UWMP adoption by the Modesto City Council and MID Board of Directors will be provided to the following cities, counties and agencies on February 26, 2007:

- |                       |                               |
|-----------------------|-------------------------------|
| ▪ Ceres/ Walnut Manor | ▪ Turlock                     |
| ▪ Del Rio/ Hillcrest  | ▪ Waterford                   |
| ▪ Empire              | ▪ Stanislaus County           |
| ▪ Hickman             | ▪ Oakdale Irrigation District |
| ▪ Grayson             | ▪ Turlock Irrigation District |
| ▪ Salida              |                               |

On April 25, 2007 (approximately 14 days following adoption), the adopted UWMP will be provided to the Department of Water Resources. In addition, the cities, counties and agencies listed above will be provided with the Water Service Reliability Section of the adopted UWMP, and the Final UWMP will be made available for public review at the following locations:

- City of Modesto, Public Works Department, 1010 Tenth Street, 4<sup>th</sup> Floor, Modesto
- City of Modesto Public Works Department website (<http://www.ci.modesto.ca.us/pwd>)
- MID Secretary's Office, 1231 Eleventh Street, Modesto
- MID website (<http://www.mid.org/water/uwmp>)

### 11.3 Implementation

The City has continued to implement the management programs discussed in the 2000 UWMP. The main management program specified in the 2000 UWMP was the installation of water meters. The City is currently installing meters (see Section 5.2.4 for additional information).



## References

## References

*2000 Urban Water Management Plan* Prepared for the City of Modesto Engineering & Transportation Capital Planning Division and the Modesto Irrigation District. Black & Veatch Corporation.

*2003 Urban Growth Policy Review Draft Report*, City of Modesto. City of Modesto Community & Economic Development Department, Planning Division, May 2003.

*Amended and Restated Treatment and Delivery Between Modesto Irrigation District and the City of Modesto*, October 2005.

Be a Wiser Water Miser. Retrieved September 22, 2005, from [http://www.ci.modesto.ca.us/pwd/water\\_conserve/](http://www.ci.modesto.ca.us/pwd/water_conserve/).

*Discussion on Operational Yield for the 2005 Urban Water Management Plan (UWMP)*. City of Modesto. February 2007.

*Engineer's Report: Justification and Cost Allocation for Proposed Water System Improvements*. Prepared for City of Modesto. West Yost & Associates, September 2004.

*Integrated Regional Groundwater Management Plan for the Modesto Subbasin Final Draft*, Prepared for the Stanislaus and Tuolumne Rivers Groundwater Basin Association. Bookman-Edmonston, June 2005.

*MRWTP Phase Two Expansion Project Final Subsequent Environmental Impact Report* (SCH Number: 2004022013). Prepared for Modesto Irrigation District and City of Modesto. Jones & Stokes, June 2004.

*MRWTP Phase Two Expansion Project Mitigation Monitoring and Reporting Plan*. Prepared for Modesto Irrigation District and City of Modesto. Jones & Stokes, June 2005.

*MRWTP Phase Two Expansion Project Subsequent Environmental Impact Report Public Review Draft* (SCH Number: 2004022013). Prepared for Modesto Irrigation District and City of Modesto. Jones & Stokes, November 2004.

*Treatment and Delivery Agreement Among Modesto Irrigation District, City of Modesto, and Del Este Water Company*. April 1992.

*Turlock Groundwater Basin Groundwater Management Plan (Draft)*. Turlock Groundwater Basin Association, August 2005.

*Urban Water Conservation Potential: 2003 Technical Update*. Prepared for California Urban Water Agencies. A & N Technical Services, Inc., July 2004.

*Water Management Plan for the Modesto Irrigation District, prepared in accordance with the Memorandum of Understanding, November 13, 1996, regarding Agricultural Water Suppliers Efficient Water Management Practices Act of 1990 AB 3616*. Modesto Irrigation District, July 1999.

Water Rate Increase Frequently Asked Questions. Retrieved September 22, 2005 from <http://www.ci.modesto.ca.us/pwd/>.

*Water System Hydraulic Model Update, City of Modesto*. West Yost & Associates, 2005.

*Water Utility Connection Fee Analysis*. Prepared for City of Modesto. Foresight Consulting Services, April 2005.

*Water Utility Cost of Service Rate Study, City of Modesto*. Foresight Consulting Services, September 2004



City of Modesto



Modesto Irrigation District



2001 North Main Street, Suite 400  
Walnut Creek, CA 94596  
925.627.4100 T  
925.627.4101 F