City of Waterford

Draft Urban Water Management Plan

2005

City of Waterford Draft 2005 Urban Water Management Plan

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List of Abbreviations

AC	Acreage
AF	Acre feet
AFY	Acre feet per year
CIMIS	California Irrigation Management Information System
DBCP	Dibromochloropropane
DMM	Demand Management Measure
DU	Dwelling Unit
DWR	Department of Water Resources
EOM	Emergency Operations Manual
GPD	Gallons per day
GPDC	Gallons per day per capita
GPM	Gallons per minute
IRGMP	Integrated Regional Groundwater Management Plan
MGD	Million gallons per day
MID	Modesto Irrigation District
MRWTP	Modesto Regional Water Treatment Plant
SCADA	Systems Control and Data Acquisition
STRGBA	Stanislaus and Tuolumne Rivers' Groundwater Basin Association
TID	Turlock Irrigation District
UWMP	Urban Water Management Plan
WWTP	Wastewater Treatment Plant

Chapter 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 a specific plan every five years which defines their current and future water use, sources of supply and its reliability, and existing conservation measures.

In recognition of the state requirements, the City of Waterford (City) has prepared this Urban Water Management Plan (UWMP) to address the anticipated future urban demands that will be met by the newly formed City of Waterford Water Department from 2005-2030. As such, this 2005 UWMP is the first UWMP prepared by the City of Waterford and therefore is not an update of an existing plan. This UWMP will discuss the demands generated by anticipated urban development within the City of Waterford service area, and the supplies the City will use to meet these demands. This discussion will also include demand management, supply reliability, water quality impacts, wastewater and recycled water, supply and demand comparison, and water shortage planning.

1.1 Background and Effective Date

As of its formation in 2005, the City of Waterford Water Department (Department) will be responsible for supplying all urban water demands within their service area. As of 2005, the Department service area is the 1,610-acre Primary Sphere annexation area surrounding the current City boundaries. The City will also supply water to River Pointe, a 75-acre section within the City limits where new residential development has recently begun.

The effective date of this document is June 1, 2005. As of the effective date, the City did not supply water to the service area, however development is in its initial phases and the City is expected to be supplying water as early as mid to late 2005. Currently, the service area consists of primarily agricultural land that is being converted into residential areas.

The area within current City of Waterford boundaries is and will continue to be served by the City of Modesto. This has been the case since the mid 1990's when the City of Modesto took over service from the Del Este Water Company. The City has no plans at this time to service existing City of Modesto Waterford customers but will focus on new development within the City boundaries and sphere of influence.

The existing water demands in the Primary Sphere which include agricultural and limited residential demands are met with raw surface water from the Modesto Irrigation District (MID), and private groundwater wells. As previously stated, the City is not responsible for supplying these current demands. As agricultural areas are transitioned to residential areas during development of the area, the City will take over service.

1.2 Agency Coordination

In preparing this UWMP, the City has coordinated with MID and the City of Modesto during preparation of their 2005 UWMP updates. The City has also coordinated with the Department of Water Resources (DWR) on several occasions to develop a document that will meet DWR requirements. The City will also supply the County of Stanislaus (County) the Draft 2005 UWMP prior to adoption.

Table 1-1: Coordination with Appropriate Agencies

Agency	Level of Coordination
MID	Meetings, demand review, shared UWMP information, Draft UWMP review
City of Modesto	UWMP information, Draft UWMP review
DWR	Conference call held to discuss UWMP format and specifics to Waterford (September 2005). Completeness review of Draft UWMP requested (October 2005).
County of Stanislaus	Draft UWMP will be sent to the County for review and posting.

1.3 Resource Maximization/Import Minimization Plan

The City understands that water is a limited, though renewable resource, and that a long-term reliable supply of water is essential to protect the local and state economy. It also recognizes that, while conservation and efficient use of water is a statewide concern, planning for this use is best done at the local level.

The main focus for the City is to maximize the efficient use of water and install water meters. In addition to the water meter program, the City is increasing its other water conservation measures as described later in the UWMP.

1.4 Plan Updates

This 2005 UWMP is the original plan for the newly formed City Water Department.

1.5 City and County Notification and Participation

The City will notify appropriate parties of the preparation of this Draft 2005 UWMP.

1.5.1 Notification Regarding 2005 UWMP Review and Revision

As stated, the City has not previously developed an UWMP. A Draft UWMP will be sent to the following agencies: MID, the City of Modesto, Stanislaus County, and DWR. The Final UWMP will be submitted to DWR for approval.

1.5.2 Evidence of Consultation and Comments

The City is planning to consult with DWR, and other agencies as necessary, during the Draft UWMP review period. The City is prepared to incorporate comments received into a Final UWMP for submittal to DWR for approval. A summary of any comments received from DWR or other agencies will be found as Appendix A to the Final 2005 UWMP, along with the transmittal letters sent to these agencies with the Draft UWMP.

1.6 Public Participation

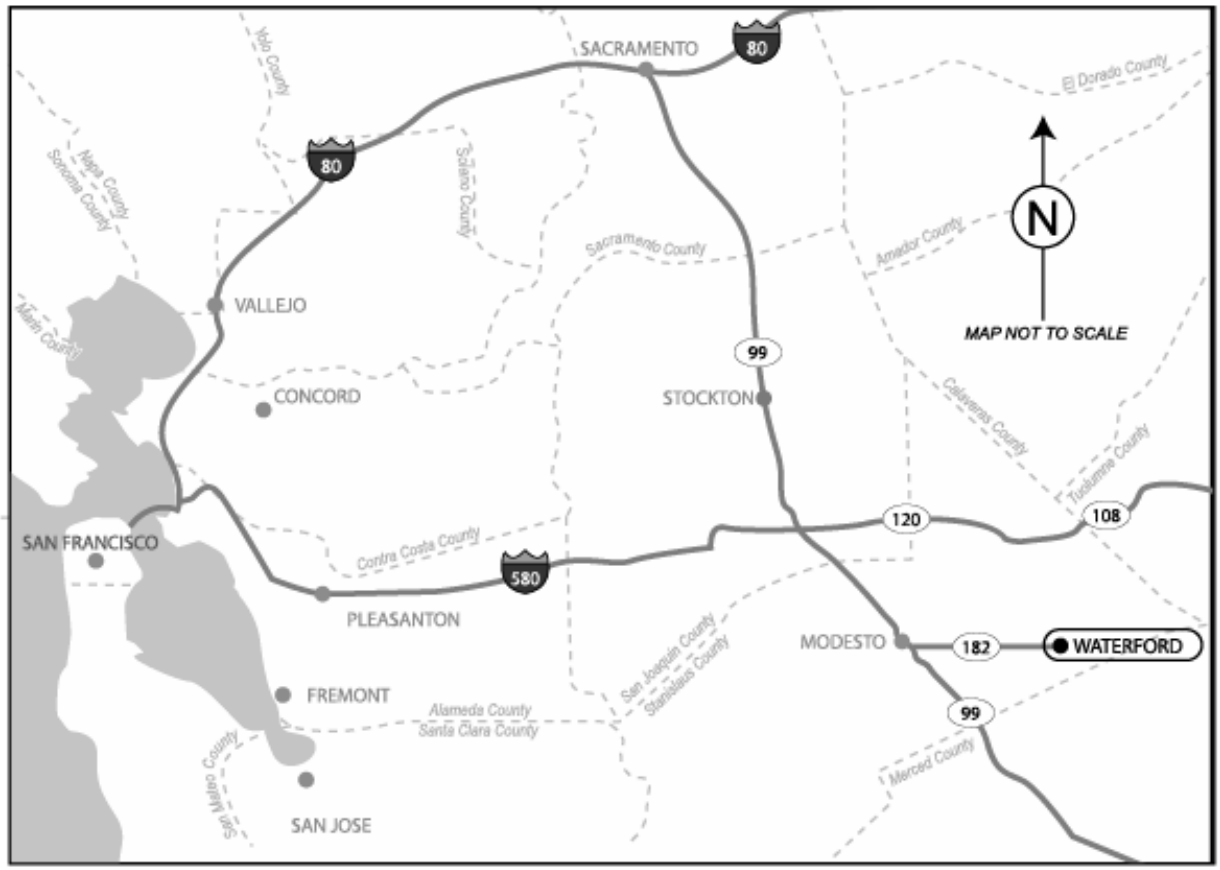
To the extent possible, the City will encourage public participation through circulating a public draft and holding a public hearing. A least two notifications of the time and location of the public hearing will be published in the Modesto Bee at least 14 days prior to the hearing date and close of the public review period. The notifications will also include the locations of the Draft UWMP available for review. Copies of the Draft UWMP will be placed at the Nora Ballard Library, the Waterford Community Center, and the Stanislaus County Clerk's office.

Chapter 2 Supplier Service Area

2.1 Background

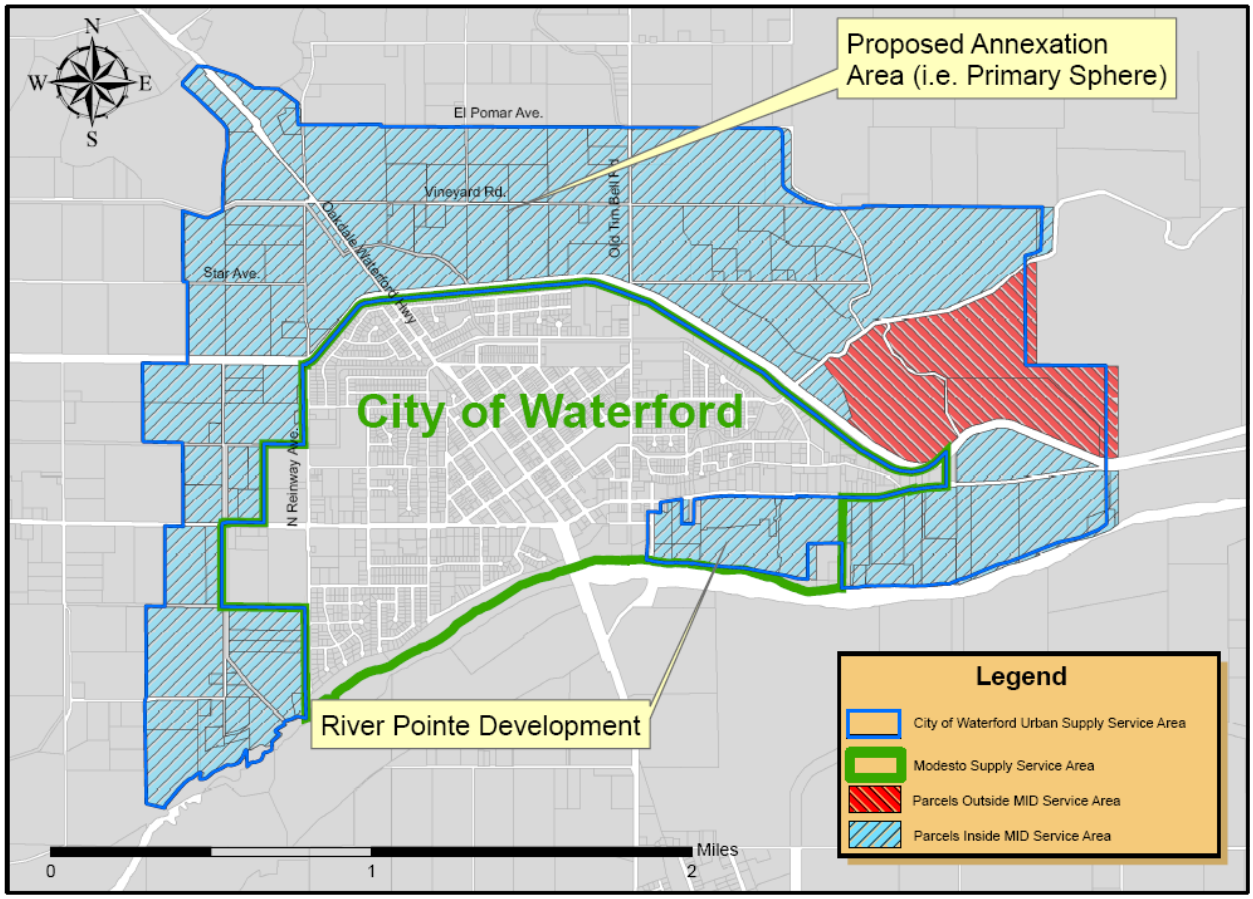
The City of Waterford is located in Stanislaus County, 13 miles east of the City of Modesto along State Highway 132 (Yosemite Boulevard). Figure 2-1 shows its general location within California.

Figure 2-1: City of Waterford - General Location



The City is planning to serve any urban development occurring within the 1,610 acre Primary Sphere. Currently, this area is mostly agricultural land but is expected to be completely converted (reach buildout) by 2030 into low-density residential housing (4.5 dwelling units/acre). Since development has already begun in the River Pointe area, it will be addressed separately from the Primary Sphere with regard to current demand and supply. Figure 2-2 presents the service area delineation in the City of Waterford vicinity.

Figure 2-2: Water Supplier Service Areas



As previously stated, the City does not currently plan to supply water within the existing City of Waterford boundary except to the River Pointe development. Areas within the city limits are currently supplied by the City of Modesto. The City of Modesto supplies this area with groundwater wells located in Waterford. Within the City's service area, existing land use is primarily agricultural with a few associated residences. Current demand within the City service area is supplied by MID and private groundwater wells.

As the City's service area is converted to urban residences, the City will become the primary water supplier. The sources of these supplies will be discussed in Chapter 3.

It is assumed that MID will continue to serve the agricultural demands within its service area until the land is converted for residential development and municipal service standards are met. Further details on MID users and demands can be found in the MID Agricultural Water Management Plan.

2.2 Climate

Climate data including temperature and precipitation estimates used for the Waterford area were obtained from the Western Regional Climate Center near Modesto, California. The period of record was January 1, 1931 through December 31, 2004. Evapotranspiration values for the area were calculated specific to crop type and can be found in a Technical Memorandum authored by RMC in October 2005 (RMC, 2005b).

In general Waterford's climate is described as continental, characterized by moderate, wet winters and hot, dry summers**.** Table 2-1 shows the historic climate characteristics in the Waterford area.

Table 2-1: Climate Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann.
Monthly Average ETo[1] (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[2] (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[2] (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[2] (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

1. Data from CIMIS Station #71. The period of record is June 1987 to present.
2. 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 Waterford 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://wwwcimis.water.ca.gov/.

2.3 Other Demographic Factors

No other demographic factors were determined to affect water management at this time. As the City undergoes development, other factors may be identified and would be discussed in subsequent UWMP updates.

2.4 Population Projections

The current and projected population (through 2030) of the service area was estimated using parcel information and buildout projections. The current population, methodology, and resulting projections are discussed in the following sub-sections.

2.4.1 Current Population Determination

For the purposes of this UWMP, the current population of the River Pointe development area is considered to be zero given that the development construction has just begun. The current population of the Primary Sphere was estimated using parcel assessment data (MetroScan) provided by MCR Engineering. For each Primary Sphere parcel section, the total number of residences was calculated. After determining the total number of residences, an industry standard approximation of 3 persons per household was used to derive the current population. Based on this methodology, the total current population for the entire service area (Primary Sphere and River Pointe) was calculated to be 204 people.

2.4.2 Future Population Projections – Primary Sphere and River Pointe Development

Population projections were developed by extrapolating linearly from current population to buildout at 2030. Table 2-2 shows projected buildout population and acreage by land use category.

Table 2-2: Estimated Buildout (2030) Land Use Categories and Acreage for the Service Area

Land Use Category	Gross Acreage (ac)	Dwelling Units[1]	Population[1]
Low Density Residential	1,392	6,264	18,792
Industrial	126	0	n/a
General Commercial	48	0	n/a
Major roads, canals, railroads	129	0	n/a
Total	**1,695**[2]	6,264	**18,792**

1. Population estimate assumes 3.5 persons/DU, 4.5 dwelling units (DU) per acre (gross acreage), and a net acreage value of 85% (effectively 3.85 DU/acre)
2. Includes Primary Sphere (1610 acres) and River Pointe development (75 acres).

As shown in the Table 2-2, the City's service area population is expected to reach 18,792 persons by 2030. Table 2-3 shows the projected population in 5-year increments, assuming a linear increase from 2005 to 2030. It is important to note that these population projections include the existing population not currently served water by the City.

Table 2-3: Current and Projected Population for the Service Area

	2005	2010	2015	2020	2025	2030
Service Area Population	204	3922	7639	11357	15074	18792
Estimated Residences in the Service Area	68	1307	2546	3786	5025	6264

Chapter 3 Water Supply

The following sections describe the sources of supply, as well as current and future supply analysis.

3.1 Sources of Supply

Urban demands within the service area will be supplied from a combination of surface water and groundwater sources. The following subsections describe the current surface water and groundwater sources and planned expansion of these supplies.

3.1.1 Surface Water

MID has historic surface water rights on the Tuolumne River. These water rights have been used to divert raw water irrigation supply for the agricultural users within MID's service area and the Primary Sphere. Agricultural demands within the Primary Sphere but outside of MID's service area are met through private groundwater supplies. As these agricultural areas are converted to residential, industrial and commercial areas, or other urban zones, the City is planning to utilize existing MID surface water supply allocations to meet the urban supply needs. Instead of flowing through agricultural aqueducts, raw MID water will be routed to the Modesto Regional Water Treatment Plant (MRWTP) and treated for potable use, then distributed as needed throughout the developing service area. It is anticipated that such an arrangement will be procured to coincide with a proposed MRWTP expansion in 2018.

The MRWTP is located at the Modesto Reservoir, approximately 2 miles east of the city. The plant is a complete conventional treatment facility providing flocculation, sedimentation, and filtration, along with ozonation for primary disinfection. The MRWTP and the transmission pipeline are owned and operated by MID and would provide treated surface water to the City by agreement.

3.1.2 Groundwater

Groundwater in the Waterford area is pumped from the Modesto Subbasin. The Modesto Subbasin is part of the much larger San Joaquin Valley Groundwater Basin. The cities of Modesto, Oakdale, and Riverbank, and the communities of Salida and Empire use groundwater to supply their service areas (STRGBA 2005).

The groundwater basin is managed under the umbrella of the Modesto Subbasin Integrated Regional Groundwater Management Plan (IRGMP). The subbasin is not currently adjudicated; however, it is managed closely by Stanislaus and Tuolumne Rivers' Groundwater Basin Association (STRGBA). It is estimated in the IRGMP that 32% of the current agricultural supply in the area is met by groundwater. Historically, groundwater has been depleted near Modesto, which resulted in a cone of depression (STRGBA 2005). This cone of depression began recover in 1994 when the MRWTP surface water treatment plant was constructed (STRGBA 2005) allowing for surface supply offset. Aside from localized depressions, the groundwater levels have remained relatively consistent over 40 years (STRGBA 2005). The total municipal safe yield of the subbasin is 50,000 acre-feet per year (AFY).

Until treated surface water supplies are available, the City will meet emerging demand through groundwater. Currently, the City of Modesto owns 6 wells[1] within Waterford to supply the existing Modesto service area within the City of Waterford. The City of Waterford proposes to drill and construct groundwater wells in the Primary Sphere and River Pointe areas to meet pre-2018 development demands prior to the anticipated 2018 MRWTP supplies. Groundwater will also be used to supply areas that fall outside of the MID service area within the Primary Sphere.

[1] Only five wells are currently operational (TM: Hydraulic Evaluation of the City of Waterford Water System. West Yost & Associates, November 3, 2004.).

3.2 Current Supply Determination

The City does not currently supply any water. The areas within the Primary Sphere and River Pointe are currently supplied by MID (agricultural use) and private wells (agricultural and residential use, i.e. farms). Though MID and private wells will continue to supply undeveloped areas, the City will begin supplying water to all new urban development within the area as it is converted from agricultural use. When buildout is reached, the City will supply the entire Primary Sphere and River Pointe areas. This section outlines the analysis that was performed to determine the amounts of water currently being supplied by MID and private wells within the Primary Sphere and River Pointe areas.

Demand estimates found in the Groundwater Management plan for the Modesto Subbasin (quoted below) were used to estimate the ratio of surface supply (MID) verses groundwater supplies (private wells) utilized to meet the current demand.

> "The water demand for the Modesto groundwater Subbasin was estimated at 590,000 acre-feet for water year 2000 (Burow et al. 2004). Surface water deliveries accounted for about 65%, or 360,000 acre-feet, of the total water supply. Groundwater accounted for about 35%, or about 200,000 acre-feet, of the total supply. Of the approximately 530,000 acre-feet used to meet irrigation demand, 68% was surface water and 32% was groundwater. Of the approximately 56,000 acre-feet used to meet urban demand, 42% was supplied by surface water and 58% was supplied by groundwater. Although two thirds of the wells in the study area are domestic wells, the amount of water pumped has not been quantified." (Page 71; STRGBA, 2005)

Based on the above information, it was assumed that of the 4,591 AFY of current agricultural demand (detailed in Section 4.1.1), 68% (3,122 AFY) is supplied by surface water, and 32% (1,469 AFY) is supplied by groundwater. One hundred percent of the current residential demand in the Primary Sphere (34 AFY) and River Pointe demand (321 AFY; discussed in Section 4.1.2) is currently met by private groundwater supplies. Therefore, the total current demand of 4,946 AFY is supplied by 3,122 AFY from surface water (MID) and 1,824 AFY from groundwater (private wells).

3.3 Future Supply

The City will initially use groundwater to supply development growth within the service area. It is anticipated that the MRWTP will be expanded in 2018, and the City will be able to purchase surface water treated by MID at the MRWTP for potable use. An agreement with MID will be required to secure this future surface water supply. MID water can be used only in the areas within the Primary Sphere that are also within the MID service area. Since MID water cannot be distributed for use outside of their service area, a small portion of groundwater supply will need to be available as development occurs outside the MID service area (see Figure 2-2).

Figure 3-1 shows the current and projected supply scenario. Figure 3-1 shows that as development grows within the service area, supplies will be made available as needed either through groundwater pumping or treated surface water. As agricultural groundwater demands decrease, groundwater supplies become available to meet urban demands.

Figure 3-1: Current and Projected Water Supplies to Meet Demand in the Service Area

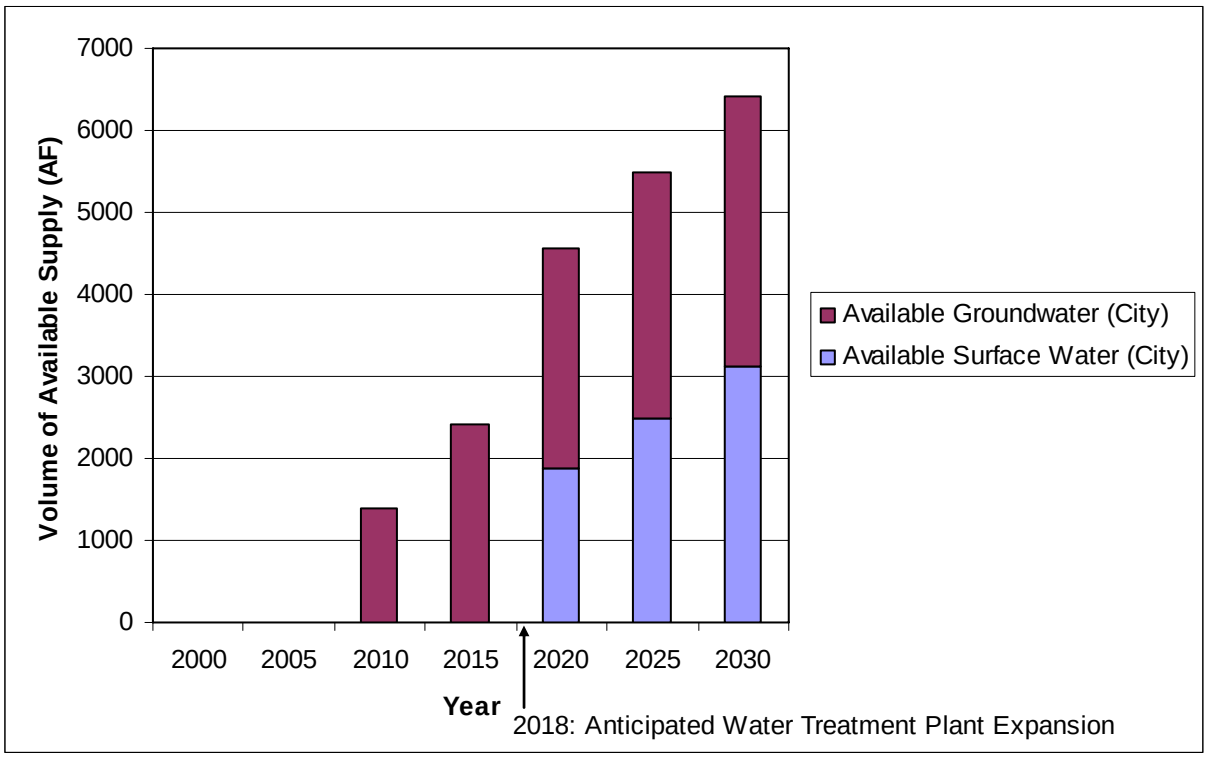


Table 3-1 summarizes the future available water supply scenario for the service area.

Table 3-1: Supply by Source Summary

Supply Type	2000 (AFY)	2005 (AFY)	2010 (AFY)	2015 (AFY)	2020 (AFY)	2025 (AFY)	2030 (AFY)
City Surface Water Supply Available (MID)	0	0	0	0	1873	2498	3122
City Groundwater Supply Available	0	0	1397	2405	2699	2993	3286
Total Available Supply	**0**	**0**	**1397**	**2405**	**4572**	**5490**	**6408**

3.4 Exchange or Transfer Opportunities

Waterford not only lies within an area with significant agricultural consumption, but is proximate to other service providers such as the Turlock Irrigation District (TID). Given these factors, exchange or transfer opportunities do exist. At this time, when there is currently no development in the service area, these opportunities are not necessary, but could be evaluated in the future.

3.5 Desalination

Due to a lack of proximate saline supplies and the prohibitive cost of conveyance, there are no opportunities for the development of desalinated water in the City. Therefore, the City will not utilize desalination as a source of supply available to meet its demands.

3.6 Wholesale Supplies

As the City begins supplying water to its service area, MID will be the sole wholesaler supplier. The projected MID supplies available from MID to the City are shown below in Table 3-2. These projected demands have been provided to MID.

Table 3-2: Available Wholesaler Supplies (Current and Projected) to the City (AFY)

Wholesaler	2005	2010	2015	2020	2025	2030
MID	0	0	0	1873	2498	3122

3.7 Summary of Supply

The City will supply new development within the service area with groundwater until 2018 when the anticipated expansion of the MRWTP is complete. At this time the City will supply the areas within the MID service area (approximately 86% of the service area) with treated surface water from the MRWTP. The areas outside of the MID service area will be supplied by the City with groundwater. At buildout, the City's projected available surface water and groundwater supplies will be approximately 3,122 AFY and 3,286 AFY, respectively. The total available supply at buildout is estimated to be 6,408 AFY within the service area.

Chapter 4 Water Demand

This chapter describes the urban water demands that will need to be met by the City's supplies described in Chapter 3. These demands are first described as current and future, and then broken down by land use type (agriculture, residential, industrial and commercial). A summary of all demands is given in Section 4.5.

4.1 Current Water Demand

Although not supplied by the City, current agricultural demands within the service area were developed as part of a Draft Technical Memorandum authored by RMC in October 2005 (RMC, 2005b). These calculations were used as a basis for determining potential supplies available to the City through MID, but are not considered to be a part of the service area urban demand.

The current urban water demand for the service area was estimated by determining the agricultural demand and then summing those demands with the current residential demands. Currently in the service area there are no demands for other land use types such as industrial, commercial, institutional, or recreational. This is also true for past demands (Year 2000). For the purposes of this UWMP, the current urban water demand within the service area is considered to be zero.

4.2 Future Water Demand Analysis

The following sections describe the methodologies used to estimate projected water demand for the planned urban water use sectors of residential, industrial, and commercial use. It is anticipated that development within River Pointe and the Primary Sphere will consist of low density residential, industrial, and commercial users. Once again, any previously existing irrigation and residential demands are excluded as they are not agricultural uses met by the City's urban supply system.

4.2.1 Residential Demand

Population Projections – Primary Sphere and River Pointe Development

Population projections were based on current population (estimated from MetroScan data) and projecting linearly to buildout. The population projections are shown in Table 2-4, in Section 2.4.2.

Water Demand Projections – Primary Sphere and River Pointe Development

Residential water demand was projected based on estimated development dwelling unit projections in Table 2-3.

New development in similar parts of the state with large houses on small yards with water efficient plumbing fixtures, have a water consumption of approximately 0.5 AFY/unit. In future revisions, actual consumption rates based on data collected between 2005 and 2010 will be used. Therefore, for this UWMP, dwelling unit estimates were multiplied by the assumed water consumption of 0.5 AFY/unit to develop total projected water demands.

Table 4-1 shows the resulting projected residential water demand from 2005 to 2030 in 5-year increments. The DWR 2005 UWMP Guidebook requests past water demand estimates. As previously stated, no water was served by the City prior to 2005, however there was a residential demand of 34 AFY and the water park (formerly located in the River Pointe area) demand of 321 AFY (355 AFY current total demand) in 2000. Demands in Table 4-1 include the water park for 2005. Following 2005, water park demands are reduced to zero.

Table 4-1: Residential Water Demand in Service Area – Current and Projected

	2000[1]	2005[2]	2010	2015	2020	2025	2030
Water Demand Total (AFY)	355	355	654	1273	1893	2512	3132
Water Demand within MID Service Area (AFY)	350	350	562	1095	1628	2161	2694
Water Demand outside of MID Service Area (AFY)	5	5	92	178	265	352	438

1. 2000 water demands were met by MID surface water and private wells.
2. Water park demands are included for 2000-2005, but are zero in subsequent years.

Table 4-1 also differentiates between demands within and outside of the MID service area, as shown in Figure 2-2. The majority of the City's service area is within the MID service area, with the exception of approximately 205 acres. This distinction is important when assessing supply alternatives to meet these demand areas because MID water cannot be used to supply demands outside of the MID service area (Chapter 3). Water demand was allocated proportionally according to total acreage. Of the total Waterford service area, 14% (205 acres out of 1,490 acres; RMC 2005) was outside MID service area, so the demand for this area was assumed to be 14% of the total residential demand for the entire Waterford service area at buildout.

4.2.2 Industrial and Commercial Demand

At buildout, 7% of the total acreage is expected to be industrial land use and 3% of the total acreage is expected to be commercial (RMC 2005). Currently there are no industrial or commercial water demands in the Primary Sphere or River Pointe areas. Therefore, only future industrial and commercial demands have been estimated.

Future Industrial and Commercial Demand

Industrial and commercial demands were estimated for buildout conditions. Once the industrial and commercial buildout demands were determined, a linear relationship was used to calculate demand in five year intervals from 2005-2030. The buildout demands were based on the estimated acreage of these land uses at buildout. For industrial and commercial uses, estimates of 126 acres and 48 acres, respectively, were used (RMC 2005).

Water use factors for industrial and commercial demands were based on estimates used for similar development areas (MWH 2002). For industrial demands, a water use of 2.65 AFY/acre (2,366 gallons per day (gpd/acre) was used (MWH 2002). For commercial demands, a water use factor of 2.91 AFY/acre (2,600 gpd/acre) was used (MWH 2002).

Calculated water demand for industrial and commercial values are shown in Table 4-2. For the year 2000, the demand is assumed to be equal to the current demand (0 AFY).

Table 4-2: Industrial and Commercial Water Demand – Current and Projected

	2000	2005	2010	2015	2020	2025	2030
Industrial (AFY)	0	0	67	134	200	267	334
Commercial (AFY)	0	0	28	56	84	112	140
Total (AFY)	0	0	95	190	284	379	474

4.3 Sales to Other Agencies

The City does not currently sell water to other agencies, nor does it anticipate sales to other agencies in the future.

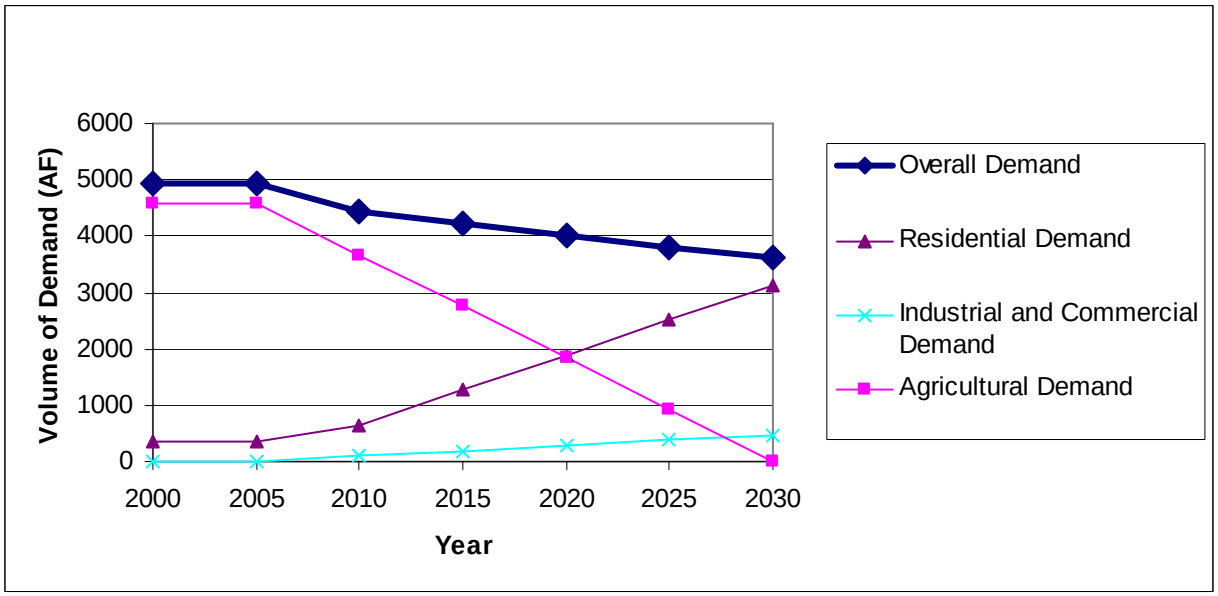
4.4 Other Water Uses

Other water uses including saline barriers, groundwater recharge, conjunctive use, raw water, and recycled water have not been identified for the service area at this time. Currently there is no water service in the service area therefore system losses are 0%. As infrastructure is constructed a system loss of 5% is expected and will be evaluated in future plan updates.

4.5 Future Water Demand Summary

The future water demands for agricultural, residential, industrial and commercial uses, as well as total demand for the service area are shown in Figure 4-1. Since the City is only responsible for residential, industrial and commercial demands, agricultural demands are zero within the City.

Figure 4-1: Total Projected Water Demand by Sector within the Service Area



Currently, there is a demand of 355 AFY for residential uses, and zero demand for industrial and commercial uses. These demands are expected to increase as agricultural land is converted to urban uses.

As development commences, MID will continue to supply the agricultural demands within its service area. For this reason, this UWMP only addresses demand generated by development (residential, industrial and commercial demand).

The future total urban water demand for the City to meet is shown in Figure 4-2 and Table 4-3. Since the current residential demand of 355 AFY is not supplied by the City, this demand is zero in the figure and table. The remaining demands not met by the City will be supplied by existing private wells.

Figure 4-2: Total Projected Water Demand to be met by City within the Service Area

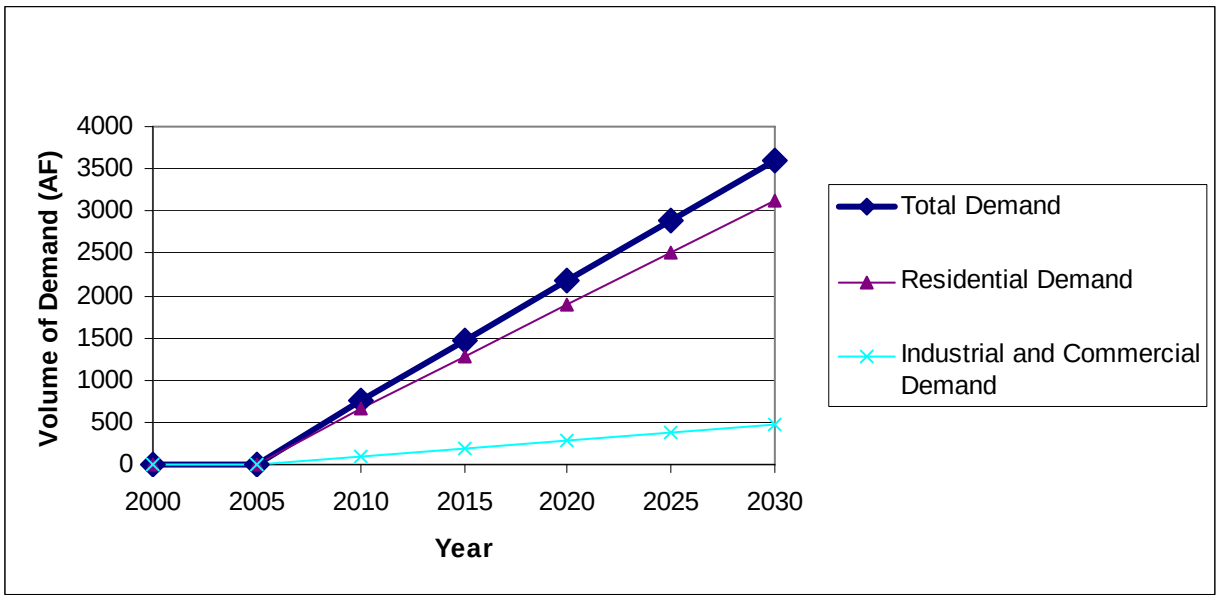


Table 4-3: Past, Current, and Future Water Demand Summary in Service Area

		Water Use Sectors	Single Family	Multi-Family	Comm-ercial[1]	Ind-ustrial[2]	Inst/Gov	Land-scape	Total
2000	Metered	Accounts	0	0	0	0	0	0	0
		Deliveries (AFY)	0	0	0	0	0	0	0
	Unmetered	Accounts	0	0	0	0	0	0	0
		Deliveries (AFY)	0	0	0	0	0	0	0
2005	Metered	Accounts	0	0	0	0	0	0	0
		Deliveries (AFY)	0	0	0	0	0	0	0
	Unmetered	Accounts	0	0	0	0	0	0	0
		Deliveries (AFY)	0	0	0	0	0	0	0
2010	Metered	Accounts	1308	0	11	1	0	0	1320
		Deliveries (AFY)	654	0	28	67	0	0	749
	Unmetered	Accounts	0	0	0	0	0	0	0
		Deliveries (AFY)	0	0	0	0	0	0	0
2015	Metered	Accounts	2546	0	21	2	0	0	2569
		Deliveries (AFY)	1273	0	56	134	0	0	1463
	Unmetered	Accounts	0	0	0	0	0	0	0
		Deliveries (AFY)	0	0	0	0	0	0	0

		Water Use Sectors	Single Family	Multi-Family	Comm-ercial[1]	Ind-ustrial[2]	Inst/Gov	Land-scape	Total
2020	Metered	Accounts	3786	0	32	3	0	0	3821
		Deliveries (AFY)	1893	0	84	200	0	0	2177
	Unmetered	Accounts	0	0	0	0	0	0	0
		Deliveries (AFY)	0	0	0	0	0	0	0
2025	Metered	Accounts	5024	0	42	3	0	0	5069
		Deliveries	2512	0	112	267	0	0	2891
	Unmetered	Accounts	0	0	0	0	0	0	0
		Deliveries (AFY)	0	0	0	0	0	0	0
2030	Metered	Accounts	6264	0	53	4	0	0	6321
		Deliveries (AFY)	3132	0	140	334	0	0	3606
	Unmetered	Accounts	0	0	0	0	0	0	0
		Deliveries (AFY)	0	0	0	0	0	0	0

1. The number of commercial accounts was based on 2.65 AFY (2,357 gpd) per account.
2. The number of industrial accounts was based on 83 AFY (73,554 gpd) per account.

In summary, it was determined that the current water demand was 34 AFY for the Primary Sphere, and 321 AFY for the River Pointe area. Residential areas (with a population of 204) make up 34 AFY, and the current water park demand makes up the other 321 AFY. At buildout, assumed to be in 2030, residential demand is projected to increase to 3,132 AFY for a population of 18,792 within the service area. Industrial and commercial demands are projected to increase from 0 AFY currently to 474 AFY in 2030. Therefore the total demand at buildout for all land uses (residential, industrial and commercial) is projected to be 3,606 AFY.

Chapter 5 Demand Management and Conservation

5.1 Demand Management Measures

Table 5-1 summarizes the Demand Management Measures (DMMs) discussed in this section.

Table 5-1: Demand Management Measures Implemented by the City

DMM Number	Demand Management Measure	Implemented or Planned
1	Water survey programs for single-family residential 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 for 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, an institutional accounts	✓
10	Wholesale agency programs	✓
11	Conservation pricing	✓
12	Water conservation coordinator	✓
13	Water waste prohibition	✓
14	Residential ultra-low-flush toilet replacement programs	✓

Each of the following DMMs includes a brief description of the proposed program, the implementation schedule through 2030, and methods that will be used to evaluate effectiveness.

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

Description

The City will implement a water survey program for residential units. The surveys will be available for single-family homes (there are no multiple-family homes planned for the service area). The surveys will be conducted by trained water surveyors who will evaluate the efficiency of home plumbing systems, water usage on the property both indoors and outdoors, and will offer water savings measures. The indoor survey will include checks for leaks at toilets, faucets, and meters, and flow-rate measurements from showerheads and toilets. The surveyor will also offer suggestions regarding the replacement of inefficient/high-flow devices. The outdoor survey will include inspection of the irrigation system and control timers, along with a review of the irrigation schedule.

The surveys will be conducted to target high-use accounts, performed by customer request. The City will allocate funds for approximately 2 surveys per year between 2005 and 2010.

Implementation Schedule

The City will start providing the opportunity for water surveys to residents as move into the service area.

Effectiveness Evaluation

The effectiveness of DMM 1 will be measured by monitoring the number of requested and completed surveys.

Conservation Savings

This DMM is not currently being implemented since no water is being served and therefore no actual expenditures and savings can be determined. Projected expenditures by the City are $140 for a single-family residence (CUWA 2004). The projected savings is approximately 14 gpd per survey at single-family residences (CUWA 2004), and therefore a total projected of savings of 28 gpd per year for the program. The savings decay rate is assumed to average approximately 15% per year due to equipment failure, customer use error, and customer turnover (CUWA 2004). The City will discuss the concept of working with other local water purveyors to streamline the program.

5.1.2 DMM 2: Residential Plumbing Retrofit

Description

The planned residences within the service area have not been constructed prior to 2005. The Energy Policy and Conservation Act passed by the State in 1992 requires the installation of ultra-low-flow toilets in all new homes. This relates to the plumbing retrofit in that there are zero (0) pre-1992 single- or multi-family homes. This DMM will be implemented as homes are constructed. The new homes to be constructed in the service area will be constructed with brand new plumbing so it is assumed that retrofits will not be necessary for some time.

Implementation Schedule

Concurrent with development, DMM 2 will be implemented as housing construction begins. Construction begins in mid 2005.

Effectiveness Evaluation

There are zero (0) pre-1992 single- or multiple-family homes in the annexation area. All homes planned for construction will use brand new plumbing.

Conservation Savings

There will be no water savings since there is no old plumbing to retrofit[2].

5.1.3 DMM 3: System Water Audits, Leak Detection, and Repair

Description

Water system audits, and leak detection and repair, will be implemented by the City. This measure will detect inconsistencies including leaks, faulty meters and unauthorized water users. Currently, there is no infrastructure upon which to conduct inspections. As infrastructure is constructed (approximately 27 miles planned – RMC 2005d), system water audits will begin taking place on an annual basis. Based on

[2] If there were retrofits, projected expenditures by the City are approximately $65.56 per toilet (CUWA). The projected savings is approximately 7 gpd per high-efficiency showerhead and aerators and a 23.6 gpd per ultra-low-flow toilet installed (CUWA 2004).

audit results, leak detection surveys will take place if water loss greater than 5% is identified. In addition to annual audits, users will be expected to report leaks so repairs can be made as necessary. Leakage is not expected to be significant, given that all infrastructure was constructed post-2004.

Implementation Schedule

The City will conduct annual water system audits and, as necessary, leak detection surveys. All water pipes are inspected for leaks upon completion of construction.

Effectiveness Evaluation

The effectiveness of this DMM will be measured by the reduction in loss rates within the water distribution system.

Conservation Savings

This DMM is not currently being implemented since no water is being served, and therefore no actual expenditures and savings can be determined. The benefit for this DMM is typically a reduction in system losses. Given the age of the infrastructure, the system loss rate is expected to be very low (<3%) so the opportunity for savings is very low.

5.1.4 DMM 4: Metering with Commodity Rates for all New Connections and Retrofit for Existing Connections

Description

As urban development occurs, the City will install meters on all water accounts. Within the service area there are currently no structures built that are connected to the City water supply system. At buildout in 2030, it is expected that the entire service area will be metered. Commodity rates will be established. As these rates have not yet been developed, it is assumed that they will be similar to other local water purveyor rates. Table 5-2 shows the City's projected water rates and charges.

Table 5-2: Estimated City Water Rates and Charges

Average Cost of Service Rates	FY 05/06	FY 10/11
Service Charges, $/Acct/Month		
Monthly Charge		
0.75-inch	$11.20	$12.90
1-inch	$17.40	$20.00
1.5-inch	$32.80	$37.80
2-inch	$51.40	$59.10
Quantity Charge, $/Ccf		
Unit Costs	$1.20	$1.33

Implementation Schedule

Meters will be installed concurrently with structures as they are built. Development began in 2005 and is expected to increase until full development buildout in 2030.

Effectiveness Evaluation

The effectiveness of this DMM can not be measured because no pre-metered data is available.

Conservation Savings

This DMM is currently being implemented with each new building. Actual expenditures are zero since the building owner pays for the meter. Savings cannot be calculated since no pre-meter data is available.

5.1.5 DMM 5: Large Landscape Conservation Programs and Incentives

Description

The service area does not currently have any open space areas to be served by the City. As the area is developed, any large landscape areas will be installed with dual pipes for irrigation to allow for the potential future use of recycled water. Although recycled water supplies are not currently available, the City anticipates its future development. In addition to dual plumbing, the City will conduct irrigation water audits on landscape areas greater than 5 acres every three years. Landscaping staff will be expected to report on and repair irrigation issues that will lead to increased water efficiency.

Implementation Schedule

As landscaped areas are developed, dual plumbing irrigation pipelines and fixtures will be installed. Irrigation audits will be conducted as described above in order to detect water use inefficiencies.

Effectiveness Evaluation

Given that there are no large landscape areas currently within the service area, no savings can be determined at this time. A reduction in water usage is expected in the future with the implementation of water audits, and recycled water utilization.

Conservation Savings

This DMM is not currently being implemented because no water is being served and therefore no actual expenditures and savings can be determined.

5.1.6 DMM 6: High-Efficiency Washing Machine Rebate Programs

Description

The City will offer a rebate for every high-efficiency washing machine installed in a residential home in the service area by the home owner. The rebate will be set at $25 per high-efficiency washing machine. A maximum of 40 rebates will be issued every year.

Implementation Schedule

The City will begin implementing the rebate program in 2008.

Effectiveness Evaluation

The number of rebates provided will measure the effectiveness of this DMM.

Conservation Savings

This DMM is not currently being implemented and therefore no actual expenditures and savings can be determined. Projected expenditures by the City are expected to be $1500 per year ($1000 for rebates, and $500 for administration).

5.1.7 DMM 7: Public Information Programs

Description

The City shall provide water conservation information through various forms of public outreach activities including bill inserts/newsletters/brochures, and/or bills showing water usage rates over time. The City will also to coordinate with other government agencies, industry, public interest groups, and media in these efforts.

Implementation Schedule

The City will provide public outreach concurrently with development in the service area.

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.

5.1.8 DMM 8: School Education Programs

Description

The purpose of this DMM is to promote water conservation awareness in schools, and to teach good water practices at a young age. This DMM is currently being implemented by other water purveyors in the area. Given that school locations have not been specified within the service area, the City will coordinate with other local water purveyors and the City of Waterford School System as appropriate.

Implementation Schedule

The City will coordinate with other local water purveyors to implement a program to promote water conservation awareness in Waterford schools. The frequency of school visits will be approximately one visit every two years.

Effectiveness Evaluation

Not applicable at this time.

Conservation Savings

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

5.1.9 DMM 9: Conservation Programs for Commercial, Industrial, an Institutional Accounts

Description

The City will implement a water conservation program for commercial and industrial users (no institutional areas are planned for the service area). The program will consist of surveys conducted by trained water surveyors who will evaluate water using apparatus and processes, and offer water savings measures. The customers receiving surveys will be contacted within a year of the survey for feedback on water savings from implementation of suggested improvements. The City will coordinate with local purveyors (such as the City of Modesto) on any existing programs within the City of Waterford area.

The surveys will be conducted to target high-use accounts, and will be performed at customer request. The City will allocate funds for approximately one survey per year to be conducted during the years of 2005-2010.

Implementation Schedule

The City will conduct conservation programs for commercial and industrial accounts immediately upon completion of construction of these types of facilities. Conservation programs for commercial and industrial accounts will continue indefinitely.

Effectiveness Evaluation

Historical water use data for these accounts will not be available and therefore effectiveness will be difficult to measure. The City will track the water use of these customers to compare to future evaluations.

Conservation Savings

This DMM is not currently being implemented since no water is being served, and therefore no actual expenditures and savings can be determined. Projected expenditures by the City are approximately $1,120 per survey (CUWA 2004). The projected savings on average is 0.25 AFY (CUWA 2004).

5.1.10 DMM 10: Wholesale Agency Programs

Description

The City will not be a wholesale water supplier and therefore will not be responsible for implementing these programs. The City's anticipated wholesaler, MID, is currently implementing these programs and will continue to implement wholesale agency programs as the City begins coordination to purchase water from MID for urban use. More information on MID's wholesale agency programs can be found in the MID's UWMP.

Implementation Schedule

MID is currently implementing these programs. As the City begins to purchase water from MID, anticipated in 2018, coordination with the programs will take place.

Effectiveness Evaluation

For details on effectiveness of MID's wholesale agency programs, refer to MID's UWMP.

Conservation Savings

For details regarding conservation savings through MID's wholesale agency programs, refer to MID's UWMP.

5.1.11 DMM 11: Conservation Pricing

Description

The City does not currently implement a tiered pricing program, however, the City is implementing a metering program, and as they collect water usage data they will be able to develop a tiered pricing program in the future.

Implementation Schedule

This DMM will be implemented as the City begins serving urban users.

Effectiveness Evaluation

Historical water use data for all accounts will not be available and therefore effectiveness will be difficult to measure. The City will track the total water use to compare to future evaluations.

Conservation Savings

This DMM is not currently being implemented since no water is being served, and therefore no actual expenditures and savings can be determined.

5.1.12 DMM 12: Water Conservation Coordinator

Description

A person within the City Water Department will be designated to coordinate the City's water conservation practices and programs. The City will utilize the Water Conservation Coordinator in a part-time position. The Coordinator will work with the City, customers, and other agencies to implement the DMMs specified in this plan for implementation.

Implementation Schedule

The Coordinator will ramp up to a 50% time schedule as development reaches buildout in the service area.

Effectiveness Evaluation

The effectiveness of this DMM will be evaluated through the success of implementing the various DMMs called out in this plan, and the development of effective working relationships between conservation programs.

Conservation Savings

Not applicable.

5.1.13 DMM 13: Water Waste Prohibition

Description

The purpose of this DMM is to discourage wasted water. The City will adopt several ordinances in order to discourage wasteful water practices. These ordinances will include the necessary mechanism for enforcement. The City's ordinances are expected to cover:

- Water waste
- Faulty fixtures
- Landscaping (irrigation and sprinkling)
- Construction uses
- Dual Plumbing for recycled water (per Section 8.1)
- Additional prohibited uses during water shortage conditions
    - Washing outdoor surfaces
    - Outdoor ornamental fountains
    - Water use when alternate source available

- External washing of trailers, mobile homes, or home exteriors
- Indiscriminate running of water or washing

Implementation Schedule

This DMM will be implemented as ordinances are approved.

Effectiveness Evaluation

The effectiveness of this DMM will be monitored by yearly comparisons showing an overall decrease in the percentage of offenders.

Conservation Savings

A methodology has not been developed to quantify the savings from this qualitative DMM. However, this DMM is considered an essential part in an overall conservation strategy.

5.1.14 DMM 14: Residential Ultra-Low-Flush Toilet Replacement Programs

Description

The State passed legislation requiring all toilets sold and installed after January 1, 1994 to be ultra-low flushing toilets with no more than 1.6 gallons per flush. Since the service area is in its initial phase of development, all homes will be constructed with ultra-low flush toilets to implement this DMM.

Implementation Schedule

Concurrent with development, this DMM will be implemented as housing construction begins. Construction will begin in mid 2005.

Effectiveness Evaluation

There are zero (0) pre-1994 homes in the annexation area served by the City. All homes planned for the area will be constructed with ultra-low flush toilets; therefore it will not be possible to evaluate the effectiveness of the retrofit, since none could occur.

Conservation Savings

Since no toilet replacements are possible, it is not possible to calculate water savings.

5.2 Planned Supply Projects

Two wells are under construction in the River Pointe area.

Table 5-3: Projected Supply for Planned Projects

	2005	2010	2015	2020	2025	2030
Rate of Supply from two new River Pointe area wells[1] (mgd)	0	1.728	1.728	1.728	1.728	1.728

It is assumed that the wells will operate 24 hours/day during the summer, and each well is designed to pump at 1,200 gallons per minute (gpm). During the winter, either the wells will operate at a decreased production rate, or the number of operating wells will be reduced.

Other wells are planned for the service area, but are not under design at this time.

Chapter 6 Water Supply Reliability

6.1 Climate: Reliability and Vulnerability

The City will utilize surface water from MID and groundwater to meet its future water demands. Seasonal and climactic variations may impact the available supply within the City. The current agricultural demand in the service area directly supplied by MID is greater than the expected future urban demand that the City will need to supply using MID supplies. Hence, even in the event of a multiple year drought, the City is not expected to be vulnerable to water shortages. Groundwater will also be supplied by the City, and is a significantly more reliable source in times of drought.

6.2 Projected Water Supplies

Table 6-1 summarizes the projected water supplies based on groundwater and surface water sources at buildout. These estimates are further discussed in this section. The City will be installing wells to provide groundwater in lieu of surface water until 2018 when the anticipated MRWTP expansion is completed.

Table 6-1 Supply Reliability at Buildout Year 2030(AFY)

		Multiple Dry Water Years		
Average/Normal Water Year	Single Dry[3] Year	Year 1	Year 2	Year 3
6,408	6,007	6,275	6,141	6,007
% of Normal Year Supply	94%	98%	96%	94%

6.2.1 Basis for Average, Single and Multiple Dry Water Year Data

The available supply for a normal year given in Table 6-1 was calculated by adding the current MID supplies being delivered to the service area to the current and future groundwater supplies that will be developed, then subtracting supplies commited to agricultural or prior residential uses (slowly being phased out). The basis of the water year data, is shown in Table 6-2, below.

[3] Based on a 3-year multiple dry year scenario the single dry year estimate in Table 6-1 assumes the maximum supply cutback of 94% (Year 3). In the following chapters, the single dry year scenario is based on a 5-year multiple dry year scenario.

Table 6-2 Basis of Water Year Data

Water Year Type	MID Surface Water	Private Groundwater	City Groundwater
Average/Normal Water Year	Current supply to area – assumption that this supply will always be available to the service area	Current estimate for agricultural lands outside of MID, and other users within the service area	City will install wells to supply groundwater needed to meet estimated demand
Single Dry Water Year	Assumes maximum reduction percentage (21.4%). Same as third year in 3-year cutback	No reductions in groundwater, based on average/normal water year	City will install wells to supply groundwater needed to meet estimated demand. There is no projected reduction in groundwater, based on average/normal water year. Based on available supply surpassing demand, groundwater production will not be increased to make up for surface water reductions.
Multiple Dry Water Years	Cutback estimates based on MID 2000 UWMP – historical drought year cutbacks.	No reductions in groundwater, based on average/normal water year	City will install wells to supply groundwater needed to meet estimated demand. There is no projected reduction in groundwater, based on average/normal water year. Based on available supply surpassing demand, groundwater production will not be increased to make up for surface water reductions.

It is assumed that MID water allotments would simply transfer from agricultual to urban uses through the City as development occurs until buildout in 2030. Given that this surface supply will be consistently available, and that the City will install groundwater wells, in addition to the private wells currently operating in the area, the available supply to the City will increase as agricultural lands transfer to urban uses. While demands may decrease with the implementation of conservation measures, this volume of supply is not expected to decrease in a single dry year.

No data is available for the City for previous drought reductions since the City has never historically supplied water. For this reason, multiple dry year reduction estimates are based on a percentage decrease experienced by the City of Modesto from MID supplies in the historic multiple dry year sequence (1989-1991). Modesto based its shortages on the 9-inch cutback it received from its MID allotment of 42-inches (based on Modesto's Treatment and Delvery Agreement) in the third year of a three-year drought. To estimate a 5-year drought from this data, shortages were equally porportioned for each year of a 5-year drought based on the 9-inch cutback (9/42 = 21.4% total cutback, or 1.8% additional cutback per year). Therefore, the first year cutback would be 1.8/42 or 4.3%. The second year would require an 8.6% cutback, the third year a 12.9% cutback, the fourth year a 17.1% cutback, and the fifth year a 21.4% cutback in surface water supply (Modesto 2000). When factoring in groundwater supplies which are

expected to remain constant in dry years, the actual total supply cutbacks experienced are less, as shown in Table 6-1.

The City's single-dry year supply estimate assumes the maximum supply cutback of 21.4% in a single-year. No supply inconsistencies are anticipated and the demand in the dry year scenario is not expected to change significantly. The single-dry and multiple-dry year estimates are based on previous surface water cutback data from the Joint City of Modesto and MID 2000 UWMP.

6.3 Supply Inconsistencies

The Joint City of Modesto and MID 2000 UWMP showed percentage cutbacks outlined in Modesto's Treatment and Delivery Agreement with MID, based on the 1989-1992 drought years. These same percentage cutbacks are assumed to apply to MID's supply to the City of Waterford. Currently, MID supplies 4,591 AFY of water within the Primary Sphere, primarily for agricultural purposes. As these agricultural areas are developed into urban residential areas, the overall water demand is expected to decrease (residential users are expected to use less water than agricultural users). Therefore, at buildout, the City will be purchasing less water from MID than MID is currently directly supplying to the service area. For this reason, the MID supply is expected to be 100% of normal years, and although there is a percentage cutback in single-dry and multiple-dry year scenarios, the supply will still adequately meet projected urban demands, as shown in Table 6-3.

Table 6-3 Wholesale Supply Reliability (% of Normal AFY)

		Multiple Dry Water Years		
Wholesaler Sources	**Single Dry Year**	**Year 1**	**Year 2**	**Year 3**
MID Surface Water	87%	96%	91%	87%

While a percentage decrease of MID supply is shown above, it is important to note that the City will need less MID water than is currently being supplied (residential areas use slightly less water than agricultural areas). This coupled with implementation of DMM's and adoption of the Water Shortage Contingency Plan (detailed in Chapter 10) result in little to no concern if supply inconsistencies do occur.

Table 6-4 details the factors resulting in inconsistent wholesaler supply. MID is the only wholesaler identified for the City. Only climatic variation has been identified as a factor capable of impacting this surface water supply.

Table 6-4 Factors Resulting in Inconsistency of Wholesaler's Supply

Name of Supply	Legal	Environmental	Water Quality	Climactic
MID Surface Water	None identified	None identified	None identified	Potential for drought year cutbacks, maximum cutback (21.4%).

Legal issues, including place of use and water rights issues, are not projected to limit supply reliability for the City in future years. The City anticipates purchasing surface water from MID beginning in 2018. MID is a holder of pre-1914 water rights. In addition, the City anticipates pumping a minimal amount of

groundwater from the Modesto groundwater subbasin, which is not adjudicated and therefore has no legal limit on the quantity of groundwater that may be pumped.

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. 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.

Water quality impacts are not expected to reduce available supply to the City. This is discussed in greater detail in Chapter 7.

In order to relieve pressure in drought years, the City will adhere to the DMMs listed in Chapter 5, and will implement conservation measures consistent with its Water Shortage Contingency Plan.

Chapter 7 Water Quality Impacts on Reliability

7.1 Water Quality Impacts

No water quality issues have been identified or reported for surface water supply sources discussed in this UWMP. The neighboring City of Modesto has identified localized groundwater quality issues, including issues at one of its service wells within Waterford. Well No. 303 in Waterford has been out of service due to the presence of Dibromochloropropane (DBCP), a nematicide[4]. This is considered to be an isolated occurrence, with the other five service wells within Waterford currently operating under normal conditions. In general, groundwater in the Modesto Subbasin is reported as having good quality, and localized groundwater issues are the result of constituents such as total dissolved solids, nitrates, radionuclides, pesticides, and volatile organic compounds (STRGBA 2005). In addition to these constituents, point-source issues such as gas and solvent leaks and spills are present, but are not expected to impact the City's supply.

Waterford's main strategy to insure reliability against the possibility of having supply problems due to groundwater quality is to have more wells than necessary to meet demand. Therefore, a well could be taken out of service without impacting the overall quality of water delivered.

Given the localized nature of groundwater quality issues, the availability of standby wells, and the current and project supplies listed in Chapter 9 are not expected to change based on insufficient groundwater quality.

[4] TM: Hydraulic Evaluation of the City of Waterford Water System. West Yost & Associates, November 3, 2004.

Chapter 8 Wastewater and Recycled Water

8.1 Coordination

The City has a recycled water supply available at this time, but does not have treatment infrastructure in place to treat the wastewater to Title 22 Standards. The City is willing to commit to requiring dual-plumbing within any newly developed, large, open space area to accommodate the potential for future use of recycled water for irrigation.

8.2 Wastewater Quantity, Quality and Current Issues

The City currently operates and maintains a wastewater collection, treatment and disposal system permitted for 1.0 mgd. The existing wastewater treatment system is a "one-pass" biological treatment system consisting of concrete-lined-aerated basins followed by percolation for disposal. Current average flow to the wastewater treatment plant (WWTP) is approximately 0.585 mgd (Wastewater Master Plan, DJH Engineering, February 2005) generated by a current population of approximately 7,800. Per capita wastewater contribution to the WWTP is approximately 75 gallons per capita per day (gpcd). The existing system reduces the strength of the wastewater and meets current wastewater discharge requirements. However, the system does not meet secondary treatment standards, nor will it meet future discharge standards, if not upgraded.

In anticipation of future development in the Primary Sphere and River Pointe area, the City is also currently in the process of evaluating its wastewater system for the collection, treatment, and discharge of projected increases in wastewater production. These increases are shown in Table 8-1.

Table 8-1 Wastewater Collection and Treatment (AFY)[1]

Type of Wastewater	2005	2010	2015	2020	2025	2030
Volume of wastewater collected and treated in service area (AFY)	656	838	1,021	1,203	1,386	1,569
Volume that meets recycled water standard	0	0	0	0	0	0

1. Volume estimates include wastewater generated in the City of Waterford outside the Water Department's service area.

8.3 Wastewater Disposal and Recycled Water Uses

Currently, the WWTP utilizes percolation basins for wastewater disposal. The basins have a capacity of 1 mgd; however, the capacity could be increased by constructing two new basins east of the current basins (DJH 2005).

Table 8-2 Disposal of Wastewater (Non-Recycled AFY)

Method of Disposal	Treatment Level	2005	2010	2015	2020	2025	2030
Percolation	Meets current RWQCB standards	656	838	1,021	1,203	1,386	1,569

As stated, the City does not currently have a wastewater treatment system capable of treating wastewater for reuse. Therefore, no recycled water is generated, and no recycled water is used within the service area. However, the City is willing to require dual-plumbing within any newly developed, large, open space area for the potential future use of recycled water.

8.4 Potential and Projected Use, Optimization Plan with Incentives

Currently, there is no recycled water being used in the service area. The City does not currently have a wastewater treatment system capable of treating wastewater for reuse.

The water recycling options are very limited due to the location of the WWTP. The treatment processes required for recycled water production and use will require a higher level of treatment than is currently provided by the WWTP (DJH 2005), and therefore, the projected future use of recycled water is 0 AFY through 2030.

To encourage the use of recycled water, the City will incorporate dual plumbing fixtures in large open space areas for the future potential use. The results of this action will be 0 AFY recycled water use until recycled water is available to the City. The City does not currently have a recycled water optimization plan and other incentives have not been identified for the 2005 UWMP, but may be evaluated in the following plan updates.

Chapter 9 Supply and Demand Comparison

The following sections compare available supplies with current and projected demands. The purpose of this comparison is to evaluate the supplies relative to the demand to determine whether there will be supply deficiencies in the future. No supply deficiencies have been noted for the City's supplies through 2030. While available supplies are shown, the City will only treat and/or pump the volume of water necessary to meet demands.

9.1 Normal Year

9.1.1 Supply

Comparison of projected normal year water supply, and the projected normal year water demand over the next 25 years, in 5-year increments are shown in Table 9-1 below.

Table 9-1 Projected Normal Year Water Supply (AFY)

Available Supply	2005	2010	2015	2020	2025	2030
Surface Water	0	0	0	1873	2498	3122
Groundwater	0	1397	2405	2699	2993	3286
Total Supplies	0	1397	2405	4572	5490	6408

Currently, there is no supply available to the City. MID services agricultural areas with 3,122 AFY in the service area. As these areas are transferred to urban use, the MID surface water and groundwater supplies will also be made available to the City for urban supply.

9.1.2 Demand

Normal year water demands are shown in Table 9-2.

Table 9-2 Projected Normal Year Water Demand (AFY)

Demand	2005	2010	2015	2020	2025	2030
Total Demand on the City	0	748	1463	2177	2891	3606

These estimates are discussed in greater detail in Chapter 4. Because the City is in its initial phase of development, and no water is currently being supplied, the demand for 2005 is zero.

9.1.3 Comparison

Normal year supplies and demands are compared in Table 9-3 to evaluate deficit.

Table 9-3 Projected Supply and Demand Comparison (AFY)

	2005	2010	2015	2020	2025	2030
Available Supply Totals	0	1397	2405	4572	5490	6408
Demand Totals	0	748	1463	2177	2891	3606
Deficit	None	None	None	None	None	None

As shown, the available supplies are more than sufficient to meet current and projected demands. As previously mentioned, the City will only use a portion of its available supply water to meet demands.

9.2 Single and Multiple Dry Years

Table 9-4 projects single and multiple dry year supplies and compares the projected supply and demand. As discussed in Chapter 6, single and multiple dry year reductions on MID surface supplies, or "cutbacks" are based on actual reduction data from Modesto during the 1989-1992 drought. Groundwater supplies are not expected to be impacted by drought conditions. The cutback percentages are 4.3% for the first year, 8.6% for the second year, 12.9% for the third year, 17.1% for the fourth year, and 21.4% for the fifth year and single-dry year. The reduction objective for demand is 10-20% when there is a supply shortage between 10% - 25% (demand reduction is shown as an average 15% in Table 9-4). This corresponds to the third through fifth year of a 5-year drought sequence.

The 2005 multiple dry year demands in Table 9-4 were estimated on a yearly basis because no demands exist in 2005, however they could develop as soon as 2006. After 2010, demands are only estimated at 5-year intervals. For the 2005 - 2015 period all supplies are groundwater and therefore do not decrease in a dry year sequence.

Table 9-4 Projected Available Supply, Demand, and Comparison during Single and Multiple Dry Year Periods (AFY)

Year	Scenario	Demand (AFY)	Available Supply (AFY)	Supply Deficit (AFY)
2005	Normal	0*	0*	None
	Single Dry	0*	0*	None
	Multiple Dry			
	2006	150	279	None
	2007	299	559	None
	2008	382	838	None
	2009	509	1117	None
	2010	636	1397	None
2010	Normal	748	1397	None
	Single Dry	636	1397	None
	Multiple Dry			
	2011	748	1397	None
	2012	748	1397	None
	2013	636	1397	None
	2014	636	1397	None
	2015	636	1397	None

Year	Scenario	Demand (AFY)	Available Supply (AFY)	Supply Deficit (AFY)
2015	Normal	1463	2405	None
	Single Dry	1243	2405	None
	Multiple Dry			
	2016	1463	2405	None
	2017	1463	2405	None
	2018	1243	2405	None
	2019	1243	2405	None
	2020	1243	2405	None
2020	Normal	2177	4572	None
	Single Dry	1850	4171	None
	Multiple Dry			
	2021	2177	4492	None
	2022	2177	4411	None
	2023	1850	4331	None
	2024	1850	4251	None
	2025	1850	4171	None
2025	Normal	2891	5490	None
	Single Dry	2458	4955	None
	Multiple Dry			
	2026	2891	5383	None
	2027	2891	5276	None
	2028	2458	5169	None
	2029	2458	5062	None
	2030	2458	4955	None
2030	Normal	3606	6408	None
	Single Dry	3065	5739	None
	Multiple Dry			
	2031	3606	6275	None
	2032	3606	6141	None
	2033	3065	6007	None
	2034	3065	5873	None
	2035	3065	5739	None

*The City will not be serving water until after 2005. Groundwater is served all years outside of the MID service area.

When compared with demands, the available supply even in the fifth year of a 5-year drought is estimated to be more than sufficient to meet projected demands. Therefore, no supply deficits for the City are anticipated. In the event of an unforeseen deficit, the City is prepared to meet demands with the implementation of DMMs (Chapter 5), and the Water Shortage Contingency Plan (Chapter 10).

Chapter 10 Water Shortage Contingency Plan

The Primary Sphere and River Pointe areas are in their initial stages of development and therefore the City was unable to prepare a water shortage contingency plan based on an existing supply system. In order to develop this 2005 Water Shortage Contingency Plan, the City has drawn from the City of Modesto's Water Shortage Contingency Plan outlined in the Joint City of Modesto and MID 2000 UWMP to serve as the draft plan. Because there is no existing supply system, it is expected that the following plan could be revised as the City begins and expands water service. In revisions will be documented in subsequent updates to this 2005 UWMP.

10.1 Stages of Action

Table 10-1 identifies the stages of action that the City will take in response to a water supply shortage. The three stages range from 10-50% reduction in water demands from baseline with Stage 3 as the most severe. The requested consumer actions for each stage are discussed in detail in Section 10.4.

Table 10-1: Water Shortage Stages of Action

Stage	Description	Reduction Objective (from Baseline)
1	Minor Shortage Potential	10-20% reduction in water demands
2	Moderate Shortage Potential	20-35% reduction in water demands
3	Critical Shortage Potential	35-50% reduction in water demands

10.1.1 Triggering Mechanisms

The City will identify a person responsible for implementing the contingency plan including declaring stages of action. The City of Modesto developed phasing criteria in their Water Shortage Contingency Plan to aid in the declaration of a particular stage of action. This will be used as a guideline by the City of Waterford and is shown in Table 10-2.

Table 10-2: Phasing Criteria for Water Shortage Stage Determination

Stage	Water Supply Conditions
1	• Below average rainfall in the previous 12-24 months • 10% or more of 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
2	• Below average rainfall in the previous 24-36 months • 10% or more of municipal wells out of service due to noncompliance with drinking water standards • Irrigation allotments by local irrigation districts reduced by 25% • Warm weather patterns typical of summer months • Prolonged periods of low water pressure
3	• Below average rainfall in the previous 24-48 months • 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 • Prolonged periods of low water pressure

10.2 Estimate of Minimum Supply for the Next Three Years

The driest 3-year period of record occurred during the drought years of 1989 to 1992. Table 10-3 shows estimates for the minimum supply of water for the next three years based on groundwater and surface water sources. These estimates are discussed below. The City will be installing wells to provide groundwater in lieu of surface water until 2018 when the completion of a MRWTP expansion is anticipated. The addition of groundwater wells will vary the available supply over time. The current demand on the City is zero; but this demand will increase to 748 AFY in 2010. Therefore, as Table 10-3 shows, the minimum supply exceeds current projected demands for the next three years.

Table 10-3 Minimum Supply by Source for the Next Three Years (AFY)

			Multiple Dry Water Years		
	Average/Normal Water Year – 2005	Single Dry Year	Year 1	Year 2	Year 3
Supply (SW)	0	0	0	0	0
Supply (GW)	0	0	279	559	838
Demand	0	0	150	299	382

10.3 Catastrophic Supply Interruption Plan

Because the City of Waterford Water Department is in its inception, the Catastrophic Supply Interruption Plan has not yet been developed, and will therefore be presented in a future UWMP. Similar to Modesto's manual, the City will develop an Emergency Operations Manual (EOM). This manual will present actions and procedures to be implemented during, or immediately after a catastrophic event occurs (such as a

regional power outage, earthquake, flood, etc.). The Modesto EOM manual currently includes the immediate establishment of an Emergency Operations Center to direct actions pertaining to an emergency water supply, and also to announce reduction orders.

10.4 Prohibitions, Penalties and Consumption Reduction

10.4.1 Mandatory Prohibitions on Water Wasting

When a water shortage stage has been announced, the City will request a series of consumer actions; some voluntary, others mandatory. Table 10-4 below lists the requested consumer actions during a supply shortage[5]. The City will utilize Modesto's approach for this 2005 UWMP, and may further refine requested actions in future UWMP updates.

Table 10-4: Requested Consumer Actions by Stage

Stage	Requested Consumer Action
1	• Outdoor water use prohibited daily from noon to 7pm (service area rotation schedule) • Car washing subject to above-cited limitation with use of positive shutoff nozzle • Hosing concrete areas, building exteriors, etc., may only be done with a City-issued permit and only with the use of a positive shutoff nozzle • Water leaks, once identified, must be repaired within 24 hours • Restaurants encouraged to serve water only on request • New landscaping to comply with existing and future landscape ordinances • Water meter installation on all new single-family homes
2	• Outdoor water use prohibited daily from 9am to 7pm (implemented through service area rotation schedule) • No watering of front yards except for trees and shrubs by hand, and vegetation maintained through drip irrigation. Back yard watering subject to above-cited limitations • Car washing subject to above-cited limitations with use of a positive shutoff nozzle • Hosing concrete areas, building exteriors, etc., is prohibited except for health and safety concerns • Water leaks, once identified, must be repaired within 24 hours • Restaurants prohibited from serving water except upon request • New landscaping to comply with existing and future landscape ordinances • Mandatory retrofit of low flow showerheads in homes when building remodeling occurs • No use of outdoor fountains except for maintenance purposes • Water meter installation on all new single-family homes • Creation of community-based task force to deal with possible implementation of stage 3 restrictions

[5] Based on requested consumer actions outlined in the Joint City of Modesto and MID 2000 UWMP.

Stage	Requested Consumer Action
3	• 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

10.4.2 Excessive Use Penalties

Penalties will be implemented during a water shortage stage. These penalties will be monetary in the form of administrative fees, or fines. The fines will be assessed by the number of violations a customer accrues, i.e. the first violation will be a warning, the second violation will be a fine, and thereafter fines will increase for consecutive violations (within a 12-month period from the issue of a warning). Table 10-5 lists penalties by stage, below.

Table 10-5: Penalties for Excessive Water Use by Stage

Stage	Violation No.	Penalty
1	1	Written warning
	2	$50 Administration fee
	3	$200 Administration fee
	3+	$250 Administration fee
2	1	Written warning
	2	$150 Administration fee
	3	$200 Administration fee
	3+	$300 Administration fee
3	1	Written warning
	2	$200 Administration fee
	3	$300 Administration fee
	3+	$400 Administration fee

10.5 Analysis of Revenue Impacts of Reduced Sales during Shortages

This analysis was completed based on assumed rates used by other local water purveyors. It was assumed that the bulk of water use will be at a flat rate and therefore even under cutbacks the potential revenue loss is minimal. Such loss could be covered easily with normal system financial reserves or a temporary rate surcharge.

10.6 Draft Ordinance and Use Monitoring Procedure

10.6.1 Draft Ordinance

The City will adopt the Water Shortage Contingency Plan concurrently as part of adopting this 2005 UWMP. Prior to adoption, the City will make a draft Water Shortage Contingency Plan available for public review as part of the draft 2005 UWMP.

10.6.2 Water Use Monitoring Procedure

The City's water system has not yet been constructed. As urban development within the service area occurs, the City will construct water supply infrastructure to supply these areas. As the City develops its water infrastructure, flow monitoring devices will be integrated into a Systems Control and Data Acquisition (SCADA) system maintained by the City. The City will be able to monitor trends and analyze reductions.

Chapter 11 Provisions, Adoption, and Implementation

The following items will be addressed during the finalization of this Draft 2005 UWMP.

11.1 Provision of Water Service Reliability Section

The Final 2005 UWMP will be provided to the County within 60 days of submission to DWR. The areas which are served within the City of Waterford 2005 UWMP are not yet developed, and therefore the Final UWMP will only need to be delivered to the County.

11.2 Participation and Plan Adoption

Participation was discussed in Sections 1.4 and 1.5 of this Draft UWMP. The Final UWMP to be submitted to DWR will include a copy of the adoption resolution anticipated to be passed by the City of Waterford Board of Directors in April 2006. Along with a copy of the resolution, the Final UWMP will include proof of the notification for and completion of a public meeting, and proof of distribution to the County of within the allotted 30 days after adoption. These documents will be attached to the Final 2005 UWMP as part of Appendix A

11.3 Implementation

This is the first UWMP created by the City of Waterford. Future updates to the City of Waterford's 2005 UWMP will include a section on implementation which reviews the previous plan's DMMs and recycled water plan, and discusses the status and effectiveness of implemented and/or planned practices.

Chapter 12 References

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