

# CHAPTER 9. WATER SHORTAGE CONTINGENCY PLAN

*10632. The plan shall provide an urban water shortage contingency plan analysis...*

This chapter describes the City's Water Shortage Contingency Plan, including the following:

- Development and update of the City's Water Shortage Contingency Plan,
- Water conservation stages for water supply reductions up to 50 percent,
- Minimum water supply for the next three years based on the driest three-year historic period for the City,
- Actions to be taken during catastrophic interruption of water supplies,
- Mandatory prohibitions and consumption reduction methods,
- Penalties and charges for excessive use,
- Discussion of potential revenue and expenditure impacts,
- Draft Water Shortage Contingency Plan resolution, and
- Mechanisms for determining actual reductions in water use.

Appendix J of this UWMP contains a draft resolution which can be used to implement one or more stages of this Water Shortage Contingency Plan.

## PLAN DEVELOPMENT

### Previous Planning Efforts

Since 1989, the City has developed and adopted two plans in response to actual and potential water shortages:

- Drought Contingency Plan (adopted in 1989), and
- Water Shortage Contingency Plan (adopted in 1994).

The development of each of these plans is described below.

### Drought Contingency Plan

During the 1987 to 1992 California drought, the City experienced declining groundwater levels, requiring approximately 18 percent of the pumps in the City's wells to be lowered. Furthermore, the loss of about 20 percent of the total production capacity from wells out of service due to contaminants resulted in reduced water system pressures during peak demand periods. As a result, in June 1989, the City adopted a resolution declaring that an emergency existed which created an immediate threat of reduction in system pressures below the level needed to maintain minimum fire flows and meet domestic consumption needs.

The resolution implemented a Drought Contingency Plan, which established extraordinary measures to reduce water use. These emergency measures included immediate restrictions on outdoor watering days and hours. In 1990, these emergency measures were made permanent on a year-round basis and were the origin of the City's current summer and winter watering schedules. The measures, along with subsequent additions and updates, were incorporated into the City's Municipal Code (Section 6-520 Wastage of Water) and are discussed later in this chapter.

### 1994 Water Shortage Contingency Plan

The City's original Water Shortage Contingency Plan was developed by City staff in 1993 in response to the 1991 California Assembly Bill 11X (AB 11X) which amended the California Water Code and mandated that every urban water supplier providing municipal water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually develop a Water Shortage Contingency Plan. A public hearing was held on December 14, 1993 and the City's original Water Shortage Contingency Plan was adopted by City Council in January 1994.

Since the cities of Fresno and Clovis share the same groundwater aquifer, the development of the City's original Water Shortage Contingency Plan was coordinated with the City of Clovis. Also, the City's Emergency Response Plan was coordinated with the Fresno County Office of Emergency Services (OES), and water shortage planning was incorporated into the Fresno County Disaster Plan<sup>1</sup> (see further discussion later in this chapter under Planning for Catastrophic Water Supply Interruption).

### **Current Planning Effort**

This updated Water Shortage Contingency Plan, now a part of the City's UWMP, is based on the City's 1994 Water Shortage Contingency Plan. The overall structure of the plan has remained essentially the same, and includes updates and revisions to reflect the operational and policy changes which have occurred within the City's water system since 1994. In particular, the City now has a mutual aid water system agreement in place with the City of Clovis which includes the provision of two future interties between the Fresno and Clovis water systems for use by either or both agencies during emergencies.

### **STAGES OF ACTION FOR WATER USE REDUCTION**

*10632 (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.*

### **Water Use Reduction Plan**

One of the key elements of the Water Shortage Contingency Plan is a staged Water Use Reduction Plan (Reduction Plan). The City's 1994 Water Shortage Contingency Plan had a

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<sup>1</sup> Source: City of Fresno Water Shortage Contingency Plan, January 1994.

three-stage Reduction Plan. For this updated Water Shortage Contingency Plan, four stages have been established to provide for increased flexibility to address water supply shortage conditions of up to 50 percent (see Table 9-1).

**Table 9-1. City of Fresno Water Supply Shortage Stages and Conditions (DWR Table 23)**

Stage	Shortage Condition	Demand Reduction Goal	Program Type
1	Minimal Shortage: Up to 10 percent	10 percent	Voluntary
2	Moderate Shortage: 10 to 25 percent	25 percent	Mandatory
3	Severe Shortage: 25 to 35 percent	35 percent	Mandatory
4	Critical Shortage: 35 to 50 percent	50 percent	Mandatory

### Water Use Reduction Plan Triggers

Each stage of the Reduction Plan is generally triggered by a water shortage condition. The City has a legal responsibility to provide for the health and safety water needs of the community. To minimize the social and economic impact of water shortages, the City will manage its water supplies prudently.

It should be noted that a water shortage may trigger any stage of the Reduction Plan at any time, and that the City will determine the most appropriate stage to implement based on the actual conditions at the time of the shortage/emergency. The conditions that may trigger specific stages of the City’s Reduction Plan are shown in Table 9-2. Water reduction stages may be triggered by any one or a combination of the listed conditions if they result in a loss, or impending loss, of water supply or production capacity. Stage 1 of the Reduction Plan will be triggered when it is anticipated that there will be up to a 10 percent reduction in the City’s water supply or production capacity or a key Stage 1 trigger occurs. Under this stage, the City will request customers to voluntarily reduce water consumption by 10 percent, and will enact additional specific water use restrictions (see discussion below and draft resolution in Appendix J). Subsequent Reduction Plan stages will be implemented if additional water supply or production capacity reductions occur and will include enactment of additional specific water use restrictions (see discussion below). Successive stages of the Reduction Plan will be declared only after exhausting efforts to make a prior stage successful. In general, Stage 2 will be triggered by a reduction of water supply or production capacity up to 25 percent (or a key Stage 2 trigger occurs); Stage 3 will be triggered by a reduction of water supply or production capacity up to 35 percent (or a key Stage 3 trigger occurs); and Stage 4 will be triggered by a reduction of water supplies up to 50 percent (or a key Stage 4 trigger occurs), and will include enactment of additional specific water use restrictions (see discussion below).

In some cases it may be necessary for the City to immediately implement an advanced stage of the Reduction Plan. This may occur during a natural disaster or when the health and safety of the persons within the City’s water service area are jeopardized. The Reduction Plan and its stages are designed to be flexible so that the City can respond to the specific water supply situation occurring at a particular time.

**Table 9-2. Water Use Reduction Plan Triggering Mechanisms<sup>(a)</sup>**

Stage	Shortage Condition	Demand Reduction Goal	Possible Triggering Mechanisms <sup>(b)</sup>
1	Up to 10%	10%	<ul style="list-style-type: none"> <li>• In the second of two consecutive years, the volume of surface water available to the City through USBR and FID is projected to be less than the long-term average, and the reduction in supply, averaged over the consecutive years, is equal to 10% or greater, or</li> <li>• Groundwater contamination condition exists (DHS requires the City to shut down wells) or a large-scale infrastructure failure occurs that results in a 10% loss in water production capacity, or</li> <li>• Localized groundwater cones of depression develop, and to avoid possible litigation, City must shut down existing wells that result in a 10% loss in groundwater production capacity, or</li> <li>• A combination of the above mentioned circumstances or a disaster reduces the City's overall water supply or production capabilities by 10% or more</li> <li>• After having been in a Stage 2 classification, the following water year results in a declaration by the USBR of normal or above normal water deliveries on the Friant-Kern system; or the original trigger for a previous higher stage classification has been rectified to a point that is consistent with the above conditions for this stage</li> </ul>
2	10 to 25%	25%	<ul style="list-style-type: none"> <li>• In the third of three consecutive years, the projected volume of surface water available to the City through USBR, FID or other means such as water banking, is less than the long term average, and the reduction in supply, averaged over the three consecutive years equals 10% or greater, or</li> <li>• The volume of surface water available to the City through FID plus water available through other means such as water banking, is reduced by 25% of the long-term average, or</li> <li>• The volume of surface water available to the City through USBR plus water available through other means such as water banking, is reduced by 25% of the long-term average, or</li> <li>• One-year change in average groundwater level in 30 key City wells exceeds 3 feet or two-year change in average groundwater level in 30 key City wells exceeds 6 feet, or</li> <li>• Groundwater contamination condition exists (DHS requires the City to shut down wells) or a large-scale infrastructure failure occurs that results in a 25% loss in water production capacity, or</li> <li>• A combination of the above mentioned circumstances or disaster reduces the City's overall water supply or production capabilities by 25% or more</li> <li>• After having been in a Stage 3 classification, the following water year results in a declaration by the USBR of normal or above normal water deliveries on the Friant-Kern system; or the original trigger for a previous higher stage classification has been rectified to a point that is consistent with the above conditions for this stage</li> </ul>
3	25 to 35%	35%	<ul style="list-style-type: none"> <li>• In the fourth of four consecutive years, the projected volume of surface water available to the City through USBR, FID or other means such as water banking, is less than the long term average, and the reduction in supply, averaged over the four consecutive years equals 10% or greater, or</li> <li>• The volume of surface water available to the City through FID plus water available through other means such as water banking, is reduced by 35% of the long-term average, or</li> <li>• The volume of surface water available to the City through USBR plus water available through other means such as water banking, is reduced by 35% of the long-term average, or</li> <li>• One-year change in average groundwater level in 30 key City wells exceeds 5 feet or two-year change in average groundwater level in 30 key City wells exceeds 10 feet, or</li> <li>• Groundwater contamination condition exists (DHS requires the City to shut down wells) or a large-scale infrastructure failure occurs that results in a 35% loss in water production capacity, or</li> <li>• A combination of the above mentioned circumstances or disaster reduces the City's overall water supply or production capabilities by 35% or more</li> <li>• After having been in a Stage 4 classification, the following water year results in a declaration by the USBR of normal or above normal water deliveries on the Friant-Kern system; or the original trigger for a previous higher stage classification has been rectified to a point that is consistent with the above conditions for this stage</li> </ul>
4	35 to 50%	50%	<ul style="list-style-type: none"> <li>• In the fifth of five consecutive years, the projected volume of surface water available to the City through USBR, FID or other means such as water banking, is less than the long term average, and the reduction in supply, averaged over the five consecutive years equals 10% or greater, or</li> <li>• The volume of surface water available to the City through FID plus water available through other means such as water banking, is reduced by 50% of the long-term average, or</li> <li>• The volume of surface water available to the City through USBR plus water available through other means such as water banking, is reduced by 50% of the long-term average, or</li> <li>• One-year change in average groundwater level in 30 key wells exceeds 7.5 feet or two-year change in average groundwater level in 30 key City wells exceeds 12 feet, or</li> <li>• Groundwater contamination condition exists (DHS requires the City to shut down wells) or a large-scale infrastructure failure occurs that results in a 50% loss in water production capacity, or</li> <li>• A combination of the above mentioned circumstances or disaster reduces the City's overall water supply or production capabilities by 50% or more</li> </ul>

<sup>(a)</sup> Based on revisions to triggers contained in the January 1994 City of Fresno Water Shortage Contingency Plan

<sup>(b)</sup> Water reduction stages may be triggered by any one or a combination of the listed conditions, if they result in a loss, or impending loss, of water supply or production capacity as defined by the shortage condition.

The Reduction Plan presented herein is not intended to be construed as a binding legal document, but rather a comprehensive summary of water use reduction criteria that are built upon City Municipal Code and ordinances, DWR references, and common water industry practices. During a future drought or other water supply shortage, the draft resolution contained in Appendix I may be used as a model for the enactment of appropriate restrictions.

## **ESTIMATED MINIMUM WATER SUPPLY FOR NEXT THREE YEARS**

*10632 (b) An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historical sequence for the agency's water supply.*

As discussed in Chapter 4, the City currently has the following sources of supply:

- Surface water from FID (Kings River),
- Surface water from the USBR (CVP),
- Previously recharged surface water supply, available through the City's groundwater recharge activities, and
- Groundwater supply.

The driest historical three-year period was 1987, 1988 and 1989, at the beginning of the 1987 to 1992 drought. Based on the 2006 Settlement Agreement, these three years were classified as dry or normal-dry. However, for purposes of this evaluation, it has been assumed that the minimum water supply for the next three years is based on three consecutive years with critical low water supply conditions. As described in Chapter 4, under these conditions, surface water deliveries from FID and USBR would be reduced significantly. Under these conditions, groundwater is anticipated to be available to make up for the loss in surface water supplies. Table 9-3 presents the estimated minimum water supply for the next three years.

Also shown in Table 9-3 are the projected demands for the next three years (see Chapter 6). For these assumed hydrologic conditions (critically dry years), demands have been assumed to be reduced by increasing percentages, from 15 to 25 percent, for the three-year period based on mandated water conservation measures to be implemented during dry year conditions. These demand projections do not include the additional water conservation recommended as part of the City's future water supply plan. Implementation of the Water Shortage Contingency Plan may, in fact, result in additional savings, thus further reducing the water demand. However, based on the assumed minimum useable supplies and reduced water demand, shortages would occur in each of the next three years based on the assumed historic hydrologic conditions. Based on current operations, the estimated shortage in supply would be met using groundwater from storage, as reflected in the change in groundwater basin storage shown in Table 9-3. As discussed in Chapter 4, in the future, the City may consider additional facilities that could enable the City to utilize more surface water and eliminate the need to use groundwater basin storage to meet demands.

**Table 9-3. Estimated Minimum Water Supply for the Next Three Years (DWR Table 24)**

Supply Source	Projected Minimum Water Supply, acre-feet		
	2008	2009	2010
Assumed Hydrologic Classification	Critical-low	Critical-low	Critical-low
Available Supplies <sup>(a)</sup>			
Surface Water			
FID (Kings River)	48,640	48,920	49,200
USBR (CVP)	13,900	13,900	13,900
<u>Recharge (Recycled)</u>	<u>13,800</u>	<u>13,800</u>	<u>13,800</u>
Total Surface Water	76,340	76,620	76,900
Groundwater			
Natural Recharge	24,600	24,800	25,100
<u>Subsurface Inflow</u>	<u>25,500</u>	<u>24,000</u>	<u>22,500</u>
Total Groundwater	50,100	48,800	47,600
Total Available Supplies	126,400	125,420	124,500
Useable Supplies <sup>(a)</sup>			
Surface Water			
Surface Water Treatment Facility	30,800	30,800	30,800
<u>Recharge &amp; Extracted<sup>(b)</sup></u>	<u>38,100</u>	<u>38,100</u>	<u>43,100</u>
Total Surface Water	68,900	68,900	73,900
Groundwater			
Natural Recharge	24,600	24,800	25,100
<u>Subsurface Inflow</u>	<u>25,500</u>	<u>24,000</u>	<u>22,500</u>
Total Groundwater	50,100	48,800	47,600
Total Useable Supplies	119,000	117,700	121,500
Total Water Demand <sup>(c)</sup>	166,180	169,040	171,900
Assumed Mandatory Water Conservation Savings <sup>(d)</sup>	15%	20%	25%
Reduced Water Demand	141,250	135,230	128,900
Supply Shortage/Change in GW Basin Storage <sup>(e)</sup>	(22,250)	(17,530)	(7,400)

(a) Available and useable supplies derived from Fresno Metro Plan Update Phase 1 Report dated December 2007 (Table 5-16). See Chapter 4 for discussion of available supplies vs. useable supplies.

(b) Intentional recharge with surface water was 38,100 af in 2007. The City's future water supply plan includes an increase in intentional recharge (see Table 4-13).

(c) See Chapter 6 for discussion of water demand. Does not include additional water conservation as recommended as part of the City's future water supply plan.

(d) Demand in critically dry years assumed to be 75 to 85 percent of normal (15 to 25 percent reduction).

(e) Based on current operations, assumes that the City will utilize groundwater basin storage to meet demands. Based on the 1992 Metro Plan, the total groundwater storage in the Fresno/Clovis Metropolitan Area was estimated to be 2 million acre-feet. Therefore, the change in groundwater storage shown in Year 1 above represents approximately a 1.1 percent decrease in groundwater storage. Year 2 and 3 changes in groundwater storage represent 0.9 percent and 0.4 percent decreases in groundwater storage, respectively.

## PLANNING FOR CATASTROPHIC WATER SUPPLY INTERRUPTION

10632 (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.

In addition to responding to drought conditions, the City’s Water Shortage Contingency Plan can be used to respond to emergency or catastrophic conditions that impact the availability of the City’s water supplies, and/or the ability to deliver water within the City’s service area. Potential events are listed in Table 9-4 and are described below.

**Table 9-4. Potential Emergency Events and Summary of Possible Actions (DWR Table 25)**

Potential Emergency Events	Possible Cause of Event	Summary of Possible Actions
Loss of Surface Water Supply	<ul style="list-style-type: none"> <li>• Surface water contamination</li> <li>• Water treatment facility shutdown (i.e., process failure, mechanical malfunction)</li> <li>• Major transmission pipeline break</li> </ul>	<ul style="list-style-type: none"> <li>• Use of groundwater supply, and/or</li> <li>• Activate interties with City of Clovis per Fresno/Clovis Mutual Aid Water System Agreement as appropriate, and/or</li> <li>• If necessary, implement Water Shortage Contingency Plan to reduce demands</li> </ul>
Loss of Groundwater Supply	<ul style="list-style-type: none"> <li>• Groundwater contamination</li> </ul>	<ul style="list-style-type: none"> <li>• Use of other wells and/or treated surface water supply to meet demands, and/or</li> <li>• Activate interties with City of Clovis per Fresno/Clovis Mutual Aid Water System Agreement as appropriate, and/or</li> <li>• If necessary, implement Water Shortage Contingency Plan to reduce demands</li> </ul>
Area-Wide Electrical Power Failure	<ul style="list-style-type: none"> <li>• Regional power outage</li> </ul>	<ul style="list-style-type: none"> <li>• Use of wells equipped with emergency back-up generators to meet demands of critical facilities, and/or</li> <li>• Activate interties with City of Clovis per Fresno/Clovis Mutual Aid Water System Agreement as appropriate, and/or</li> <li>• If necessary, implement Water Shortage Contingency Plan to reduce demands</li> </ul>
Earthquake	<ul style="list-style-type: none"> <li>• Natural disaster</li> </ul>	<ul style="list-style-type: none"> <li>• Isolate pipeline breaks and repair as quickly as possible, and/or</li> <li>• Activate interties with City of Clovis per Fresno/Clovis Mutual Aid Water System Agreement as appropriate, and/or</li> <li>• Obtain emergency potable supplies from Bakman Water Company per Water Division Emergency Response Plan, and/or</li> <li>• If necessary, implement Water Shortage Contingency Plan to reduce demands</li> </ul>
Flood	<ul style="list-style-type: none"> <li>• Natural disaster</li> </ul>	<ul style="list-style-type: none"> <li>• Isolate impacted portions of system to allow for repair as quickly as possible, and/or</li> <li>• Activate interties with City of Clovis per Fresno/Clovis Mutual Aid Water System Agreement as appropriate, and/or</li> <li>• If necessary, implement Water Shortage Contingency Plan to reduce demands</li> </ul>

Actions that the City would take if these emergencies occurred today are outlined below.

### **Loss of Surface Water Supply**

The surface water that the City obtains from the Bureau and FID is potentially subject to contamination as a result of a chemical or other contaminant spill or other event near the canals that convey surface water to the City's surface water treatment facility. Also, the surface water treatment facility and/or transmission mains leading to or from the surface water treatment facility are potentially subject to shutdown due to process malfunction, mechanical failure, or pipeline breakage. If any of these events were to occur, the City could potentially lose its surface water supply for a period of time.

Under this scenario, depending on the time of year and the water demands at the time of the event, the City may be able to meet demands with minimal impacts to the overall system, or may need to increase groundwater production and/or implement the Water Shortage Contingency Plan to reduce water demands until the surface water supply can be restored. In the future, if appropriate, another alternative may be to activate one or both of the proposed interties to the Clovis water system per the Fresno/Clovis Mutual Aid Water System Agreement.

In the future, if the City decides to construct a second surface water treatment facility, this second facility would provide additional system redundancy, minimizing the impact of a process malfunction or failure at one of the surface water treatment facilities.

### **Loss of Groundwater Supply**

Recently the City has experienced loss of groundwater production in the northwest and southeast areas of the City due to groundwater contamination in the underlying aquifer. Although this loss in production has been gradual, if the trend continues, the City will either need to replace lost groundwater production with new wells in non-contaminated areas, or increase its surface water treatment capacity to allow for the increased use of treated surface water supplies. Because the installation of new wells and/or the construction of a new water treatment facility will take time, the City may need to implement one or more stages of the Water Shortage Contingency Plan in order to reduce water demands until the loss in groundwater production can be mitigated. In the future, if appropriate, another alternative may be to activate one or both of the proposed interties to the Clovis system per the Fresno/Clovis Mutual Aid Water System Agreement.

### **Area-Wide Electrical Power Failure**

If an area-wide/regional electrical power failure were to occur within the City's water service area, the City plans to maintain emergency levels of well production, especially near critical care facilities, and maintain a minimum of 20 psi within the distribution system through the use of emergency generators located at key well sites. Currently, thirty (30) of the City's wells have back-up power provisions: twenty-seven (27) have diesel-fired generators and three (3) have natural gas-fired generators<sup>2</sup>. The City is currently in the process of planning for emergency backup power provisions at ten (10) additional well sites and is planning to conduct a study to

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<sup>2</sup> Source: City of Fresno Water Division Emergency Response Plan, September 2003.

determine the feasibility of installing an emergency generator at the surface water treatment facility. None of the City's booster pump stations are currently equipped with emergency backup generators.<sup>3</sup>

If the regional power failure were to last for a prolonged period of time (i.e., more than 24 hours), it may be necessary to implement one or more stages of the Water Shortage Contingency Plan in order to reduce system water demands and ensure that adequate system pressures can be maintained to meet fire fighting and other critical health and safety water demands during the power outage. In the future, if appropriate, another alternative may be to activate one or both of the proposed interties to the Clovis system per the Fresno/Clovis Mutual Aid Water System Agreement.

## **Earthquake**

There are a number of active and potentially active faults within and adjacent to the City. Although the City is situated in an area of relatively low seismic activity by comparison to other areas of the state, the faults and fault systems that lie along the western boundaries of Fresno County, as well as other regional faults, have the potential to produce high-magnitude earthquakes throughout the county and in the City<sup>4</sup>.

Water system infrastructure, including water treatment facilities, wells, pump stations, storage tanks, and pipelines, can be damaged during a strong earthquake. The City's facilities have been constructed in accordance with the applicable building codes to minimize potential damage during an earthquake. However, it is expected that some facilities may be damaged as the result of a strong earthquake.

In addition to the City's surface water treatment facility, the City has approximately 250 groundwater wells located throughout the distribution system. These numerous supply points within the distribution system, along with looped distribution pipelines, will allow potentially damaged portions of the City's system to be quickly isolated, by-passed and repaired, while maintaining service in non-damaged areas.

Also, two future interties with the City of Clovis are planned based on the Fresno/Clovis Mutual Aid Water System Agreement. In the Water Division Emergency Response Plan, the City has also identified the Bakman Water Company as a potential potable water supply sources in the event of an emergency. Temporary piping connecting the systems would be necessary to provide pressurized water to the City's distribution system. Also, several drinking water companies (e.g., Alhambra, Arrowhead) have been identified as emergency potable water supply sources.

In the future, if the City constructs a second water treatment facility, this second facility would provide some additional system redundancy, minimizing the impact of a shutdown of one of the

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<sup>3</sup> Source: Brock Buche, City of Fresno Water Division, e-mail regarding City wells and booster stations, June 5, 2006. The City has decided that since the booster pump stations do not produce water (they only move water), they are a lower priority for backup power provisions.

<sup>4</sup> Source: Fresno County General Plan, October 2000.

water treatment facilities or loss of groundwater production capacity as a result of earthquake damage.

After an earthquake, it may be necessary to implement one or more stages of the Water Shortage Contingency Plan to reduce system water demands to ensure that adequate system pressures can be maintained to meet fire fighting and other critical health and safety water demands during the immediate period after an earthquake, and as facilities are restored to full operation.

In the future, if appropriate, another alternative may be to activate one or both of the proposed interties to the Clovis system per the Fresno/Clovis Mutual Aid Water System Agreement.

## **Flood**

Since its beginning as Fresno Station in 1872, and before construction of the flood control and urban drainage system, Downtown Fresno has regularly experienced flooding. The Fresno Metropolitan Flood Control District (FMFCD) was created in 1956 for the purpose of protecting lives and property in the Fresno-Clovis metropolitan area. FMFCD oversees the north-central portion of Fresno County, between the San Joaquin and Kings Rivers, and is authorized to control storm waters within an urban and foothill watershed of approximately 400 square miles. This area includes most of the Fresno-Clovis metropolitan area, and unincorporated lands to the east and northeast. Flood control facilities within the City of Fresno include numerous storm water retention basins, along with a system of storm water inlets, siphons, underground pipelines and pump stations.<sup>5</sup>

As with an earthquake, water system infrastructure, including water treatment facilities, wells, pump stations, storage tanks, and pipelines, can be damaged or rendered inoperable during a flood. Although the FMFCD has constructed facilities to control flooding within the City, localized flooding may occur in portions of the City as a result of large storms or even ruptured water mains. If such an event were to occur, it is expected that some facilities may be damaged or rendered inoperable.

In addition to the City's surface water treatment facility, the City's has approximately 250 groundwater wells located throughout the distribution system. These numerous supply points within the distribution system, along with looped distribution pipelines, will allow potentially damaged or inoperable portions of the City's system to be quickly isolated, by-passed and repaired, while maintaining service at least at minimal levels in non-damaged or non-impacted areas.

After a flood, it may be necessary to implement one or more stages of the Water Shortage Contingency Plan to reduce system water demands to ensure that adequate system pressures can be maintained to meet fire fighting and other critical health and safety water demands during the immediate period after a flood has occurred, and as facilities are restored to full operation.

In the future, if appropriate, another alternative may be to activate one or both of the proposed interties to the Clovis system per the Fresno/Clovis Mutual Aid Water System Agreement.

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<sup>5</sup> Source: Fresno Metropolitan Flood Control District website, [www.fresnofloodcontrol.org](http://www.fresnofloodcontrol.org).

## **WATER USE PRIORITIES DURING WATER SHORTAGE EMERGENCIES**

The City has established priorities for the use of available water, based on guidance from the California Water Code (Chapter 3. Water Shortage Emergencies) and community input<sup>6</sup>. The priorities, in order of importance, are:

1. Health & Safety: Interior residential (domestic and sanitation) and fire fighting
2. Commercial, Industrial & Governmental: Maintain jobs and economic base
3. Existing Landscaping: Especially trees and shrubs
4. New Demand: Projects without permits when a water shortage is declared

## **MANDATORY PROHIBITIONS AND RESTRICTIONS**

*10632 (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.*

The City Municipal Code contains a section on the wastage of water and water conservation measures (Section 6-520 Wastage of Water), which outlines the mandatory prohibitions and restrictions that are in place under normal water supply conditions in the City. These measures include the following regulations and restrictions.

- Outdoor watering schedule:
  - Winter Watering Schedule: December 1 – March 1
    - Odd Numbered Addresses: Saturdays Only
    - Even Numbered Addresses: Sundays Only
    - Watering Times: Anytime
  - Summer Watering Schedule: March 2 – November 30
    - Odd Numbered Addresses: Tuesdays, Thursdays, Saturdays Only
    - Even Numbered Addresses: Wednesdays, Fridays, Sundays Only
    - Watering Times: 8:00 am – 11:00 am; 7:00 pm – 6:00 am
    - No Watering between 6:00 am – 8:00 am; 11:00 am – 7:00 pm
  - No watering on Mondays
- Installation of blue grass and rye grass is prohibited.
- Watering any lawn except by use of a hose held in the person’s hand or a sprinkling device is prohibited.
- Keeping, maintaining, operating, or using any water connection, hose, faucet, hydrant, pipe, outlet, or plumbing fixture which is not tight and free from leakage is prohibited.

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<sup>6</sup> Source: City of Fresno Water Shortage Contingency Plan, January 1994.

- Willfully or negligently wasting water is prohibited.
- Flooding any part of the premises of another is prohibited.
- Sprinkling the premises of another so as to prevent the normal use thereof or unreasonably wet objects thereon which should not be subjected to a spray of water except as naturally caused by the elements or by action of the owner of the object is prohibited.
- Sprinkling or irrigating any yard, ground, premise, or vegetation unless the watering device is controlled by an automatic shut-off device, or a person is in immediate attendance of the hose or watering device is prohibited.
- Washing any privately owned motor vehicle, trailer, or boat except from a bucket or in a commercial car wash, provided a hose equipped with a shut-off nozzle may be used for a quick rinse, is prohibited.
- Washing or rinsing with a hose or watering device any sidewalk, driveway, parking area, tennis court, patio, or any other exterior paved area, except in a manner which prevents the bulk of the runoff water from entering the street and instead diverts such water to other productive purposes such as landscape irrigation is prohibited.
- Lawn sprinkling system/devices shall be properly designed, installed, maintained and operated to prevent wastage of water.
- Installing or replacing air-conditioning systems (including portable systems) without a water conservation device which is properly maintained is prohibited.
- The draining of swimming pools more than once every three years, except for structural damage or cyanuric acid level over 100 parts per million, total dissolved solids over 2,500 parts per million, or calcium over 450 parts per million is prohibited. A permit is required to drain a swimming pool.

Table 9-5 lists the additional conservation measures associated with each Water Use Reduction Plan stage which would further restrict the allowable water uses and landscape irrigation practices during a water shortage condition. It should be noted that the actions included in each stage are cumulative, meaning that if Stage 2 is implemented, all of the measures in Stages 1 and 2 shall be implemented. If Stage 3 is implemented, all of the measures in Stages 1, 2 and 3 shall be implemented. If Stage 4 is implemented, all of the measures in Stages 1, 2, 3 and 4 shall be implemented.

Another potential mechanism used by some water utilities to conserve water use is to lower overall distribution system pressures slightly, say by 5 psi, to minimize leaks and water waste. The City can reduce system pressures City-wide using their SCADA system to change zone pressure settings.

**Table 9-5. Mandatory Prohibitions and Water Use Restrictions for City of Fresno Water Shortage Contingency Plan (DWR Table 26)**

Stage	Water Use Reduction Goal	City Actions/Additional Restrictions and Prohibitions
1	10%	<p>The City of Fresno shall:</p> <ul style="list-style-type: none"> <li>• Initiate a public information program/media campaign to: <ul style="list-style-type: none"> <li>— Notify all customers of the water shortage and the need to conserve water</li> <li>— Mail information to every customer explaining the importance of significant water use reductions</li> <li>— Provide practical information to customers on ways to improve water use efficiency</li> <li>— Publicize and expand the toilet retrofit and other efficiency programs</li> </ul> </li> <li>• Request customers to voluntarily reduce their water use by 10 percent</li> <li>• Increase its water waste patrols to enforce the provisions of the Fresno Municipal Code Section 6-520 Wastage of Water</li> </ul>
2	25%	<p>The City of Fresno shall:</p> <ul style="list-style-type: none"> <li>• Intensify its public information program and media campaign</li> <li>• Further increase water waste patrols</li> <li>• Adopt additional ordinances to: <ul style="list-style-type: none"> <li>— Limit summer outdoor irrigation to 2 days/week with reduced watering times [or allow only irrigation of trees and shrubs, but not turf]</li> <li>— Prohibit winter outdoor irrigation</li> <li>— Allow car washing with bucket only (a hose equipped with a shut-off nozzle may be used for a quick rinse)</li> </ul> </li> </ul>
3	35%	<p>The City of Fresno shall:</p> <ul style="list-style-type: none"> <li>• Continue its intensified public information program and media campaign</li> <li>• Intensify its leak detection program</li> <li>• Adopt additional ordinances to: <ul style="list-style-type: none"> <li>— Limit summer outdoor irrigation to 1 day/week with reduced watering times [or allow only irrigation of trees and shrubs, but not turf]</li> <li>— Prohibit winter outdoor irrigation</li> <li>— Allow car washing with bucket only (a hose equipped with a shut-off nozzle may be used for a quick rinse)</li> </ul> </li> <li>• Implement Stage 3 water consumption allocations for all customers (see Table 9-8)</li> <li>• Not issue building permits or install meters for new accounts which had not received building permits before the water shortage emergency declaration [or continue to allow building permits, but do not allow new landscaping to be installed].</li> </ul>
4	50%	<p>The City of Fresno shall:</p> <ul style="list-style-type: none"> <li>• Continue its intensified public information program and media campaign</li> <li>• Adopt additional ordinances to: <ul style="list-style-type: none"> <li>— Prohibit all outdoor irrigation</li> <li>— No restaurant, hotel, café, cafeteria or other public place where food is sold, served, or offered for sale, shall serve drinking water to any customer unless expressly requested</li> <li>— Prohibit use of potable water to clean, fill or maintain decorative fountains, lakes or ponds unless such water is reclaimed</li> <li>— Prohibit use of potable water for construction, compaction, dust control, street or parking lot sweeping, building wash down where non-potable or recycled water is sufficient</li> <li>— Prohibit use of potable water for sewer system maintenance or fire protection training without prior approval by the City Manager</li> <li>— Prohibit use of potable water to wash sidewalks, walkways, driveways, parking lots, open ground or other hard surfaced areas except where necessary for public health or safety</li> <li>— Prohibit allowing potable water to escape from breaks within the customer's plumbing system for more than twenty-four (24) hours after the customer is notified or discovers the break</li> <li>— Prohibit washing cars, boats, trailers, aircraft, or other vehicles except to wash such vehicles at commercial or fleet vehicle washing facilities using water recycling equipment</li> <li>— Require covers for swimming pools when not in use</li> <li>— Prohibit use of outdoor misters</li> </ul> </li> <li>• Implement Stage 4 water consumption allocations for all customers (see Table 9-8)</li> </ul>

## CONSUMPTION REDUCTION METHODS

10632 (e) Consumption reduction methods in the more 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.

### Per Capita Health and Safety Allotments Used in 1994 Plan

The City's previous Water Shortage Contingency Plan included Residential Per Capita Health and Safety Water Use Allotments for the most restrictive stages of the Water Shortage Contingency Plan. These Residential Health and Safety Water Use Allotments were based on calculated minimum domestic water uses, including toilet flushing, showering, clothes washing, and kitchen and other uses. These calculated allotments equated to 50 to 68 gallons per capita per day (gpcd), which is equivalent to a water allotment of about 26 to 35 percent of the 2006 per capita residential water use of 192 gpcd. While these calculated allotments represent theoretical minimum domestic water use, they are not based on actual water use data for the City's residents, are extremely low and difficult to track, as most of the City's residential customers are not metered, and likely would not be achievable during a water shortage emergency.

### Estimated Residential Wintertime Water Use

For this update of the City's Water Shortage Contingency Plan, actual water use data for residential wintertime water use (e.g. January and February) has been utilized to calculate residential water use allotments for the most restrictive stages of the Water Shortage Contingency Plan. Wintertime water use is considered to be more representative of actual minimum domestic water use because it consists primarily of indoor domestic uses, as exterior water use is likely to be minimal during the months of January and February.

As shown in Table 9-6, metered multi-family residential water use data for the months of January and February plus estimates of unmetered single-family residential water use for the months of January and February were evaluated for the last several years (2003 through 2006). The winter-time water use was found to range from about 93 gpcd to 124 gpcd. These wintertime water uses are about 47 to 54 percent of the average annual per capita residential water use and more typical of what one would expect for interior wintertime use.

**Table 9-6. Estimated Residential Wintertime Water Use**

Year	Population Served <sup>(a)</sup>	Total Annual Residential Water Use, af <sup>(b)</sup>	Average Annual Residential Water Use Per Person, gpcd	Wintertime (January/February) Residential Water use, af <sup>(b)</sup>	Average Wintertime (January/February) Residential Water Use Per Person, gpcd	Percent of Annual Average Residential Per Capita Water Use
2003	457,511	116,747	228	10,288	124	54%
2004	466,203	110,667	212	9,619	114	54%
2005	475,061	105,398	198	8,024	93	47%
2006	484,087	103,217	192	8,579	98	51%
Average			208		107	51%

(a) As estimated by the City Water Division.

(b) Estimated based on metered annual multi-family residential water use and estimated unmetered annual single-family residential water use (see Table 6-3).

Based on this analysis, for Stage 3, a water use allotment equal to 110 percent of the average wintertime (January/February) residential water use is proposed for single-family and multi-family accounts. For Stage 4, a water use allotment equal to 95 percent of the average wintertime (January/February) residential water use is proposed for single-family and multi-family accounts. These residential water use allotments are based on meeting the required demand reductions for Stages 3 and 4 of the Water Shortage Contingency Plan and are summarized in Table 9-7.

**Table 9-7. Residential Water Use Allotments For Stage 3 and 4 Water Shortages**

Customer/Connection Type	Stage 3 Allotment	Stage 4 Allotment
Residential	110% of Average Wintertime (January/February) Usage	95% of Average Wintertime (January/February) Usage

As shown in Table 9-7, the residential allotment for Stage 4 is only 95 percent of average wintertime use. However, severe water conservation measures must be implemented by all to achieve the overall Stage 4 water demand reduction goal of 50 percent.

### Non-Residential Water Use Allotments

Similar to the 1994 Water Shortage Contingency Plan, allotments have also been determined by the City for non-residential customers for the most restrictive stages of the Water Shortage Contingency Plan. Like the residential allotments, these allotments have been determined based on review of historical water use data, particularly wintertime water use, and required water use reductions to achieve the overall water use reduction goals of 35 percent and 50 percent, respectively, for Stages 3 and 4 of the Water Shortage Contingency Plan in conjunction with the residential allocations described above. These allotments are as follows:

- Commercial/institutional customers:
  - Stage 3: 85 percent of normal average (non-shortage) annual usage
  - Stage 4: 65 percent of normal average (non-shortage) annual usage
- Industrial customers:
  - Stage 3: 85 percent of normal average (non-shortage) annual usage
  - Stage 4: 75 percent of normal average (non-shortage) annual usage
- Landscape irrigation customers:
  - Stage 3: 50 percent of normal average (non-shortage) annual usage
  - Stage 4: 0 percent of normal average (non-shortage) annual usage

The proposed allotments for commercial/institutional, industrial and landscape irrigation customers for Stages 3 and 4 are summarized in Table 9-8.

**Table 9-8. Proposed Non-Residential Water Use Allotments for Stage 3 and 4 Water Shortages**

Customer/Connection Type	Stage 3 Allotment <sup>(a)</sup>	Stage 4 Allotment <sup>(a)</sup>
Commercial/Institutional	85% of Average Annual Usage	65% of Average Annual Usage
Industrial	85% of Average Annual Usage	75% of Average Annual Usage
Landscape Irrigation	50% of Average Annual Usage	0% of Average Annual Usage

<sup>(a)</sup> Allotments based on required demand reduction to achieve overall demand reduction of 35 percent and 50 percent for Stages 3 and 4, respectively.

Similar to Stage 4 residential allotments, the non-residential allotments for Stage 4 are quite low as compared to average annual use, and are actually somewhat lower (about 5 percent lower) than average wintertime uses for these water use sectors. However, severe water conservation measures must be implemented by all to achieve the overall Stage 4 water demand reduction goal of 50 percent.

### Implementation of Residential and Non-Residential Water Use Allotments

Table 9-9 shows how the residential and non-residential water use allotments for Stages 3 and 4 of the Water Shortage Contingency can reduce the overall water use within the City. As shown, using 2006 as the base year, implementation of the Stage 3 allotments results in an overall water use reduction of about 39 percent. Implementation of the Stage 4 allotments results in an overall water use reduction of about 51 percent. As such, these water use reductions are consistent with the water use reduction goals for Stages 3 and 4 of the Water Use Reduction Plan.

**Table 9-9. Stage 3 and 4 Water Use Allotments and Resulting Water Use Reductions (DWR Table 27)**

Customer/ Connection Type	2006 Annual Water Use, af	Stage 3 Reductions			Stage 4 Reductions		
		Allotment	Resulting Water Use, af	Annual Percent Reduction	Allotment	Resulting Water Use, af	Annual Percent Reduction
Single Family Residential	81,398	110% of 2006 Average Residential Wintertime Water Use: 108 gpcd	37,818	54%	95% of 2006 Average Residential Wintertime Water Use: 93 gpcd	32,661	60%
Multi-Family Residential	22,471	110% of 2006 Average Residential Wintertime Water Use: 108 gpcd	19,674	12%	95% of 2006 Average Residential Wintertime Water Use: 93 gpcd	16,991	24%
Commercial/ Institutional	24,928	85% of Average Annual Usage	21,189	15%	65% of Average Annual Usage	16,203	35%
Industrial	3,865	85% of Average Annual Usage	3,285	15%	75% of Average Annual Usage	2,899	25%
Landscape Irrigation	7,514	50% of Average Annual Usage	3,757	50%	0% of Average Annual Usage	0	100%
<b>Total Reduction (not including Unaccounted For Water)</b>	<b>140,175</b>		<b>85,722</b>	<b>39%</b>		<b>68,754</b>	<b>51%</b>
<b>Demand Reduction Goal</b>				<b>35%</b>			<b>50%</b>

**PENALTIES AND CHARGES**

10632 (f) Penalties or charges for excessive use, where applicable.

**Excessive Water Use**

Because the City’s single-family residential customers are currently unmetered and are billed for water use based on a monthly flat-rate, no penalties or charges can be assessed for excessive water use by a single-family residential customer.

Although all other customers are metered and billed based on actual water usage, they are currently billed based on a uniform rate structure which does not increase as usage increases and does not encourage water conservation as increasing block rates would. Furthermore, no penalties or charges for excessive water use are assessed for the City's metered customers.

However, as part of the City's compliance with AB514 (discussed in Chapter 8), on or before March 1, 2013, the City will be required to charge each customer that has a service connection for which a meter is installed based on the volume of deliveries as measured by the water meter. This likely would encourage additional water conservation.

### **Violation of City Municipal Code Section 6-520 Wastage of Water**

The City does, however, have penalties for violation of the water use restrictions outlined in the City's Municipal Code<sup>7</sup>. In the event any person violates any provisions of Section 6-520 of the City Municipal Code, the following shall apply:

- For the first incident of water wastage, the fee designated in the Master Fee Resolution shall be deferred for a period of two years conditioned upon the customer not having a fourth incident of water wastage within a two-year period. If the customer does not have such fourth incident of water wastage within two years such deferral shall become permanent. However, such fee shall be due and owing by the customer if a fourth incident of water wastage occurs within two years.
- The fee for the second incident of water wastage shall be deferred for customers who attend a course in water conservation. The deferral shall be conditioned upon the customer's successful completion of a water conservation course provided by the Department of Public Utilities and the customer not having a third incident of water wastage within a two-year period. The deferred fee shall be collected if a third incident of water wastage occurs within a two-year period.
- The fee for the third incident of water wastage within a two-year period shall be the fee designated in the Master Fee Resolution (plus any fee deferred from the second incident of water wastage). A customer shall have the option of submitting proof of implementation of retrofit measures of no less value than the fee imposed for such third incident of water wastage in lieu of that fee. Retrofit measures of a value less than that fee shall be credited toward payment of the fee.
- The fee for the fourth incident of water wastage within a two-year period shall include the amount as designated in the Master Fee Schedule together with all applicable amounts previously deferred as described above.

If a customer has more than four incidents of water wastage within a two-year period, the City may implement any or all of the following measures:

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<sup>7</sup> Source: City Municipal Code, Section 6-520 Wastage of Water.

- Require the customer to get a landscape evaluation, lawn water audit, and water budget, as appropriate, in order to learn efficient water use. Landscape irrigation auditors certified by the Irrigation Association would complete this work at the customer's expense.
- Require a customer to repair any defects in the watering system of such customer within fourteen days of notice by the City to repair.
- Installation by the City of flow restrictors or termination of water service for exterior use.
- Termination of all water service to a customer unless in the opinion of the Director of Public Utilities such termination would result in an unreasonable risk to the health and safety of persons.
- Require that restoration of water service after termination be contingent on an agreement by the customer to adhere to the provisions of the Section 6-520 of the City Municipal Code.

Table 9-10 summarizes the City's penalties and charges.

## REVENUE AND EXPENDITURE ANALYSIS

*10632 (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.*

### Potential Revenue Impacts

Based on FY 04/05, approximately 60 percent of the City's revenues from water charges are derived from single-family residential customers which are not metered and are billed based on a monthly flat rate. The other approximately 40 percent of revenues from water charges are derived from metered customers which are billed on a metered rate based on actual water consumption. Therefore, as customer water use decreases, only the portion of revenue derived from metered customers will be impacted. Revenue from the flat rate customers would remain the same, regardless of any reduction in actual water use by those flat rate customers. Table 9-11 demonstrates the potential impacts to the City's revenue as a result of implementation of the Water Shortage Contingency Plan.

**Table 9-10. Penalties and Charges (DWR Table 28)**

Penalty or Charge	Description of Penalty or Charge
Penalty for Excess Use	<p>Single-Family Residential Customers:</p> <ul style="list-style-type: none"> <li>• Currently billed based on flat rate</li> <li>• No penalty for excess use <sup>(a)</sup></li> </ul> <p>All Other Customers:</p> <ul style="list-style-type: none"> <li>• Currently billed based on uniform metered rate</li> <li>• Pay for all water used</li> <li>• No penalty for excess use<sup>(a)</sup></li> </ul>
Charge for Excess Use	<p>Single-Family Residential Customers:</p> <ul style="list-style-type: none"> <li>• Currently billed based on flat rate</li> <li>• No charge for excess use<sup>(a)</sup></li> </ul> <p>All Other Customers:</p> <ul style="list-style-type: none"> <li>• Currently billed based on uniform metered rate</li> <li>• Pay for all water used</li> <li>• No additional charge for excess use<sup>(a)</sup></li> </ul>
Penalties for violation of the water use restrictions	<p>Fee applied per Master Fee Resolution and provisions of Municipal Code (Section 6-520). Also, if four incidents occur within two-year period:</p> <ul style="list-style-type: none"> <li>• Require the customer to get a landscape evaluation, lawn water audit, and water budget</li> <li>• Require a customer to repair any defects in the watering system of such customer</li> <li>• Installation by the City of flow restrictors or termination of water service for exterior use</li> <li>• Termination of all water service to a customer</li> <li>• Require that restoration of water service after termination be contingent on an agreement by the customer to adhere to the provisions of the Section 6-520 of the City Municipal Code</li> </ul>

<sup>(a)</sup> If excess use is identified, customer would be subject to penalty for violation of water use restrictions.

**Table 9-11. Potential Water Revenue Impacts During a Water Shortage**

	Revenue, million \$				
	FY 2004/05 Revenue <sup>(a)</sup>	Stage 1: 10% Shortage	Stage 2: 10-25% Shortage	Stage 3: 25-35% Shortage	Stage 4: 35-50% Shortage
Anticipated Reduction in Water Sales, percent		10%	25%	35%	50%
Revenue from Flat Rate Water Charges	\$22.8	\$22.8	\$22.8	\$22.8	\$22.8
Revenue from Metered Rate Water Charges <sup>(b)</sup>	\$14.6	\$13.1	\$11.0	\$9.5	\$7.3
Other Revenues	\$8.5	\$8.5	\$8.5	\$8.5	\$8.5
<b>Total Water Revenue</b>	<b>\$45.9</b>	<b>\$44.4</b>	<b>\$42.3</b>	<b>\$40.8</b>	<b>\$38.6</b>
Reduction in Water Revenues, percent		3%	8%	11%	16%

(a) Source: FY 2004/05 revenue data received from Henry McLaughlin on 06/30/06.

(b) Revenue from metered rate water customers assumed to decrease by same percentage as water use reduction.

As shown in Table 9-11, the current flat rate structure for single-family residential customers, although not conducive to water conservation, contributes to some stabilization of the City’s water revenue stream during water shortage periods. This is demonstrated by the Stage 4 revenue reduction of only about 16 percent, even when water sales are reduced by 50 percent.

However, in the future, as the City implements its Residential Water Metering Program, fewer and fewer customers will be billed on a flat rate structure and, eventually, all customers will be metered and billed based on a metered rate. As this transition occurs, the City will become potentially more vulnerable to revenue impacts during periods when water use is reduced.

**Potential Expenditure Impacts**

During a water shortage, the City’s expenditures for water-related services may be impacted. Expenditures may increase for a number of reasons, including the following:

- Increased conservation program costs to implement, monitor, and enforce new or more intensive water conservation programs
- Increased staff costs for operation and maintenance of facilities to ensure efficient operation of available facilities
- Increased costs for acquisition and treatment of additional surface water supplies, if needed to compensate for decreased groundwater supplies

- Increased costs for groundwater pumping, if additional groundwater pumping is needed to compensate for decreased surface water supplies or if more energy is required because of increased pumping lifts associated with decreasing groundwater levels (although these increased groundwater pumping costs may be offset by overall lower groundwater production costs due to the lower overall demand)

Table 9-12 demonstrates how these costs might increase for the various stages of the City’s Water Shortage Contingency Plan and how overall operating expenditures might be impacted. For this analysis, the following cost increases have been assumed:

- Conservation program costs:
  - Stage 1: 5 percent increase over pre-shortage costs
  - Stage 2: 10 percent increase over pre-shortage costs
  - Stage 3: 15 percent increase over pre-shortage costs
  - Stage 4: 25 percent increase over pre-shortage costs
- Groundwater production costs:
  - No net change over pre-shortage costs<sup>8</sup>
- Surface Water Treatment Facility costs:
  - 5 percent increase over pre-shortage costs for each stage (e.g., 5 percent for Stage 1, 10 percent for Stage 2, etc.)
- Water supply costs:
  - 5 percent increase over pre-shortage costs for each stage (e.g., 5 percent for Stage 1, 10 percent for Stage 2, etc.)

As shown in Table 9-12, with the assumed increases in certain expenditures, overall water expenditures may increase somewhat during the various stages of the Water Shortage Contingency Plan. As shown in Table 9-12, these increases in expenditures, coupled with reductions in revenue, could potentially significantly impact the City’s annual surplus or shortfall.

**Proposed Measures to Overcome Revenue and Expenditure Impacts**

Table 9-13 summarizes the two primary measures that may be implemented to overcome revenue and expenditure impacts:

- Water rate increases, and
- Development and use of reserve funds.

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<sup>8</sup> A net cost increase of 0 percent is assumed for groundwater production because even though the number of wells operated may decrease due to lower demand, it will likely be more expensive to operate the remaining wells due to higher pumping lifts as a result of declining groundwater levels during drought conditions. These changes in operational cost are assumed to cancel each other out for a net cost increase of 0 percent per stage.

**Table 9-12. Revenue and Expenditure Analysis  
WITHOUT Rate Increases  
(all costs rounded to nearest \$1000)**

	FY 04/05	Stage 1 (10% Conservation)	Stage 2 (25% Conservation)	Stage 3 (35% Conservation)	Stage 4 (50% Conservation)
<b>Water Revenues</b>					
Water Charges					
Flat Rate Charges	\$ 22,829,000	\$ 22,829,000	\$ 22,829,000	\$ 22,829,000	\$ 22,829,000
Metered Rate Charges <sup>(a)</sup>	\$ 14,620,000	\$ 13,158,000	\$ 10,965,000	\$ 9,503,000	\$ 7,310,000
Other Revenues (includes backflow/misc. interest, transfers, and other misc revenue)	\$ 8,497,000	\$ 8,497,000	\$ 8,497,000	\$ 8,497,000	\$ 8,497,000
<b>Total Water Operating Revenues</b>	<b>\$ 45,946,000</b>	<b>\$ 44,484,000</b>	<b>\$ 42,291,000</b>	<b>\$ 40,829,000</b>	<b>\$ 38,636,000</b>
<b>Percent Increase (Reduction)</b>		<b>-3%</b>	<b>-8%</b>	<b>-11%</b>	<b>-16%</b>
<b>Water Expenditures</b>					
Operating					
Administration	\$ 3,120,000	\$ 3,120,000	\$ 3,120,000	\$ 3,120,000	\$ 3,120,000
Water Quality	\$ 1,904,000	\$ 1,904,000	\$ 1,904,000	\$ 1,904,000	\$ 1,904,000
Water Production <sup>(b)</sup>	\$ 9,225,000	\$ 9,225,000	\$ 9,225,000	\$ 9,225,000	\$ 9,225,000
Distribution Maintenance	\$ 1,938,000	\$ 1,938,000	\$ 1,938,000	\$ 1,938,000	\$ 1,938,000
Meter/Cross Connection Control	\$ 1,074,000	\$ 1,074,000	\$ 1,074,000	\$ 1,074,000	\$ 1,074,000
Surface Water Treatment Facility <sup>(c)</sup>	\$ 1,313,000	\$ 1,379,000	\$ 1,444,000	\$ 1,510,000	\$ 1,576,000
Recharge Maintenance	\$ 313,000	\$ 313,000	\$ 313,000	\$ 313,000	\$ 313,000
Conservation Service <sup>(d)</sup>	\$ 597,000	\$ 627,000	\$ 657,000	\$ 687,000	\$ 746,000
Litigation	\$ 138,000	\$ 138,000	\$ 138,000	\$ 138,000	\$ 138,000
Water Supply <sup>(e)</sup>	\$ 3,436,000	\$ 3,608,000	\$ 3,780,000	\$ 3,951,000	\$ 4,123,000
ISF Charges <sup>(f)</sup>	\$ 7,385,000	\$ 7,385,000	\$ 7,385,000	\$ 7,385,000	\$ 7,385,000
Services Provided to Other Divisions	\$ 34,000	\$ 34,000	\$ 34,000	\$ 34,000	\$ 34,000
<b>Subtotal Operating Expenditures</b>	<b>\$ 30,477,000</b>	<b>\$ 30,745,000</b>	<b>\$ 31,012,000</b>	<b>\$ 31,279,000</b>	<b>\$ 31,576,000</b>
Capital Expenditures	\$ 11,540,000	\$ 11,540,000	\$ 11,540,000	\$ 11,540,000	\$ 11,540,000
Debt Service	\$ 4,303,000	\$ 4,303,000	\$ 4,303,000	\$ 4,303,000	\$ 4,303,000
<b>Total Water Enterprise Expenditures <sup>(g)</sup></b>	<b>\$ 46,320,000</b>	<b>\$ 46,588,000</b>	<b>\$ 46,855,000</b>	<b>\$ 47,122,000</b>	<b>\$ 47,419,000</b>
<b>Percent Increase (Reduction) in Expenditures <sup>(g)</sup></b>		<b>1%</b>	<b>1%</b>	<b>2%</b>	<b>2%</b>
<b>Total Annual Surplus (Shortfall)</b>	<b>(\$374,000)</b>	<b>(\$2,104,000)</b>	<b>(\$4,564,000)</b>	<b>(\$6,293,000)</b>	<b>(\$8,783,000)</b>

<sup>(a)</sup> Metered Rate Charges assumed to decrease by the same percentage as total water use is reduced.

<sup>(b)</sup> Water Production from groundwater wells assumed to have no net increase (production from individual wells may increase due to increased pumping lifts, but overall demand for groundwater should decrease as demand decreases).

<sup>(c)</sup> Surface Water Treatment Facility costs assumed to increase by 5% per stage as costs to operate WTP increase with each stage (additional surface water production requirements, overtime, etc.).

<sup>(d)</sup> Conservation Service costs assumed to increase 5% for Stage 1, 10% for Stage 2, 15% for Stage 3 and 25% for Stage 4 for additional staff time, advertising to educate customers about need for conservation and enforcement of conservation measures.

<sup>(e)</sup> Water Supply costs assumed to increase 5% per stage as additional surface water supplies are required to compensate for reduction in groundwater supply with each stage.

<sup>(f)</sup> ISF Charges are for services provided by other City divisions.

<sup>(g)</sup> Relative to FY 04/05 expenditures.

**Table 9-13. Proposed Measures to Overcome Revenue and Expenditures Impacts (DWR Tables 29 and 30)**

Name of Measure	Anticipated Effect
Water Rate Increase	Increase flat and metered water rates to maintain revenues at pre-water shortage levels and compensate for increased expenditures associated with the water shortage condition
Development and Use of Reserves	Develop and use reserves to minimize the need or amount of water rate increases

Table 9-14 demonstrates how a water rate increase might impact the City’s revenue and expenditures during various stages of the Water Shortage Contingency Plan. For this analysis, the following water rate increases have been assumed.

- Stage 1: No rate increase; use of reserves as needed
- Stage 2: No rate increase; use of reserves as needed
- Stage 3: 22.5 percent over pre-shortage rates
- Stage 4: 11.5 percent over Stage 3 rates; overall 34 percent over pre-shortage rates
- Post-shortage: 15 percent over pre-shortage rates

Upon implementation of Stages 1 and 2, it has been assumed that the City will use its reserves to compensate for lower revenues and/or higher expenditures, such that water rate increases would not take effect until Stage 3 of the Water Shortage Contingency Plan. However, if conditions require that the City remain in Stages 1 or 2 for more than two years, or reversing out of a higher stage into Stages 1 or 2 results in the Water Shortage Contingency Plan being implemented for more than two years, water rate increases may also be required.

It should be noted that for this analysis, it has been assumed that the water rate increases will be applied to both flat rate water accounts and metered water accounts. As shown in Table 9-14, the use of reserves in Stages 1 and 2 and implementation of the water rate increases in Stages 3 and 4 helps to stabilize the City’s revenues and compensate for increased expenditures during the water shortage.

Historically, most California water agencies that have experienced water shortages have found that it required several years for individual customer water use to return to pre-shortage levels. While this continued pattern of water conservation is desirable and generally beneficial to all, it can result in continued reduced water revenues, which may have an adverse impact on the financial condition of the City’s water enterprise. Therefore, in anticipation of reduced water sales following a shortage, the City’s water rates would be set at 15 percent over the pre-shortage rates. Any excess revenues collected as a result of this rate adjustment would be used to re-establish the City’s reserves for use in future emergencies.

**Table 9-14. Revenue and Expenditure Analysis  
WITH Rate Increases  
(all costs rounded to nearest \$1000)**

	FY 04/05	Stage 1 (10% Conservation)	Stage 2 (25% Conservation)	Stage 3 (35% Conservation)	Stage 4 (50% Conservation)
<b>Rate Increase (to be applied to all flat rate and metered rate customers)</b>					
Required Water Rate Increase by Phase		0%	0%	22.5%	11.5%
Total Required Water Rate Increase over Current Rates		0%	0%	22.5%	34.0%
<b>Water Revenues</b>					
Water Charges					
Flat Rate Charges	\$ 22,829,000	\$ 22,829,000	\$ 22,829,000	\$ 27,966,000	\$ 30,591,000
Metered Rate Charges <sup>(a)</sup>	\$ 14,620,000	\$ 13,158,000	\$ 10,965,000	\$ 11,641,000	\$ 9,795,000
Other Revenues (includes backflow/misc. interest, transfers, and other misc revenue)	\$ 8,497,000	\$ 8,497,000	\$ 8,497,000	\$ 8,497,000	\$ 8,497,000
<b>Total Water Operating Revenues</b>	<b>\$ 45,946,000</b>	<b>\$ 44,484,000</b>	<b>\$ 42,291,000</b>	<b>\$ 48,104,000</b>	<b>\$ 48,883,000</b>
Percent Increase <b>(Reduction)</b> in Revenue		<b>-3%</b>	<b>-8%</b>	<b>5%</b>	<b>6%</b>
<b>Water Expenditures</b>					
Operating					
Administration	\$ 3,120,000	\$ 3,120,000	\$ 3,120,000	\$ 3,120,000	\$ 3,120,000
Water Quality	\$ 1,904,000	\$ 1,904,000	\$ 1,904,000	\$ 1,904,000	\$ 1,904,000
Water Production <sup>(b)</sup>	\$ 9,225,000	\$ 9,225,000	\$ 9,225,000	\$ 9,225,000	\$ 9,225,000
Distribution Maintenance	\$ 1,938,000	\$ 1,938,000	\$ 1,938,000	\$ 1,938,000	\$ 1,938,000
Meter/Cross Connection Control	\$ 1,074,000	\$ 1,074,000	\$ 1,074,000	\$ 1,074,000	\$ 1,074,000
Surface Water Treatment Facility <sup>(c)</sup>	\$ 1,313,000	\$ 1,379,000	\$ 1,444,000	\$ 1,510,000	\$ 1,576,000
Recharge Maintenance	\$ 313,000	\$ 313,000	\$ 313,000	\$ 313,000	\$ 313,000
Conservation Service <sup>(d)</sup>	\$ 597,000	\$ 627,000	\$ 657,000	\$ 687,000	\$ 746,000
Litigation	\$ 138,000	\$ 138,000	\$ 138,000	\$ 138,000	\$ 138,000
Water Supply <sup>(e)</sup>	\$ 3,436,000	\$ 3,608,000	\$ 3,780,000	\$ 3,951,000	\$ 4,123,000
ISF Charges <sup>(f)</sup>	\$ 7,385,000	\$ 7,385,000	\$ 7,385,000	\$ 7,385,000	\$ 7,385,000
Services Provided to Other Divisions	\$ 34,000	\$ 34,000	\$ 34,000	\$ 34,000	\$ 34,000
<b>Subtotal Operating Expenses</b>	<b>\$ 30,477,000</b>	<b>\$ 30,745,000</b>	<b>\$ 31,012,000</b>	<b>\$ 31,279,000</b>	<b>\$ 31,576,000</b>
Capital Expenditures	\$ 11,540,000	\$ 11,540,000	\$ 11,540,000	\$ 11,540,000	\$ 11,540,000
Debt Service	\$ 4,303,000	\$ 4,303,000	\$ 4,303,000	\$ 4,303,000	\$ 4,303,000
<b>Total Water Operating Expenditures <sup>(g)</sup></b>	<b>\$ 46,320,000</b>	<b>\$ 46,588,000</b>	<b>\$ 46,855,000</b>	<b>\$ 47,122,000</b>	<b>\$ 47,419,000</b>
Percent Increase <b>(Reduction)</b> in Expenditures <sup>(g)</sup>		<b>1%</b>	<b>1%</b>	<b>2%</b>	<b>2%</b>
<b>Proposed Use of Reserve Funds</b>	<b>\$ -</b>	<b>\$ 2,565,000</b>	<b>\$ 5,487,000</b>	<b>\$ -</b>	<b>\$ -</b>
<b>Total Annual Surplus (Shortfall)</b>	<b>\$ (374,000)</b>	<b>\$ 461,000</b>	<b>\$ 923,000</b>	<b>\$ 982,000</b>	<b>\$ 1,464,000</b>

<sup>(a)</sup> Metered Rate Charges assumed to decrease by the same percentage as total water use is reduced.

<sup>(b)</sup> Water Production from groundwater wells assumed to have no net increase (production from individual wells may increase due to increased pumping lifts, but overall demand for groundwater should decrease as demand decreases).

<sup>(c)</sup> Surface Water Treatment Facility costs assumed to increase by 5% per stage as costs to operate WTP increase with each stage (additional surface water production requirements, overtime, etc.).

<sup>(d)</sup> Conservation Service costs assumed to increase 5% for Stage 1, 10% for Stage 2, 15% for Stage 3 and 25% for Stage 4 for additional staff time, advertising to educate customers about need for conservation and enforcement of conservation measures.

<sup>(e)</sup> Water Supply costs assumed to increase 5% per stage as additional surface water supplies are required to compensate for reduction in groundwater supply with each stage.

<sup>(f)</sup> ISF Charges are for services provided by other City divisions.

## **DRAFT WATER SHORTAGE CONTINGENCY RESOLUTION**

*10632 (h) A draft water shortage contingency resolution or ordinance.*

Appendix J contains a draft resolution which can be used to implement one or more stages of the Water Shortage Contingency Plan. The draft resolution is provided as a model, and the text of any resolution and/or ordinance actually adopted may vary from the draft provisions presented in Appendix J.

## **MECHANISMS FOR DETERMINING ACTUAL WATER USE REDUCTIONS**

*10632 (i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.*

The City's water production (including surface water treatment facility production and well production) is continuously monitored by the City's SCADA system. Under normal, non-shortage conditions, totals are reported weekly to the Water Chief of Operations, and monthly to the Water Division Manager as part of the monthly update of the "Goldbook" (the City's compilation of water production data and statistics).

During a Stage 1 or Stage 2 water shortage, production figures will be reported to the Water Chief of Operations daily. The Water Chief of Operations will then compare the weekly production to the target weekly production to verify that the reduction goal is being met. Weekly reports would be forwarded to the Water Division Manager and the Director of Public Utilities. If reduction goals are not met, the Director of Public Utilities would notify the City Manager, Mayor's Office and City Council so that corrective action (i.e., implementation of additional water use restrictions) could be taken.

During a Stage 3 or Stage 4 water shortage, the procedure would remain the same, with the addition of a daily production report to the Water Division Manager.

If the water shortage is the result of a disaster, production figures will be reported to the Water Chief of Operations hourly or on demand, and to the Water Division Manager daily. Regular reports will also be provided to the City Manager, Mayor's Office, City Council, California Department of Health Services, and the City and/or Fresno County Office of Emergency Services, as warranted by the emergency.

Table 9-15 provides a summary of the reporting schedule for the various phases of the Water Shortage Contingency Plan. As shown, with each stage of the Water Shortage Contingency Plan, the water production reporting becomes more frequent, allowing Water Division staff and management to effectively monitor water use and recommend corrective action as needed.

**Table 9-15. Water Production Monitoring Reporting Schedule**

Stage	Reports to Water Chief of Operations	Reports to Water Division Manager	Reports to Director of Utilities	Reports to City Manager, Mayor’s Office, City Council, County OES
Normal	Weekly	Monthly	Monthly	As needed
Stage 1	Daily	Weekly	Weekly	As needed
Stage 2				
Stage 3	Daily	Daily	Weekly	As needed
Stage 4				
Emergency/Disaster	Hourly or On Demand	Daily	Weekly	As needed

Table 9-16 summarizes the water use monitoring mechanisms used by the City.

**Table 9-16. Water Use Monitoring Mechanisms (DWR Table 31)**

Mechanisms for Determining Actual Reduction	Type and Quality of Data Expected
SCADA Monitoring of Water System	Continuous monitoring of surface water treatment facility and well production
Regular Reporting of Production Data	Production figures regularly reported to Water Chief of Operations and Water Division Manager to monitor overall system water demands and demand reductions (if applicable)
Increased Reporting of Production Data During Water Shortages	Production figures reported to Water Chief of Operations, Water Division Manager and Director of Public Utilities to monitor overall system water demands and demand reductions (if applicable) Reporting to City Manager, Mayor’s Office and City Council (if corrective action required) and County OES (if applicable)