

CHAPTER 7. DROUGHT RISK ASSESSMENT

7.1 IDENTIFYING HAZARDS—DESCRIPTION OF THE DROUGHT HAZARD

This section identifies the risks of drought in the City of Roseville.

Rain and snowfall in the American River watershed eventually flowing to and captured in Folsom Lake, a reservoir within the United States Central Valley Project, and to a more limited extent, within the City of Roseville and neighboring jurisdictions, directly affect the water availability for Roseville water users. The City of Roseville owns the Roseville water system and water treatment plant and has negotiated contracts with the U.S. Bureau of Reclamation, the Placer County Water Agency (PCWA), and the San Juan Water District (SJWD) to ensure that water needs for existing and future growth are met.

Drought—Drought is a function of the cumulative impacts of several dry years on water users.

Hydrological Drought—deficiencies in surface and subsurface water supplies.

Socioeconomic Drought—drought impacts the health, well being, and quality of life or is when a drought starts to have an adverse impact on a region.

Source: Placer County Multi-Hazard Mitigation Plan, January 2005

Roseville’s potential drought impacts are limited to hydrological and socioeconomic. The City is largely urbanized with no agricultural interests remaining. Lack of sufficient water supply would affect residents and businesses that rely on water for their daily household, employee, and industrial needs.

7.1.1 Water Supply Strategy

The water supply strategy for the City of Roseville uses a comprehensive approach to ensure water reliability for customers. The City has a diverse set of water supply options including surface water contracts, recycled water, and groundwater wells to ensure that even following a period of dry years, a combination of available water supplies and water conservation measures will ensure that the community has adequate water.

The City of Roseville has contracts for surface water with three agencies. The primary water contract is with the U.S. Bureau of Reclamation (USBR) for 32,000 acre-feet per year of surface water from Folsom Lake. An acre-foot is the amount of water needed to serve one or two households for one year.



Folsom Dam Spillway

Roseville’s secondary supply of surface water is through PCWA. Roseville signed agreements to purchase 10,000 acre-feet of water and has additionally signed for two options for an additional 20,000 acre-feet. Based on the provisions of these contracts, the City of Roseville is entitled to a total of 30,000 acre-feet of water from the Middle Fork of the American River. PCWA has several interconnections between its treated water system and the City of Roseville to supply this water and to enable water supply should an emergency occur. In addition, Roseville is pursuing long-term wheeling agreements that will allow delivery of this PCWA through USBR facilities at Folsom Lake. It is anticipated that this agreement will be

completed in 2005, with use of temporary agreements until completion of the long-term agreement.

The third source of surface water for the City of Roseville is through transfer of underused PCWA water purchased by SJWD and made available to Roseville. SJWD is a water district located in Sacramento and Placer Counties that draws water from Folsom lake. SJWD also wholesales water to Citrus Heights Water District, Fair Oaks Water District, Orangevale Water Company in Sacramento County, which are considered part of the “SJWD Family”. After review of available water under contract by SJWD, it was determined that 4,000 acre-feet could be transferred to Roseville in normal water years. The City of Roseville has entered into a reallocation agreement with SJWD for 4,000 acre-feet per year. Table 7.1 provides a list of contractors and the amount of the water supplied.

TABLE 7.1. CITY OF ROSEVILLE WATER SUPPLY CONTRACTS	
Source	Contract Amount (Acre-Feet per Year)
US Bureau of Reclamation	32,000
San Juan Water District	4,000
Placer County Water Agency	
Exercised	10,000
2 – options	20,000
<i>Placer County Water Agency Total</i>	<i>30,000</i>
Total	66,000

7.1.2 Water Supply Infrastructure

The City of Roseville Water Treatment Plant is located on Barton Road east of Roseville. Constructed in 1971, the water treatment plant treats water to Environmental Protection Agency (EPA) domestic drinking water standards once delivered from Folsom Lake.

The City of Roseville owns the water system network consisting of water mains ranging in size from 4 to 66 inches in diameter. A booster pump station is located near East Roseville Parkway and North Sunrise Boulevard is designed to provide sufficient water pressure to the higher elevations of the city as well as fill and manage the reservoirs in the system. Some areas within the Roseville limits are supplied by either the PCWA or SJWD where due to topography and facility locations it is beneficial to do so. The system is designed to deliver an adequate supply of water throughout the community at an acceptable pressure level for domestic and fire flow purposes.

The City of Roseville supplements its water supply with backup wells located throughout city. These wells are planned to be used primarily to offset cutbacks required from Folsom lake in times of drought or emergencies that may occur. In addition, the City operates a recycled water utility to lessen the use of potable water to irrigate landscaped areas. The City is also pioneering aquifer storage and recovery programs whereby water is proposed to be injected into the underground aquifers in wet years and recovered in dry years for public use.

7.1.3 The Water Forum

In the late 1990s, the City of Roseville Mayor and Environmental Utilities Director participated in the Water Forum, a process and agreement involving regional stakeholders concerned with the protection of

the Lower American River and reliable water supplies. As a result, the City entered into a “Purveyor Specific Agreement” that outlines how the City of Roseville will meet commitments resulting from the Water Forum. These commitments include a strategy for providing a safe and reliable water supply through the year 2030 and protecting resources associated with the Lower American River. A special commitment resulting from the Water Forum Agreement (WFA) is a limitation of diversions from the American River for the City of Roseville from 66,000 acre-feet to 58,900 acre-feet in a normal or wet year.

In the final Water Forum Agreement, Roseville projected a build-out water demand of 54,900 acre-feet for the anticipated growth area at that time. Roseville agreed to limit takes of American River water in reduced amounts based on the supply available, tied to the unimpaired inflow to the American River as described above. In addition, annexations to the city (Foothill Business Park, Doctor’s Ranch, and the West Roseville Specific Plan) occurred after completion of Water Forum negotiations and an additional 4,000 acre-feet was provided through an agreement with SJWD. Therefore, the total water supply allocated through the Water Forum process is 58,900 acre-feet. As water shortages occur, Roseville will reduce American River diversions to a minimum of 39,800 acre-feet. When combined with commitments made through the Water Forum by other agencies, the water supply will be sufficient water to meet all needs.

7.2. DROUGHT HAZARD PROFILE

7.2.1 Location and Extent

Droughts affecting urban areas typically occur after two or three consecutive years of below average rainfall for the period between November and March when about 75 percent of the State’s average annual precipitation falls. The months of December, January, and February are usually when approximately 50 percent of the rainfall occurs in the State of California.

Droughts can be localized to a particular watershed and may affect only a part of the State or can affect the entire State depending on the weather patterns. Droughts in Northern California, the source of 70 percent of the State’s rainfall and much of the developed water supply, rarely last longer than three years.

7.2.2 Drought Event History

State of California

According to the California Department of Water Resources website, the State has measured hydrologic data back to the early 1900s. Data prior to the 19th century are very limited and in some cases have only been discovered through scientific research such as the study of tree rings (<http://watersupplyconditions.water.ca.gov>). The State’s hydrologic data shows multi-year droughts from 1912 to 1913, 1918 to 1920 and 1922 to 1924. Since the early 1920s, three prolonged periods of drought occurred in California.

1929 to 1934 Drought. The 1929 to 1934 drought established the criteria for designing the supply and yield of many large Northern California reservoirs. The Sacramento Valley runoff was 55 percent of average for the time period from 1901 to 1996 with only 9.8 million acre-feet received.

1975 to 1977 Drought. The State of California had one of its most severe droughts due to lack of rainfall during the winters of 1976 and 1977. The year of 1977 was the driest period on record in California with the previous winter recorded as the fourth driest in California’s hydrological history. The cumulative impact led to widespread water shortages and severe water conservation measures throughout the State.

Only 37 percent of the average Sacramento Valley runoff was received with just 6.6 million acre-feet recorded. Over \$2.6 billion in crop damages were recorded in 31 counties. A Federal Disaster Declaration was declared in Placer County and surrounding counties.

1987-1992 Drought. The State of California received precipitation well below average levels for four consecutive years. While the Central Coast was most affected by the lack of rainfall and low run-off, the Sierra Nevada in Northern California as well as the Central Valley counties including Placer County were also affected. During this drought, only 56 percent of average runoff for the Sacramento Valley was received totaling just 10 million acre-feet. By February 1991, all 58 counties in California were suffering from drought conditions and urban areas as well as rural and agricultural areas were impacted.

Placer County

Placer County also experienced drought conditions in 1977, 1988, and in 1991. The PCWA, the County's primary water provider, declared a water shortage in each of these years and restricted water use at levels that varied according to the severity of the drought. In 1977, water use was restricted for both municipal and industrial customers by 50 percent and rates were increased. The PCWA Board lifted restrictions on water use in January 1978.

In 1988, the PCWA declared a water emergency and all customers were required to reduce water consumption by 25 percent with higher rates for use above the specified limits. An emergency was again declared just three years later with raw water customers having to reduce annual water consumption by 50 percent and seasonal usage by 25 percent. The drought emergency ended in April 1991.

Placer County had two agricultural drought declarations in 2001 and 2003 with some crop damage reported.

Roseville Drought History

Roseville's drought history parallels the water shortages noted for the State of California and Placer County. The Roseville City Council has only declared an official drought once in its history from April 1991 to March 1993 when Stage 2 drought water restrictions were in effect and enforced through full-time water patrols. Water conservation measures included the prohibition of washing streets, parking lots and sidewalks, water was served in restaurants by request only, landscape irrigation was limited to early morning and night hours and commercial irrigation accounts had to reduce consumption by 30 percent when compared to 1990 water consumption levels.

Roseville's drought levels are now defined by the Water Forum Agreement definitions as adopted by the member agencies in 1999. The definition is based on the type of hydrologic year for inflow to the Folsom Reservoir, which serves Roseville among many other purveyors, and 70 years of hydrologic data into Folsom Reservoir.

Local Water Contracts—Definition of Drought

The Water Forum Agreements define various hydrologic water year types. These include Baseline, Wet/Average Years, Drier Years, and Driest Years. Each of these year types along with a description of the amount of water the City may divert under each condition is described below.

Baseline

Baseline means the historical maximum amount of water that suppliers diverted from the American River in any one year through 1995 or in certain appropriate instances other amounts specified in a Purveyor Specific Agreement. For the City of Roseville, the baseline amount is 19,800 acre-feet per year.

Wet/Average Years

Years when the projected March through November unimpaired flow to Folsom Reservoir is greater than 950,000 acre-feet are classified as wet or average years. The City of Roseville can divert (use) up to 54,900 acre-feet per year plus an additional 4,000 acre-feet from the SJWD in this year type.

Dry or Drier Years

Dry or drier years are when the projected March through November unimpaired flow to Folsom Reservoir is less than 950,000 acre-feet and greater than 400,000 acre-feet. Dry years over the 70-year hydrologic record are listed in Table 7.2.

TABLE 7.2. DRY YEAR FLOWS INTO FOLSOM RESERVOIR			
Dry Year	Unimpaired Inflow to Folsom Reservoir (1,000 acre-feet)	Dry Year	Unimpaired Inflow to Folsom Reservoir (1,000 acre-feet)
1931	571	1981	881
1934	690	1987	705
1939	873	1988	545
1959	872	1990	873
1961	854	1992	631
1976	518	1994	649

The City’s maximum diversion will decrease from 54,900 acre-feet to 39,800 acre-feet with PCWA Water Agency’s Middle Fork Project providing replacement water to the river equivalent to Roseville’s diversions above the baseline (1995 levels of diversion = 19,800 acre-feet). Replacement water is required to remain in the river to the confluence of the American and Sacramento rivers, but can be sold to downstream users. During this year type, the PCWA replacement water will be no more than 20,000 acre-feet so the total allocation received by Roseville will be 39,000 acre-feet (20,000 acre-feet plus the baseline of 19,800 acre-feet = 39,800 acre-feet). The Water Forum refers to this replacement water as “re-operation” or “re-op” water. SJWD water is not available in these conditions as a condition of the transfer agreement.

Driest Years (Conference Years)

Years when the projected March through November unimpaired flow to the Folsom Reservoir is less than 400,000 acre-feet are defined as the driest years or conference years per the Water Forum Agreement. Table 7.3 provides a list of driest year flows into the Folsom Reservoir.

TABLE 7.3. DRIEST YEAR FLOWS INTO FOLSOM RESERVOIR	
Dry Year	Unimpaired Inflow to Folsom Reservoir (1,000 acre-feet)
1924	379
1977	332

Conference years require the City and other stakeholders to meet and confer on how best to meet current demands and how to protect the American River. Under this year type, the City will decrease its diversions to 39,800 acre-feet and PCWA’s Middle Fork Project water will provide 20,000 acre-feet of replacement water to the river. Should the unimpaired inflow into Folsom Reservoir be insufficient to supply this quantity, Roseville will meet with other purveyors and stakeholders in the region to determine how the available water supply should be managed. The Water Forum Agreement includes a set of guiding principles for such a meeting.

7.2.3 Probability of Future Drought Occurrences

Through the Water Forum process, water supplies from the American River watershed were reviewed based on water available on a 70-year hydrologic pattern and the water rights and water supply contracts that exist for the City. This analysis provided the frequency and duration of anticipated shortages in future years and was compared to commitments made to the water supply. The City used this information to develop conservation measures for a cut back of up to 32 percent from the build-out water demand that is projected.

Unimpaired flow (March through November) into Folsom Reservoir varies and depending on the type of year, Roseville will decrease the amount of surface water taken (54,900 acre-feet to 39,800 acre-feet) in proportion to the decrease in unimpaired inflow, from 950,000 to 400,000 acre-feet.

There have been two years within the 70-year hydrologic record when the unimpaired inflows to Folsom Reservoir did not reach 400,000 acre-feet. The State of California had a multi-year drought from 1922-24 that affected the inflow to the Folsom Reservoir, with the most dramatic impact in the third year 1924.

From November 1975 through November 1977, California had very little rainfall and suffered severe drought conditions. In winter 1976, only 1/2 of the precipitation was received and in 1977, only 1/3 of normal precipitation occurred. This resulted in Folsom Reservoir being at its lowest recorded levels.

The USBR mandated supply cutbacks to Roseville’s water supply contract in 1990, 1991, 1994, and 2001. These cutbacks required exercising water options with PCWA to reduce projected shortfalls. This water was conveyed through USBR facilities under a single year, temporary wheeling contract.

7.2.4 Other Potential Factors for Drought Vulnerability

A significant potential factor regarding drought vulnerability includes potential changes in the distribution of water based on increased demand in the region due to growth. The City has long-term contracts now with the federal government and local regional agencies. Should these be renegotiated in the distant future, the potential for water shortages would be present.

7.3 VULNERABILITY ASSESSMENT

Based on the hydrologic data for the American River, there is a probability that rainfall will be insufficient once every 17 years to supply the Folsom Reservoir and guarantee the City of Roseville its existing contract amounts. In these years, the City by agreement is required to find alternate sources of supply to reach the average or wet year supply.

Having the flexibility to use both the USBR and PCWA contractual supplies during a drier or driest year enables the City to provide a 73 percent reliable surface water supply for municipal and industrial uses. By incorporating groundwater into the water supply strategy, the City’s reliability increases to 90 percent. The remaining ten percent will be compensated for by water use reductions (implementation of drought stages as outlined in the Roseville Municipal Code) due to conservation.

The City’s Environmental Utilities staff acknowledges that in certain extreme conditions, or potentially successive dry years, it is possible, although unlikely, that Roseville’s diversion could drop below 39,800 acre-feet per year. The City’s Urban Water Management Plan Update of 2003 outlines the Roseville’s Water Supply Reliability at Build-out for a three year drought. Water would be supplied by the American River through Folsom Reservoir and groundwater only in the second year of a drought. Roseville’s recycled water utility is expected to provide a constant annual supply of 4,526 acre-feet per year. A summary of the water supply reliability at build-out for multiple dry water years is provided in Table 7.4.

	Normal Water Year	Single Dry Water Year	Multiple Dry Water Years		
			Year 1	Year 2	Year 3
Surface Water Supply	58,900 ⁵	54,900 ¹	54,900 ¹	47,350 ³	39,800 ⁴
Groundwater	0	0	0	2,739	8,822
Recycled Water	4,526	4,526	4,526	4,526	4,526
Projected Demand	58,662	58,662 ⁶	56,081 ²	54,615 ²	53,148 ²
<u>Surplus or (Deficit)</u>	4,764	764	3,345	0	0

Notes:

1. Although contracts are in place for normal water year supplies of 62,000 acre-feet, the supply shown is consistent with Water Forum Agreement diversion limits and water is not available from San Juan Water District. Volume is dependent on unimpaired inflow to the American River.
2. Conservation savings in times of shortage is estimated at 5% for the pre-annexation city area in the first year of multiple dry years. Prolonged shortage savings is estimated at 7.5% and 10% in pre-annexation areas and 2.5% and 5% for annexation areas in later years through continued conservation messages.
3. Surface supply is estimated at 50% ramp down, consistent with Water Forum supply agreement (drier years)
4. Surface supply reduction is consistent with Water Forum supply agreement anticipating worst case shortage (driest years)
5. Although additional water is under contract, surface water supplies are available based on Water Forum Agreement diversion commitments.
6. Conservation measures would be implemented in event of supply cutback. Savings are not projected for these programs for reliability in a single dry year.

Source: City of Roseville 2003 Urban Water Management Plan Update

7.3.1 Building Inventory Information

Roseville has a total of 43,099 housing units as of January 1, 2005. Single family detached residential units account for 79 percent of the total developed residential units in Roseville. The total number of units by type of dwelling unit is show in Table 7.5.

TABLE 7.5. RESIDENTIAL DWELLING UNITS IN THE CITY OF ROSEVILLE AS OF JANUARY 1, 2005	
Type of Unit	Existing Citywide Units
Single Family	31,299
Half-Plex	417
Other Attached Single Family	266
Duplex	552
Mobile Home	443
Multi-Family (>=3 units attached)	9,199
Total	43,099

Source: City of Roseville Planning Department Quarterly Development Activity Report, January 2005

Roseville has over 27 million square feet of developed non-residential land uses on 3,000 acres city-wide. A majority of this development has occurred since the mid-1980s when the specific plan process was established and large tracts of land were entitled for development. Table 7.6 presents the amount of developed acreage according to type of land use.

TABLE 7.6. NON-RESIDENTIAL DEVELOPMENT IN THE CITY OF ROSEVILLE AS OF JANUARY 1, 2005		
Type of Land Use	Developed Square Feet	Developed Acres
Commercial/Retail	10,818,409	1,279.75
Business/Professional Office	6,000,197	528.73
Daycare	7,500	1.33
Industrial/Warehouse	8,404,151	832.48
Public and Quasi-Public Uses; Churches; Parks and Recreation	2,017,530	372.72
Total	27,247,787	3,051.01

The City uses the current building inventory information and project development entitled through the specific plan process to estimate future water usage as shown in Table 7.7 later in this section.

7.3.2 Impact of Drought on Life, Safety and Health

The City of Roseville, regional water purveyors, members of the Water Forum agreement, and the USBR have spent considerable time and effort to protect life, safety and health should several consecutive dry years occur. Provisions and measures have been taken to analyze and account for anticipated water shortages. The City has the ability to minimize any impacts on residents and water consumers in Roseville. No significant life or health impacts are anticipated as a result of drought in Roseville.

7.3.3 Impact of Drought on Critical Facilities Inventory

Critical facilities as defined for this plan, will continue to be operational during a drought. Although, critical facility elements such as landscaping may not be maintained due to limited resources, the risk to the city's critical facilities inventory will be largely aesthetic. For example, when water conservation measures are in place landscaped areas will not be watered and may die. These aesthetic impacts are not considered significant.

7.3.4 Structures

No structures will be affected by drought conditions in Roseville.

7.3.5 Economic Impact

Economic impact will be largely associated with those industries that use water or depend on water for their business. For example, landscaping businesses were affected in the droughts of the past as the demand for service significantly declined because landscaping was not watered. The City's Environmental Utilities Department through the water conservation programs works to ensure that those businesses whose product relies on water during the process receive their allotments to continue operating.

7.3.6 Impact of Drought on Future Trends in Development

Table 7.7 illustrates past, current, and projected water use from 1990 to 2020 in acre-feet per year. Water use is estimated by review of existing meter data as well as proportioning un-metered water based on flat rate sales within the service area.

7.4 REVIEW OF EXISTING ORDINANCES, PROGRAMS, AND PLANS

Since California's 1975 to 1977 drought, Roseville has had a policy of no water waste supported by City ordinances. The City adopted a "No Waste" ordinance in 1989 and most recently updated the Water Conservation Ordinance (Roseville Municipal Code Chapter 14.09—Water Conservation) in April 1991 to include drought mitigation measures. The ordinance provides conservation measures for shortages in water supply due to drought conditions. Drought mitigation is achieved through a tiered approach that is based on the surface water available to Roseville. As water supplies decrease, additional restrictions are imposed. Conservation measures (water use restrictions) have been established to address conditions from adequate water supplies to conditions in which surface water supplies are capable of meeting only 50 percent of Roseville's water needs.

A significant portion of Roseville's water is used for landscape irrigation. Landscape irrigation also accounts for a large portion of water wasted in Roseville. Conservation patrols are used to enforce City ordinances restricting water waste. These patrols generally consist of existing service workers that identify and document water waste during daily travels or when responding to complaints. Evening calls are made in response to resident complaints.

In times of reduced water availability, higher drought stages are implemented. In summer 1991, Roseville hired temporary employees to serve as the first dedicated water patrol. This patrol supplemented existing service crew coverage and provided 24-hour per day capability. These patrols led to the issuance of over 500 water waste citations that greatly decreased water wasted through malfunctioning irrigation systems and/or excessive watering.

TABLE 7.7.
CITY OF ROSEVILLE PAST, CURRENT, AND PROJECTED WATER USE (ACRE-FEET PER YEAR)

Water Use Sectors	1990	1995	2000	2005	2010	2015	2020
Single family residential	7,534	9,966	13,566	21,327	23,486	26,164	28,089
Multi-Family residential	589	780	1,061	1,668	1,837	2,047	2,197
Commercial	713	943	1,284	2,019	2,223	2,477	2,659
Industrial	1,507	1,993	2,713	4,265	4,697	5,233	5,618
Institutional and Governmental	717	948	1,290	2,028	2,234	2,489	2,672
Landscape	2,897	3,832	6,216	8,199	9,029	10,059	10,799
Sales to other agencies	0	0	0	0	0	0	0
Groundwater recharge (recycled water)	NA						
Conjunctive use ¹	0	0	0	0	0	0	0
Agriculture ²	0	0	0	0	0	0	0
Unaccounted system loss ³	285	377	513	806	888	989	1,062
Total	14,242	18,839	26,644	40,314	44,395	43,457	53,095

Notes:

1. Conjunctive use programs are currently being developed and will be included in future city studies.
2. No agricultural water use is required in the Roseville service area.
3. Unaccounted system losses are estimated at 2% of total water production, which is not considered unreasonable for well-run and new systems. Actual loss will be evaluated once full system metering is completed.

NA = Not applicable

Source: City of Roseville 2003 Urban Water Management Plan Update

Roseville has a number of programs and policies that are implemented as early as possible to reduce water use in the event of a prolonged water shortage. Roseville, as a USBR contractor, is required to develop and maintain a water conservation plan consistent with the requirements of the Central Valley Project Improvement Act (CVPIA) of 1992. In addition, Roseville is a member and signatory to the American River Water Forum, which also includes requirements for water conservation programs.

To proactively promote water conservation and to be prepared in the event of a water shortage, the City implements Demand Management (Conservation) Measures, is developing supplemental water supplies, and has a Water Shortage Contingency Plan. These are summarized in the City of Roseville 2003 Urban Water Management Plan Update (2003) and detailed in the work programs for the Environmental Utilities Department Water Division.

7.5 REVIEW OF MITIGATION ALTERNATIVES

Chapter 15 of the City’s Multi-Hazard Mitigation Plan identifies mitigation measures for all hazards in the Roseville plan including drought. These strategies are included based on a review of Roseville’s existing programs and services, potential future resources, capabilities, and the goals of the plan. A comprehensive review of the mitigation alternatives occurred prior to the summary of mitigation strategies. For the drought hazard, mitigation alternatives reviewed include initiatives in the following categories:

7.5.1 Preventive Activities

Preventive activities are those associated with regulation and project conditions. The City of Roseville's existing regulatory approach to managing water supply emphasizes appropriate use of water in all phases of project development. Elements of this program include the following:

- The City's Planning Department adopted Water Efficient Landscape Requirements in 1993. These requirements are applicable to parcels within the City of Roseville to new and rehabilitated landscaping for industrial, commercial, office, institutional, multi-family residential common areas, model homes, developer installed landscaping for single-family residences, and developer and city-installed landscaping which is city maintained. The requirements set forth the general design criteria for the installation of water conservation oriented landscape design making landscapes less vulnerable to periods of severe drought. The Uniform Plumbing Code is updated to include water efficient technologies. Post 1992 homes have been equipped with water efficient devices saving water with each use which results in conservation during typical uses. Features included are low water using interior fixtures and ultra-low flush toilet installations.
- Water use reviews of any new construction is required to insure that appropriate internal conservation measures are taken. These reviews are conducted as part of project conditioning and permitting.
- When appropriate, recycled water is required for use on landscaping. This allows potable supplies to be reserved for applications that recycled water in either not available or its use would be inappropriate.

7.5.2 Property Protection Activities

Property protection activities include assistance related to water waste during times of shortage that can minimize losses associated with prolonged drought conditions. Program elements include:

- Water leaks found on private property are the responsibility of the property owner to repair. The city, however, works with these customers to identify areas in need of repair.
- In times of drought, watering restrictions have been designed to minimize impact to landscape. Water cutbacks could hopefully be monitored to balance water availability with landscape stress, minimizing permanent losses associated with cutbacks.

7.5.3 Resource Protection Activities

Resource protection activities include activities that will make the best use of available water supplies. The City's current policies and programs that emphasize water conservation meet these criteria and should be continued. The City of Roseville has developed a Water Conservation Plan that includes certain Best Management Practices (BMP) regarding all aspects of residential, commercial and industrial applications. Conservation criteria were required and programs were developed to meet these criteria. Each year, the conservation program grows and practices change to best meet the needs of the customers while satisfying the established targets. The program consists of the following:

- Comprehensive water audits performed on all customer types. Certified water auditors perform thorough internal and external water audits on customer's homes and businesses looking for leaks, inefficiencies and opportunities for water savings.

Recommendations are given to the property owner after each audit on the findings and what steps they should take to improve their water usage.

- Providing plumbing retrofit kits to homes constructed prior to 1992. At various community events and at on-site audits plumbing retrofit kits are given away to those that need them. These kits include conservation oriented shower heads, faucet aerators, toilet tank replacement flapper, exterior hose shut-off nozzles, soil moisture meters, and toilet leak detection dye tablets.
- Evaluation of current city owned distribution system checking for leaks and repairing those found. The city's distribution system is tested and monitored to ensure system leaks are found quickly and repaired. New technologies could be used to locate hard to find water losses through expanded programs.
- Residential meter retrofits for homes constructed without a water meter and a tiered meter rate structure. The city developed a meter retrofit program whereby all non-metered residential customers will be metered within 10 years of program development and will be placed on a metered rate. Metered usage allows the city to better track water usage and more quickly identify problem areas. Also, this information provides customers direct feedback on water use and allows them to make lifestyle changes that result in water conservation. Each month, the city reviews the top 20% of water users, contacts them, and works with them to reduce their usage.
- Large landscape audits are offered to all landscaped areas larger than 1 acre in size. The goal is to identify inefficient irrigation systems or system in disrepair and offer recommendations and incentives for repair.
- City departments collaborate to provide school based educational programs. Students are taught, through various means, about ecology, conservation and efficiencies. Taking this message home goes far in developing a conservation minded attitude by future generations.
- The city conducts water waste patrols during peak summer months looking specifically for irrigation abuses and other water loss problems. Also, throughout the year, city employees are encouraged to patrol while responding to other city business.
- New water efficient programs are developed as funding is identified. Conservation oriented rebate programs such as the Water-Wise House Call, Ultra Low-Flush Toilet Rebate Program, the High Efficiency Clothes Washer Rebate Program, the RE-View Energy and Water Audit program, the large landscape audits, residential plumbing retrofits and a new ET irrigation controller replacement program are current programs offered to Roseville customers . As funding becomes available, the City will provide incentives to the development community to produce homes with the utmost efficiencies in mind.

7.5.4 Emergency Service Activities

Emergency services activities include activities that deal with warning and response to events. As illustrated in Section 4.2 of this plan, Roseville's existing programs in this category are exemplary. Possible program enhancements may include the following:

- Early identification of required enforcement of water conservation ordinance and determination of cutbacks required. Keeping public informed as to ongoing water supply issues will allow consumer changes to occur as the need develops.

7.5.5 Structural Activities

These types of activities include structural solutions that could potentially provide additional water supplies on an emergency basis. These projects can be expensive. When reviewing these types of activities, the City of Roseville will emphasize the benefits of the project versus its cost. Structural solutions include the following:

- Roseville is developing alternative water supplies through installation of wells in new development areas. Although water supplies are primarily surface water, groundwater can be used when surface water may not be available due to drought conditions.
- Wells constructed and rehabilitated in Roseville include the necessary features to store surface water, when available, in groundwater basins. Use of this Aquifer Storage and Recovery (ASR) capability insures that groundwater supplies are available when needed and can managed to result in no impact to the basin even when extractions are required for extended periods.
- Roseville looks to develop reliability of the system through system inerties with surrounding water purveyors. This allows water transfers as needed to meet purveyor needs. Depending on the agency, water supply availability and transfer capability drought conditions may be able to be mitigated.

7.5.6 Public Information Activities

Public information activities include activities that provide shortage and conservation information to the public that will aid them in preparing, responding, recovering and mitigating from the impacts of a drought or water shortage. Roseville's current programs under this category excel in all facets of this category. Program elements include the following:

- City's water conservation website provides information on water supply availability and potential cutbacks. Also included in considerable information of conservation measures that can be taken to reduce water use.
- Internal media (EU Today, Roseville Reflections, bill inserts and bill messages, government access channel, city council, public utilities commission)
- Regional media conservation efforts (Sacramento Bee, local news stations, press Tribune, billboards). As drought conditions persist Roseville would work cooperatively with other agencies to develop a regional message regarding conservation and water supply conditions.
- Public Outreach events (Downtown Tuesday Night, National Night Out, Earth Day, landscape workshop sponsorships) are all used to work with area water users to educate on conservation techniques and abilities.
- School programs (Newspaper in Education, LivingWise, concerts)
- Development of Utilities Education Center at Mahany Library.