APPENDIX H-2

CREEKVIEW WATER SUPPLY ASSESSMENT

WATER SUPPLY ASSESSMENT FOR THE CREEKVIEW SPECIFIC PLAN

Prepared By

City or Roseville

Environmental Utilities Department

December 2010

WATER SUPPLY ASSESSMENT FOR THE CREEKVIEW SPECIFIC PLAN

INTRODUCTION

PURPOSE

Senate Bill 610 requires a City or County to request and the public water system to prepare, an assessment of the availability of water supplies for certain large development projects. Such a water supply assessment (WSA) is performed in conjunction with the land-use approval process. The WSA must include an evaluation of the sufficiency of the water supplies available to the water supplier to meet existing and anticipated future demands, including the demand associated with the project over a twenty-year horizon that includes normal, single-dry and multiple-dry years.

The WSA must identify existing water supply entitlements, water rights, or water service contracts held by the water supplier or relevant to the identified water received in prior years by the public water system.

If the public water supplier includes groundwater supplies, the WSA must describe all groundwater basins from which the proposed project will be supplied. For each basin that has not been adjudicated the assessment should indicate whether the Department of Water Resources has identified the basin as over drafted or has projected that the basin will become over drafted if present management conditions continue. In addition the report should provide a detailed description of the efforts being undertaken in the basin to eliminate the long-term over draft condition.

If the WSA concludes that additional water supplies are necessary, the public water supplier must submit plans for acquiring additional water supplies including the measures that would be taken to acquire and develop supplies. The future water supply projects and programs discussion may be based upon proposed methods of financing, estimated costs, information related to federal, state and local permits and the estimated timeframes within which the public water system expects to be able to acquire the additional supplies.

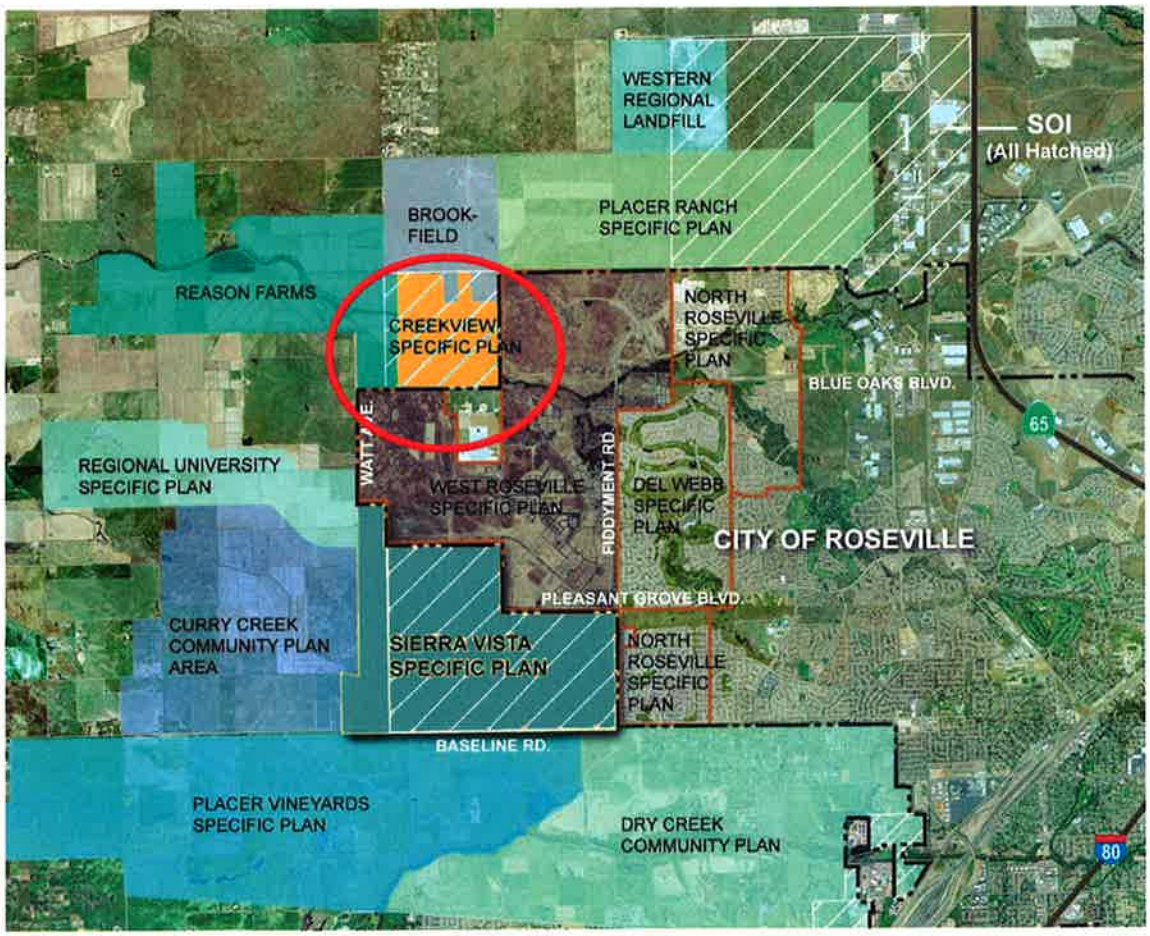
PROJECT DESCRIPTION

This WSA is prepared for the proposed Creekview Specific Plan (CSP), an approximately 501 acre mixed use development project proposed in Placer County, California, north and west of the City of

Roseville existing boundary, north of the planned extension of Blue Oaks Boulevard and north of the Roseville Energy Park. The project site is located approximately 6 miles west of Interstate 80 and State Route 65, and is approximately two miles west of the Blue oaks Boulevard interchange on SR 65 and is shown on Figure 1.

FIGURE 1

PROJECT LOCATION



PROJECT AREA CHARACTERISTICS

The CSP is currently undeveloped annual grasslands that were historically used for agricultural or grazing activities. Two tributaries of Pleasant Grove Creek: Coyote Creek and University Creek are located on the southeast and north sections of the site respectively. The land formation within the project area is generally composed of rolling topography with mild slopes. The elevation of the project area ranges between 75 feet and 100 feet above mean sea level (msl).

PROJECT BACKGROUND AND HISTORY

Pursuant to the California Environmental Quality Act (CEQA), the City is preparing the Creekview Specific Plan Environmental Impact Report (EIR) that evaluates the environmental impacts of the proposed CSP. Information from this WSA is used in the analysis of project impacts in the Public Utilities section of the EIR. The EIR includes extensive analysis of the potential environmental impacts of the water supply strategy for the project.

The CSP EIR examines the potential effects of a proposed project that includes: 1) amending a 501-acre area, immediately west of the City of Roseville (City) corporate boundaries, north of Blue Oaks Boulevard planned extension, in unincorporated Placer County into the City's jurisdiction (annexation); 2) expanding approximately 373 acres, of the City's Sphere of Influence (SOI) over a small portion of the western boundary), and 3) adopting the Creekview Specific Plan (CSP) and associated entitlements.

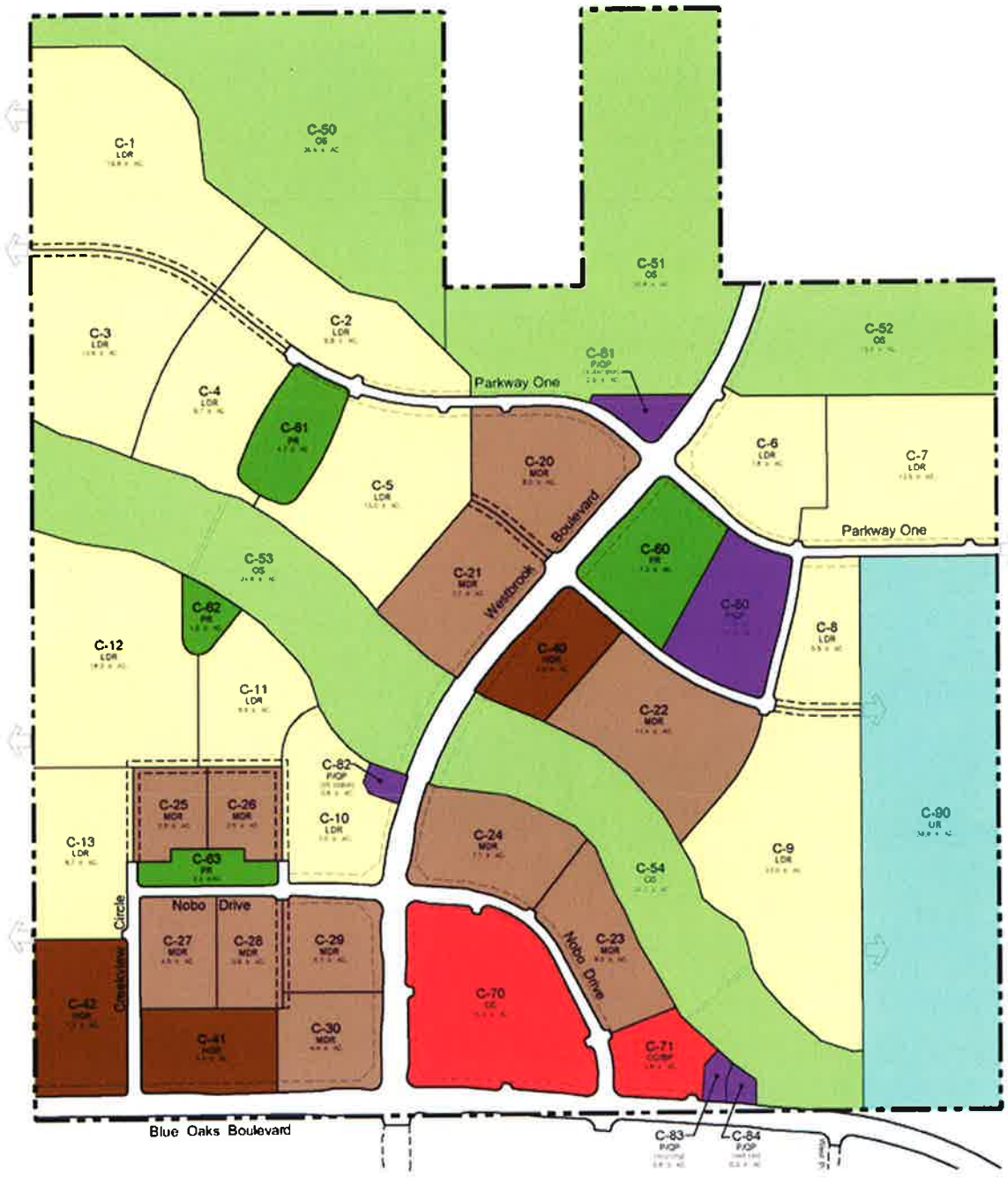
The Creekview Specific Plan (CSP) is a proposed specific plan project that would include development of a mix of land uses, including 2,011 residential units, approximately 19 acres of commercial and office uses, approximately 53 acres of public/quasi-public, 136 acres of open space uses, and 16 acres of parks. The proposed project site is within the City's SOI, which was expanded in 2004, as part of the West Roseville Specific Plan (WRSP) annexation.

PROPOSED PROJECT

The CSP project proposes to annex the property into the City of Roseville and change the adopted land use and zoning presently in Placer County. The Placer County General Plan currently designates most of the project site as Agriculture/Timberland, 80-acre minimums. The CSP is designated in the Placer County Zoning Ordinance as Farm Combining Building, Site, 80-acre (FB-X-80). The CSP would change the existing General Plan and Zoning from farm uses on approximately 501 acres to allow a mix of commercial, business professional, and residential land uses with up to 2,011 residential units. The summary of the proposed land use designations are graphically illustrated on Figure 2.

FIGURE 2

LAND USE PLAN



As shown on Figure 2, Creekview Specific Plan's proposed land use plan includes low, medium, and high density residential uses; community commercial; commercial mixed-use; public/quasi-public; parks

and recreation areas, open space, and paseos; landscape corridors; an urban reserve area; and roadways. At buildout, the proposed project would provide approximately 2,011 dwelling units, generate a population of approximately 5,108 persons, based on the City of Roseville's General Plan assumption of 2.54 persons per household. According to the specific plan, the project would accommodate approximately 190,000 square feet of retail and office uses, which would generate approximately 445 jobs. The Creekview Specific Plan also includes 39.9 acres of Urban Reserve Area. While this WSA includes the Urban Reserve area, no development is proposed on those parcels. The Creekview Specific Plan's proposed land use designations, applied zoning districts, acreages, and total dwelling units are summarized in Table 1.

TABLE 1
CSP LAND USE SUMMARY

Land Use Designation		Applied Zoning Districts	Acres	Units
Residential Neighborhoods				
LDR	Low Density Residential	RS/DS	155.8	836
MDR	Medium Density Residential	RS/DS and R3/DS	64.3	655
HDR	High Density Residential	RS/DS and R3/DS	17.1	520
	Subtotal		*237.2*	*2,011*
Commercial and Employment				
CC	Community Commercial	CC	15.5	
CC/BP	Community Commercial / Business Professional	CC/BP	3.8	
	Subtotal		*19.3*	
Open Space/Public				
P/QP	Public/Quasi-Public	P/QP	9.6	--
P/R	Parks and Recreation	P/R	15.7	--
OS	Open Space	OS	136.2	--
OS	Paseos	OS	0	--
UR	Urban Reserve	UR	39.9	--
	Subtotal		*201.4*	--
Roadways and Landscape Corridors			*43.4*	--
TOTAL			**501.3 Acres**	**2,011 DU**

DESCRIPTION OF THE CITY OF ROSEVILLE SERVICE AREA

The City of Roseville is located in Northern California's Central Valley, within comfortable driving distance of both the Sierra Nevada Mountains and the Pacific Coast, midway between the cities of Sacramento and Auburn. A mixture of residential, park and recreation, commercial and industrial land uses characterizes the service area.

The City of Roseville's climate is described as mild with abundant sunshine year-round averaging 285 sunny days per year. Total rainfall averages 17.5" with the majority of rain between January and March. Summer months rarely experience precipitation. Peak water demands occur during the summer months.

The City's water service area is currently divided into six pressure zones. With the exception of Pressure Zone 4, where pressure is reduced through pressure reducing stations, all other pressure zones (Pressure Zones 1, 2, 3, 5, & SJWD) are either serviced by gravity, require boosting or are served by adjacent water agencies that have sufficient pressure to serve these areas. The proposed CSP would be included in Pressure Zone 4.

SCOPE OF WATER SUPPLY ASSESSMENT

This WSA discusses historic water supplies, current water supplies, and additional sources of supply that will be available to serve planned future growth. This information is presented consistent with the requirements of SB-610 and as detailed in Water Code Section 10910 - 10915, and includes:

- Description of existing and projected water demand.
- Description of existing and projected water supply sources including:
    - Groundwater basins, surface water and other sources.
    - Opportunities for exchange or transfers of water on a short-term and long-term basis.
    - Plans to acquire additional water supplies.
- Assessment of the availability of existing and projected water supply sources during normal, single-dry, and multiple-dry years within a 20-year projection.

The WSA for the proposed CSP project contains information derived from several sources including:

- *Creekview Specific Plan Master Water Study,* MacKay and Somps, November 30, 2010

- *Creekview Specific Plan Recycled Water Master Plan*, MacKay and Somps, November 30, 2010
- *Creekview Specific Plan Water Conservation Plan,* HydroScience Engineers, Inc., November 23, 2010
- *City of Roseville Urban Water Management Plan,* Brown and Caldwell, 2006
- *Groundwater Impact Analysis for Proposed Reasons Farms Land Retirement Plan, MWH, June 2003*
- *PCWA's Integrated Water Resources Plan,* Brown and Caldwell, August 2006
- *Placer Groundwater Management Plan,* PCWA 1998
- *Sierra Vista Specific Plan EIR Technical Memorandum: Effects of Changed Water Management Operations on Fisheries and Water Quality Impacts Previously Disclosed in the Water Form Agreement EIR, Robertson-Bryan Inc. and HDR, October 2009*
- *Sierra Vista Specific Plan FEIR*, May 2010
- *TM-1 – Unit Water Demand Factor Verification and Water Demand Evaluation and Update,* MWH, September 2006
- *TM 5a – Market Assessment for Recycled Water Distribution System,* RMC, Updated February 2008
- *Water Forum Agreement Final EIR,* November 1999
- *West Roseville Specific Plan FEIR,* February 2004
- *Western Placer County Groundwater Management Plan,* MWH ,August 2007

Water Code Sections 10910 - 10915 (inclusive) require land use lead agencies: 1) to identify the responsible public water purveyor for a proposed development project, and 2) to request from the responsible purveyor, a "Water Supply Assessment" (WSA). The purpose of the WSA is to demonstrate the sufficiency of the purveyors' water supplies to satisfy the water demands of the proposed development project, while still meeting the current and projected water demands of existing customers. Water Code Sections 10910 – 10915 delineate the specific information that must be included in the WSA.

This WSA is structured in way that clearly shows which portion of the Water Code Section is being satisfied by stating the section number and title. Additional information is provided where it is useful in the understanding of the proposed Project, its water demands, and its water supplies.

Section 10910(a) ***Determine if a proposed project is subject to California Environmental Quality Act (CEQA).***

The City of Roseville has made the determination that the proposed Creekview Specific Plan (CSP) is subject to CEQA.

Section 10910(b) ***Identify responsible public water system that will or may supply water to the proposed project.***

The City of Roseville has been identified as the responsible public water system for the CSP.

Section 10910(c)(1) ***Determine if the most recent Urban Water Management Plan (UWMP) includes projected water demand associated with the project.***

The 2005 UWMP dated March 2006, which was adopted by City of Roseville's Council Resolution 06-108, identifies current and projected water supply and demand through 2030 based on General Plan buildout. Because the proposed project is an annexation, water demands for the CSP were not included in the 2005 UWMP. The 2005 UWMP will be updated to reflect the water demands associated with the proposed project as described herein.

Water Demand

Water demand is the amount of water required to service customers on an average annual basis. The City measures this amount of water in acre feet per year (AFY). One acre foot of water is the volume of

water that can cover an acre of land at a depth of one foot and equals 325,828 gallons. Total water demand for buildout of the City's existing General Plan and the CSP was developed using the City's unit demand factors and applying those factors to the proposed land uses for the plan area.

Water demands are segmented into potable demands and recycled water demands. Potable demands are that component of the total water demand that will be used for public health related activities such as drinking water, indoor use and irrigation in instances when recycled water is not available. Potable water demand needs are typically met by surface water supplies and supplemented by groundwater supplies for backup during emergency or surface water shortage conditions. Recycled water is tertiary treated wastewater and is a component of the overall water demand that can be used for irrigation. Net potable demands are calculated by subtracting estimated recycled water demands from the total water demand of the City.

The City's unit water demand factors are based upon actual customer water meter usage data. The current demand factors were developed in 2002 as part of the West Roseville Specific Plan process. The City conducted an additional study in 2006 to re-confirm the unit demand factors using a longer history of available water meter data from City customers. This study, *TM-1 – Unit Water Demand Factor Verification and Water Demand Evaluation and Update by MWH, September 2006* is provided in Attachment 1 of this WSA. The study re-confirmed the appropriateness of the unit demand factors developed in 2002. These factors are provided in Table 2.

TABLE 2

WATER DEMAND FACTORS

Residential Land Use Categories	Unit Demand Factor (GPD/DU)
LDR1 (<3.5 DUs / Acre)	728
LDR2 (3.5 to 5 DUs / Acre)	600
LMDR1(>5.0 to 6.0 DUs / Acre)	521
LMDR2(6.0 to 8.0 DUs / Acre)	430
MDR (>8.0 to 12.0 DUs / Acre)	323
HDR1 (>12.0 to 16.0 DUs / Acre)	288
HDR2 (>16.0 DUs / Acre)	177
Non Residential Land Use Categories	**Unit Demand Factor (GPD/AC)**
Community Commercial / Retail	2,598
Business Professional	2,598
Light Industrial	2,598
Industrial	2,562
Railyard	109
Elementary School	3,454
High School	4,069
Pubic Quasi-Public	1,780
Parks	2,988
Open Space / Right of Way	0

GPD/DU = Gallons per day per dwelling unit
GPD/AC – Gallons per day per acre

The total water needed for buildout of the City's existing General Plan and the CSP was determined by applying the demand factors in Table 2 to proposed land uses in the CSP and the Urban Reserve parcels. Finally, a two percent factor is added to account for water system losses.

General Plan Buildout Demands

At buildout of the City's current General Plan, water demands are estimated to reach 61,709 AFY. Table

3 provides a summary of these demands.

TABLE 3

GENERAL PLAN BUILDOUT WATER DEMANDS

Project Land Use	Water Demand (AFY)
Low Density Residential	25,354
Medium Density Residential	7,939
High Density Residential	3,369
Commercial	6,974
Commercial Business Park	2,494
Industrial	1,532
Light Industrial	3,644
Public/Quasi Public	1,184
Parks	6,575
Rail Road	70
Schools	2,076
Open Space	0
Urban Reserve (SVSP)	3
Sub-Total (w/o losses)	61,214
2% of Losses (a)	1,224
Sub-Total (w/losses)	62,348
Water Conservation Reduction (SVSP)	-729
Total Water Demand	**61,709**

SVSP = Sierra Vista Specific Plan

CSP Water Demands

For purposed of discussion the annexation area (or project) is comprised of the CSP area and the CSP Urban Reserve area. Development of the CSP area and Urban Reserve would include residential, commercial, business professional, and school uses that would require water. The total water demand for the Project, as summarized in Table 4 below, is estimated to be 998 AFY. This amount includes 1,076.7 AFY for the CSP, 116.4 AFY for the Urban Reserve parcels, 23.8 AFY for system losses (2% of total demand) and a water demand reduction of 212 AFY for water conservation measures.

The project has included significant water conservation measure into the project. These water

conservation measures include:

- Turf reductions and low water using landscaping in residential front yards
- Smart irrigation controllers for irrigation uses
- Re-circulating hot water systems for residential units.

The Creekview Potable Water Master Plan dated November 23, 2010 by, MacKay and Somps (included as Attachment 2) and the Creekview Specific Plan Water Conservation Plan dated September 10, 2010 by HydroScience Engineers, Inc (included as Attachment 3) provides the calculations showing the demands for the project and the estimated water saving expected from the conservation measures identified above.

TABLE 4

CSP AND URBAN RESERVE WATER DEMANDS

Project Land Use	Water Demand (AFY)
Low Density Residential	511.1
Medium Density Residential	230.1
High Density Residential (a)	103.1
Commercial and Commercial Mixed Use	56.2
Open Space	0
Parks and Paseos	52.6
Public/Quasi Public	5.2
Schools	27.1
Streetscapes	97.1
Subtotal CSP Water Demand	**1,082.5**
Urban Reserve (Harris)	116.3
Subtotal CSP and UR Water Demand	**1,198.8**
2% for Losses (a)	23.7
CSP Water Conservation Reduction	<205>
Urban Reserve Water Conservation Reduction	<20>
Total Water Demand (b)	**998 (rounded)**

(a) Losses: CSP = 21.7 AFY and UR = 2.0 AFY
(b) Total Demand: CSP = 900 AFY and UR = 98 AFY

Development of the CSP in combination with projected water demand for buildout of the City would be 62,707 AFY (61,709 AFY + 998 AFY).

Section 10910(c)(2) ***If demands are included in most recent UWMP; incorporate information from the UWMP in the WSA.***

As indicated above, a water demand for the project site was not included in the City's 2005 UWMP update. Specific information on water demands is provided in response to Section 10910 (c)(1), above and response to Section 10910(c)(3) and 10910(c)(4), below.

Section 10910(c)(3) ***If demands are NOT included in most recent UWMP, discuss existing system's water supplies available during normal, single dry, and multiple dry years during a 20-year projection to meet project demands, existing system and planned future uses.***

Section 10910(c)(4) ***Discuss projected water supplies available during normal, single dry, and multiple dry years during a 20-year projection versus projected water demand including existing system, and planned future uses.***

Water Supply Sources

The City of Roseville has three sources of water supply: 1) surface water, 2) recycled water for irrigation and cooling water, and 3) groundwater in dry years or in times of emergency. Each are described herein.

Surface Water

Folsom Lake has been the primary source of water for the City of Roseville since 1971. Through the Folsom Lake Municipal and Industrial (M&I) intake, Roseville receives untreated water from the U.S. Bureau of Reclamation (USBR) and the Placer County Water Agency (PCWA). Additionally, through this same delivery point, the City receives a normal/wet year water supply from San Juan Water District (SJWD). The untreated surface water is delivered to the City's Barton Road Water Treatment Plant. Roseville also maintains interties with PCWA, San Juan Water District (SJWD), the California American Water Company, and the Citrus Heights Water District. Interties are connections between existing distribution systems that can be used to deliver water between districts in the event of water treatment plant or conveyance system disruptions.

The City of Roseville has three surface water contract entitlements for American River water totaling 66,000 acre-feet per year (AFY): a 32,000 AFY contract with the USBR from the Central Valley Project (CVP) supply from Folsom Lake; a 30,000 AFY contract with PCWA supplied from the Middle Fork [American River] Project (MFP); and a 4,000 AFY contract with SJWD. The SJWD contract allows for delivery of a portion of their PCWA contract water supply (also provided from the MFP) to the City's service area. Table 5, summarizes the City's water contracts.

TABLE 5

CITY OF ROSEVILLE SURFACE WATER CONTRACTS

Contracted Water Supply Source	Contract Amount (AFY)
USBR (CVP supply)	32,000
PCWA (MFP supply)	30,000
SJWD (wet year only – MFP supply)	4,000
Total Contracted Supplies	**66,000**
Available Supplies: Normal/Wet Years	58,900 (a)
Available Supplies: Driest (Critically Dry) Years	39,800

(a). Contract reduction due to City's Water Forum Agreement.

The City of Roseville is a signatory to the Water Forum Agreement (WFA), which provides a framework for future surface water and groundwater supplies in the region through the year 2030. Although water contract entitlements total 66,000 AFY, the City's diversions from the American River are limited by the Water Forum Agreement (WFA). The Water Forum categorized water years into three types: 1) Normal or Wet (normal/wet) Years, 2) Drier Years, and 3) Driest Years. These hydrologic year types are defined as follows:

- Normal/Wet Years: When the projected March through November Unimpaired Inflow to Folsom Reservoir is greater than 950,000 AF;
- Drier Years: When the projected March through November Unimpaired Inflow to Folsom Reservoir is between 950,000 AF and 400,000 AF; and,
- Driest Years: When the projected March through November Unimpaired Inflow to Folsom Reservoir is less than 400,000 AF.

In normal/wet years, the City is limited to 58,900 AFY. In driest years, also called critically dry years, the maximum diversion from the American River is limited to 39,800 AFY. It is important to note that during

driest years, the City agreed to a requirement that an additional 20,000 AFY of water be made available for release down the American River by PCWA through re-operation of their Middle Fork project. This 20,000 AFY of re-op water is not a portion of the City's contracted supply of 66,000 AFY and is described further herein. In drier years, the City may divert an amount between 54,900 and 39,800 AFY from the American River based on unimpaired flow into Folsom Lake with similar release requirements from PCWA In driest years, per the City's WFA, the maximum diversion from the American River is limited to 39,800 AFY. In below average to dry years, the City may divert an amount between 58,900 and 39,800 AFY from the American River based on unimpaired flow into Folsom Lake.

While the WFA limited the City of Roseville diversion from Folsom Lake in driest years to no more then 39,800 AFY, the original goal was to limited diversion to 1995 baseline levels. City baseline diversions in 1995 were 19,800 AF. Because annual municipal and industrial (M&I) demands were projected to increase significantly between 1995 and 2030 it was agreed that it was not feasible to reduce City diversions to 1995 levels. The City agreed as part of the Water Forum to offset a portion of the demand in drier and driest years by facilitating the release of up to 20,000 AF (the difference between 39,800 AF and 1995 levels of 19,800 AF) of water down the American River. The City is working with PCWA on a re-operation plan for drier and driest years from PCWA's Middle Fork Project (MFP) that will allow the release of up to 20,000 AFY of raw water down the American River to offset increased diversions above 1995 levels. Increased releases would come either from MFP storage in total or a combination of PCWA contract water and MFP storage. Re-operational releases would not be released as part of normal MFP operations. The intent of MFP re-operational releases during drier and driest years is to mitigate environmental impacts resulting from increased diversions above 1995 baseline levels. By agreeing to release the same amount of environmental mitigation water down the American River as was diverted to supply new growth in the City, environmental impacts were held to 1995 levels. Those impacts were identified in the WFA EIR and mitigated by the WF purveyor specific agreement as discussed above.

Based on over 107 years of historical hydrology (and WFA restrictions), the 58,900 AFY contract surface water supply is assumed to be available to the City in about 83 percent of the years. In about 17 percent of the years, quantities ranging from 58,900 AFY to 39,800 AFY of surface water would be available per the WFA. Thus, in drier and driest years (e.g. droughts), supplemental supplies potentially totaling up to 19,100 AFY (the difference between the normal/wet year supply and the driest year supply) is needed to make up for the dry-year and critically dry (driest)-year deficiencies.

Recycled Water

The City of Roseville, along with the South Placer Municipal Utility District and Placer County are regional partners in the South Placer Wastewater Authority (SPWA). The SPWA was created in 2000 to oversee funding for regional wastewater and recycled water infrastructure. The City owns and

operates two regional wastewater treatment facilities on behalf of the regional partners. These treatment facilities include the Dry Creek wastewater treatment plant (DCWWTP) and the Pleasant Grove wastewater treatment plant (PGWWTP). Both plants produce a Title 22 quality effluent that is available for recycled water applications. Recycled water for this project will be provided from the Pleasant Grove WWTP.

The City prepared the South Placer Regional Wastewater and Recycled Water Systems Evaluation (Systems Evaluation, June 2007) which delineates the 2005 regional wastewater service area boundary (2005 SAB) and provides baseline and projected characterizations of its regional wastewater and recycled water systems. The 2005 SAB includes areas within Roseville, Rocklin, Loomis, and portions of Granite Bay and unincorporated Placer County. Chapter 6, Recycled Water Systems Evaluation, of the Systems Evaluation report was conducted to assist in the ongoing expansion of a regional water recycling system. The goal of utilizing recycled water supplies is to promote responsible water supply management by beneficially reusing available tertiary treated recycled water for irrigation use to free up surface water and groundwater supplies for potable uses.

The regional recycled water system currently serves approximately 3,000 AFY of recycled water to parks, streetscapes, and golf course customers within and outside of the City limits. Of this amount, approximately 2,040 AFY are for irrigation and industrial customers within the City of Roseville. The City also supplies recycled water for cooling purposes to the Roseville Energy Park. System expansion is planned for more intensive use of recycled water in the western portion of the City as new development is built. Recycled water demands within the City are expected to increase by approximately 2,348 AFY for a total recycled water demand of 4,388 AFY at buildout of the City's existing General Plan. Recycled water is expected to be available in all hydrologic year types.

As documented in the *Creekview Recycled Water Master Plan,* MacKay and Somps, November 30, 2010, the project recycled water demands are estimated at 218 AFY under the proposed land use plan. This includes 201 AFY within CSP and 17 AFY in the Urban Reserve. After implementation of measures set forth in the CSP Water Conservation Plan, recycled water demands are reduced by 87AFY (79 in the CSP and 8 in the UR) for a total recycled water demand of 131 AFY (218 AFY – 87 AFY) at buildout if the project. A copy of the Recycled Water Master Plan is included as Attachment 4 to this document. When considering buildout of the existing General Plan in addition to the Project, a total of 4,519 AFY is available to offset total water demands at buildout. This includes 4,388 AFY within the existing City General Plan area and 131 AFY of recycled water usage within the CSP and UR areas. The use of recycled water as an assured water supply source reduces total water supply needs for the build out of the City and the Project to 58,188 AFY (62,707 AFY water demand – 4,519 AFY RW supply).

Groundwater

The use of groundwater is part of the City of Roseville's current water supply strategy, used for short-term back-up supply during dry years. The City's WFA recognizes the extraction of up to 6,600 AFY of groundwater during the drier and driest WFA hydrologic year types. The City is pursuing an aquifer storage and recovery (ASR) program. Although not included in this Project, ASR would allow the City to store treated drinking water in the aquifer for use when needed. Under such a program, surface water could be injected into the aquifer during wet times (wet years or during the rainy season), and then the City's groundwater wells could pump stored water during drier times or be used to shave peak water demand periods, like those which occur during summer months. Over the past several years the City has been working with the State Regional Water Quality Control Board and other state agencies in developing its ASR program. This has included the injection of potable water taken from the City's distribution system into the aquifer and subsequent extraction and delivery to City water customers. Prior to this testing program for ASR, the last time the City relied on groundwater was during drought conditions experienced in 1991. In August 2007, the Cities of Roseville and Lincoln along with PCWA and the California American Water Company (CAW) completed the *Western Placer Groundwater Management Plan* (GMP). The GMP was prepared in an effort to maintain a safe, sustainable and high-quality groundwater resource to meet backup, emergency and peak demands within a zone of the North American River Groundwater Sub-basin.

The City currently operates four groundwater well facilities which are capable of delivering approximately 12,000 AFY of water supply if run full time for the entire year. A more realistic production is 33 AF per day utilized for short term water supply. The wells are maintained primarily as a backup water supply and for improving water supply reliability. The City has plans to expand its groundwater well network. Seven groundwater well sites are available in the City for construction of new wells. Future wells will be designed to include provisions for ASR. Once built, the City's groundwater facilities would allow for delivery of up to 73 AF per day or 27,500 AFY if run on a continuous basis. However, it is the City's practice to only use its groundwater facilities as a backup supply for emergencies and when surface water supplies are cut-back.

Water Demands

Water demand is the amount of water required to service a customer on an average annual basis. The City measures this amount of water in acre feet per year (AFY). Total water demand for the proposed project was developed using the City's unit demand factors and applying those factors to the proposed land uses for the plan area.

The City's unit demand factors are based upon actual customer water meter usage data. The current demand factors were developed in 2002 as part of the West Roseville Specific Plan process. The City

conducted an additional study in 2006 to re-confirm the unit demand factors using a longer history of available water meter data from City customers. This study, *TM-1 – Unit Water Demand Factor Verification and Water Demand Evaluation and Update by MWH, September 2006*, re-confirmed the appropriateness of the unit demand factors developed in 2002. These factors were provided previously in Table 2.

Water demands are segmented into potable demands and recycled water demands. Potable demands are that component of the total water demand that will be used for public health related activities such as drinking water, indoor use and irrigation when recycled water is not available. Potable water demand needs are typically met by surface water supplies and supplemented by groundwater supplies as needed. Recycled water is that component of the overall water demand that can be used for outside irrigation use. Potable demands are calculated by subtracting estimated recycled water demands from the total water demand.

Existing and Buildout Water Demand

The City's total water demand in 2008 was 36,559 AFY. Of this demand approximately 2,040 AFY was met through recycled water supplies. At buildout of the City's General Plan, water demands are estimated to reach approximately 61,709 AFY of which 4,388 AFY will be met through recycled water supplies.

CSP Water Demands

Development of the CSP area would include residential, commercial, business professional, and school uses that would require water. The potable water demand for the project was determined utilizing unit water demand factors identified in Table 2 and applying those factors to proposed land uses in the CSP and the Urban Reserve parcels then subtracting recycled water supplies and estimated savings from planned water conservation measures. In calculating water supply, a two percent factor is added in to account for water system losses. For purposes of the CEQA project level analysis, development within the Urban Reserve parcels was assumed at no more then one unit per parcel and assigned the City's lowest density residential unit demand factor of 728 gallons per day per dwelling unit.

The CSP has included significant water conservation measures into the project. These water conservation measures include:

- Turf reductions and low water using landscaping in residential front yards
- Smart irrigation controllers for irrigation uses
- Re-circulating hot water systems for residential units.

Creekview Specific Plan Water Conservation Plan dated November 23, 2010 by HydroScience Engineers, Inc (included as Attachment 3) provides the calculations showing the estimated water saving expected from the conservation measures identified for inclusion in the CSP project.

The total water demand for the Project is estimated to be 998 AFY as described previously in Section 10910(c)(1). Development of the CSP in combination with projected water demand for buildout of the City would be 62,707 AFY (61,709 AFY + 998 AFY). Total water demands for the City and the project at buildout are summarized in Tables 3 and 4, above.

Water Supply vs. Water Demand

The City of Roseville currently supplies surface water for municipal and industrial (M&I) uses. This requires firm surface water contract amounts to ensure that proper supplies are maintained for the residents and businesses relying on this supply of water. The estimates in the 2005 UWMP update show that in normal water years the City of Roseville has sufficient water to meet its customer's needs through 2030. Table 6 provides a comparison of projected water supply vs. projected water demand through 2030 of the City's existing General Plan including the CSP project. It is important to note that build-out of the City's General Plan is expected to occur beyond the year 2030. In times of drought and water shortage, the urban demand is expected to decrease by a minimum 10 percent as a result of increased conservation awareness and regulations. Water available from surface water supplies would be supplemented with use of recycled water and groundwater. It is expected that if supply were to be reduced due to shortage consistent with reductions identified in the WFA, existing supply is sufficient to meet existing City-wide demands.

Table 6

Water Demand vs. Supply Availability
Current General Plan Plus CSP Through 2030

Year	Normal Year demand, Acre-feet/year	Surface Water Available (Normal) Acre-feet/year	Recycled Water Available Acre-feet/year
2010	44,363	58,900	2,040
2011	44,618	58,900	2,058
2012	44,880	58,900	2,076
2013	45,148	58,900	2,094
2014	45,494	58,900	2,112
2015	45,916	58,900	2,216
2016	46,567	58,900	2,321
2017	47,307	58,900	2,434
2018	48,125	58,900	2,548
2019	48,991	58,900	2,661
2020	49,853	58,900	2,722
2021	50,918	58,900	2,783
2022	52,017	58,900	2,850
2023	53,121	58,900	2,917
2024	54,227	58,900	2,983
2025	55,344	58,900	3,071
2026	55,884	58,900	3,159
2027	56,180	58,900	3,243
2028	56,447	58,900	3,327
2029	56,704	58,900	3,412
2030	56,964	58,900	3,481

Normal / Wet Years

Assuming buildout of the existing City General Plan and the CSP and Urban Reserve areas, water demands would total 62,707 AFY. When considering buildout recycled water supplies of 4,519 AFY the resultant surface water supply need would be 58,188 AFY. In normal/wet years when full contracted surface water supplies are available, supplies exceed demand.

Drier and Driest Years

To meet water supply demands during drier and driest years the City may utilize other supplies like recycled water and groundwater. Recycled water offsets the use of surface water supplies by reducing the City's reliance on American River supplies by filling irrigation demands that would otherwise use surface water supplies. Groundwater is used to make up any additional water supply shortfall as further described herein.

In drier and driest years, the City will implement the water conservation strategies outlined in the Roseville Municipal Code (RMC). Section 14.09 of the RMC identifies "stages" of conservation designed to achieve a specific amount of reduction in water use to match available supplies for that year. Section 14.09 outlines five drought stages with specific actions a water customer can implement to achieve a 10 to 50 percent water reduction.

Groundwater use has been identified as a method to augment available surface water supplies during drought Stages three through five. The use of groundwater will mitigate the impact of American River (surface water) supply shortfalls. The use of groundwater in drier and driest years is consistent with current City practices and is identified in the General Plan as a backup source of supply to be used in droughts or emergencies.

To understand the impacts of dry and driest year types on the City's water supply availability, this WSA looks at 100 years of hydrologic record from the American River under two different water delivery pattern scenarios. The first scenario considers water supply cut backs per the City' WFA (reference Figure 3). The second scenario considers reasonably foreseeable USBR water supply cutbacks as a result of current Operations Criteria and Plan (OCAP) discussion.

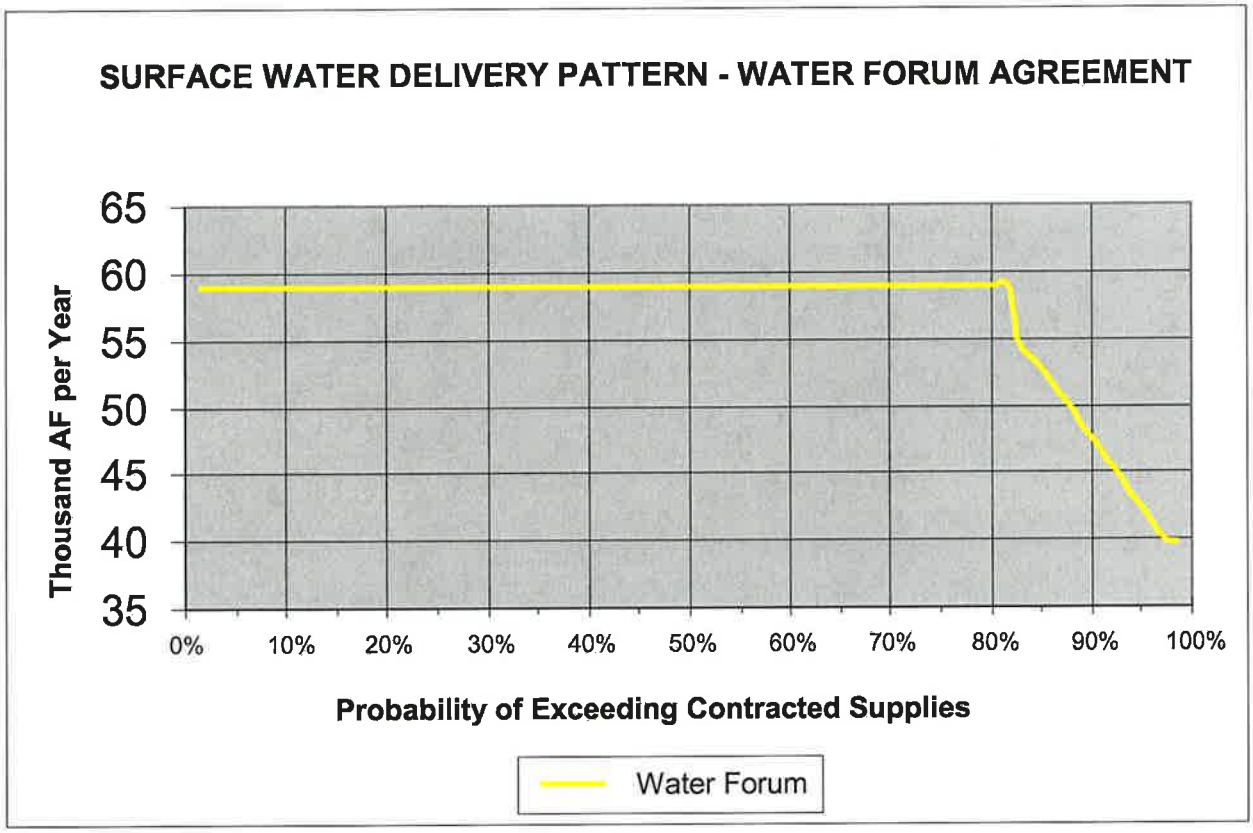
Water Forum Agreement Delivery Pattern

The City participated in the Water Forum, a regional stakeholder effort concerned with the protection of the Lower American River and reliable water supplies. The Water Forum resulted in the development of purveyor specific agreements that outline how suppliers will meet commitments agreed to as part of the Water Forum efforts. The goal of the Water Forum was to provide a safe and reliable water supply through the year 2030, while protecting resources associated with the Lower American River. Roseville's agreement included a limitation of diversion from the American River in both wet and dry years. In wet years the City agreed to limit diversions from its American River supply contracts to no more than 54,900 AFY and no less than 39,800 AFY in driest years. Through its agreement with the San Juan Water District, the City increased its normal year water supplies an additional 4,000 AFY, for a total wet year supply of 58,900 AFY. Water supply contracts and Water Forum limitations are summarized in Table 5. Based on over 100 years of historical hydrology (and WFA restrictions), the 58,900 AFY contract surface water supply is assumed to be available to the City in about 83 percent of the years.

In about 17 percent of the years, quantities from 58,900 AFY to a minimum of 39,800 AFY of surface water would be available per the WFA. Thus, in drought years, supplemental supplies potentially totaling up to 19,100 AFY (the difference between the average/wet year supply and the dry year supply) is needed to make up for the dry-year and driest-year deficiencies. Figure 3 depicts the expected pattern of surface water supply deliveries to the City based upon historic hydrologic data under its

Water Forum Agreement (WFA). The analysis completed for the Water Forum EIR projects full deliveries occur approximately 83 percent of the time.

FIGURE 3



USBR OCAP Delivery Pattern

The OCAP describes the operations of the Central Valley Project and the State Water Project (reference Sierra Vista Specific Plan EIR Technical Memorandum: Effects of Changed Water Management Operations on Fisheries and Water Quality Impacts Previously Disclosed in the Water Form Agreement EIR, Robertson-Bryan Inc. and HDR, October 2009, and included as 5 to this document). This is pertinent to Roseville in that USBR water contracts with the City are delivered per Central Valley Project (CVP) operation plans. The CVP is operated by the United States Bureau of Reclamation (USBR) while the State Water Project (SWP) is operated by the California Department of Water Resources (DWR). Both the CVP and the SWP rely on the Sacramento River and the Delta as common conveyance facilities to meet various system demands including water contracts and environmental needs. Reservoir releases and Delta exports must be coordinated so that both the CVP and SWP are able to retain their portion of the shared water and also jointly share in the obligations to

protect beneficial uses. A Coordinated Operations Agreement (COA) between the CVP and SWP was developed and became effective in November 1986 as signed by USBR and the DWR.

The COA defines the rights and responsibilities of the CVP and SWP regarding water needs of the Sacramento River system and Delta and includes obligations for in-basin uses, accounting, and real-time coordination of water obligations of the two projects. A CVP/SWP apportionment of 75/25 is implemented to meet in-basin needs under balanced Delta conditions, and a 55/45 ratio is in effect for excess flow conditions. The COA contains considerable flexibility in the manner with which Delta conditions in the form of flow standards, water quality standards, and export restrictions are met.

The operation of CVP/SWP is described in a document known as the Operations Criteria and Plan (OCAP). As updated in 2004, the OCAP provides a detailed description of the coordinated operations of the CVP and SWP based on historical data and serves as a starting point for planning project operations in the future. Under the federal Endangered Species Act (ESA), the United States Fish and Wildlife Service (USFWS) produced a formal Biological Opinion analyzing the impact of OCAP implementation on ESA-listed species (including the delta smelt). In effect, the ESA authorizes USFWS to require changes to the OCAP for the protection of the delta smelt and other federally listed species.

In 2005, USFWS issued a Biological Opinion for an updated OCAP, and concluded that CVP/SWP operations did not jeopardize delta smelt populations. However, that opinion was struck down by a federal judge (Judge Wanger) following a lawsuit filed by environmentalists. USFWS was ultimately ordered to revise their Biological Opinion. The court also severely restricted CVP and SWP pumping in the Delta (Wanger Decision) pending the USFWS's completion of the new Biological Opinion. Those restrictions took effect in December 2007.

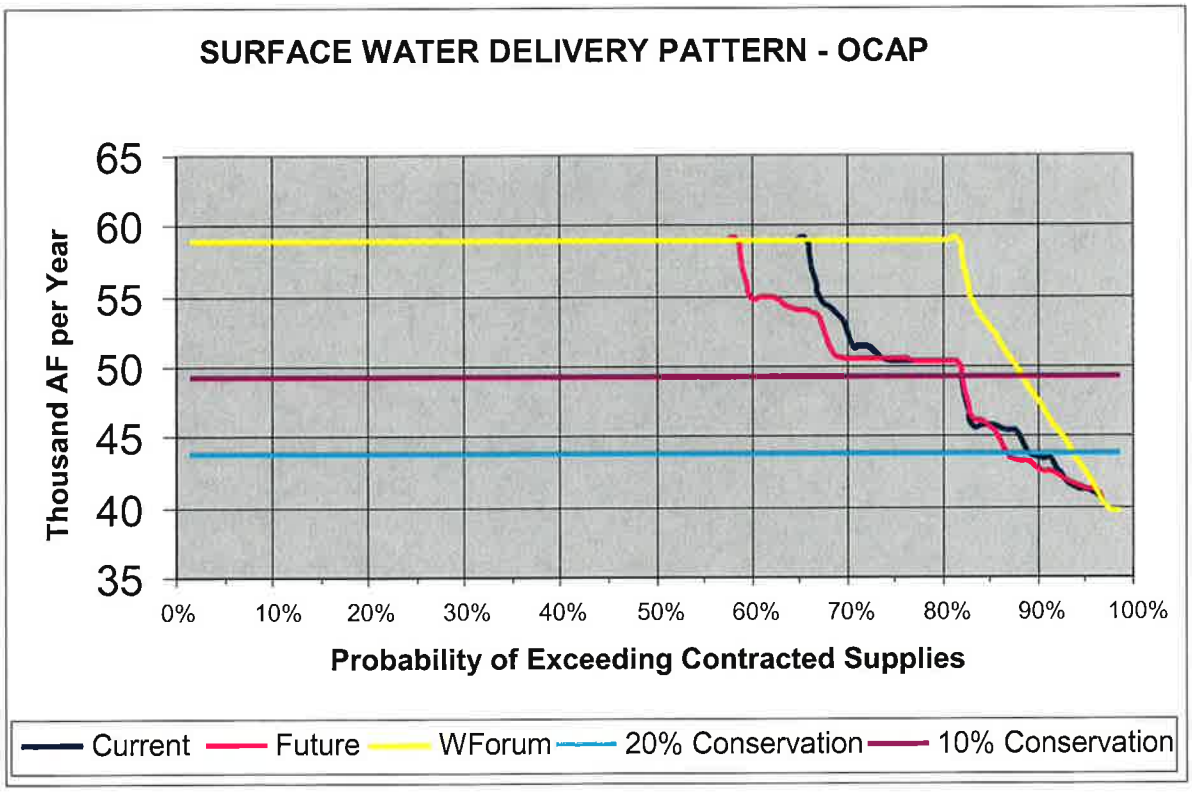
In December 2008, USFWS released a new Biological Opinion concluding that CVP and SWP operations would jeopardize the continued existence of endangered delta smelt. USFWS further detailed a "reasonable and prudent alternative" to the proposed OCAP protocol that would, it claimed, protect the delta smelt and its habitat from the adverse effects of pumping operations. The "Reasonable and Prudent Alternative" (RPA) would restrict Delta pumping operations and would thus limit deliveries of water to CVP/SWP contractors south of the Delta. In 2009, NOAA's National Marine Fisheries Service (NMFS) also released a Biological Opinion on the revised OCAP and requested changes to protect ESA listed species including endangered Sacramento Rover winter-run Chinook salmon, threatened Central Valley spring-run Chinook salmon, threatened Central Valley steelhead and threatened Southern Distinct Population Segment (DPS) of North American green sturgeon.

To develop the new biological opinions, both USFWS (smelt) and National Marine Fisheries Service (NMFS) (salmon) utilized a series of model runs from CALSIMII know as Study 7 and Study 8. CALSIM II

is a model of California's State Water Project (SWP) and the Federal Central Valley Project (CVP), developed jointly by the California Department of Water Resources (DWR) and U.S. Bureau of Reclamation (USBR). Study 7 evaluated current conditions and Study 8 depicted future conditions as prepared by the Bureau of Reclamation. Neither study contains the assumptions for the (RPAs prescribed in the Biological Opinions. There is an accelerated effort to model the RPAs in CALSIMII by the Bureau; the effort has not been completed yet with the appropriate simulations of the RPA. However, utilizing the model runs used by both USFWS and NMFS identifies the frequency of the deliveries to Roseville.

For purposes of this WSA, Study 8 (future conditions) is used to evaluate possible impacts to Roseville deliveries from the OCAP. Figure 4 depicts the changes in water supply deliveries to the City under OCAP, Study 8 (shown as the magenta colored line) as compared against WFA deliveries (shown as the yellow line) and current delivery patterns (shown by the dark blue line). In addition, Figure 4 shows total water demand if the City were to conserve water equivalent to a 10% reduction in surface water supplies (purple colored line) or a 20% reduction (aqua colored line).

FIGURE 4



Under the new OCAP (Study 8) full deliveries of PCWA and USBR contracted supplies are projected to occur fifty-eight (58) percent of the time. Forty-five (45) percent of the time shortages in surface water supplies can be mitigated through implementing water conservation Stages 1 and 2 (between 10% and 20% conservation) outlined in the Roseville Municipal Code (RMC) Section 14.09. This is the area between the purple 10% line and the aqua 20% line. Thirteen (13) percent of the time surface water deliveries will fall below a level where mitigation can be accomplished through 20% conservation efforts and supplemental supply from groundwater. This is shown as the area below the aqua colored line. In the Water Forum analysis deliveries were projected to fall below the same level only seven (7) percent of the time.

Supplemental Supplies

In drier and driest years, regardless of delivery pattern, the City will need to make up the difference between available supplies from the American River and projected demands. This would be done through implementing conservation measures as identified in the RMC and supplementing available supplies with groundwater. As explained earlier, the RMC identifies five drought stages with varying degrees of reduction (10% to 50%). The hydrologic record indicates that there were two (2) critically dry (driest) years and thirteen (13) drier years where City demands would need to be adjusted downward to conform to available surface water supplies under the City's WFA. .

Table 7 depicts the impacts of the Water Forum Agreement and shows estimated surface water shortfalls during historical drier and driest years assuming City buildout demand equivalent to 58,900 AFY (maximum diversion under the City's WFA). For example in a normal year such as occurred in 1929 there would be no anticipated shortfalls in available surface water supplies to the City. In a critically dry (driest) years such as occurred in 1924 and 1977, the City would need to make up 19,100 AF of water supply. In drier years as the amount of surface water availability to the City increases from 39,800 AFY to 58,900 AFY, based upon the unimpaired inflow, the anticipated shortfall decreases from 19,100 to 0 AFY.

TABLE 7

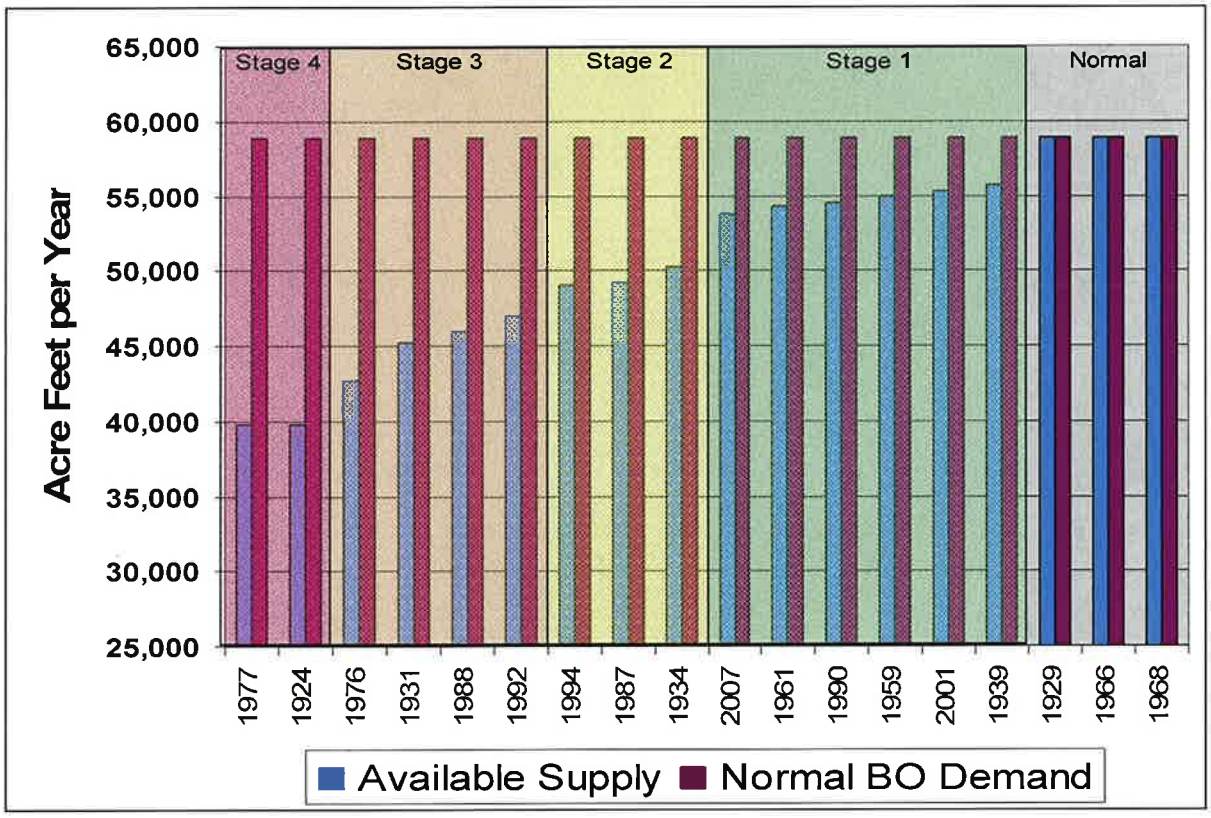
WATER FORUM AGREEMENT IMPACTS ON HISTORIC AMERICAN RIVER HYDROLOGIC DRY AND DRIEST YEAR RECORDS

Year	Year Type	Annual AF	Unimpaired Inflow AF	Available Water Supply AF	Normal Demand AF	Shortfall AF
1977	Driest	520,190	289,740	39,800	58,900	19,100
1924	Driest	628,800	388,900	39,800	58,900	19,100
1976	Drier	598,260	484,060	42,719	58,900	16,181
1931	Drier	854,600	557,200	45,259	58,900	13,641
1988	Drier	892,974	576,736	45,938	58,900	12,962
1992	Drier	989,570	604,927	46,917	58,900	11,983
1994	Drier	956,228	665,328	49,014	58,900	9,886
1987	Drier	940,048	667,769	49,099	58,900	9,801
1934	Drier	1,084,000	699,700	50,208	58,900	8,692
2007	Drier	1,128,924	800,702	53,715	58,900	5,185
1961	Drier	1,021,670	817,440	54,297	58,900	4,603
1990	Drier	1,036,113	822,331	54,466	58,900	4,434
1959	Drier	1,209,420	836,380	54,954	58,900	3,946
2001	Drier	1,185,375	845,617	55,275	58,900	3,625
1939	Drier	1,006,140	858,220	55,713	58,900	3,187
1929	Normal	1,255,100	952,600	58,900	58,900	0

Figure 5 graphically shows how the estimated shortfall determined in Table 7 would be evaluated and placed into corresponding drought stages.

FIGURE 5

SURFACE WATER SUPPLY SHORTFALLS DURING HISTORIC AMERICAN RIVER HYDROLOGIC DRY AND DRIEST YEAR RECORDS



The normal buildout demand for the City General Plan plus the CSP and Urban Reserve areas is estimated to be 62,707 AFY (61,709 AFY + 998 AFY). The net potable water demand is 58,188. This is calculated by subtracting anticipated recycled water usage at buildout with the Project from the buildout water demand (62,707 AFY – 4,519 AFY = 58,188 AFY). This amount is then compared to available surface water supplies. In a normal water year, there is 58,900 AFY available from the American River.

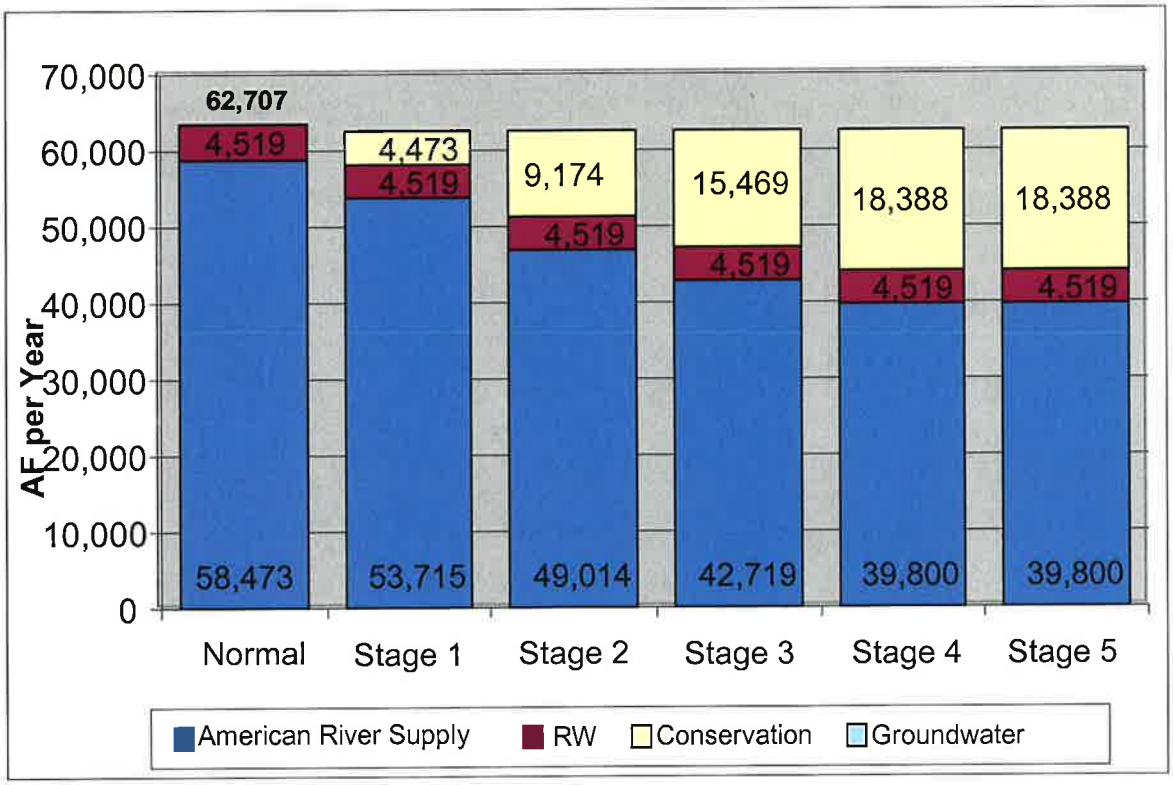
In dry and driest years, the City would need to make up the difference between 39,800 AFY and 58,900 AFY (0 AFY to 19,100 AFY). This would be done through implementing conservation measures as identified in the RMC and supplementing available supplies with groundwater. As explained earlier, the RMC identifies five drought stages with varying degrees of reduction (10% to 50%). Table 7 and Figure 5 compares projected build out demands to available supplies based on 100 years of hydrologic record of

the American River. The full history is contained in Attachment 5 to this WSA. The hydrologic record indicates that there were two (2) critically dry (driest) years and thirteen (13) drier years where City demands would need to be adjusted downward to conform to available surface water supplies. By way of example and as shown on Figure 5 a critically dry year would necessitate the implementation of a Stage Four drought to reduce water demands to a level that is comparable with available supplies. Drought Stages One, Two and Three would be required during the drier years depending on the level of surface water supply shortfall.

It is important to note that if the City is able to accomplish the recommended reductions in demand through more stringent conservation measures outlined in the RMC, groundwater would not be needed to supplement supplies. This is depicted in Figure 6 below.

FIGURE 6

DRY AND DRIEST YEAR SUPPLY SCENARIOS
STAGED WATER CONSERVATION



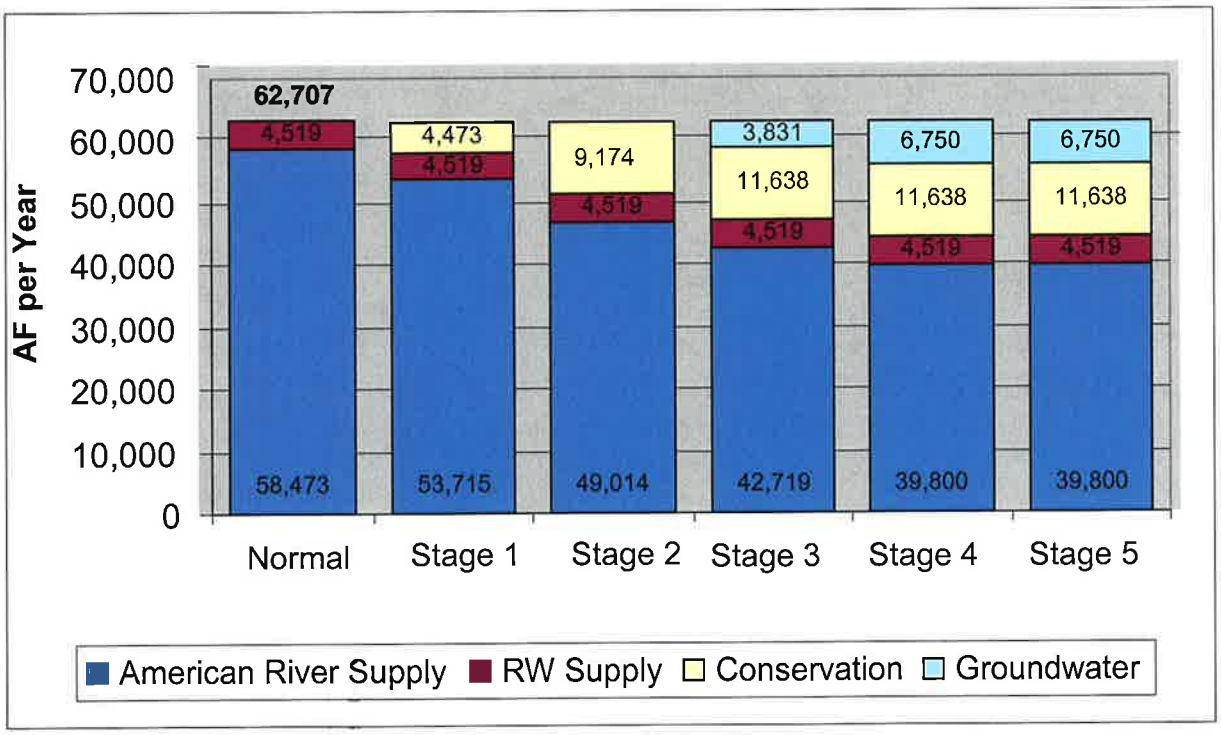
Notes: AR: American River Supply; RW: Recycled Water

However, to ensure a highly reliable water supply for the City, this WSA assumes only a 20 percent reduction of surface water demands through conservation (20% of 58,188 AFY = 11,638 AFY). The 100 years of hydrologic data includes both the 1977 and 1924 droughts of record. This record provides a good picture of what could be anticipated as future unimpaired flows in the American River. The record indicates that there would be 15 years out of 100 that would require some level of conservation. Depending on water delivery patterns (WFA or OCAP) the number of years in which groundwater is required is different. Each is described below.

WFA Scenario

Of the 15 years out of 100 when supplemental supplies are required to meet demands and assuming only a 20 percent reduction in water demand through conservation efforts, only 6 years would require groundwater pumping to make up for shortfalls in surface water supplies. The total amount of groundwater extracted over the life of the Project (based on the 100 year hydrologic record and the need to pump groundwater in only 6 of 100 years) would be 29,346 AF. The annual amount varies depending on the year type, but ranges from a high of 6,750 AFY to a low of 0 AFY and is depicted in Figure 7 below.

FIGURE 7
DRIER AND DRIEST YEAR SUPPLY SCENARIO
20% WATER CONSERVATION



In addition to groundwater to supplement surface water supplies during drought conditions, the City has identified groundwater as an emergency backup supply for the recycled water system to bolster reliability. It is assumed that 11 AFY of groundwater could be required during emergencies such as a plant outage to backup the recycled water system. This is based upon 1.8 million gallons per day for a period of two days. Additionally, it was assumed an emergency could occur once every five years. Thus for the life of the project (assumed to be the hydrologic record of 100 years) up to 220 AF of groundwater could be required. This would result in a total extraction of groundwater over 100 years of 29,566 AF (29,346 AF + 220 AF).

OCAP Scenario

Of the 15 out of 100 years when supplemental supplies are required to meet demands and assuming only a 20 percent reduction in water demand through conservation efforts, 13 years would require groundwater pumping to make up for shortfalls in surface water supplies. The total amount of groundwater extracted over the life of the Project (based on the 100 year hydrologic record and the need to pump groundwater in only 14 of 100 years) would be 52,839 AF. The annual amount varies depending on the year type, but like with the WFA scenario ranges from a high of 6,750 AFY to a low of 0 AFY and as previously depicted in Figure 5. An additional 220 AF of groundwater is expected to be extracted during the analysis period of the project (100 years) to supplement recycled water supplies for emergency conditions such as a plant outage. Thus for the life of the project (assumed to be the hydrologic record of 100 years) under the OCAP Scenario, total extraction of groundwater over 100 years would total 53,059 AF (52,839 AF + 220 AF).

Section 10910(d)(1) Identify existing water supplies for the proposed project.

Existing surface water, recycled water, and groundwater supplies for the City of Roseville are described under Section 10910(c)(4), above.

Section 10910(d)(2)(A) Demonstrate existing water supply entitlements, water rights or water service contracts through written contracts or other proof.

Documentation for water entitlement contracts is contained in Attachment 6. Included are:

- United States Bureau of Reclamation Long term water supply No. 14-06-200-3474A
- PWCA Water Supply Contract dated 20 November 1991
- United States Bureau of Reclamation Contract for Conveyance of Non-Project Water between the United States and City of Roseville No. 02-WC-20-2217

Section 10910(d)(2)(B) ***Provide copy of capital outlay program for financing of a water supply that has been adopted by the public water system.***

Financing for water supply facilities are included in the City's Capital Improvement Projects (CIP). A list of CIPs for the next five years is provided in the City's annual budget document. Copies of the budget document are available at the City's Finance Department. Financing of these projects is through a combination of connection fees on new construction and general obligation bonds. A projected fund balance tied to the Capital Improvement Project schedule is also available at the City's Finance Department.

Section 10910(d)(2)(C) ***Identify any federal, state, and local permits required for construction of the facilities identified for delivering the water supply to the proposed project.***

The majority of the proposed water transmission facilities will be located in proposed City public rights-of-way and with City approved plans. A list of permit requirements for proposed facilities will be identified after the City's review of improvement plans. Possible permit requirements include grading permits, tree permits and other local, state or federal permits are identified in the environmental document for the CSP project.

Section 10910(d)(2)(D) ***Identify any necessary regulatory approvals required to convey or deliver the water supply to the proposed project.***

Long-term water supply from the CVP is the primary source of water for the City of Roseville. The existing contract is valid through 2011. This contract is currently being re-negotiated with USBR with objective of solidifying this water supply for an additional term. Roseville has established a need for the contract amount of 32,000 AF to move forward in negotiations but is awaiting USBR negotiations to resume.

The State Department of Public Health and the Regional Water Quality Control Board must review and approve an Engineering Report documenting the proposed use of recycled water within the project area prior to recycled water use within the plan area.

Section 10910(e) ***Identify other public water system or water contract holders that receive a water supply or have existing water supply entitlements, water rights, or water service contracts, to the same source of water as the public water system for the proposed project.***

The City of Roseville is a signatory to the Water Forum Agreement. The Water Forum is a Regional Plan developed by the Sacramento Area Water Forum and Foothill Forum Water Group with the

objective for safe, reliable, and environmentally-sound water supplies from the American River watershed, the source of Roseville contract water. A number of stakeholders were involved in the planning process focusing on a Regional Water Agreement, which identified the resources needed to meet 2030 water demands. A copy of the WFA is available for review online at http://www.watefforum.org/AGREE.HTM.

Section 10910(f)(1) Review any information contained in the UWMP relevant to the identified groundwater supply for the proposed project.

Because the CSP is an annexation, water demands for this project were not included in the 2005 UWMP. Section 4.2 for the 2005 UWMP does include information pertaining to the local groundwater basin. As identified in the UWMP, the primary source of water supply for the City's service area is surface water from the Folsom Lake. Although restrictions on groundwater use are not identified in the Water Forum Agreement, its use was only projected to be in times of drought and water shortage. Studies produced for the Water Forum estimated that groundwater will only be required approximately 17 percent of the years. As documented in Section 10910 (c)(3) and (c)(4), above, the City now estimates groundwater would be used in up to 6 of 100 years under the WFA Scenario or up to 14 of 100 years under the OCAP Scenario.

Section 10910(f)(2) Describe any groundwater basin from which the proposed project will be supplied. Include information as to whether the Department of Water Resources has identified the basin as over drafted or has projected that the basin will become over drafted.

Placer, Sutter, and Sacramento counties are situated in the North American sub-basin located in the eastern central portion of the Sacramento Groundwater Basin. The North American sub-basin is defined by the Bear River on the north, the Feather River and Sacramento River on the west, the American River on the south, and on the east by the Sierra Nevada Range. The sub-basin encompasses 351,000 acres (548 square miles). Drainage in the sub-basin is west -southwest at an average five percent grade.

The eastern boundary of the sub-basin is a north-south line extending from the Bear River south to Folsom Lake that passes about 2 miles east of Lincoln and is the approximate edge of the alluvial basin, where little or no groundwater flows into or out of the groundwater basin from the Sierra Nevada. The western portion of the sub-basin is a flat flood basin for the Bear, Feather, Sacramento, and American Rivers and several small east-side tributaries.

Various geologic formations comprise the water-bearing deposits that underlie the region. These formations include an upper aquifer system consisting of the Riverbank (formerly known as Victor) and

Turlock Lake/Laguna (formerly known as Fair Oaks-Laguna Formations), and a lower aquifer system consisting primarily of the Mehrten Formation. These formations are typically composed of lenses of interbedded sand, silt, and clay interlaced with coarse-grained stream channel deposits. These deposits form a wedge thickening from east to west at a fairy constant rate to a maximum thickness of 2,000 feet near the Sacramento River.

Groundwater occurs in an unconfined to semi-confined state throughout the region. A confined aquifer state occurs in aquifers that have overlying stratum of low permeability. Groundwater under a confined state is described in terms of its piezometric surface elevation rather than a water surface elevation. The piezometric surface elevation is the elevation of water within a piezometer or well that is screened only in the confined or semi-confined aquifer. The groundwater surface elevation is the elevation of water in an unconfined aquifer. Semi-confinement can occur in local areas, and the degree of confinement typically increases with depth. Groundwater in the Riverbank and Turlock Lake/Laguna Formations is typically unconfined. The deeper Mehrten Formation, a major source of groundwater, exhibits semi-confined conditions.

The California Department of Water Resources (DWR) has not identified the basin as an over drafted basin. Groundwater levels in southwestern Placer County and northern Sacramento County have generally decreased between 1947 through 1997. Many wells experienced declines at a rate of about one and one-half feet per year with some of the largest decreases occurring in the area of McClellan AFB. After 1997 water levels seem to stabilize implying that the basin is in a state of equilibrium. Groundwater levels in Sutter and northern Placer Counties generally have remained stable, although some wells in southern Sutter County have experienced declines.

The groundwater basin has historically been pumped for agricultural and urban uses. According to the PCWA Integrated Water Resources Plan (IWRP) prepared by Brown and Caldwell dated August 2006 indicates a potential safe yield of 95,000 AFY for the basin. The safe yield is defined as the amount of groundwater that can be continuously withdrawn from a basin without adverse impact and is commonly expressed as an annual average in acre-fee per year (AFY). The IWRP also estimated average annual agricultural and urban demands in Western Placer County have been about 97,000 AFY. Under these pumping conditions the groundwater levels at the southern end of the basin have been stable since about 1982 and at the northern end of the basin, the levels have risen slightly. These stable groundwater levels indicate that groundwater pumping is currently in balance with the natural groundwater recharge rate.

Groundwater elevations are monitored by DWR for several decades. There are three groundwater wells in the DWR monitoring network in and immediately adjacent to the western edge of the City. One well is located adjacent to Pleasant Grove Creek just west of Fiddyment Road in the City's West Roseville

Specific Plan Area. A second well is east of the WRSP along Kaseberg Creek southeast of the intersection of Fiddyment and Phillip Roads. The third well is located on City-owned land north of the WRSP. Data for the first well indicate rising groundwater elevations since about 1977, which could be attributable to a decrease in agricultural pumping or recharge into a subsurface channel system. In 2002, the groundwater elevation ranged from 45 to 47 feet above mean sea level (msl). The second well, which has not been monitored since 1993, shows almost stable groundwater elevations since about 1980. Reported groundwater elevations in the well in 1993 were 17 to 20 feet msl. The westernmost well has also been stable since about 1980, and decreased agricultural water use in the area suggests water table levels are rising. In 2002, groundwater elevations ranged from a low of 24 feet msl in November to a high of 17 feet msl in April. Bulletin 118 prepared by the California Department of Water Resources identifies eleven groundwater basins as being in a critical condition of overdraft. The North American sub-basin is not one of the eleven basins identified.

These stable groundwater conditions may be attributed to the conversion of agricultural lands to urban uses over the past several decades. With the land conversions pumping demands have decreased, especially for heavy pumping uses, such as rice farming. It is expected that basin pumping demands will continue to decrease over time. According to the IWRP, urban development within the Placer Vineyards, Curry Creek and West of Lincoln study areas alone are estimated to reduce agricultural groundwater pumping demands by 20,000 AFY over time. If these pumping demands are not replaced by other equivalent pumping demands, it is expected to result in improvements to the condition of the basin. There are no existing legal constraints that limit groundwater pumping.

Section 10910(f)(3) ***Describe the amount and location of groundwater pumped by the public water system for the past five (5) years.***

With the exception of the City's Aquifer Storage and Recovery (ASR) demonstration project, the City has not pumped groundwater from the basin for the past five years. Use of groundwater is part of the City of Roseville's current water supply planning, but it is only used for short-term back-up supply during dry years. As of December February 28th, 2008, the City had injected 178 AF of surface water into the groundwater basin and extracted 440 AF as part of phase one of the demonstration project. Phase two consisted of injecting an additional 830 AF of treated surface water and extracting 2,140 AF for delivery to water customers. No other extractions have occurred during this timeframe.

Section 10910(f)(4) ***Describe the amount and location of groundwater projected to be pumped by the public water system from any basin from which the proposed project will be supplied.***

The use of groundwater is part of the City of Roseville's current water supply strategy, used for short-term back-up supply during dry years and as an emergency backup to the recycled water system.

Based upon the estimated water demand for the project, and as shown in Figure 7, a maximum of 6,750 AFY of groundwater maybe required during drier and driest hydrologic year types. Over the life of the project and as described in Section 101910(c)(2) above, under the OCAP Scenario, a total of 53,059 AF of groundwater would be required. This includes groundwater to supplement surface water supplies during drought conditions to meet City plus project buildout and 220 AF of groundwater as emergency backup supply for the recycled water system.

Section 10910(f)(5) ***Analyze the sufficiency of the groundwater from the basin from which the proposed project will be supplied to meet the projected water demand associated with the proposed project.***

As indicated in Section 10910(f)(4) above, surface water will be used as the primary source of supply to service the project. During normal/wet hydrologic year types (86% of the years) groundwater is not required to meet water system demands. During 14% of the years (over a 100 year period and under the OCAP Scenario) up to 6,750 AFY or a lifetime draw of 53,059 AF of groundwater would be extracted from the basin to meet dry year water supply needs and supplemental recycled water demands.

The groundwater basin has historically been pumped by agricultural and urban uses. Over the past several decades, agricultural land has been converted to urban uses. With the land conversions pumping demands have decreased, especially for heavy pumping uses; such as rice farming. It is expected that basin pumping demands will continue to decrease over time. If these pumping demands are not replaced by other equivalent pumping demands, it is expected to result in improvements to the condition of the basin. There are no existing legal constraints that limit groundwater pumping and the PCWA August 2006, Integrated Water Resources Plan study indicates a potential safe yield of 95,000 AFY for the basin based on current groundwater level stability at these pumping levels.

Further, a review of potential basin impacts incorporates the results of a groundwater impact analysis prepared by MWH in June 2003 as part of the West Roseville Specific Plan (WRSP) project. This report, MWH Groundwater Impact Report, is included in Attachment 7. The MWH report used the *North American River and Sacramento County Combined Integrated Groundwater and Surface Water Model* (IGSM) to simulate groundwater conditions. This model was originally developed for the *American River Water Resources Investigation* (ARWRI) and later updated by the American River Basin Cooperating Agencies for the *Regional Water Master Plan.*

The groundwater impacts described in the *MHW Groundwater* Impact *Report* were defined as the incremental changes between the groundwater conditions corresponding to a baseline condition that does not include development of the City's WRSP Area and groundwater conditions resulting after the WRSP Area has been developed. The following assumptions were made for the analysis of

mitigating the dry-year groundwater use, which was assumed to be accomplished by fallowing land at the City owned Reason Farms property:

- 1,080 acres fallowed,
- 6,483 AFY of groundwater required to meet crop irrigation demand,
- 2,632 AFY of groundwater return by deep percolation of irrigation water,
- Net 3,151 AFY of groundwater recharge "banked" and available for other uses, based strictly on mass balance of water in system. (6,483 AFY – 2,632 AFY for percolation - 700 AFY for current cattle ranching operations).

To characterize the impacts to groundwater this WSA analyzes the most conservative dry year scenario, the OCAP Scenario, when there are more years when supplemental groundwater is required. As previously described it is estimated that under the OCAP, there historic hydrologic data indicate there would be 14 years out of 100 when groundwater could be required to supplement reduced surface water supplies. In 86 out of 100 years, groundwater would not be required. The analysis calculates the volume of water that as a result of land retirement from Reason Farms is "banked" or saved and compares that against the volume of groundwater anticipated to be extracted over the same time period (100 years). This analysis is summarized below.

Using 3,851 AFY of banked groundwater available for beneficial use as a result of land retirement at Reason Farms and applying it over the time of the hydrologic record when water supplies are not reduced (86 of 100 years) projects a 270,986 AF of saved groundwater over time (3,151 AFY x 86 years). Extracting the projected groundwater needs for the City and the CSP over this same time period under the more conservative OCAP scenario (53,059 AF) results in a net storage of groundwater of 217,927 AF (270,986 AF – 53,059 AF). This is an average annual groundwater savings of 2,181 AFY over 100 years. Under these conditions the groundwater basin is expected to increase as a result of eliminating rice farming at Reasons Farms. Because the proposed project is expected to use less water than that identified as available from groundwater banking, impacts to the groundwater basin are not anticipated. This is described in Table 8 below.

TABLE 8
GROUNDWATER SUPPLY NEEDS AT BUILDOUT CONDITIONS
USBR OCAP DRY YEAR SCENARIO

GROUNDWATER USE	GROUNDWATER DEMAND (AFY)	GROUNDWATER OVER PROJECT LIFE (100 YEARS)	COMMENT
Maximum dry year supply to supplement surface water	6,750	52,839 AF	Groundwater required in 14% of all years. Reference Impact 14.12.1-2
Recycled water emergency backup supply	11	220 AF	Assumes 1.8 mgd for a period of two days under emergency conditions when recycled water is not available. It is further assumed emergency conditions would occur once every five years for a total groundwater need of 220 AFY for the life of the project (100 years).
Total Groundwater Needs	**6,761 AFY**	**53,059 AF**	
Banked Groundwater from Retirement of Reason Farms	**3,151 AFY**	**270,986 AF**	Banking occurs in 86 of 100 years.
Net Groundwater Banked		**217,927 AF**	

DETERMINATION OF SUFFICIENCY

The City of Roseville is currently utilizing multiple water sources including surface water, recycled water and groundwater to serve existing and future customers. Based upon the City's total projected water supplies for normal, single-dry, and multiple-dry years over a 20-year projection, as demonstrated by this WSA, the City will have sufficient water to meet projected water demands for the Creekview Specific Plan project in addition to meeting the existing service area's planned future demands. This determination is based on the information provided in this WSA.