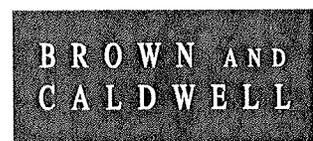
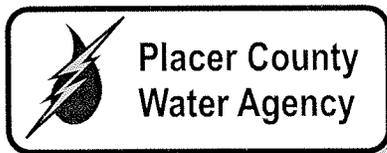
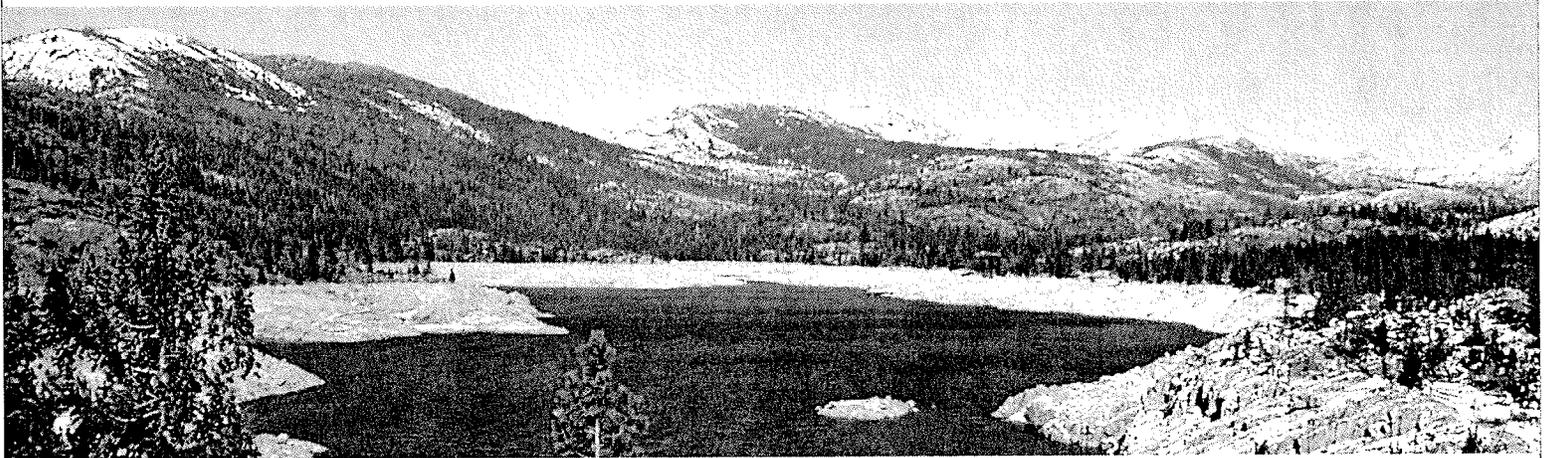


PLACER COUNTY WATER AGENCY

INTEGRATED WATER RESOURCES PLAN

August 2006



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August 2006

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Cover photo depicts Lake Spaulding, provided by
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LIST OF ACRONYMS AND ABBREVIATIONS

ac	acres
ac/DU	acres per dwelling unit
ac-ft	acre-feet
ac-ft/yr	acre-feet per year
ADF	average daily flow
ADWF	average dry weather flow
APN	Assessor Parcel Number
ARPS	American River Pump Station
ASR	aquifer storage and recovery
BMP	best management practice
cfs	cubic feet per second
CARA	California River Assessment
CIMIS	California Irrigation Management Information System
CSA	County Service Area
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
DOF	California Department of Finance
DHS	California Department of Health Services
DU	dwelling units
DU/ac	dwelling units per acre
DWR	Department of Water Resources
GIS	geographic information systems
gpd/ac	gallons per day per acre
gpd/DU	gallons per day per dwelling unit
IWRP	integrated water resources plan
M&I	municipal and industrial
MFP	Middle Fork Project
MG	million gallons
mgd	million gallons per day
mg/L	milligrams per liter
MOU	Memorandum of Understanding
MWH	Montgomery Watson Harza
NID	Nevada Irrigation District
PCWA	Placer County Water Agency
PG&E	Pacific Gas & Electric
SACOG	Sacramento Area Council of Governments
SJWD	San Juan Water District
SMD	Sanitary Maintenance District
SOI	sphere of influence
SSWD	Sacramento Suburban Water District
TDS	total dissolved solids
UGA	Urban Growth Areas
USBR	United States Bureau of Reclamation

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

WTP	water treatment plant
WRSP	West Roseville Specific Plan
WWTP	wastewater treatment plant

EXECUTIVE SUMMARY

PLACER COUNTY WATER AGENCY INTEGRATED WATER RESOURCES PLAN AUGUST 2006

Placer County Water Agency (PCWA) has a limited supply of water. Population growth has made it important to closely assess available water supplies and future demand. This document is an Integrated Water Resources Plan (IWRP) that presents a detailed assessment of the water supply and demand situation in western Placer County. The intent of this IWRP is to plan the integration of the variety of available water supply resources to meet future water needs.

PCWA made an assessment of its water supplies and future demand five years ago as documented in the March 2001 Surface Water Supply Discussion Paper. This IWRP updates the water supply and demand assessment done in 2001. The key conclusion in the 2001 Discussion Paper was that PCWA had adequate surface water supply entitlements to match the demands that would occur at build out of the general plans at that time within its west Placer County service area. The 2001 assessment assumed that groundwater and reclaimed water would not constitute any of the supply, instead relying only on surface water for supply. This assessment includes both groundwater and reclaimed water as part of the total available supply.

The 2001 assessment used general plans adopted as of the date of the study to determine buildout water demands. This IWRP not only re-evaluates the demand based on general plans currently adopted, but also considers several growth scenarios that would result in land development beyond what is currently authorized in adopted general plans.

The 2001 assessment based its water demand projections on an analysis of water use by the various categories of customers in 1999. This IWRP presents an update of this unit water use analysis using 2004 water use information.

There are several areas in west Placer County that were not included in the 2001 projection of water demands. These areas that are now included are the City of Roseville, Nevada Irrigation District (NID), San Juan Water Districts' service areas in Placer County, the Sheridan area, and lands that lie to the west of the existing boundaries of the cities of Lincoln and Roseville.

Description of Water and Wastewater Agencies

The majority of the west Placer County population is served by large regional water and wastewater facilities. The large regional water systems primarily use surface water sources. The PCWA service area is currently divided into five zones that provide treated and raw water to Colfax, Auburn, Loomis, Rocklin, Lincoln, a small portion of Roseville, unincorporated areas of western Placer County, and a small community in Martis Valley near Truckee. Only zones 1, 2, and 5 are within the study area. The PCWA system consists of eight water treatment plants (WTPs). The City of Lincoln supplements its water purchased from the NID and PCWA with its own groundwater wells and reclaimed water. The City of Roseville serves customers within its boundaries with surface water from Folsom Lake treated at its own water treatment plant. Roseville's surface water supplies consist of contract Central Valley Project (CVP) water and PCWA water. The City of Roseville supplements its surface water supplies with groundwater and reclaimed water. The San Juan Water

District (SJWD) serves customers both in Placer County and Sacramento County exclusively with surface water from Folsom Lake treated at its own water treatment plant. SJWD uses PCWA surface water to supply its Placer County customers. South Sutter Water District and Camp Far West Irrigation District supply irrigation water in the northwestern portion of west Placer County. NID supplies treated water to the north Auburn area and is planning to provide treated water to a portion of the City of Lincoln in the near future. There are several smaller water systems in the area.

There are five major wastewater treatment plants (WWTP) and several smaller wastewater systems that serve the west Placer County area. Major facilities include Roseville’s two WWTPs, the City of Lincoln WWTP, the County’s North Auburn WWTP, and the City of Auburn WWTP (the smallest of the five). There are several smaller wastewater systems in the area.

Growth Scenarios

This study looked at four alternative land use scenarios for future growth in west Placer County. Scenario 1 is based on the currently approved general plans. Scenario 2, Enhanced General Plan, is based on Scenario 1 plus proposed projects that are in the approval process. A sub-scenario, 2b, includes a recently submitted update to the Placer Vineyards development to reflect the higher dwelling unit densities desired in the Sacramento Area Council of Governments (SACOG) Preferred Alternative. Scenario 3, SACOG Preferred Alternative, is based on the SACOG Blueprint Preferred project, which is based on increased dwelling unit densities. The most recent analysis of existing land use was completed by SACOG for 2001 conditions, and is shown in Figure ES-1. Projected land use for each future scenario is shown in Figures ES-2, ES-3, and ES-4, respectively. The resulting build out population and dwelling unit projections for each scenario are presented in Table ES-1.

Table ES-1. Current and Projected Population and Dwelling Units by Growth Scenario

Scenario	Total population ^a	Total dwelling units ^b
2001Development	208,108	90,483
2006 Development ^c	248,313	114,674
Scenario 1 Existing General Plans	473,234	175,272
Scenario 2 Existing General Plans Enhanced	602,710	223,226
Scenario 2b Existing General Plans Enhanced – Placer Vineyard Blueprint	622,876	230,695
Scenario 3 SACOG Blueprint Preferred	568,000	253,249

Notes:

^a Population for Scenarios 1, 2, and 2b based on assumed 2.7 people per dwelling unit.. This is based on year 2000 US Census data for the PCWA service area. Population for 2001 existing development and Scenario 3 provided by SACOG.

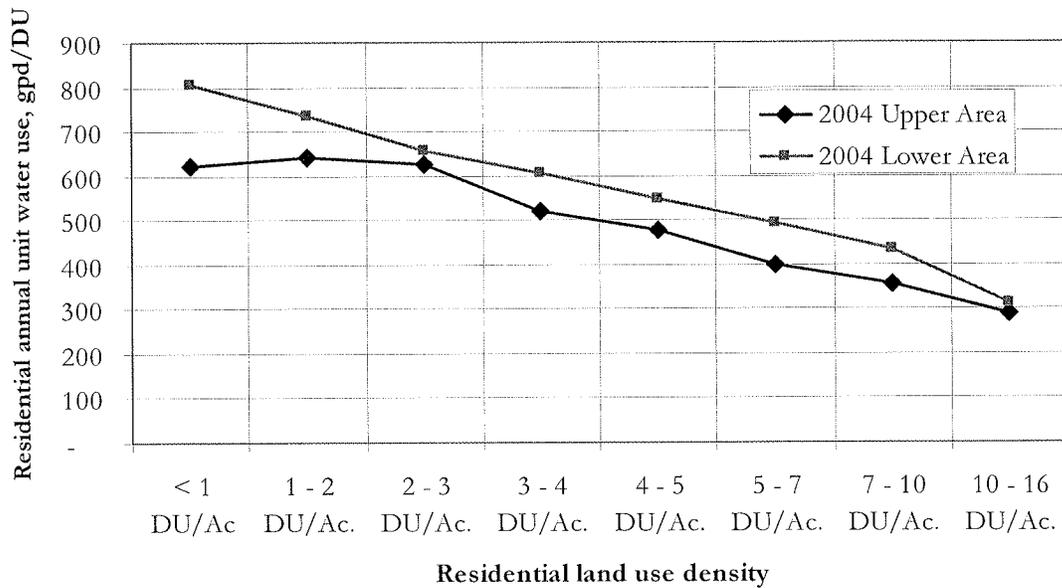
^b Total dwelling units for Scenarios 1, 2, and 2b are estimated for this study based on the existing median number of dwelling units per net acre in each residential land use category. This is based on the analysis of PCWA customer database and assessor parcel information, as described in Chapter 4 of this report. Total dwelling units for 2001 existing development and Scenario 3 provided by SACOG.

^c Estimated based on California Department of Finance Placer County 2006 estimate times 2001 west Placer County proportions to total 2001 Placer County population and dwelling units.

Water Use Characteristics

The unit water demands for the various land use categories were defined based on an analysis of the 2004 water use by PCWA’s customers. Water demands were evaluated to determine unit water factors to apply to the growth scenarios to calculate future water demands.

The analysis investigated density-based and location-based unit water demands. PCWA’s Zone 1 service area is split into an upper area (Auburn and Newcastle areas) and a lower area (all other areas in Zone 1). Residential accounts are divided into eight land use density categories, from less than 1 dwelling unit (DU)/acre to 10-16 DU/acre. Resulting median residential unit water demands for each residential land use density category are illustrated in Figure ES-5. A separate analysis for the Granite Bay planning subareas resulted in a separate water demand factor. The analysis indicates that there was little change in average use for middle to high density residential customers between 1999 and 2004. However, a decrease in the water use by large lot, low density single family dwelling units is noted. Non-residential unit water demand factors are generally based on the 2001 analysis. Resulting average annual unit water demands per day are presented in Table ES-2.



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Figure ES-5. Upper and Lower Area Residential Unit Water Demands

Water Demand Projections

The residential water demands for each growth scenario were determined based on the number of dwelling units at buildout for each land use category combined with the dwelling unit demand factor from Table ES-2. The buildout dwelling units were calculated based on the number of acres for each land use category combined with a gross to net acre factor that is generally 0.8. The nonresidential treated water demands were computed based on the number of acres of each

applicable land use category. The total demands were adjusted to include unaccounted-for water of 16 percent. The total water demand was also adjusted with a maximum year demand factor of 1.045 to account for the higher demands that occur during years in which the spring is dry and the irrigation season begins early. The results are presented in Table ES-3. Since the water demand projections are based on 2004 unit water use, any future additional water conservation efforts would result in water demands lower than presented in Table ES-3.

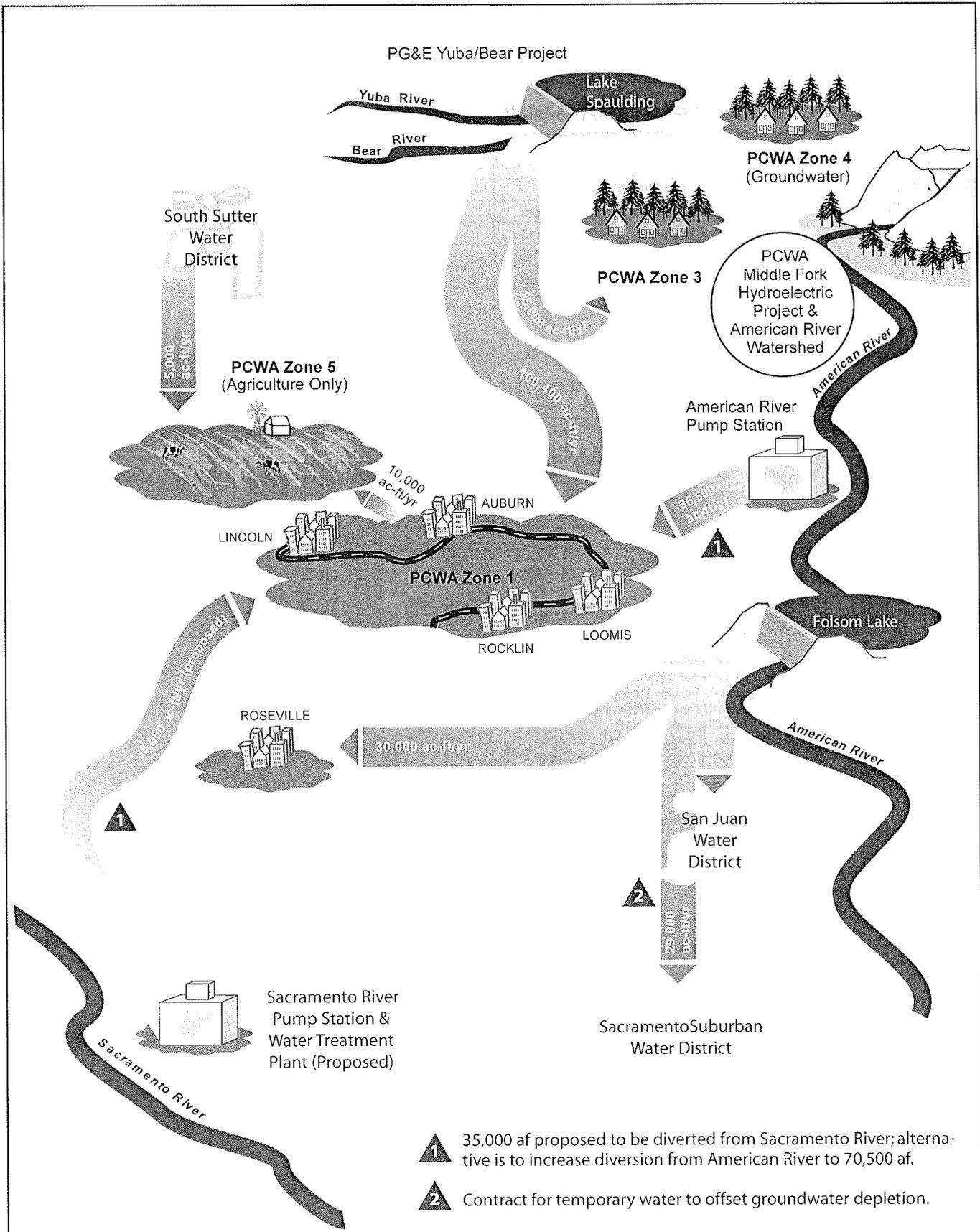
Water Supplies

Surface water, reclaimed water, and groundwater are the water supply sources available in west Placer County. PCWA's water supply sources consist of water purchased from Pacific Gas and Electric (PG&E) from the Yuba and Bear Rivers, Middle Fork Project (MFP) water from the American River, and CVP water from the American River. Surface water supplies in normal, single dry, and multiple dry years are summarized in Table ES-4. The surface water supply schematic for west Placer County is shown in Figure ES-6. Dry year restrictions for the CVP supply are based on the US Bureau of Reclamation (USBR) stated maximum reduction of 25 percent for CVP water used for municipal and industrial purposes. Due to the large amount of storage capacity in the MFP compared to its consumptive water rights, the MFP supply is assumed not to be impacted during dry years. The PG&E supply is assumed to have reductions up to 50 percent based upon data from the 1977 drought.

Reclaimed water supply is currently available from two sources, City of Lincoln and City of Roseville. Indirect reclaimed water is also available from City of Auburn's WWTP, as its effluent is discharged to the Auburn Ravine where it is available to meet agricultural demands during the irrigation season.

The amount of future reclaimed water demand depends on the extent that reclaimed water will be used for landscape irrigation. Supplying higher reclaimed water demands would require installation of extensive reclaimed water distribution systems to reach smaller landscape parcels, which is unlikely to be cost effective. Reclaimed water demand estimates used for this analysis are based on the assumption that the reclaimed water use will be limited to large common area landscapes. The reclaimed water supply is assumed to be equal to the reclaimed demand. This analysis assumes there is no change in reclaimed water supply or demand during dry years.

Existing groundwater use in west Placer County is mostly limited to supplying agricultural demands. The City of Lincoln does supplement their surface water with groundwater when necessary during peak periods. The City of Roseville has existing groundwater supply capacity, but little actual historic use. There is some groundwater use by private wells. The underlying groundwater basin, the North American Groundwater Sub-basin No. 5-21.64, generally contains high quality water, although iron, manganese, and arsenic are found on the west side of the basin. Preliminary findings from an ongoing PCWA groundwater study indicate the maximum average annual yield within the Placer County portion of the groundwater basin is approximately 95,000 acre-feet per year (ac-ft/yr). This study assumes that groundwater yield is not impacted by dry years.



- 1 35,000 af proposed to be diverted from Sacramento River; alternative is to increase diversion from American River to 70,500 af.
- 2 Contract for temporary water to offset groundwater depletion.

P:\126000\126233 PCWA\GRAPHICS\FIGURES

BROWN AND CALDWELL	PROJECT	126233	SITE	Integrated Water Resources Plan Placer County Water Agency	Figure ES-6
	DATE	8-4-06	TITLE	Water Supply Schematic	

Table ES-2. Placer County Land Use Water Use Factors

Land use classification	Upper Area		Lower Area	
	gpd/DU	gpd/ac	gpd/DU	gpd/ac
High Density Residential 20.1+ DU/ac	212		230	
High Density Residential 15.1-20.0 DU/ac	232		371	
High Density Residential 10.1-15.0 DU/ac	326		386	
Medium Density Residential 7.1-10.0 DU/ac	440		539	
Medium Density Residential 5.1-7.0 DU/ac	495		608	
Low Density Residential 3.1-5.0 DU/ac	613		703	
			1,802 ^a	
Low Density Residential 1.1-3.0 DU/ac	783		857	
			1,802 ^a	
Low Density Residential 0.05-1.0 DU/ac	769		998	
			1,802 ^a	
Commercial		2,299		2,759
Professional Office		2,682		3,219
Industrial		2,682		3,219
Public/schools (average)		2,816		3,379
Agricultural or Timberland		5,251		5,251
Resort/Recreation		5,251		5,251
Recreation/Conservation		5,251		5,251
Open Space		5,251		5,251

Notes:

Water use factors include maximum year demand and unaccounted-for water adjustments.

Water use factors are applied to net acreage.

^a 1,802 gpd/DU for Low Density Residential and Rural Residential land uses in Granite Bay - SJWD subarea.

^b 1,857 gpd/DU for Low Density Residential land uses in Granite Bay - PCWA subarea.

DU/ac = dwelling units per acre

gpd/ac = gallons per day per acre

gpd/DU = gallons per day per dwelling units

Table ES-3. Total Water Demand Projections*

Demand Areas	Scenario 1 Exist General Plans, ac-ft/yr	Scenario 2 Enhanced General Plans, ac-ft/yr	Scenario 2b Enhanced General Plans and Placer Vineyards BP, ac-ft/yr	Scenario 3 SACOG Blueprint Preferred, ac-ft/yr
Auburn	12,188	12,188	12,188	13,278
City of Lincoln	29,959	44,243	44,243	35,192
Rocklin	27,841	27,841	27,841	25,795
Loomis/Granite Bay area	16,284	16,284	16,284	18,641
West Placer	30,129	49,078	52,125	43,839
PCWA plus Lincoln Subtotal:	116,400	149,634	152,681	136,745
Roseville	57,825	65,970	65,970	51,924
San Juan Water District	16,415	16,415	16,415	14,339
Roseville and SJWD Subtotal:	74,240	82,385	82,385	66,263
Remainder area	1,469	1,643	1,643	3,754
NID demand areas	9,355	9,364	9,364	31,659
Subtotal:	10,823	11,007	11,007	35,413
West Placer County Potable Total:	201,463	243,026	246,073	238,421
Raw Water:	75,000	75,000	75,000	75,000
West Placer County Total:	276,463	318,026	321,073	313,421

Notes:

* Demand includes treated water, municipal groundwater, private groundwater, and reclaimed water. Raw water includes PCWA deliveries to canal customers.

ac-ft/yr = acre-feet per year

BP = Blueprint

Table ES-4. Surface Water Supplies

Agency holding water right or contract entitlement	Normal year, ac-ft	Multiple dry year, ac-ft	Single dry year, ac-ft
PCWA			
Middle Fork Project	120,000	120,000	120,000
Central Valley Project	35,000	26,250	26,250
PG&E (Drum – Spaulding Project)	100,400	75,300	50,000
South Sutter Water District	5,000	0	0
PCWA Subtotal:	260,400	221,550	196,250
City of Lincoln surface water (agreement with NID/PCWA)	3,300	2,475	1,650
City of Roseville			
Central Valley Project	32,000	24,000	24,000
Total	295,700	248,025	221,900

Note:

ac-ft = acre-feet

Allocation of Water Shortages from the Yuba-Bear River System

The Yuba-Bear River supply purchased from PG&E (the PG&E supply) has historically been the primary water supply for western Placer County. The original water system dates back to the California gold rush and the Zone 1 facilities operated by PCWA today were purchased from PG&E in 1968. All of PCWA's Zone 1 raw water customers and the Auburn/Bowman treated water system are served exclusively from the PG&E supply. Most of the present demands on the Foothill/Sunset treated water system and some of the irrigation demands in Zone 5 are also met

with the PG&E supply. The remainder of the Foothill/Sunset and Zone 5 demands are currently met from diversion of MFP water from the American River at Auburn. As the treated water demands on PCWA's system grow in the future it will be necessary to further develop PCWA's currently unused MFP and CVP supplies to meet these demands.

As shown in Table ES-4, surface water supplies from the Yuba-Bear River system are subject to reductions during dry periods. In any dry year the South Sutter Water District supply is reduced to zero. It is assumed that a PG&E supply cutback of 25 percent would occur in multiple year droughts and 50 percent in the driest single year event.

Due to the physical and geographic layout of PCWA's water supply and raw water delivery system (open channel configuration, location, and altitude), dry year reductions in the PG&E supply cannot be reasonably mitigated with other sources of supply. Water which is delivered from the Yuba-Bear River serves a geographical area that will continue to be mostly separated from PCWA's other water sources as they are developed to meet the urban development proposed in western Placer County. There are physical, environmental, and economic constraints that will likely prevent supplying any significant backup water from other sources to supply PCWA's raw water system. As a result, raw water customers that are supplied by the Yuba-Bear River System would be subject to more significant supply reductions than other customers during dry years.

An analysis of the allocation of the PG&E supply indicates that in a future multi-year drought, the reduction in deliveries through the Yuba-Bear system would be 30,000 ac-ft/yr. Figure ES-7 depicts graphically the allocation of Zone 1 and 5 water supplies. Although it would be the subject of Board policy at the time it occurs, it is assumed in the modeling that raw water cutbacks would be allocated as follows:

- Raw water to Zone 5 would be cut to zero first because they have greatest access to groundwater to replace PCWA deliveries.
- Zone 1 raw water customers would be cut to 92 percent of their normal supply (55,000 ac-ft versus 60,000 ac-ft).
- 10,000 ac-ft/yr of treated water demands in the Foothill/Sunset system would be supplied by groundwater.

This conjunctive use of groundwater recognizes the physical limitations of the raw water system and benefits both treated and raw water customers. Zone 1 raw water customers would see limited demand reductions because less PG&E water would be supplied to the treated water customers, and instead would be supplied to raw water demands. Zone 1 treated water customers would see no demand reductions, even though the PG&E supply would be greatly reduced, because groundwater would be used to make up the difference. The conjunctive strategy provides the greatest drought supply reliability for the PCWA system overall, and for the raw water and treated water systems individually.

In the single driest year, the reduction in Yuba-Bear system deliveries would be 55,000 ac-ft/yr. The modeling for this scenario is driven primarily by the inability to shift much additional water within the Yuba-Bear system from treated water deliveries to raw water deliveries. All of the rest of the loss in Yuba-Bear supply must be allocated to the raw water system. The result is that raw water

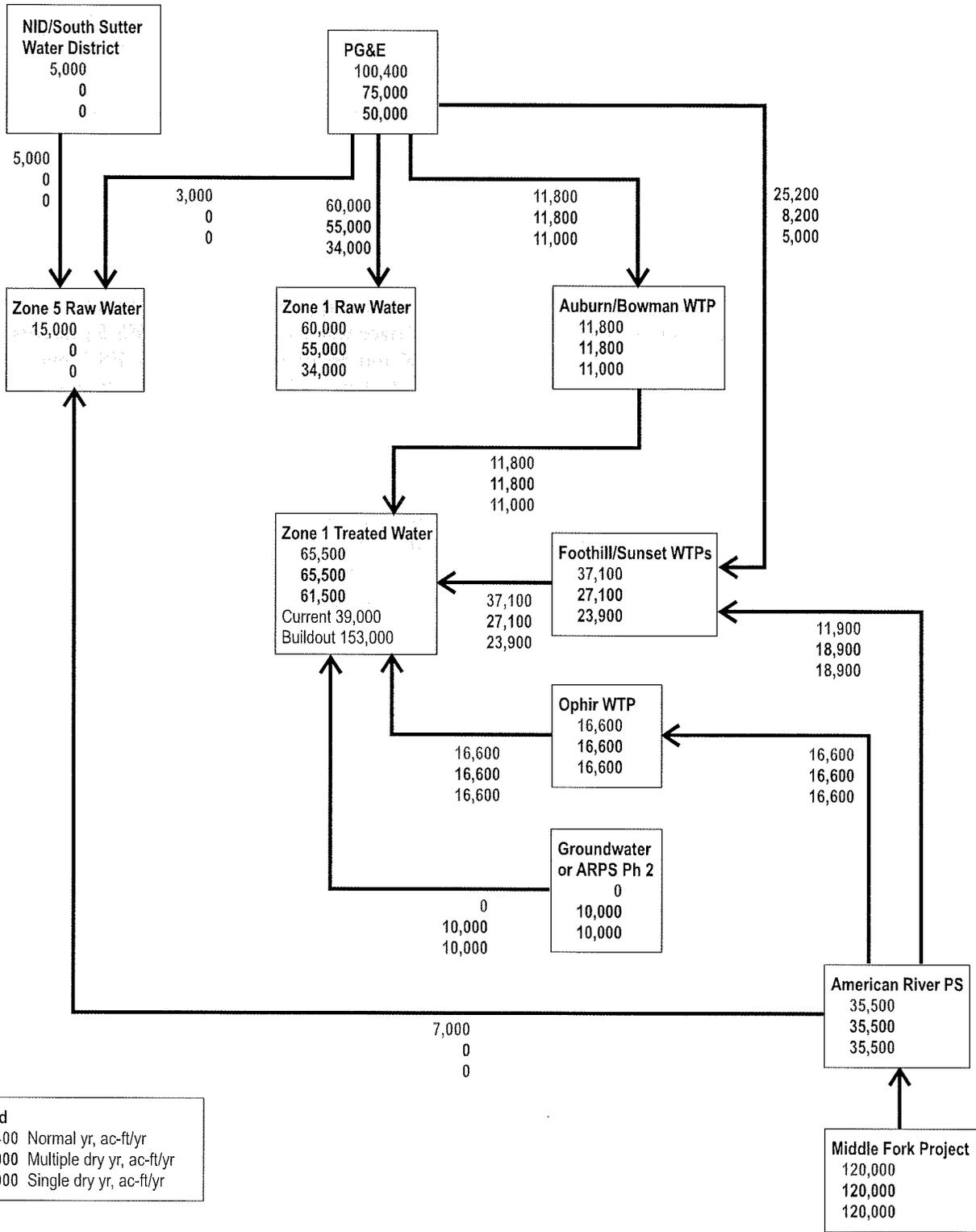
deliveries would be reduced from a normal year supply of 75,000 ac-ft/yr to only 34,000 ac-ft/yr (57 percent supply in Zone 1, 45 percent overall) in a single driest year event. Zone 1 treated water demands would still rely on 10,000 ac-ft groundwater to maintain total supply needs under this scenario.

Water Supply to Demand Comparison

Water demands can be met through an integrated water resources approach that incorporates groundwater and reclaimed water supplies in addition to surface water supplies. Table ES-5 presents the total demand and integrated supply available for normal and dry years. Tables ES-6, ES-7, and ES-8 present the water supply to demand comparisons for the City of Roseville, San Juan Water District, and PCWA's west Placer County service area, including the City of Lincoln.

The water supply to demand comparison is based on Scenario 2b. Scenario 2b is assumed to be the most likely development scenario. If future development were to follow Scenario 3, the resulting buildout water demands would be similar to Scenario 2b because the supply to demand comparison is for the areas that will be served with PCWA water supplies. Therefore, the comparison does not include the demands and supplies in the remainder area and the NID service area. The remainder area consists of several planning subareas in the northwest portion of west Placer County.

P:\26000\26233 PCWA\GRAPHICS\FIGURES\FigES-7-PGE-supply-chart.cdr



This figure is intended to depict how PCWA's available water supplies will likely be allocated in PCWA's Zone 1 in normal and dry years at such time as the treated and raw water demand is equal to the available supply from the American River Pump Station and the Yuba/Bear Rivers pursuant to PCWA's PG&E water supply contract. This is a less than buildout situation and time frame. Not shown on this Figure are the wholesale deliveries of PCWA's MFP and CVP supplies to San Juan Water District, the City of Roseville, Sacramento Suburban Water District, and additional PCWA diversions to meet its additional projected retail demands from the proposed Sacramento River diversion and water treatment plant project.

BROWN AND CALDWELL	PROJECT 26233	SITE Integrated Water Resources Plan Placer County Water Agency	Figure ES-7
	DATE 9-13-06	TITLE Zones 1 and 5 Allocation of PG&E Supply	

Table ES-5. West Placer County Supply to Demand Comparison, Scenario 2b, ac-ft/yr

Supply	Normal	Multi Dry Years	Single Driest Year
PCWA			
MFP	120,000	120,000	120,000
CVP	35,000	26,250	26,250
PG&E	100,400	75,000	50,000
South Sutter WD	5,000	0	0
Lincoln			
NID	3,300	2,475	1,650
Roseville			
CVP	32,000	24,000	24,000
Total Recycled	21,261	21,261	21,261
Private Groundwater	5,273	5,273	5,273
Groundwater			
Roseville	0	6,790	6,790
Lincoln/PCWA	0	10,000	10,000
Total	322,234	291,049	265,224
Demand			
Treated water demand factor	100%	100%	97% ^a
Raw water demand factor	100%	73%	45%
PCWA			
Auburn	12,188	12,188	11,822
Lincoln	44,243	44,243	42,916
Rocklin	27,841	27,841	27,006
Loomis/Granite Bay	16,284	16,284	15,795
West Placer	52,125	52,125	50,561
Roseville	65,970	65,970	65,970
San Juan Water District	16,415	16,415	16,415
Treated water subtotal	235,066	235,066	230,485
Raw water	75,000	55,000	34,000
Total	310,066	290,066	264,485
West Placer net	12,168	983	739
Groundwater recharge sale to SSWD	29,000	29,000	29,000
Net	-16,832	-28,017	-28,261

Note:

^a Applied only to PCWA demands.

ac-ft/yr = acre-feet per year

Table ES-6. City of Roseville Water Demand to Supply Comparison, ac-ft/yr

Supply/Demand	Normal	Multi Dry Years	Single Driest Year
Supply			
CVP	32,000	24,000	24,000
MFP	26,095	27,305	27,305
Recycled water	7,875	7,875	7,875
Groundwater	0	6,790	6,790
Total Supply	65,970	65,970	65,970
Demand	65,970	65,970	65,970
Net	0	0	0

Note:
 ac-ft/yr = acre-feet per year

Table ES-7. San Juan Water District Supply to Demand Comparison, ac-ft/yr

Supply/Demand	Normal	Multi Dry Years	Single Driest Year
Supply			
CVP	0	0	0
MFP	16,415	16,415	16,415
Recycled water	0	0	0
Groundwater	0	0	0
Total Supply	16,415	16,415	16,415
Demand	16,415	16,415	16,415
Net	0	0	0

Notes:
 Placer County portion of SJWD only.
 ac-ft/yr = acre-feet per year

Table ES-8. PCWA (including Lincoln) Supply to Demand Comparison, ac-ft/yr

Supply/Demand	Normal	Multi Dry Years	Single Driest Year
Supply			
MFP	77,490	76,280	76,280
CVP	35,000	26,250	26,250
PG&E	100,400	75,000	50,000
NID to Lincoln	3,300	2,475	1,650
South Sutter WD	5,000	0	0
Recycled water	13,386	13,386	13,386
Private residential groundwater	5,273	5,273	5,273
Groundwater	0	10,000	10,000
Total Supply	239,849	208,664	182,839
Demand			
Treated water	152,681	152,681	148,101
Raw water	75,000	55,000	34,000
Total demand	227,681	207,681	182,101
PCWA net	12,168	983	738
Groundwater recharge sale to SSWD	29,000	29,000	29,000
Net	-16,832	-28,017	-28,262

Note:
 ac-ft/yr = acre-feet per year

Findings and Conclusions

Several conclusions are made based on the analysis presented in this study:

1. Using an integrated resources approach that combines surface water, reclaimed water, and groundwater, there is adequate water supply to reliably meet all of the projected PCWA western Placer County service area demands under normal climate, multiple year, and single year drought conditions.
2. Under multiple year (moderate) drought conditions, PCWA would be required to implement drought restrictions on raw water customer usage sufficient to reduce raw water demands to balance supply and demand.
3. Under single year (severe) drought conditions, PCWA would be required to implement drought restrictions on treated and raw water customer usage sufficient to reduce demands to balance supply and demands
4. Under drought conditions, raw water customers would likely experience a larger cutback than treated water customers because of physical limitations of the PCWA water delivery system.
5. Under drought conditions PCWA, Roseville, and Lincoln will all need to rely on groundwater to improve the reliability of their system.
6. Reclaimed water supply is an important supply source, and its use is required to meet buildout demands.
7. The buildout of the existing Placer County General Plan within the San Juan Water District service area will not require all of the 25,000 ac-ft/yr currently contracted to San Juan Water District to serve that area.
8. The surface water being supplied to the Sacramento Suburban Water District will be reduced in normal years but not eliminated as water demands increase within Placer County.

CHAPTER 1 INTRODUCTION

Placer County Water Agency (PCWA) has a limited supply of water. Population growth has made it important to closely assess available water supplies and future demand. This document is an integrated water resources plan (IWRP) that presents a detailed assessment of the water supply and demand situation in western Placer County. The intent of this IWRP is to integrate the variety of available water supply resources to meet future water needs.

1.1 Study Area

The study area includes the entire west Placer County area. The eastern boundary of the study area is the edge of the Auburn and Auburn- Bowman planning areas. All cities in west Placer County are included in this analysis.

1.2 Objectives

PCWA made an assessment of its water supplies and future demand five years ago as documented in the March 2001 Surface Water Supply Discussion Paper. This IWRP updates the water supply and demand assessment done in 2001 and fulfills several key objectives, as follows:

1. Provide a framework for organized water resources planning in the context of prepared growth and development by the landuse authorities within western Placer County,
2. Coordinate water resources planning for all of the communities in western Placer County,
3. Develop water resources planning information to help provide a long term, reliable water supply.
4. Provide water demand planning guidance to help PCWA plan for: water treatment and conveyance facilities and groundwater facilities, groundwater supplies, and reclaimed water supplies.

Development of this IWRP will help to further ensure that PCWA is efficiently balancing its water resources with current and future demands for water.

1.3 Background

The key conclusion in the 2001 Discussion Paper was that PCWA has adequate surface water supply entitlements to match the demands that would occur at buildout of the general plans at that time within its western Placer County service area. The 2001 assessment made several key assumptions. Most of these assumptions are reconsidered in this IWRP, as follows:

1. Current General Plans. The 2001 assessment used general plans adopted as of the date of the study to determine buildout water demands. This IWRP not only re-evaluates the demand based on general plans adopted as of July 2005, but also considers several growth scenarios that would result in land development beyond what is currently authorized in adopted general plans.

2. Groundwater. The 2001 assessment assumed that groundwater would not be used as a source of supply. This IWRP considers groundwater as one of the available sources of water supply.
3. Reclaimed Water. The 2001 assessment did not include reclaimed water as a water supply source. This IWRP estimates the amount of reclaimed water that would be available and developed as a water supply source.
4. Unit Water Use. The 2001 assessment based its water demand projections based on an analysis of water use by the various categories of customers in 1999. This IWRP presents an update of this unit water use analysis using 2004 water use information.
5. Water Use Efficiency. The 2001 assessment did not consider possible impacts to water demands due to increased water conservation efforts. As part of this IWRP effort, an assessment of water use conservation best management practices (BMPs) is being done and reported separately in the Water Conservation Master Plan.
6. Raw Water. The 2001 assessment made an assumption regarding the amount of raw water deliveries. This IWRP presents an update regarding future raw water demands.
7. Study Area. This IWRP includes an analysis of the buildout water demands for all of west Placer County. There were several areas in west Placer County that were not included in the 2001 assessment. The areas that are now included are the City of Roseville, Nevada Irrigation and San Juan Water Districts' service areas in Placer County, the Sheridan area, and lands that lie to the west of the existing boundaries of the cities of Lincoln and Roseville.

CHAPTER 2 DESCRIPTION OF WATER AND WASTEWATER AGENCIES

This chapter describes the water and wastewater systems within the study area. In addition to the large regional treatment facilities, small community water systems located in unincorporated areas of the county are also summarized. Land use, water, wastewater, and recycled water plans, water system permits, and other documents were collected and reviewed to provide a county-wide picture of current and planned water and wastewater facilities within the county. A complete summary of existing water and wastewater facilities is presented in Appendix A. Figure 2-1 illustrates the water and wastewater providers and locations of major treatment plants in west Placer County. The study area is that portion of Placer County west of Zone 3, excluding the area served by NID, as shown in Figure 2-1.

The majority of the Placer County population, situated in and close to high density communities, is serviced by large regional water facilities. The large regional water systems use surface water sources. Those county residents that are in more remote locations are typically serviced locally through a system of groundwater wells that normally require minimal treatment.

California Department of Health Services (DHS) water system permits and other documents were reviewed to obtain the information presented in this section. Unless otherwise noted, the connection and population data is presented for 2002 and is from the DHS permit filings.

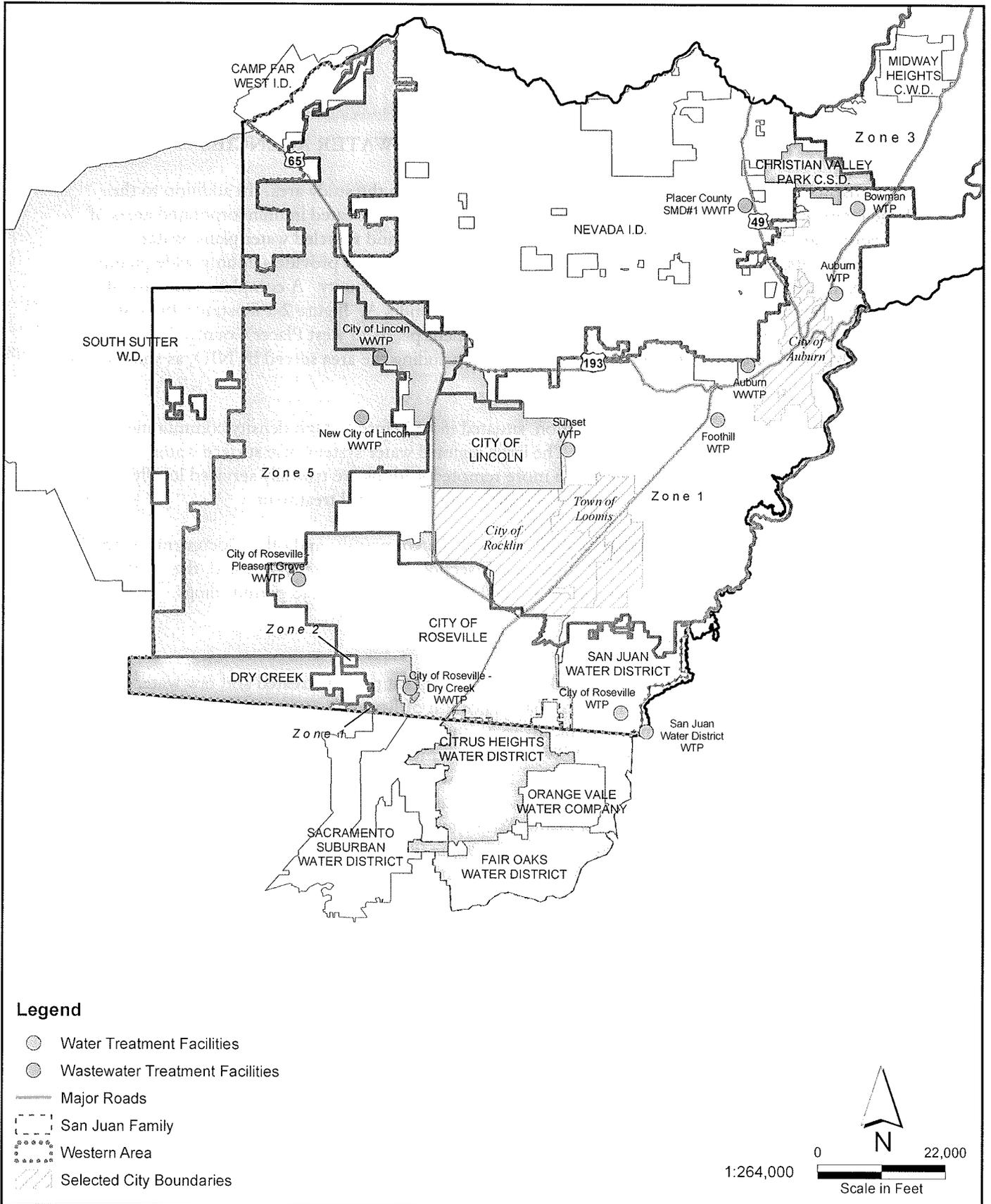
2.1 PCWA Water System

The PCWA service area is currently divided into five zones that provide treated and raw water to Colfax, Auburn, Loomis, Rocklin, Lincoln, a small portion of Roseville, unincorporated areas of western Placer County, and a small community in MartisValley near Truckee. Only zones 1, 2, and 5 are within the study area. The existing PCWA water treatment facilities within each PCWA zone are briefly described below, and shown in Figure 2-1. The western area depicted in Figure 2-1 is the area that PCWA water is used in the western Placer County and Sacramento County. The PCWA system consists of eight water treatment plants (WTPs), which serve approximately 36,100 connections and a population of approximately 135,900 in 2004 (including City of Lincoln). PCWA water treatment facilities produced 39,000 acre-feet (ac-ft) of treated water in 2004.

2.1.1 PCWA - Zone 1

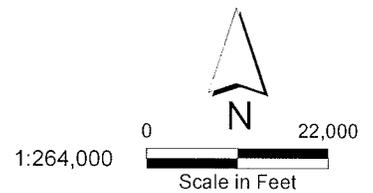
Zone 1 is the largest of the five zones, providing water service to Auburn, Bowman, Ophir, Newcastle, Penryn, Loomis, Rocklin, Lincoln, and portions of Granite Bay. Zone 1 includes four water treatment facilities, fourteen storage tanks providing approximately 24.5 million gallons (MG) of storage capacity, and approximately 370 miles of treated water piping.

The source of water for Zone 1 facilities comes from either Pacific Gas & Electric's (PG&E's) Wise/South Canal, PCWA's Boardman Canal, or from the American River. This water is used to supply the PCWA's Bowman, Auburn, Foothill, and Sunset Water Treatment Plants as well as raw water customers. PCWA serves wholesale treated water to the City of Lincoln and other property owner associations. In water year 2005, a total of 65,874 ac-ft of raw water was supplied to agricultural customers.



Legend

- Water Treatment Facilities
- Wastewater Treatment Facilities
- Major Roads
- - - San Juan Family
- Western Area
- ▨ Selected City Boundaries



BROWN AND CALDWELL	PROJECT 129300	Integrated Water Resources Plan Placer County Water Agency	Figure 2-1
	DATE 8-14-06	Water and Wastewater Treatment Facilities	

The Auburn and Bowman WTPs are located in the northern part of Zone 1 and serve the Auburn, Bowman, Ophir, and Newcastle areas of Placer County. The facilities treat surface water from the Bear River through the Boardman, Wise, and South Canals. The Bowman WTP has a maximum daily capacity of 7 million gallons per day (mgd) and is used as the primary treatment facility. Auburn WTP has a 5 mgd capacity and is used during periods of high demand. The Auburn WTP is currently being replaced with a new plant with an initial capacity of 8 mgd that is expandable to 14 mgd.

The Foothill and Sunset WTPs are located in the southern part of Zone 1 and serve the communities of Penryn, Loomis, Rocklin, Lincoln, and a portion of Granite Bay. The facilities treat surface water from the Wise/South and Caperton Canals. The Foothill WTP has a maximum daily capacity of 55 mgd and is used as the primary treatment facility. The Sunset WTP has a capacity of 8 mgd and is typically operated during the peak summer months and during outages in the PG&E supply to the Foothill WTP.

Water can be supplied to lower Zone 1 from the American River by operating pumps located near the proposed Auburn Dam site. These pumps lift water from the river to the inlet of the Auburn Tunnel. The Auburn Tunnel is a 3-mile long tunnel that connects the American River Canyon with Auburn Ravine near the town of Ophir. In addition to being able to supply American River water to Auburn Ravine, PCWA is also able to supply water to PG&E's South Canal during PG&E annual outages by operating pumps that intercept the tunnel and pump water to the surface and discharge it into PG&E's South Canal. Although allowed on a short-term basis, continuous operations face environmental concerns due to the low temperatures of the American River supply.

2.1.2 PCWA - Zone 2

Zone 2 consists of the Bianchi Estates water system that serves a small portion of the Roseville community. The system is serving approximately 46 connections with an estimated population of 152. In the past, water supply for Zone 2 was groundwater supplied by two wells. In 2003, the system was connected to the City of Roseville's pipeline in Baseline Road and now receives wheeled water from Zone 1 through Roseville's water facilities.

2.1.3 PCWA - Zone 3

Zone 3 includes four treatment facilities and provides water services to the communities of Monte Vista, Alta, Applegate, and Colfax. This zone is not within the study area. There are approximately 23.8 miles of treated water piping and 2.6 MG of treated water storage capacity within Zone 3.

The Monte Vista WTP is located in the northern part of Zone 3 and services the community of Monte Vista. The WTP is a small system serving approximately 18 connections and an estimated population of 60. The facility treats surface water from Cedar Creek Canal and provides an estimated 49 ac-ft of treated water annually (DHS, 2002).

The Alta WTP is located in the northern part of Zone 3 and services the community of Alta. The WTP system serves approximately 217 connections and an estimated population of 716. The facility treats surface water from the Alta Reservoir and provides an estimated 166 ac-ft of treated water annually (DHS, 2002).

The Applegate WTP is located in the southern part of Zone 3 and services the community of Applegate. The WTP is a small system serving approximately 60 connections and an estimated population of 198. The facility treats surface water from the Boardman Canal and provides an estimated 31 ac-ft of treated water annually (DHS, 2002).

The Colfax WTP is centrally located in Zone 3 and services the community of Colfax. The WTP system serves approximately 844 connections and an estimated population of 2,785. The facility treats surface water from the Boardman Canal and provides an estimated 614 ac-ft of treated water annually (DHS, 2002).

The source of water for Zone 3 customers comes from PG&E. PCWA purchases water from PG&E at various buy points. PCWA's Boardman Canal, beginning near Alta, extends along the I-80 corridor to Zone 3 near Lake Theodore. From the Boardman Canal, water is delivered to the four PCWA water treatment plant facilities located within Zone 3, other community water districts, and PCWA's raw water customers.

2.1.4 PCWA - Zone 4

The Zone 4 system consists of two water wells at the Lahontan site and serves a community in the Lahontan Subdivision near the Northstar community, south of Truckee. This zone is not within the study area. The system serves approximately 515 connections and an estimated population of 1,700, although most of this population is only part time. The key water facilities within Zone 4 include two wells, a 500,000 gallon water storage tank, and approximately 8.2 miles of treated water distribution system piping. The facilities provided an estimated 5.3 ac-ft in 2002 (DHS, 2002), indicating the planned population has not yet developed.

The water supply for Zone 4 is groundwater pumped from the Martis Valley aquifer. Home construction in the new development began in 1997, with only a few connections being served when PCWA began water service. The amount water pumped was 927 ac-ft in 1999, which includes one greenbelt rate customer. This amount is significantly greater than the 2002 value, indicating the water was probably used for construction and/or establishing the golf course.

2.1.5 PCWA - Zone 5

Zone 5 includes all areas of west Placer County outside of PCWA Zone 1 or other water provider service areas. Only raw water is distributed within Zone 5 to agricultural customers which is delivered through the canals and creeks that traverse the area. In water year 2003, a total of 7,400 ac-ft of raw water was supplied to Zone 5 customers. This is relatively low compared to previous years, with the average from 1995-2005 at 12,300 ac-ft/year (PCWA Operations Report).

2.2 **City of Roseville**

The City of Roseville WTP is located in Granite Bay. The 60-mgd treatment facility provides treated water to the City of Roseville. The WTP serves approximately 31,479 connections and an estimated population of 85,772. The facility treats surface water from Folsom Lake and provides an estimated 29,750 acre-feet per year (ac-ft/yr) (DHS, 2002) of treated water. This treatment plant is currently being expanded to a capacity of 100 mgd. Roseville also has purchased a small amount (averaging

less than 150 ac-ft/yr) of treated water from PCWA to serve boundary service areas. In 2005, Roseville used all of their CVP supply and 2,641 ac-ft of MFP water. In the future, all increases in demand will be met from increased diversions of Middle Fork Project (MFP) water.

2.3 City of Lincoln

The City of Lincoln purchases potable water from PCWA and Nevada Irrigation District (NID) to retail to its customers. The City also owns groundwater wells to supplement its surface water supply. Lincoln serves approximately 7,619 connections and an estimated population of 20,141 (DHS, 2002). The City uses approximately 715 ac-ft (DHS, 2002) of groundwater and 4,063 ac-ft of treated PCWA surface water annually. This 2002 value does not match PCWA's sales records to Lincoln (3,816 ac-ft). However, PCWA records indicate a meter failure during that year that could account for the discrepancy. Lincoln demands have grown substantially in recent years, with PCWA 2004 sales to Lincoln being approximately 6,500 ac-ft. The NID supply water is currently wheeled through PCWA facilities as NID does not currently have infrastructure in place to deliver treated water directly to Lincoln. Total PCWA delivery to Lincoln in 2005 was 7,602 ac-ft, of this approximately 1,115 ac-ft was within the NID service area.

2.4 San Juan Water District (SJWD)

SJWD serves retail and wholesale customers in the northeastern corner of Sacramento County and Granite Bay area in the southern Placer County. Wholesale customers in Sacramento County are known as the San Juan Family and include Citrus Heights Water District, Orange Vale Mutual Water Company, Fair Oaks Water District, and the City of Folsom. Retail customers are mainly in Granite Bay. San Juan Water District owns and operates a surface water treatment plant that treats water from Folsom Lake. SJWD's retail area serves approximately 31,340 people, and a total of 157,000 in the entire San Juan Family area, for a 2002 annual average demand of 54,000 ac-ft (USBR Management Plan, 2004). The demographics and water use in the Placer County portion is described in Chapters 3, 4, and 5. In 2005, SJWD delivered approximately 12,046 ac-ft of MFP water to its customers within Placer County.

2.5 South Sutter Water District

South Sutter Water District is located along the Placer County/Sutter County boundary with service areas in both counties. South Sutter Water District only provides supplemental irrigation water to its customers. Most of its customers irrigate with groundwater and supplement with South Sutter Water District surface water when necessary. South Sutter Water District's supply is from the Camp Far West Reservoir and receives no treatment prior to use. There are approximately 57,000 net acres within the service boundary, with 16,900 acres in Placer County. 35,000 acres are irrigated per year as of 2002 (MBK Engineers, 2003).

2.6 Nevada Irrigation District

The NID North Auburn WTP is located north of the City of Auburn and provides treated water to the north Auburn area. The WTP serves approximately 2,457 connections and an estimated population of 5,700. The facility utilizes surface water from Rock Creek Reservoir, which is fed from the Yuba-Bear complex through the Wise Canal and provides approximately 2,044 ac-ft of treated water annually (DHS, 2002).

2.7 Camp Far West Irrigation District

Camp Far West Irrigation District is located in the northwest corner of Placer County, downstream of the Camp Far West Reservoir. The District is relatively small, with only 4,500 acres, and only provides raw water for agriculture irrigation. The District receives all of its supply from Camp Far West Reservoir, which is fed by the Bear River.

2.8 Other Water Agencies

There are several smaller water agencies and facilities within Placer County serving small communities or individual developments. These systems are summarized below in Table 2-1. Only the Castle City System is within the study area. The Lake Tahoe water systems are not described.

Table 2-1. Other Placer County Water Systems

Name	Area	Annual Demand*	Source	Notes
Foresthill Public Utilities District	Town of Foresthill	932 MG (2,866 ac-ft)	Surface water from from Sugar Pine Dam and North Shirt Tail Canyon Creek	
Meadow Vista Water District	Meadow Vista community	406 MG (1,246 ac-ft)	Surface water from the Boardman Canal	Supply purchased under contract with PCWA, located within PCWA Zones.
Weimar Water Company	Weimar	153 MG (470 ac-ft) Phone Survey, 1/21/2005	Surface water from the Boardman Canal	Facility also provides treated water to Midway Heights County Water District (Zone 3).
Castle City Mobile Home Community	Mobile home park in Newcastle area	128 MG (393 ac-ft) Phone survey 1/21/2005	Surface water from Boardman Canal	Zone 1
Christian Valley Park Placer County Service District	North of Auburn	163 MG (500 ac-ft)	Surface water from the Bowman Canal	Supply purchased under contract with PCWA (Zone 3).

Notes:

* Annual demand from DHS 2002 annual reports unless otherwise noted.

ac-ft = acre-feet

MG = million gallons

2.9 Small Community Water Systems

Small water systems are defined as those public water systems supplying fewer than 200 service connections and more than either five service connections or 25 individuals served daily, in accordance with Title 22, California Administration Code, Section 64411. Document and agency research has identified approximately 24 small community water systems servicing an estimated 3,843 customers within the Placer County area. Five systems are located in PCWA Zone 3, seven systems are located within PCWA Zone 1, and twelve systems are located outside PCWA zones. More detailed information on these systems is presented in Appendix A.

2.10 Wastewater Facilities

There are five major wastewater treatment plants (WWTP) in the west Placer County area and numerous smaller wastewater systems. Major facilities include Roseville's two WWTPs, the City of Lincoln WWTP, the County's North Auburn WWTP, and the City of Auburn WWTP (the smallest of the five). Each plant is summarized in Table 2-2. Agencies in the Auburn/Loomis area of Placer

County are currently investigating options for combining the smaller treatment plants into one regional system.

Table 2-2. Major Wastewater Treatment Facilities in West Placer

Name	Service Area	Plant Capacity, mgd	Discharge Location	Notes
Roseville Dry Creek	Southern portion of Roseville service area	18.0	Dry Creek	
Roseville Pleasant Grove	Northern portion of Roseville service area	12.0	Pleasant Grove Creek	Planned for eventual expansion to 20.7 mgd.
Lincoln	Lincoln	3.3	Auburn Ravine	Planned for eventual expansion to 30.0 mgd.
Auburn	Auburn	1.35	Auburn Ravine	Discharge is upstream of NID diversion.
SMD #1	North Auburn	2.64	Rock Creek to Coon Creek	Plant expected to be abandoned with construction of new pipeline to Lincoln WWTP.

Note:
 mgd = million gallons per day

There are several smaller wastewater collection and treatment systems in the area. Table 2-3 provides a summary of the minor wastewater systems. Placer County contains three Sanitary Maintenance Districts (SMD) and six County Service Areas (CSA) as listed in the table.

Table 2-3. Small Wastewater Facilities in West Placer County

Name	Service Area	Plant Capacity, mgd	Discharge Location	Notes
Colfax	Colfax	0.13	Land application and Smuthers Ravine (to North Fork of American River)	
SMD #2	Granite Bay	N/A	N/A	Plant decommissioned and all flow sent to Roseville Dry Creek WWTP.
SMD #3	Granite Bay	0.085	Miner's Ravine	Expected to be abandoned in 2008 and flow sent to Roseville Dry Creek WWTP.
CSA #2	Sunset Industrial	N/A	N/A	System is only a collection system, flow is treated at Roseville Pleasant Grove WWTP.
CSA #6	Sheridan	0.057	Land application, or unnamed ditch tributary to Yankee Slough	WWTP at capacity, Sheridan under growth moratorium.
CSA #23	Blue Canyon	unknown	Leach field	Serves 26 connections.
CSA #24	Applegate	unknown	Leach field	Serves 27 connections, planned to be connected to SMD 1 with flow treated at Lincoln WWTP.
CSA #55	LaVoti	N/A	N/A	System is only a collection system, flow is treated at Sacramento Regional WWTP.
CSA #173	Dry Creek west of Roseville	N/A	N/A	System is only a collection system, flow is treated at Roseville Dry Creek WWTP.
United Auburn Indian/Auburn Rancheria Casino	Auburn Rancheria Casino	0.075	Orchard Creek to Auburn Ravine	
Skyview Terrace	Forest Hill Road area	0.02	Land application	Mobile home park for 135 connections.

Note:
 mgd = million gallons per day

CHAPTER 3 GROWTH SCENARIOS

This chapter describes the existing and future land use and population within the study area. A summary of the existing planning documents reviewed, a description of the planning subareas developed for this analysis, and historical demographics are provided. Projected demographics and land use for different growth scenarios are presented.

3.1 Existing Planning Documents

Existing county and city general planning documents were reviewed to determine current planning information. A complete list of documents and brief summaries is presented in Appendix B. Documents include community planning studies, specific study areas, the Placer Legacy project, and habitat and conservation plans, as well as city-specific planning documents.

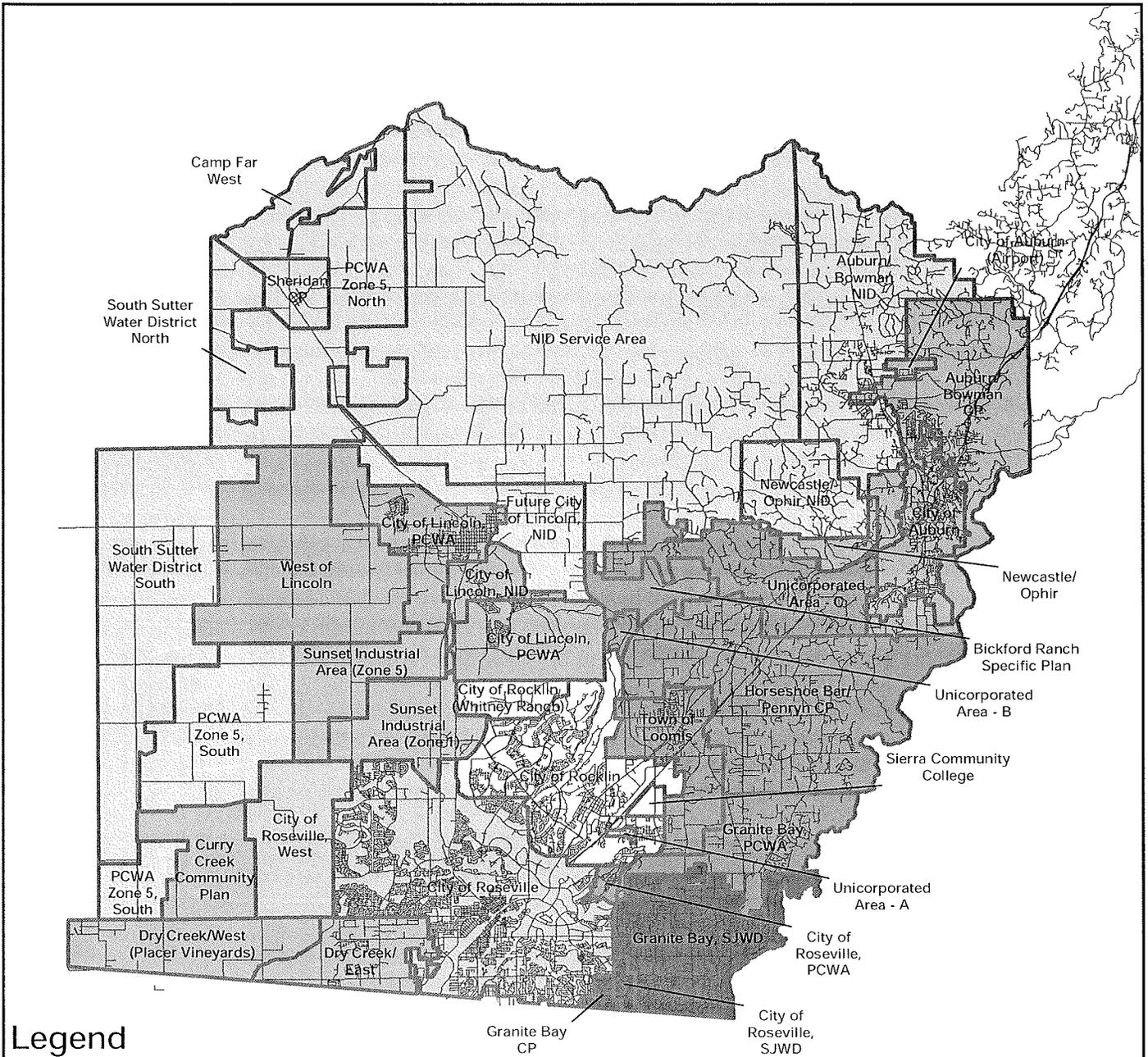
The Placer County General Plan was adopted in 1994, and with the growth that has occurred in the last decade, the plan does not contain the latest planning information concerning specific areas. Placer County provided updated planning information available in a geographic information system (GIS) that provides land use and acreage, as well as other information. Compact disks containing the County's GIS updated land use information was obtained from the County dated June, 2004. The GIS is updated by Placer County staff through review of pertinent planning documents. Although the Placer County staff attempts to keep the GIS information current, it was noted that some of the more recent development plans were not included. For these recent development areas, the GIS land use information was updated to reflect the recent development plans. An explanation of how the newer information was incorporated into the Placer County GIS land use database for these subareas is discussed in Section 3.5.

3.2 Planning Subareas

Western Placer County is divided into planning subareas for this study. These subarea boundaries are defined based on current city boundaries, city general plans, spheres of influence, unincorporated areas, or as defined by previous PCWA studies. The subareas are grouped into macro areas in order to more easily compare growth estimates between the various growth scenarios. The study area of west Placer County is defined on the south, west, and north boundaries at the Placer County line, and on the east as the edge of Auburn and Auburn-Bowman planning areas. The subareas as well as the macro areas are listed in Table 3-1 and shown on Figure 3-1. An aerial photograph with the subarea outlines is provided on Figure 3-2. More detailed aerial layouts with subarea boundaries are presented in Appendix G.

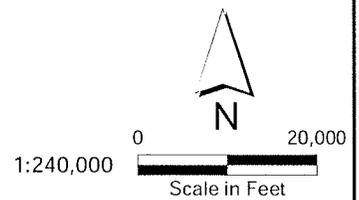
Table 3-1. List of Macro Areas and Subareas

Macro area	Subarea
Auburn	City of Auburn City of Auburn (Airport) Auburn/Bowman Community Plan Newcastle/Ophir
Loomis/Granite Bay	Horseshoe Bar/ Penryn Community Plan Town of Loomis Granite Bay, PCWA Bickford Ranch Specific Plan Unincorporated Area B Unincorporated Area C City of Roseville, PCWA
San Juan Water District	Granite Bay, SJWD Granite Bay Community Plan
Lincoln	City of Lincoln, PCWA City of Lincoln, NID West of Lincoln
City of Rocklin	City of Rocklin City of Rocklin (Whitney Ranch) Unincorporated Area C Sierra Community College
City of Roseville	City of Roseville City of Roseville, West
West Placer Development Areas	Dry Creek / West (Placer Vineyards) Dry Creek / East Curry Creek Community Plan Sunset Industrial Area (Zone 1) Sunset Industrial Area (Zone 5)
Remainder Area	PCWA Zone 5, South PCWA Zone 5, North Sheridan Community Plan South Sutter Water District, South South Sutter Water District, North Camp Far West Irrigation District
NID Service Areas	NID Service Area Future City of Lincoln, NID Newcastle/Ophir, NID Auburn/Bowman, NID

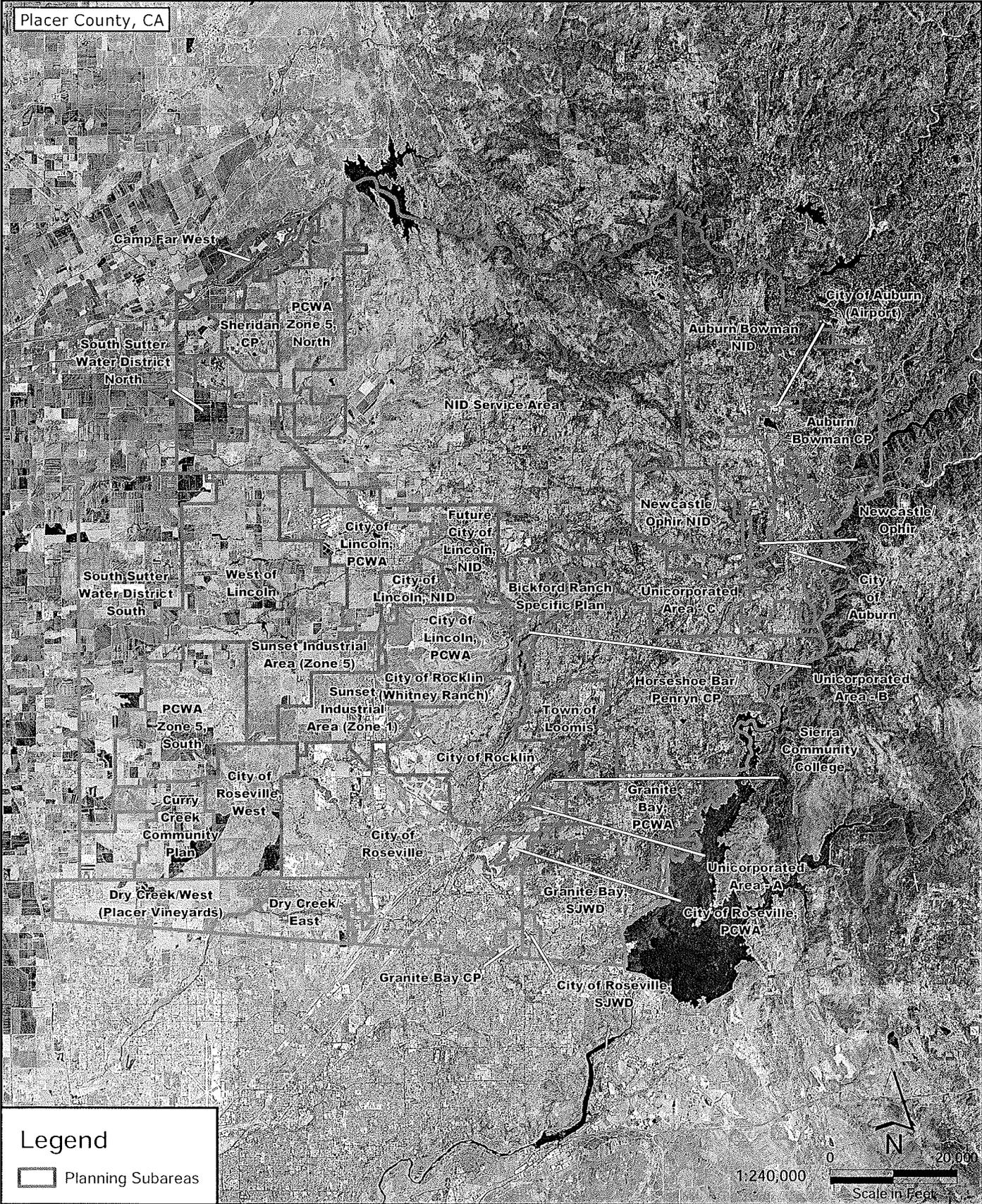


Legend

- Planning Subareas
- Roads
- Macro Areas**
- Auburn
- Lincoln
- Loomis/Granite Bay
- NID Service Areas
- Remainder Area
- Rocklin
- Roseville
- San Juan Water District
- West Placer Development Areas



BROWN AND CALDWELL	PROJECT 126233	CLIENT Integrated Water Resources Plan Placer County Water Agency	Figure 3-1
	DATE 8-15-06	TITLE Planning Subareas and Macro Areas	



BROWN AND CALDWELL	PROJECT	126233	CLIENT	Integrated Water Resources Plan Placer County Water Agency	Figure 3-2
	DATE	8-15-06	TITLE		

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3.3 Historical Demographics, Land Use, and Connections

This section describes the historical demographics, land use, and water system connections in western Placer County and the western PCWA service area.

3.3.1 Demographics

Historical and current population and dwelling unit data for Placer County as provided by the California Department of Finance (DOF) is shown in Table 3-2. The average annual population growth rate over the last five years is also shown in Table 3-2 for each of the cities and the unincorporated area within Placer County. The boundaries of the cities in Table 3-2 do not necessarily match the subarea boundaries discussed in Section 3.2.

Table 3-2. Historical and Current Population and Dwelling Units

Area	2000 ^a		2005 ^b		Population average annual growth rate (2000-2005), %
	Population	Dwelling units	Population	Dwelling units	
Auburn	12,462	5,457	12,849	5,814	0.6%
Colfax	1,520	647	1,822	801	3.6%
Lincoln	11,205	4,146	27,356	11,930	17.9%
Loomis	6,260	2,273	6,274	2,353	0.0%
Rocklin	36,330	14,421	50,494	19,679	6.6%
Roseville	79,921	31,925	102,191	42,219	4.9%
Unincorporated ^c	100,701	48,433	200,986	82,796	13.8%
Total	248,399	107,302	305,675	134,896	4.1%

Notes:

^a California Department of Finance, Demographic Research Unit. Table 2:E-4 Population Estimates for Cities, Counties, and State, revised 1/1/2001.

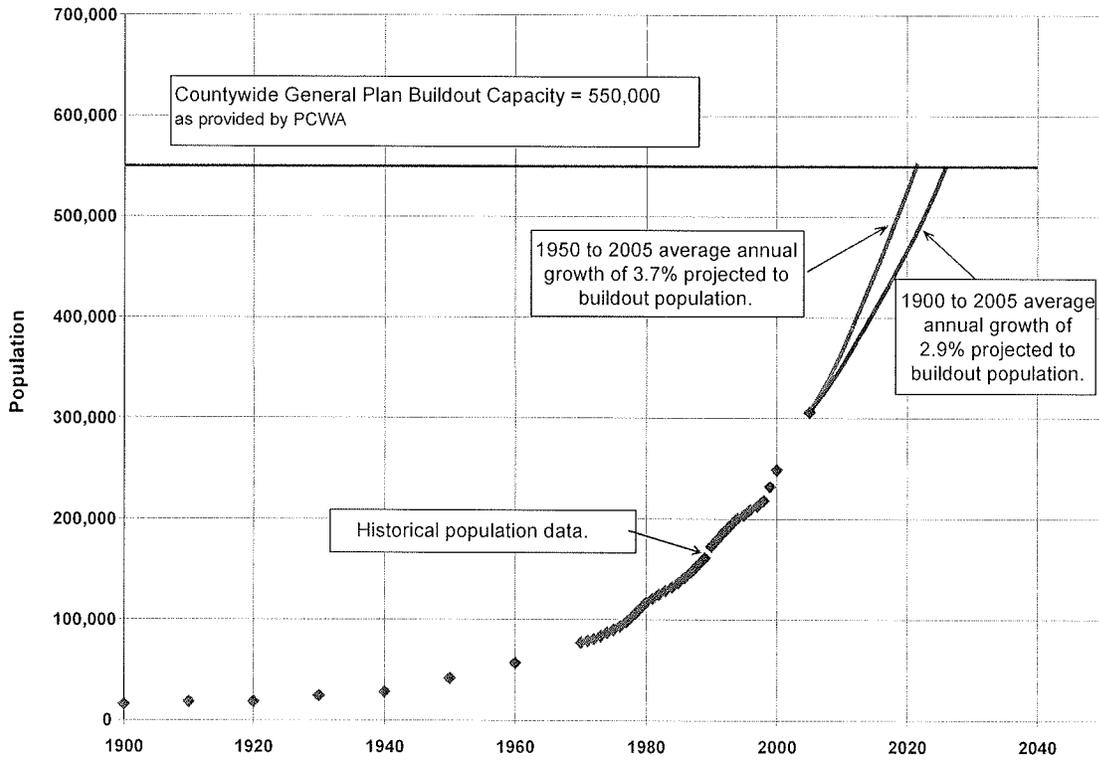
^b California Department of Finance, Demographic Research Unit Table 2: E-5 City/County Population and Housing Estimates, 1/1/2005.

^c Unincorporated includes areas of Placer County located both inside and outside of the study area.

The historical population in Placer County from 1900 through 2005 is provided in Table 3-3. The average annual population growth rates within Placer County from 1900 to 2005 and 1950 to 2005 are 2.9 and 3.7 percent, respectively. The 1980 to 2005 growth rate was 3.9 percent. These historical growth rates are projected past 2005 and compared to the county-wide General Plan 2050 buildout population of 550,000, provided by PCWA. As shown on Figure 3-3, if the 1900 through 2005 annual average growth rate of 2.9 percent is projected as the future average annual growth rate, the General Plan buildout population would be reached around 2025. Similarly, if the 1950 through 2005 annual average growth rate of 3.7 percent is projected as the future average annual growth rate, the General Plan buildout population would be reached around 2020. The analysis presented later in this chapter indicates that both the county-wide and west Placer County populations will likely exceed 550,000 at buildout.

Table 3-3. Historical Placer County Population, 1900-2005

Year	Population
1900	15,786
1910	18,237
1920	18,584
1930	24,468
1940	28,108
1950	41,649
1960	56,998
1970	77,306
1980	117,247
1990	172,796
2000	248,399
2005	305,675



Note: Countywide General Plan Buildout Capacity of 550,000 provided by PCWA.

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Figure 3-3. Comparison of Countywide Population Growth Projections Based on Growth Trends since 1900 and 1950

3.3.2 Historical Land Use

Existing developed land use as of 2001 was obtained from the Sacramento Area Council of Governments (SACOG). SACOG's analysis to determine the developed land in 2001 consisted of gathering assessor data to help determine developed versus vacant parcels. Aerial photography was then used by SACOG to verify the existence of a structure on the parcels from the assessor data. Existing developed land use within western Placer County as of 2001 is shown on Figure 3-4.

3.3.3 Historical Water System Connections

This section describes the historical number of connections and the number of connections by customer category for PCWA Zones 1, 2, 3, 4, and 5.

Table 3-4 presents the historical number of raw water and treated water customers in the entire PCWA service area. Zones 3 and 4 are outside of the study area. As shown in Table 3-4, from 1990 to 2004, the total number of connections served by PCWA increased 40 percent, which is a growth rate of approximately 2.4 percent per year.

Table 3-4. Historical Number of PCWA Connections

Year	Raw Water Connections	Treated Water Connections	Estimated Number Treated Water Multi Unit & Resale Dwelling Units ²	Total Connections	Annual Growth Rate %
1985	2,393	11,285	3,443	17,121	
1990	2,769 ¹	18,091	4,129	24,989	7.9
1996	3,220	21,951	5,095	30,266	3.2
1999	3,509 ¹	24,855	7,965	36,329	6.3
2000	3,654	25,767	11,702	41,123	13.2
2001	3,720 ¹	27,130	13,597	44,447	8.1
2002	3,786	29,005	15,561	48,352	8.8
2003	3,844	31,402	16,632	51,878	7.3
2004	3,902	32,147	19,671	55,720	7.4

Notes:

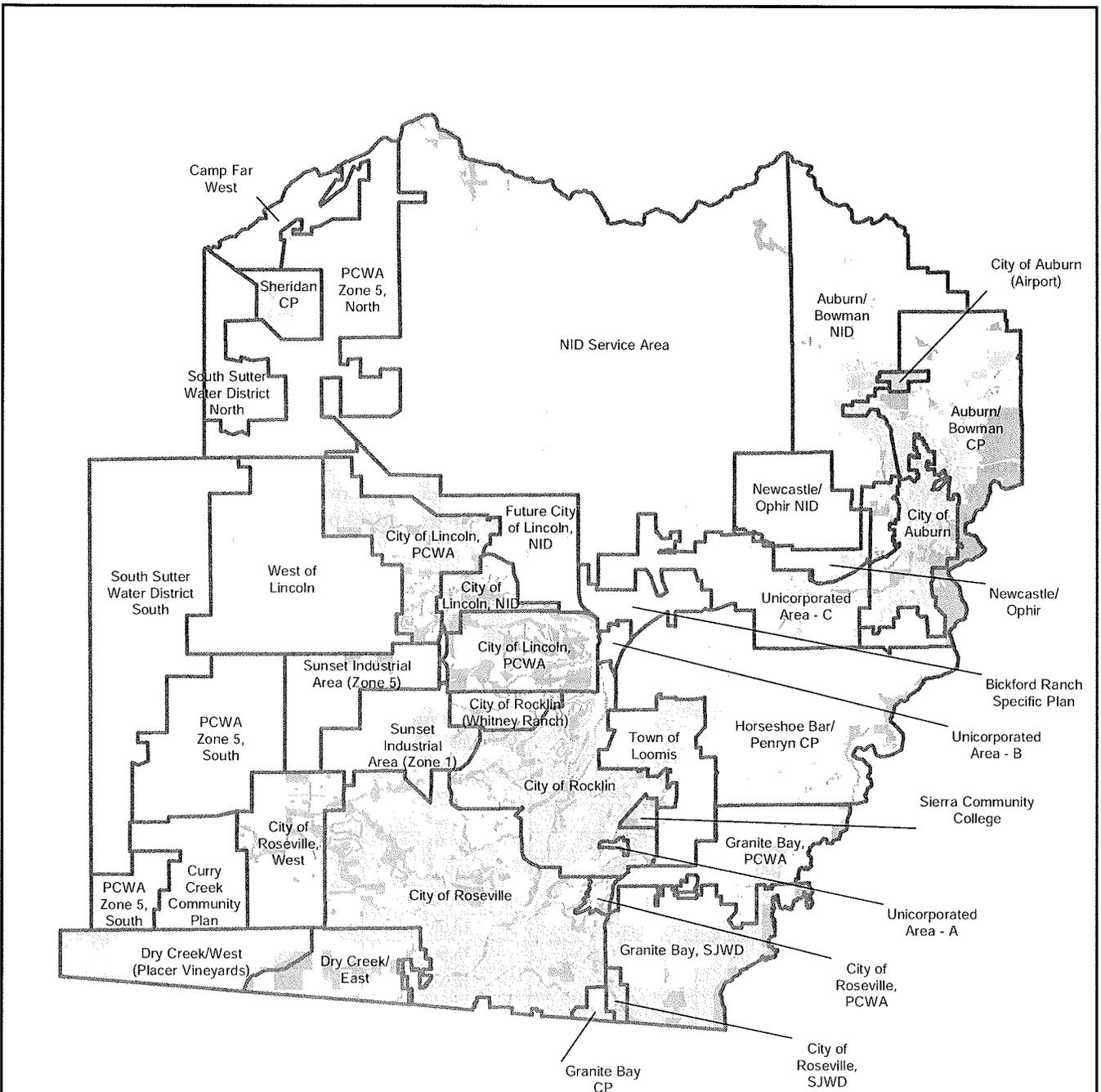
Includes PCWA customers from all zones (zones 1, 2, 3, 4, and 5). Includes City of Lincoln as one connection.

Source: Treated Water 1985 - Water Sales and Connections Summary Report, 1990-2002 Historical Treated Meter Data Report, 2003-2004 Active Connection Report.

Source: Raw water 1985 - Water Sales and Connections Summary Report, 1996-2002 - Canal Master Summary Report, 2003-2004 - Active Connection Report.

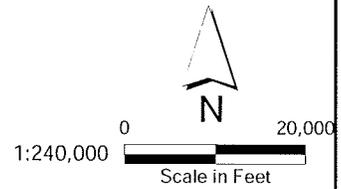
¹ Estimated.

² Includes estimated number of multiple dwelling units, dwellings in City of Lincoln, and other resale accounts.



Legend

-  Planning Subareas
- Generalized Land Use Categories**
-  Undeveloped
-  Open Space
-  Rural Residential
-  Urban



BROWN AND CALDWELL	PROJECT	126233	CLIENT	Integrated Water Resources Plan Placer County Water Agency	Figure 3-4
	DATE	8-15-06	TITLE	Existing Developed Land Use, 2001	

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Table 3-5 presents a breakdown of the number of connections for 2004 by customer category and zone. As shown in Table 3-5, the majority of the treated and untreated water customers are located in Zone 1.

Table 3-5. Connections by Customer Category and Zone, 2004

Customer type	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Total
Treated water						
Residential	25,647	46	1,027	509	0	27,229
Commercial	1,433	0	111	8	0	1,552
Landscape	335	0	4	0	0	339
Municipal	132	0	15	0	0	147
Multi-unit (7,324)	664	0	66	0	0	730
Agriculture	81	0	0	0	0	81
Industrial	2	0	0	0	0	2
Resale	8	0	0	0	0	8
Miscellaneous	1,550	0	30	3	0	1,583
Subtotal	29,852	46	1,253	520	0	31,671
Raw Water						
Summer	3,300	0	283	1	9	3,593
Winter ¹	2,200	0	128	1	0	2,329
Metered	86	0	217	0	0	303
Resale	1	0	5	0	0	6
All others	0	0	0	0	0	0
Subtotal	3,387	0	505	1	9	3,902
Total	33,239	46	1,758	521	9	35,573

¹ Not added to total.

3.4 Projected Demographics and Land Use

Projected demographics and land use within western Placer County based on four growth scenarios are presented in this section. The existing Placer County General Plan plus the general plans of Rocklin, Loomis, Roseville, Lincoln, and Auburn is defined as Scenario 1. Due to the rapid growth, there are known developments that have been approved or are currently in review, that contribute to an Enhanced General Plan scenario, Scenario 2. One of the larger developments, Placer Vineyards, is proposing an alternative land use plan, known as the Blueprint alternative, that will increase dwelling unit densities, which is defined as Scenario 2b. Scenario 3 is based on the SACOG preferred alternative. These growth scenarios are listed below in Table 3-6 and discussed in the following sections.

Table 3-6. Growth Scenarios and Land Use Source

Growth scenario		Land use source
1	Existing General Plans	Placer County
2	Enhanced General Plans	Placer County
2b	Enhanced General Plan – Placer Vineyards Blueprint Alternative	Placer County
3	Blueprint Preferred Alternative	SACOG

The analysis of the different growth scenarios utilized a GIS application to determine specific land use areas and associated data within western Placer County. The GIS land use source contained projected and current land use types, acreage, and other information. By overlaying the planning subarea boundaries discussed in Section 3.2, a GIS database was created that listed current and projected land use type and acreage for each planning subarea. Results were then analyzed using a calculations database to determine total water demand, which is presented in Chapter 5. Total acreage values do not match exactly between scenarios because land use databases were obtained from different sources and are based on different assumptions. Review of total acreages revealed that all scenarios are relatively equal, and it was deemed unnecessary to standardize the land use databases.

3.4.1 Growth Scenario 1. Existing General Plans

This growth scenario is based on the current General Plans within the western Placer County Study Area and incorporates land use designations from all currently approved specific plans and community plans. The land use data for this growth scenario was provided by the Placer County Planning Department. This scenario also includes the updated land use information for the following Specific Plan subareas which have been approved or in the approval process, but are not yet added to the County's GIS land use data.

1. Whitney Ranch – approved by City of Rocklin.
2. West-Roseville – approved by City of Roseville.
3. Bickford Ranch – approved by Placer County.
4. Placer Vineyards – not approved, but the draft Specific Plan conforms with the existing Placer County General Plan for this area.

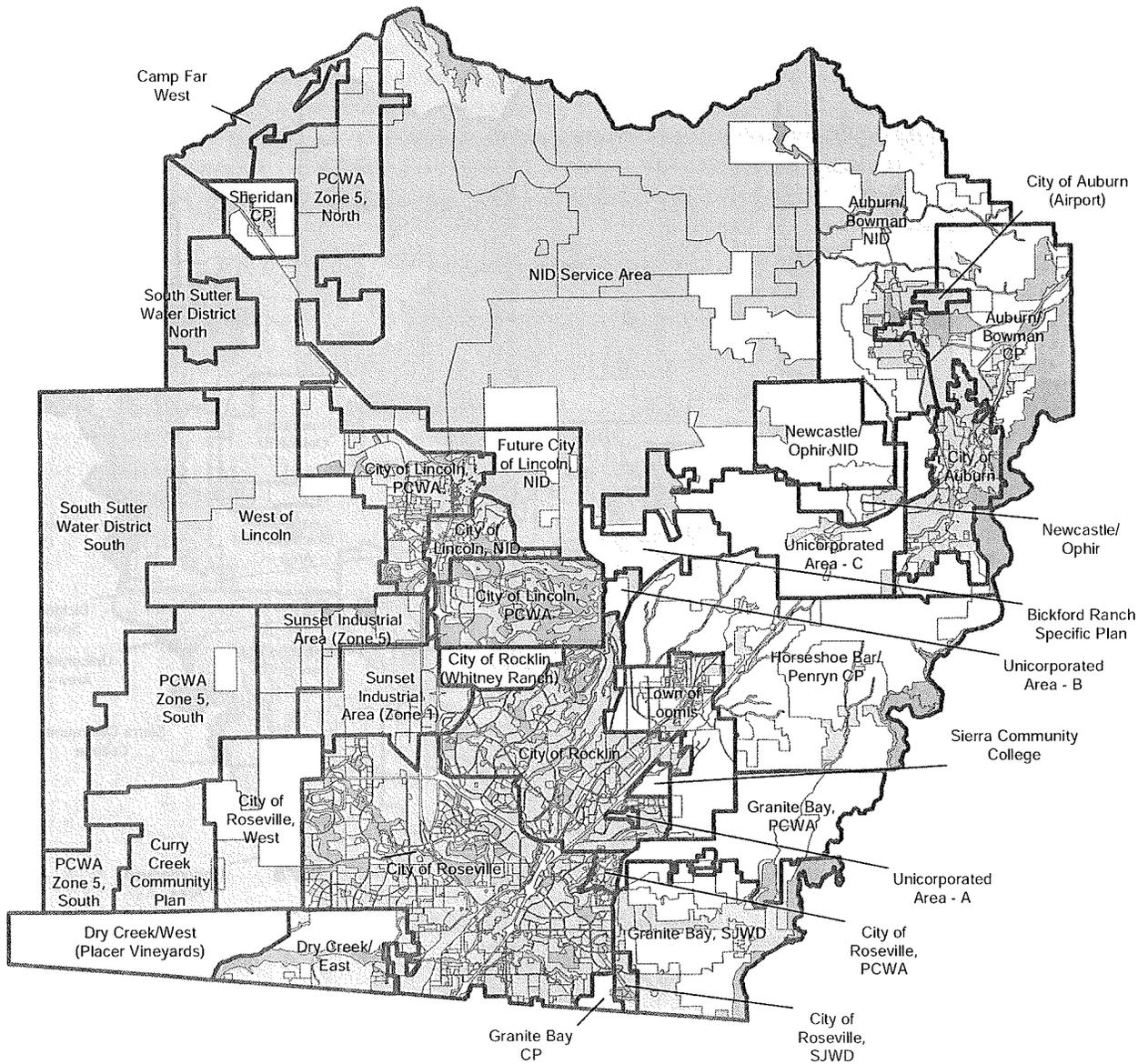
The land use for this growth scenario is shown on Figure 3-5 and summarized in Table 3-8. A description of the updated land use information for each of these planning subareas is provided in Section 3.5.

3.4.2 Growth Scenario 2 and 2b. Enhanced General Plans

This growth scenario is based on the growth Scenario 1 plus new developments recently proposed but not significantly through the approval process yet. This scenario includes the updated land use information for Scenario 1 (Whitney Ranch, West Roseville, Bickford Ranch, Placer Vineyards, and Lincoln) in addition to updates for the following planning subareas. Scenario 2b includes the Blueprint Alternative for Placer Vineyards. A description of the updated land use information for each of these planning subareas is provided in Section 3-5.

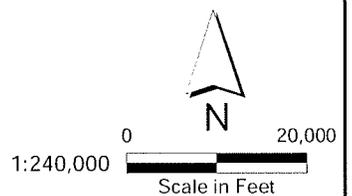
1. Sunset Industrial Zone 1 and Zone 5 – includes the Placer Ranch CSUS campus proposal
2. Curry Creek – includes the Regional University proposal.
3. City of Lincoln – includes growth in the proposed general plan.
4. City of Roseville – north and south west-Roseville MOU remainder areas.

The land use for this growth scenario is shown on Figure 3-6 and summarized in Table 3-8.

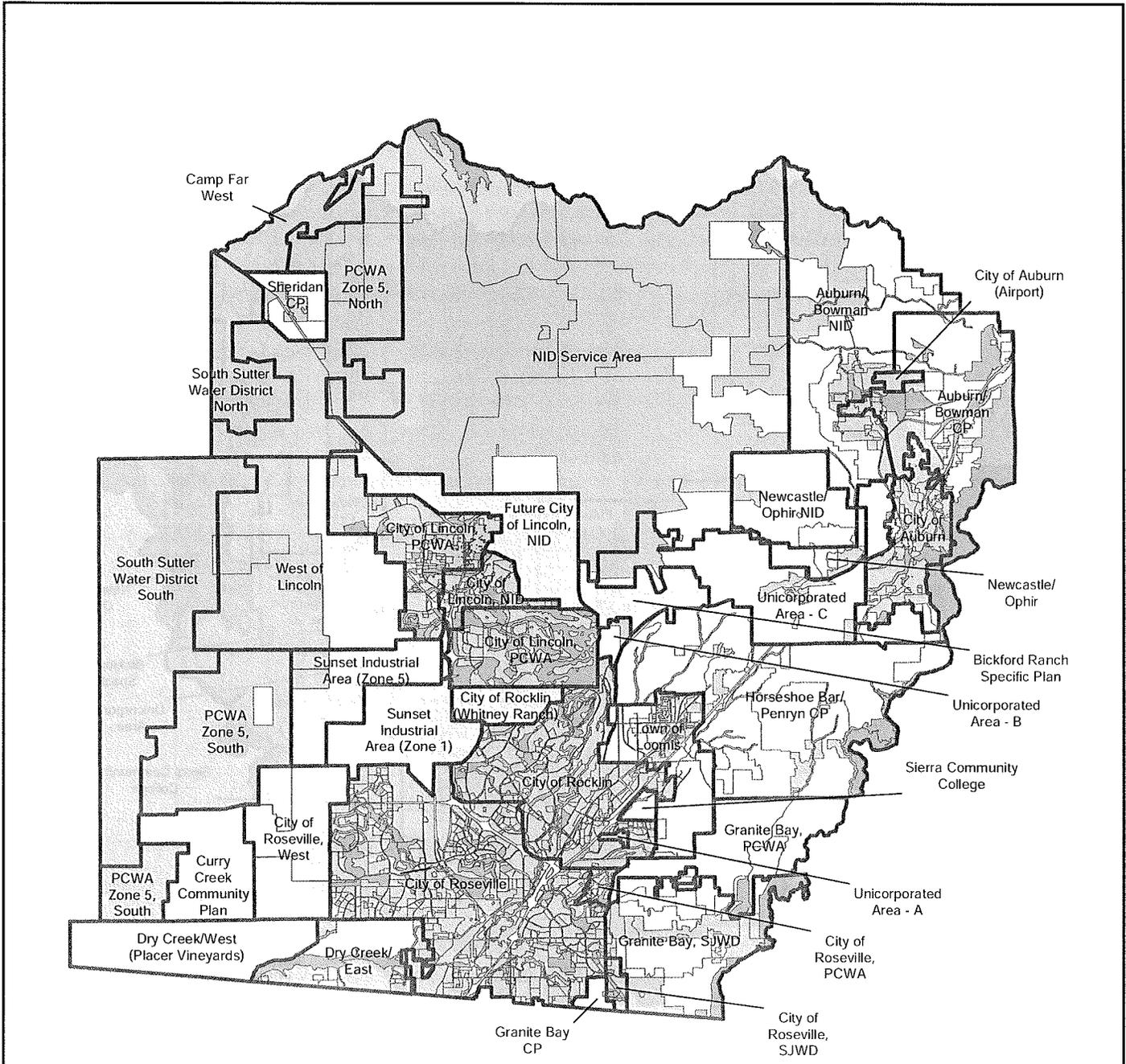


Legend

- Planning Subareas
- Generalized Land Use Categories**
- Agriculture
- Open Space
- Rural Residential
- Urban
- Mixed Use Development

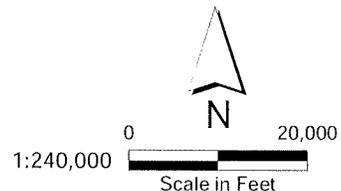


BROWN AND CALDWELL	PROJECT	126233	CLIENT	Integrated Water Resources Plan Placer County Water Agency	Figure 3-5
	DATE	8-15-06	TITLE	Scenario 1 Existing General Plans	



Legend

-  Planning Subareas
- Generalized Land Use Categories**
-  Agriculture
-  Open Space
-  Rural Residential
-  Urban
-  Proposed Mixed Use Development



BROWN AND CALDWELL	PROJECT 126233	CLIENT Integrated Water Resources Plan Placer County Water Agency	Figure 3-6
	DATE 8-15-06	TITLE Scenario 2, Enhanced General Plan	

3.4.3 Growth Scenario 3. Blueprint Preferred Smart Growth

SACOG’s preferred smart growth scenario is based on feedback and discussions with local governments and interested citizens in a series of planning workshops conducted by SACOG throughout the region and adopted in 2005. The planning theme for this growth projection is higher housing densities compared to current development, a mix of land uses, and directing population growth to “inner ring” areas. The land use for this growth projection is shown on Figure 3-7 and summarized in Table 3-8.

3.4.4 Growth Scenario Comparison

The demographics for each of the growth scenarios are presented in Table 3-7. Projected population for each of the growth projection scenarios is compared on Figure 3-8. As shown on Figure 3-8, if population continues to grow at the same average annual growth rate that occurred from 1980 to 2004 (3.9 percent), the population in western Placer County would reach buildout between 2020 and 2030. According to Scenario 3, SACOG’s Blueprint Preferred, a population of 568,000 in western Placer County would be achieved in 2050, which corresponds to an average annual population growth rate of 1.8 percent from 2004 through 2050.

The significantly lower population growth rates used by SACOG result in part from their projection of a significant increase in the median age in the region and correspondingly lower average per capita per household. The higher median age also corresponds to an assumed reduced demand for rural residential development.

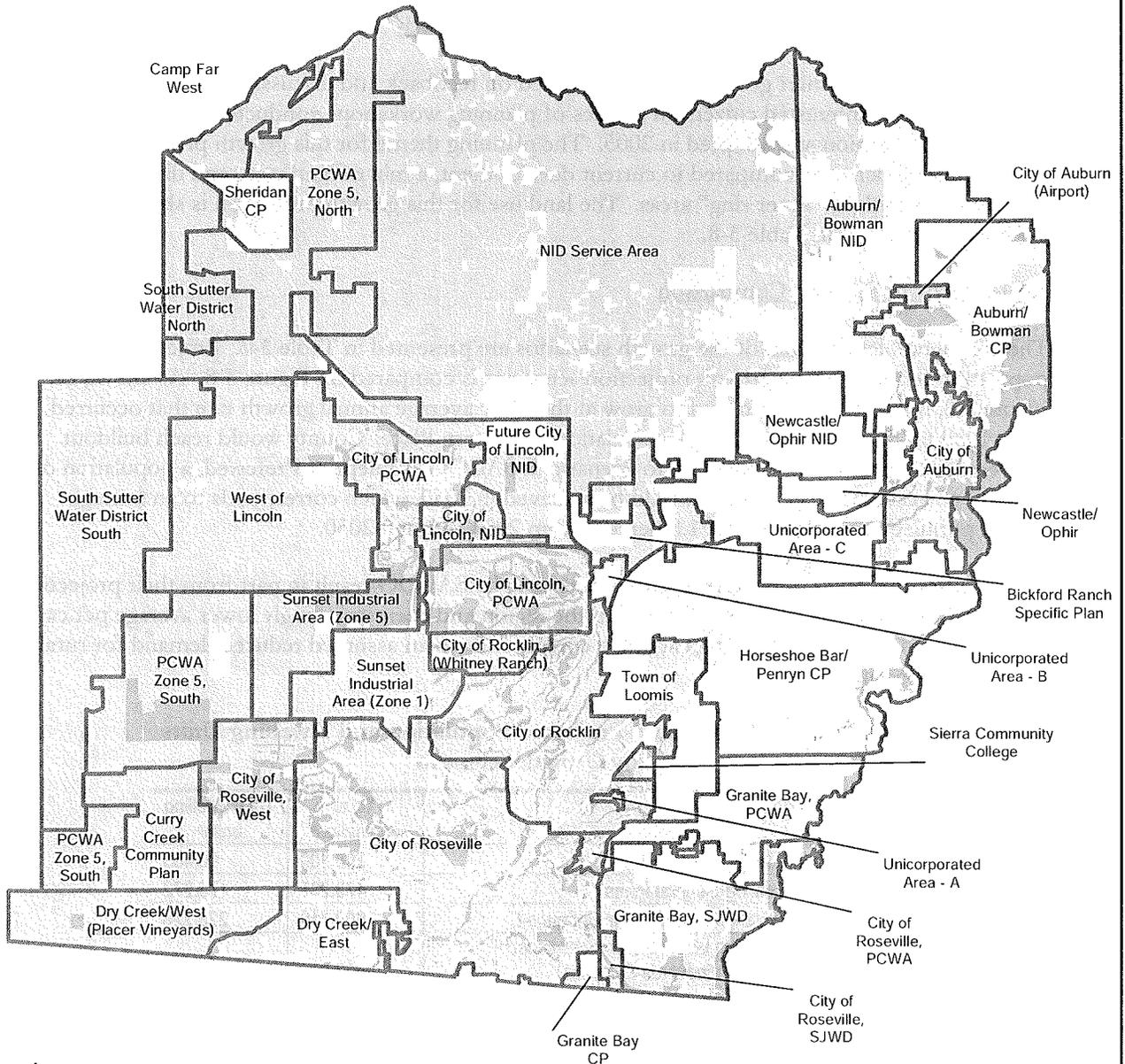
Table 3-7. Current and Projected Population and Dwelling Units by Growth Scenario

Scenario	Total population ^a	Total dwelling units ^b
2001 Existing development	208,108	90,483
Scenario 1 Existing General Plans	473,237	175,272
Scenario 2 Existing General Plans Enhanced	602,710	223,226
Scenario 2b Existing General Plans Enhanced – Placer Vineyards Blueprint	622,876	230,695
Scenario 3 SACOG Blueprint Preferred	568,000	253,249

Notes:

^a Population for Scenarios 1, 2, and 2b based on assumed 2.7 people per dwelling unit. This is based on year 2000 US Census data for the PCWA service area. Population for 2001 existing development and Scenario 3 provided by SACOG.

^b Total dwelling units for Scenarios 1, 2, and 2b are estimated for this study based on the existing median number of dwelling units per net acre in each residential land use category. This is based on the analysis of PCWA customer database and assessor parcel information, as described in Chapter 4 of this report. Total dwelling units for 2001 existing development and Scenario 3 provided by SACOG.

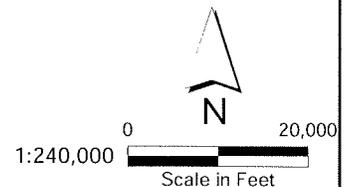


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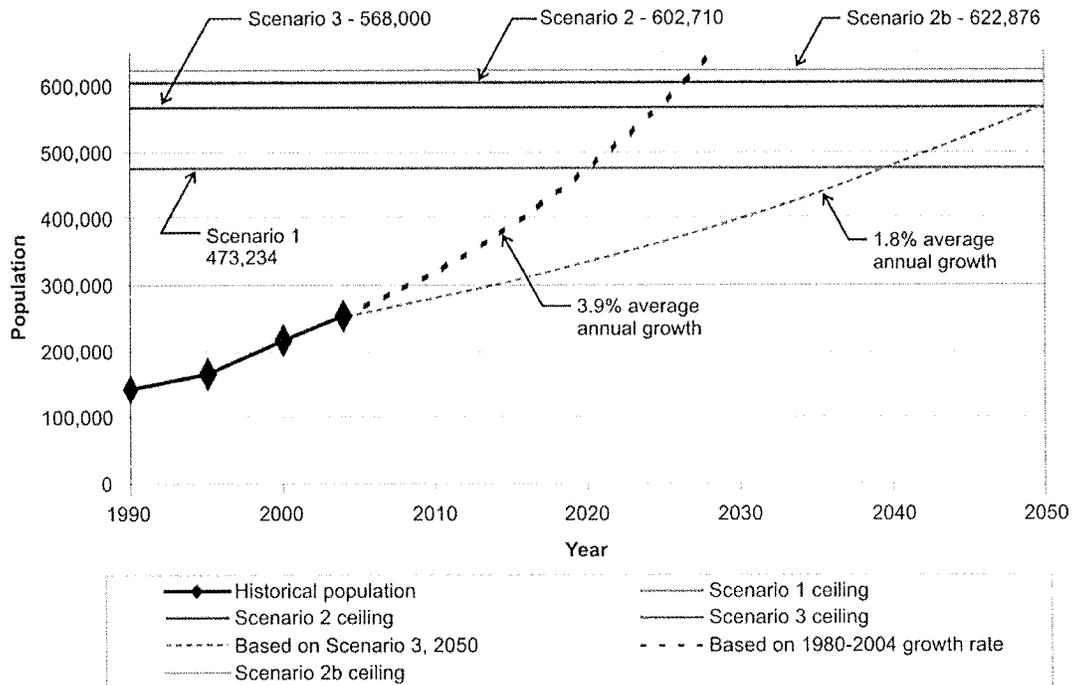
Planning Subareas

Generalized Land Use Categories

- Agriculture
- Open Space
- Rural Residential
- Rural Residential (Not Developed)
- Urban



BROWN AND CALDWELL	PROJECT 126233	CLIENT Integrated Water Resources Plan Placer County Water Agency	Figure 3-7
	DATE 8-15-06	TITLE Scenario 3, Placer County SACOG Blueprint Preferred	



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Figure 3-8. Existing and Projected Population by Growth Scenario

The land use quantities for each of the growth projection scenarios are provided in Table 3-8. The generalized land use categories in Table 3-8 consist of the numerous detailed land use categories defined by the planning agencies.

Table 3-8. Land Use by Growth Scenario, Gross Acres

Generalized land use categories	Scenario 1 Existing GPs	Scenario 2 and 2b Existing General Plan Enhanced	Scenario 3 SACOG Blueprint Preferred
Urban ¹	72,872	83,640	83,851
Rural residential	49,084	49,059	63,108
Agricultural	122,894	100,925	89,945
Open space	16,748	25,965	19,437
Other	5,259	6,922	--
Total ²	266,856	266,512	256,341

Notes:

¹ Urban land uses includes residential land use categories with density greater than 1 DU/acre and non-residential land use categories for professional office, commercial, retail, industrial, institutional, public/quasi-public.

² Difference in total acreage due to different land use database sources.

GPS = General Plans

3.5 County Land Use Updates

Land use data from the Placer County database was used to determine acreages for each subarea in growth Scenarios 1 and 2. However, the land use database is not continuously updated, and there are known approved or proposed development plans with more updated land use information. The intent of the analysis is to incorporate as much recent data as possible. Therefore, the land use designations are updated by overriding the County land use data in areas where more recent data is available to reflect current planning. The updated land use designations for Scenarios 1, 2, and 2b are presented in Appendix C.

3.5.1 Subareas with Complete Updated Land Use

This section describes the subareas where more recent land use designations from development plans were input into the database. See Sections 3.4.1 and 3.4.2 above for a description of which land use updates are included in Scenario 1, 2, and 2b.

1. Placer Vineyards. The current land use plan (dated February 16, 2005) was obtained from the developer's engineer, MacKay and Somps.
2. Bickford Ranch. The Bickford Ranch Development has gone through numerous modifications over the course of its development. The current land use plan was obtained from the Bickford Ranch Specific Plan (September 1, 2004) on file with the Placer County Planning Department.
3. Whitney Ranch. The most recent zoning map, approved by the City Council on September 9, 2004, was obtained from the City of Rocklin Planning Department.
4. West Roseville. The West Roseville subarea is divided into three main areas: West Roseville Specific Plan (WRSP), Memorandum of Understanding 1(MOU), and MOU 2. Development land use plans for the WRSP were obtained from the Master Water Study for the WRSP Area (May 2003). The land use designations for the MOU 1 and MOU 2 areas were determined based on a ratio of acreages from the WRSP area.
5. Curry Creek. Land use designations provided by Placer County are split evenly between high density residential, medium density residential, public, and open space. MacKay and Somps has been conducting numerous studies in the west Placer County area, and provided a more detailed estimation of land use projections based on various projects and developments that are being proposed for the area (MacKay and Somps fax communication, March 7, 2005). These values were used in place of the Placer County land use designations, and are presented in Table 3-9.
6. Sunset Industrial Area. The Sunset Industrial planning area is established by the Placer County Planning Department. This analysis split the planning area into two parts, one within PCWA Zone 1, and one within PCWA Zone 5. A university development, Placer Ranch, is proposed that is located partially in both subareas. The current Placer Ranch development land use plan was obtained from the Placer County Planning Department on April 18, 2005. The County's existing Sunset Industrial land use designations differ considerably from the university/community land use designations currently envisioned in the Placer Ranch proposal. Because the trend for proposed development is changing from industrial-based land uses to more community-based land uses, the land use designations for Scenario 2 and 2b are changed

to reflect the university/community based land uses. The land use categories in the Placer Ranch land use plan were used to proportionally increase the acreage for land use categories in both the Sunset Industrial subareas. Additional acreage was also added to some of the non-residential categories to meet the total planning area acreage and still maintain some industrial/commercial development.

Based on a review of available planning documents for the planning subareas, it was noted that there are differences in the type of land uses represented by the resort/recreation, recreation/conservation, and open space land use categories. Land use with a water demand for outdoor irrigation such as parks, golf course, and cemeteries is assumed to be included in either of these three land use categories, depending on the planning subarea.

3.5.2 Select Proposed Development Review

Some subareas have proposed developments that only impact a portion of the subarea. For these instances, the specific development plans were compared to Placer County's land use designations in the database for verification that the proposed development land use is still within the current land use designations. The following describes each subarea and its land use comparison.

1. Curry Creek. The Curry Creek Community Plan encompasses approximately 5,200 acres in west Placer County. The regional university community development covering approximately 1,100 acres was recently proposed within the Curry Creek planning area. Table 3-9 compares the total Curry Creek land use designations determined as described in Section 3.5.1 versus the regional university development projections. As the table indicates, the County's existing Curry Creek land use designations encompasses the regional university land uses, meaning the regional university proposal is consistent with existing land use designations and no adjustments to the land use projections are necessary. In addition, the regional university plan estimated the total build out average water demand at 2,890 ac-ft/yr. As presented in Chapter 5, the total demand for the Curry Creek planning area in Scenario 2 is approximately 11,000 ac-ft/yr, which also indicates the Curry Creek demand projections encompass the regional university demands.

Table 3-9. Curry Creek versus Regional University Land Use Designation Comparison

Land use	Curry Creek subarea, acres	Regional University development, acres
Low Density 3.1-5.0 DU/ac	1,036	69
Medium Density 5.1-7.0 DU/ac	450	118
Medium Density 7.1-10.0 DU/ac	0	29
High Density 10.1-15.0 DU/ac	0	111
High Density 15.1-20.0 DU/ac	380	45
Professional Office	400	196
Public	700	20
Recreation Conservation	400	258
Open Space	850	245
Ag or Timberland	0	0
Total:	4,200	1,100

Notes:

Regional University information from De La Salle Specific Plan, Appendix F Water Master Plan,

Revised April 8, 2005.

DU/ac = dwelling units per acre

2. Dry Creek East Placer. This subarea contains the proposed Riolo Vineyards development. Land use for this development is listed in the draft Riolo Vineyard Specific Plan, as obtained from the developer’s engineer, MacKay and Soms (fax communication, April 2005). Land uses were converted to Placer County’s land use categories used for this analysis and are presented in Table 3-10. As the table indicates, the County’s existing Dry Creek/East Placer land use designations encompass the Riolo Vineyard land uses, and no adjustments to the land use designations are necessary. In two cases, the Riolo land use acreages for both extremes of the residential categories (high density and rural residential) are higher than the acreages in the Placer County land use plan. This is not considered significant to the total water demand calculations for the Dry Creek East Placer subarea because the difference in acreage is small compared to the total subarea acreage, and no adjustments are made to the land use data.

**Table 3-10. Dry Creek/East Placer Versus Riolo Vineyard
 Land Use Designation Comparison**

Land Use	Dry Creek/ East subarea, acres	Riolo Vineyard development, acres
High Density 15.1-20.0 DU/ac	2	27
Medium Density 7.1-10.0 DU/ac	69	0
Medium Density 5.1-7.0 DU/ac	121	187
Low Density 1.1-3.0 DU/ac	1,111	0
Rural Residential 1.1-2.3 ac/DU	1,492	5
Rural Residential 10.1-20 ac/DU	0	101
Professional Office	15	8
Commercial	58	0
Industrial	234	0
Public	24	24
Recreation Conservation	0	12
Open Space	700	122
Ag or Timberland	0	42
Total:	3,825	528

Notes:
 ac/DU = acres per dwelling unit
 DU/ac = dwelling units per acre

3.5.3 City of Lincoln Land Use

The City of Lincoln is currently updating its General Plan and proposed sphere of influence (SOI) boundary. It is likely that the City of Lincoln’s boundary and SOI will expand, but the actual boundary has not yet been selected. Placer County’s land use database is based on the published Lincoln General Plan from 1988 which was used as the basis of Scenario 1. To estimate future development for Scenario 2 and 2b, this analysis estimated a future boundary and land use types based on discussions with City of Lincoln staff and other available public documents.

The City of Lincoln area is divided into four main subareas as listed below. The first two area boundaries are the current City boundaries, divided into respective service areas between PCWA and NID.

1. Lincoln – PCWA
2. Lincoln – NID
3. Future City of Lincoln – NID
4. Future City of Lincoln West.

The boundary for the east area, Future City of Lincoln – NID, was selected based on current planning documents. The City of Lincoln is conducting a water treatment plant siting study with NID (ECO:LOGIC, TM 1 August 11, 2004) that includes a proposed service area boundary. The City of Lincoln also has posted various growth alternatives on its website (Alternatives 1, 2, 3, and 5) that present future City of Lincoln boundaries. The east boundary was drawn based on these sources.

The boundary for Future City of Lincoln – West was also estimated based on the boundaries presented in the City of Lincoln’s planning alternatives.

3.6 Net Acreage

For this analysis, net acreage is defined as the land use acreage that is expected to have a water demand. Net acreage factors are established for this analysis in order to remove non-water use land use acreage from the total gross acres. The net acreage factor eliminates non-water using land areas such as acreage used for streets and easements. The method for determining the net acreage factors for this analysis varied among the growth scenarios. This section describes the methodology for determining net acreage factors for the Placer County land use based scenarios (Scenarios 1, 2, and 2b) and the SACOG land use based scenarios (Scenario 3).

3.6.1 Net Acreage for Scenarios 1, 2, and 2b

The determination of appropriate net acreage factors for Scenarios 1, 2, and 2b was an iterative process. The net acre factors were determined for subareas that represented cities such that the resulting calculated number of dwelling units for 2001 matched the number of dwelling units for 2001 reported by SACOG and DOF. The net acreage factor is applied to the land use categories that have potable water demands. It is not applied to open space land use categories. As shown in Table 3-11, the percent differences between the GIS calculated dwelling units in this analysis and the SACOG and DOF estimated dwelling units are within one percent in most cases. A net acre factor of 0.8 is used for the other subareas.

Table 3-11. Net to Gross Acre Calibration Based on US Census Data by City, 2001

City	GIS calculation		SACOG		DOF	
	Net acre factor	DUs	DUs	Percent difference from GIS calculation	DUs	Percent difference from GIS calculation
Lincoln	0.8	5,174	5,124	-1.0	5,184	0.2
Loomis	0.8	2,235	2,239	0.2	2,286	2.3
Rocklin	0.8	15,489	14,838	-4.2	14,996	-3.2
Roseville ¹	1.0	33,080	32,783	-0.9	33,139	0.2
Auburn	0.8	5,463	5,435	-0.5	5,489	0.5

Notes:

¹ Roseville’s land use acreage excludes most streets.

DUs = dwelling units

GIS = geographic information systems

3.6.2 Net Acreage for Scenario 3

The net acreage factors were provided by SACOG. In general, the net to gross acreage factors provided by SACOG are 0.6 for single family residential development, 0.7 for multi-family residential development, and 0.85 for urban non-residential development. Appendix H contains a list of the land uses by subarea and the corresponding net to gross acre factor assumed by SACOG. It should also be noted that the SACOG non-residential land use types for municipal land uses such as libraries and fire stations are embedded in the residential land use categories.

CHAPTER 4 WATER USE CHARACTERISTICS

This chapter describes the water use characteristics for customers in western Placer County. The water uses characteristics are based on historical water use within the PCWA system. PCWA has both treated water and raw water customers.

4.1 Historical Treated Water Use

Water production is the volume of water measured at the source, which includes all untreated and treated water delivered to customers, as well as unaccounted-for water. PCWA also wholesales untreated water out of Folsom Reservoir to San Juan Water District, Sacramento Suburban Water District, and the City of Roseville. From the PG&E supply in Zone 3, wholesale untreated water is sold to Weimar Water Company, Christian Valley, Meadow Vista Water District, and a few small mutual water companies. Treated water is sold in Zones 1, 2, 3, and 4. Wholesale treated water is sold in Zone 1 to the City of Lincoln, California American Water Company, and several small homeowners associations.

Table 4-1 presents historical annual treated water production for each zone for the last 20 years. Zones 1 and 2 are located in west Placer County, which is the study area. Water production is defined as water delivered to the water treatments plants, which is a greater amount than the water produced from the treatment plants due to water used at the treatment plants. Table 4-2 presents the treated water sales by customer category for 2004. Water sales is the metered treated water delivered to customers.

Historical water sales, number of accounts, and water use per account for only PCWA retail residential and commercial customers located in Zone 1 are shown in Table 4-3. The 2004 Zone 1 actual water use per customer for each of the customer categories is provided in Table 4-4. Unit water use per customer for single family and multi family residential customers from 1993 through 2004 is illustrated on Figure 4-1.

Table 4-1. Historical Treated Water Production, ac-ft/yr

	Zone 1 ¹	Zone 2 ²	Zone 3	Zone 4	Total
1985	12,216	35	545	0	12,769
1986	13,623	51	632	0	14,306
1987	14,356	56	740	0	15,152
1988	14,374	55	668	0	15,097
1989	14,697	53	713	0	15,463
1990	16,148	59	812	0	17,019
1991	17,167	63	806	0	18,036
1992	19,435	66	872	0	20,373
1993	19,368	76	511	0	19,955
1994	20,240	71	778	0	21,089
1995	19,789	65	810	0	20,664
1996	20,643	77	709	0	21,429
1997	24,064	80	737	0	24,881
1998	20,781	63	675	0	21,519
1999	25,580	76	724	35	26,416
2000	27,897	73	765	31	28,767
2001	29,191	69	838	7	30,105
2002	31,678	78	855	5	32,617
2003	32,335	36	841	30	32,632
2004	38,035	--	887	52	38,984

Notes:

¹ Includes treated water supply to the City of Lincoln.

² Zone 2 was consolidated into Zone 1 in 2003.

Production measured at the treatment plant influent meter. Includes water use at the treatment plants.

ac-ft/yr = acre-feet per year

Table 4-2. Treated Water Sales by Customer Category and Zone for Year 2004, ac-ft/yr

Customer type	Zone 1	Zone 2	Zone 3	Zone 4	Total
Residential	16,063	71	381	30.51	16,546
Multi Units (7,324)	1,983	0	93	0	2,076
Commercial	2,946	0	102	9.24	3,057
Industrial	1,078	0	0	0	1,078
Municipal	971	0	29	0	1,001
Landscape-Greenbelt	1,324	0	13	0	1,337
Irrigation/Ag	411.00	0	0.00	0	411
Construction	210.01	0	0.16	0	210
Fire Protection	9	0	0.20	0	9
Resale ¹	7,979	0	0.00	0	7,979
No Demand	139	0	1	0	140
Interties	16	0	0.00	0	16
Total ²	33,129	71	620	40	33,859

Notes:

¹ Includes treated water supply to the City of Lincoln.

² Difference between water production and sales is defined as unaccounted for water (Table 4-10).

ac-ft/yr = acre-feet per year

Table 4-3. Historical PCWA Retail Residential and Commercial Customer Water Use, Zone 1

Year	Annual water sales ¹ (ac-ft)	No. of accounts ²	Average use per account (gpd/account)
1993	12,598	16,480	682
1994	14,062	17,355	723
1995	12,457	17,629	630
1996	13,696	18,137	674
1997	14,752	18,763	701
1998	13,344	19,607	607
1999	15,449	20,133	685
2000	16,674	22,876	651
2001	17,610	23,348	673
2002	18,390	23,494	699
2003	18,908	26,670	633
2004	20,992	25,683	692

Notes:

Source: Data for years 1993-1999 from Technical Memorandum, Unit Water Demands (The Spink Corporation, 2000). Annual water sales data for 2000-2004 from PCWA monthly sales data.

¹Sales includes metered use data from residential and commercial classifications only.

²Number of accounts is based on the average for the months of January and December, consisting of residential and commercial categories only.

ac-ft = acre-feet

gpd = gallons per day

Table 4-4. Historical Customer Unit Water Sales, Zone 1

Treated water customer classification	Annual water use, gpd/customer				
	2000	2001	2002	2003	2004
Residential – single family	535	561	593	522	571
Commercial	1,932	1,984	1,822	1,915	1,894
Landscape-greenbelt	3,875	3,847	3,597	3,793	3,769
Municipal	3,796	5,404	6,897	5,430	6,904
Multi-unit residential	2,352	2,420	2,401	2,417	2,709
Irrigation/Ag (Bowman area only)	3,492	3,580	3,814	3,508	4,469
Industrial	68,300	72,865	139,522	243,780	240,668
Resale ¹	233,077	234,899	275,594	306,212	485,695
Miscellaneous ²	6,402	5,050	4,521	2,831	3,085

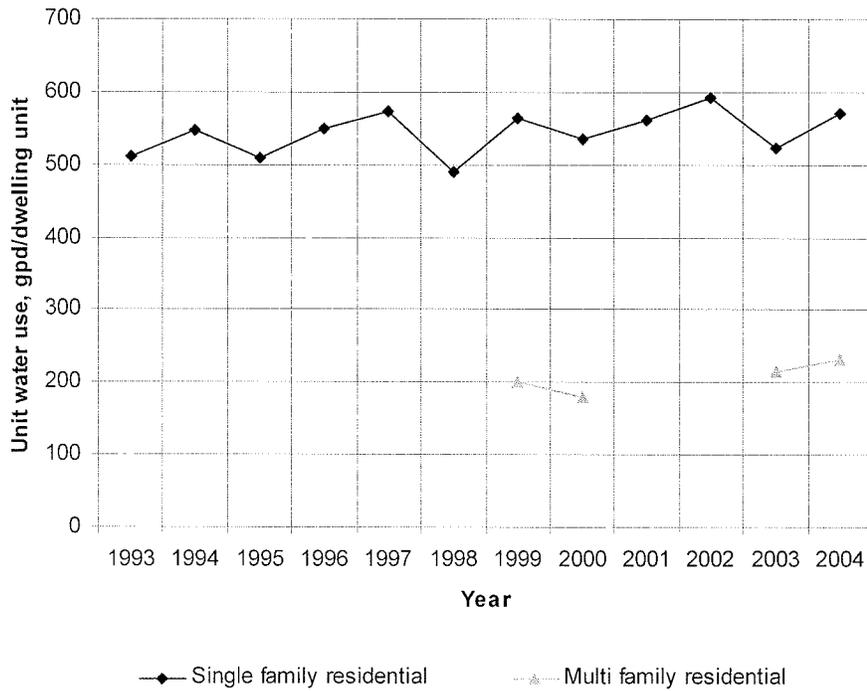
Notes:

Factors are based on water sales and do not include unaccounted-for water.

¹ Includes the City of Lincoln as one customer.

² Miscellaneous includes PCWA billing categories for no demand, fire protection, and construction.

gpd = gallons per day



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Figure 4-1. Historical Residential Dwelling Unit Water Use, Zone 1

4.2 Historical Raw Water Use

Table 4-5 shows the historical treated and raw water use (not sales) for water years from 1996 to 2004 in Zones 1 and 5. Total water use is the total measured delivery into PCWA’s system from PG&E and the American River. This “use” can be further divided into Zone 1 treated water, Zone 1 raw water, and Zone 5 raw water use. This information was used to develop the “2004-05 standard” raw water demand. This is the assumed standard current demand with a dry spring. The difference between a wet and dry spring can mean up to a two month swing in the length of the irrigation season. How hot the summer is does not have a significant effect on the total demand, but the length of the season can have a very large effect. The 2004-05 standard raw water demand is assumed to be long-term raw water demand through buildout. 2004-05 was a wet spring; therefore the demands were less than they would be in a standard year.

PCWA reports that one of the large Zone 5 customers ceased agricultural production this year as their land has been sold for development in Lincoln. Therefore, looking at the historic water use for Zone 5, PCWA believes that 15,000 ac-ft/yr will be adequate to meet future demands.

Table 4-5 shows that the total Zone 1 raw water demands have been trending down in response to significant raw water system improvements over the past decade. PCWA feels that 60,000 ac-ft/yr should be an adequate allocation to meet future dry spring Zone 1 raw water demands.

The 2001 assessment used 81,000 ac-ft/yr as the assumed standard (normalized) raw water demand for Zones 1 and 5 combined. The total required standard allocation for raw water for Zones 1 and 5 combined in this report is 75,000 ac-ft/yr, which is 6,000 ac-ft/yr less than the amount used in the 2001 report.

Table 4-5. Zone 1 and 5 Historical Water Use Data, ac-ft/yr

Year	Zone 1 Treated Water	Zone 1 Raw Water	Zone 5 Raw Water	Raw Water Total	Total
1996-07	24,000	63,600	15,400	79,000	103,000
1997-08	20,500	57,400	8,600	66,000	86,500
1998-99	24,700	65,300	15,900	81,200	105,900
1999-00	28,300	61,600	16,900	78,500	106,800
2000-01	28,400	64,800	12,700	77,500	105,900
2001-02	30,900	60,800	10,500	71,300	102,200
2002-03	33,400	56,500	7,500	64,000	97,400
2003-04	38,300	59,400	16,300	75,700	114,000
2004-05	34,900	54,200	11,700	65,900	100,800
2004-05 Standard	39,000	60,000	15,000	75,000	114,000

Note:
 ac-ft/yr = acre-feet per year

4.3 Zone 1 Water Use Analysis

Unit water use factors are developed to estimate future treated water needs. There are several methods on which to base unit water use factors to calculate water demands. Unit water use based on (1) population, (2) housing and employment, and (3) land use are three typical methods to estimate water demands. This analysis utilizes the land use based unit water factor methodology to estimate future treated water demand.

The analysis presented in this chapter updates the land use based water use factors developed in 2000 (The Spink Corporation, 2000) to reflect customer water use in 2004. Land use based water use factors are determined by correlating PCWA billing data with Placer County assessor parcel numbers (APN). Accounts are grouped into lot size densities to determine density-based water demands. Some of these land use based water use factors are then modified to account for specific neighborhoods (i.e. Auburn-Folsom corridor). The factors are then applied to the buildout land use for each growth scenario in west Placer County to develop water demands.

Water use data show widely varying water demands for connections within the same land use categories throughout the service area. Factors such as neighborhood location, lot slope, and dwelling unit age impact the water use demand factors. Due to the large geographic area covered by the land use designations in this study, a more detailed analysis was conducted to further define and customize water demand factors for various subareas in the study area.

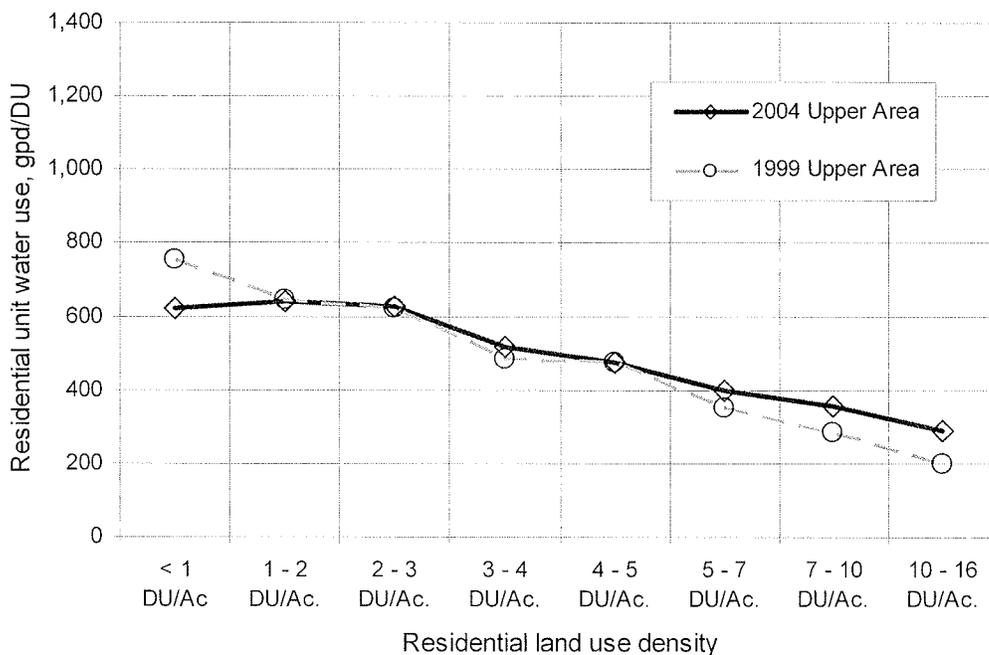
This section presents the findings from each individual detailed analysis. Specific study areas analyzed were identified by PCWA staff based on prior experience and knowledge of water usage patterns.

4.3.1 Residential Unit Water Use Analysis

PCWA has recognized similarities in residential water use depending on location within the service area. These similarities have been used to identify an upper and lower area of Zone 1. The upper area consists of all Zone 1 customers in the Auburn and Newcastle areas, and the lower area consists of all other customers in Zone 1. Upper area water use demand factors have historically been less than the lower area. Possible reasons include steeper slopes that reduce actual buildable acreage and older lots with less landscaping demand.

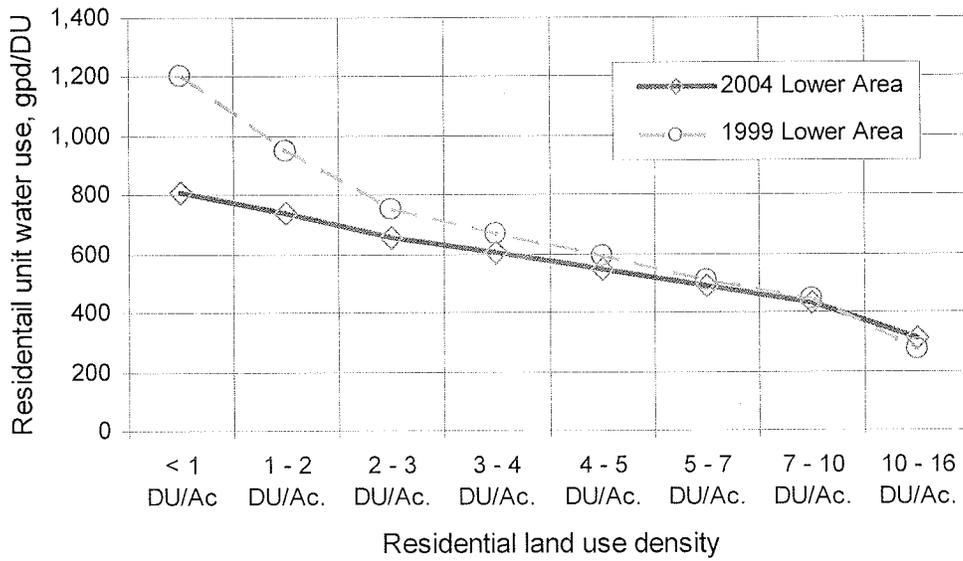
PCWA 2004 billing and customer data was analyzed for unit water demands related to parcel size and land use density in each of these areas. The complete analysis is presented in Appendix D. Of the 23,863 records in the database, 8,211 records were single family accounts with valid APN numbers. A valid APN number was required to link the account to the Placer County assessor maps to determine lot size and density. Other data excluded includes accounts with annual water demand less than 100 gallons per day per dwelling unit (gpd/DU). Water use less than 100 gpd/DU is considered abnormal, and could be the result of new accounts beginning in the middle of the year, unoccupied new homes, residential construction impacts, or other issues that would otherwise reduce the average water demand.

Figures 4-2 and 4-3 present the average gpd/DU versus land use density using 2004 data versus the results from the Spink report (1999 data) for the upper and lower areas, respectively. Figure 4-4 presents the 2004 residential water demands in ac-ft/yr per acre for the upper and lower areas. The figures indicate that water use per dwelling unit decrease with increasing density, as expected.



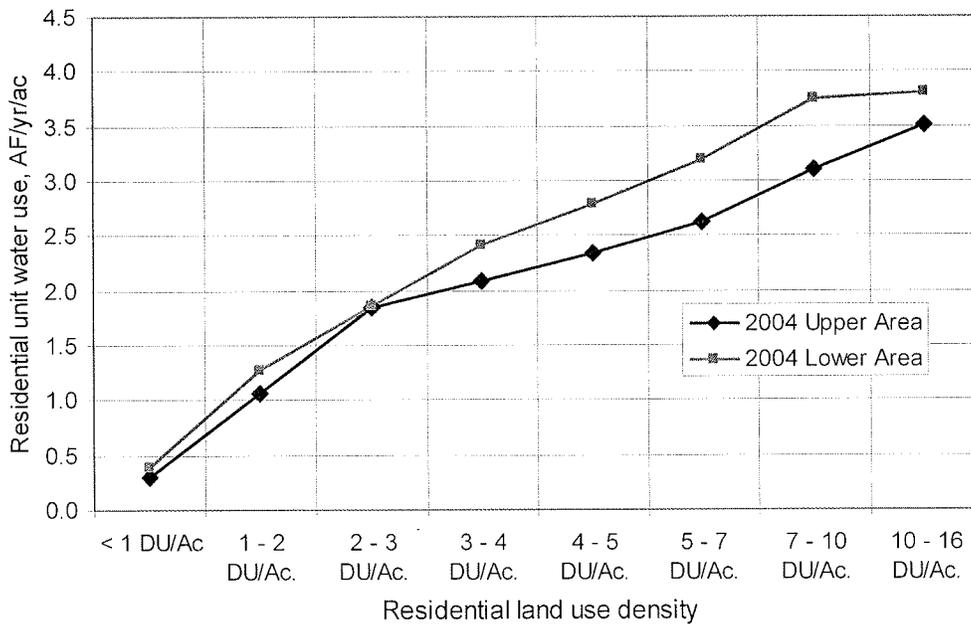
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Figure 4-2. Residential Unit Water Demand Comparison, Zone 1 Upper Area



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Figure 4-3. Residential Unit Water Demand Comparison, Zone 1 Lower Area



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Figure 4-4. 2004 Residential Unit Water Demand Comparison, Zone 1 Lower and Upper Area

The 2004 analysis indicates a much lower unit water demand in the lower area for low density residential accounts compared to similar accounts in 1999. This may be a result of conservation pricing implemented by PCWA. The more dense development (5 DU/ac and higher) has not shown significant change in unit water demand from 1999 to 2004. The higher density housing stock in the lower area is relatively new (less than 10 years). This could explain why there is little difference in unit demands from 1999 to 2004 due to hardened demand from water conservation practices built into the newer homes.

The 1999 data from the Spink report indicate a larger difference between the upper and lower water use demand factors for all densities, compared to the 2004 data. The 2004 data indicate a much smaller difference between the upper and lower low density customers, with the data approaching the limit of statistical significance for the mid to high density groups, meaning there is almost no difference in unit water demand between the upper and lower water demands in those densities. However, there remains a significant difference in low density land use categories (lower area much higher demand than upper area), possibly due to the terrain and high water demand neighborhoods in the lower area. Table 4-6 presents the water use demand factors used for the water demand projection in this study for both the lower and upper areas, according to land use density.

Table 4-6. Residential Unit Water Use Demand Factor Analysis Results

Residential land use	Upper area demand factor		Lower area demand factor	
	gpd/DU	Annual ac-ft/DU	gpd/DU	Annual ac-ft/DU
< 1 DU/Ac	621	0.70	806	0.90
1-2 DU/Ac	641	0.72	737	0.83
2-3 DU/Ac	627	0.70	657	0.74
3-4 DU/Ac	519	0.58	605	0.68
4-5 DU/Ac	476	0.53	547	0.61
5-7 DU/Ac	400	0.45	491	0.55
7-10 DU/Ac	355	0.40	435	0.49
10-16 DU/Ac	289	0.32	312	0.35
15-20 DU/Ac	187	0.21	300	0.34
20.1+ DU/Ac	171	0.19	186	0.21

Notes:

Water demand factors do not include normalization and unaccounted-for water adjustments.

Demand factor based on existing median density and average demand per category.

ac-ft/DU = acre-feet per dwelling unit

DU/ac = dwelling units per acre

gpd/DU = gallons per day per dwelling unit

4.3.2 Non-Residential Water Use Analysis.

Unit use factors for the non-residential land uses are determined from a variety of sources and analysis. An analysis was conducted for the commercial accounts in the PCWA billing and customer database. The complete analysis is presented in Appendix D. The commercial analysis is slightly different than the residential analysis in that accounts are reported in acres per account, rather than dwelling units per acre. 1,340 commercial accounts were in the database, with only 491 accounts containing valid APN numbers for use in the analysis. APN numbers are required to correlate accounts to parcel size in the County's database. The median demand was used in the analysis as there are a few commercial accounts with significantly higher demands that skew the average demand upwards. Results indicate the commercial demand in the upper and lower areas are 1,440

gallons per day per net acre (gpd/ac) and 1,080 gpd/ac, respectively. The demands from the 2001 Discussion Paper are higher for both the upper and lower areas, 1,857 gpd/ac and 2,228 gpd/ac, respectively, which are more in line with industry averages. Without further data on the analyzed commercial accounts, it was decided to use the Discussion Paper demands for this demand analysis.

An analysis of industrial account water use was not conducted and the water use for industrial accounts is based on the 2001 Discussion Paper industrial demands. Industrial land use is split into upper and lower demands, similar to the commercial demands.

The water use factor for the public land use category is based on the 2001 Discussion Paper public and school demands. The public land use category in this analysis includes institutional and municipal land uses.

Based on a review of available planning documents from the County, cities, and developer plans, it was noted that there are differences in the type of land uses represented by the resort/recreation, recreation/conservation, and open space land use categories. Land use with a water demand for outdoor irrigation such as parks, golf course, and cemeteries may be included in either of these three land use categories depending on the planning subarea. The water demand factors for resort/recreation, recreation/conservation, and open space used for this analysis are based on the evapotranspiration for western Placer County, as provided by the California Irrigation Management Information System (CIMIS). Western Placer County has an evapotranspiration of 57 in/year, or 4,241 gpd/ac.

The agricultural or timberland land use category water demand is also based on the evapotranspiration for western Placer County of 57 in/year, or 4,241 gpd/ac.

The resulting water use demand factors used in the demand projections are presented in Table 4-7.

Table 4-7. Non-Residential Unit Water Use Demand Factors

Land Use	Upper area demand factor		Lower area demand factor	
	gpd/ac	Annual ac-ft/ac	gpd/ac	Annual ac-ft/ac
Commercial	1,857	2.1	2,228	2.6
Industrial	2,166	2.4	2,600	2.9
Public	2,274	2.5	2,729	3.1
Recreation/conservation	4,241	4.8	4,241	4.8
Resort/recreation	4,241	4.8	4,241	4.8
Open space	4,241	4.8	4,241	4.8
Agricultural or Timberland	4,241	4.8	4,241	4.8

Notes:

Water demand factors do not include normalization and unaccounted-for water adjustments.

ac-ft/ac = acre-feet per acre

gpd/ac = gallons per day per acre

4.3.3 Neighborhood Specific Unit Water Use Analysis

The unique development patterns in the Auburn-Folsom Road corridor require special consideration. The area, including parts of the Granite Bay PCWA and Granite Bay SJWD subareas, is noted for large single parcels and estate developments. All of the land use planning documents that address this area project that the current zoning and land use characteristics will continue in the

future. Some of the area is served raw water from the lower Boardman Canal, but many parcels are supplied only potable water and maintain extensive landscaping, resulting in higher than average water demands. A specific investigation analyzed the metered accounts in this area in order to develop customized unit water demands for this area. The following neighborhoods or developments were investigated based on historically high unit water use per PCWA staff knowledge and meter data available for individual customers. The location of each neighborhood is shown on Figure 4-5. Placer Canyon is shown on Figure 4-5, but not included in the analysis as it was identified later in the project.

1. Los Lagos
2. Sterling Point
3. Walden Woods
4. West of Auburn-Folsom Road (catch-all area for stand alone customers on metered accounts.)

There are neighborhoods or developments that are currently served by one master meter. For these areas, the County’s parcel map GIS layer was queried to define the number of parcels in each development and the corresponding parcel data. Water use was then averaged over the total parcels served by the master meter. These areas also receive raw water, but the data was not available. As a result, the unit water demands calculated are lower than actual. The areas investigated with one master meter include:

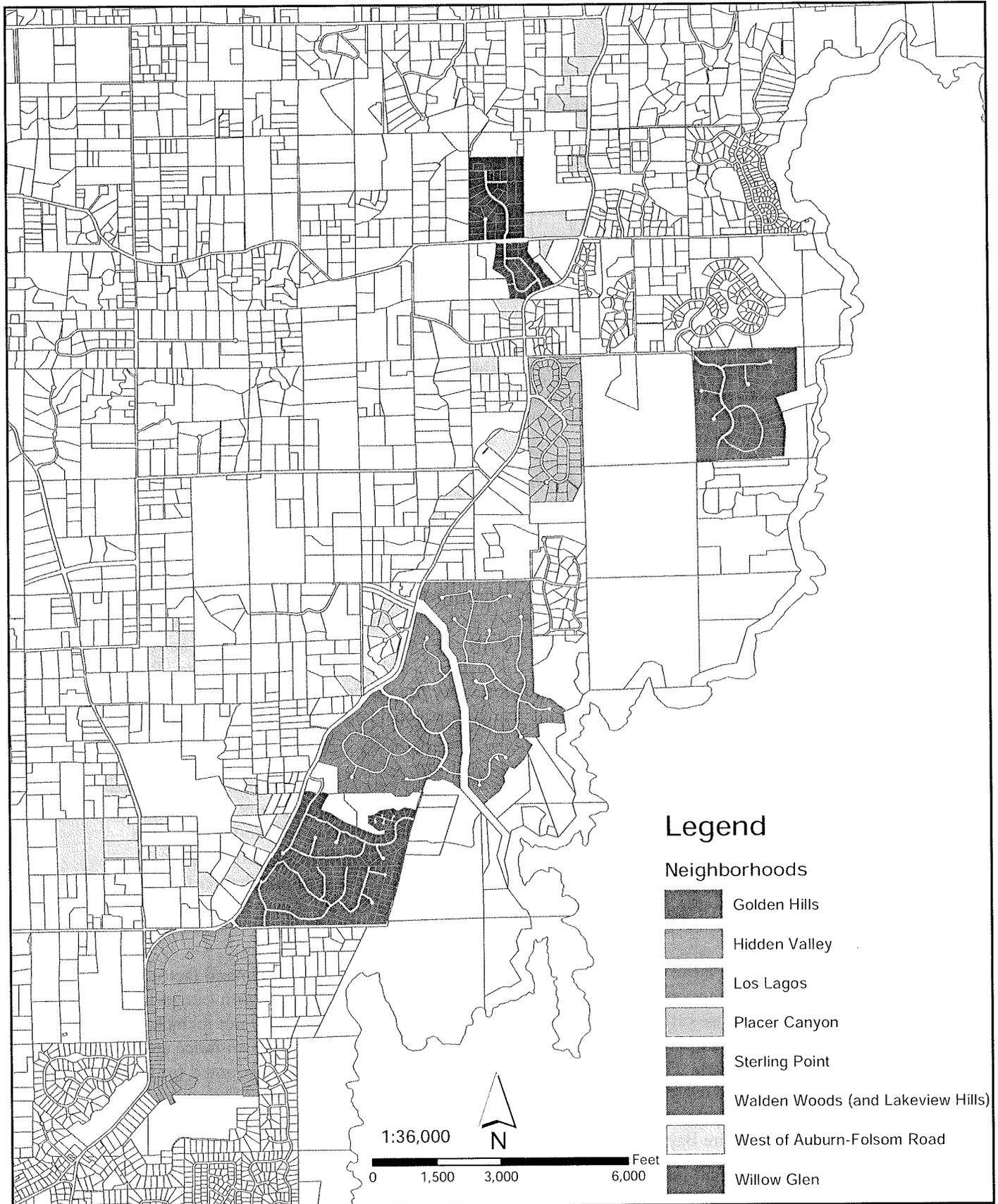
1. Golden Hills
2. Hidden Valley
3. Willow-Glen

Billing records from PCWA were queried for each area. Matching records that had complete parcel information, billing data, and an average annual water use above 100 gpd were included in the analysis. Records with incomplete information were not included in the analysis, as parcel size was necessary to complete the density analysis. The detailed account analysis is presented in Appendix E. Table 4-8 presents the resulting existing lot density distribution and Table 4-9 presents the year 2004 unit water use demands for each area.

Table 4-8. Neighborhood Specific Lot Density Distribution

Neighborhood	Existing median density, DU/ac						
	< 1	1-2	2-3	3-4	4-5	5-7	7-10
Los Lagos	0.8	1.2	--	--	--	--	--
Sterling Point	0.7	1.7	2.2	--	--	--	--
West of Auburn-Folsom Rd	0.3	--	--	--	--	--	--
Walden Woods	0.4	1.7	--	--	--	--	--
Golden Hills	--	1.5	2.0	--	--	--	--
Hidden Valley	0.9	1.1	2.6	3.7	--	--	--
Willow-Glen	0.7	1.1	--	--	--	6.0	--

Note:
DU/ac = dwelling unit per acre



BROWN AND CALDWELL	PROJECT 126233	CLIENT Integrated Water Resources Plan Placer County Water Agency	Figure 4-5
	DATE 8-15-06	TITLE Neighborhood - Specific Analysis	

Table 4-9. Neighborhood Specific Water Demand by Dwelling Density, ac-ft/DU

Neighborhood/ development	Average unit water demand, ac-ft/DU						
	< 1 DU/ac ²	1-2 DU/ac	2-3 DU/ac	3-4 DU/ac	4-5 DU/ac	5-7 DU/ac	7-10 DU/ac
Los Lagos	1.5	1.5	--	--	--	--	--
Sterling Point	1.4	0.9	1.0	--	--	--	--
West of Auburn-Folsom Rd	1.3	--	--	--	--	--	--
Walden Woods	1.2	1.0	--	--	--	--	--
Golden Hills ¹		1.0	1.0	--	--	--	--
Hidden Valley ¹	0.7	0.7	0.7	0.7	--	--	--
Willow-Glen ¹	0.3	0.3	--	--	--	0.3	--

Notes:

Water demand factors do not include normalization and unaccounted-for water adjustments.

¹ Golden Hills, Hidden Valley, and Willow Glen customers are not individually metered. It is assumed the total demand for each respective master meter is applied evenly to each dwelling density class per neighborhood. Each of these developments are also supplied raw water. Willow-Glen's raw water system is almost completely parallel to the potable system, which results in lower potable water demands.

ac-ft/DU = acre-feet per dwelling unit

The results in Table 4-9 indicate that the average unit water demand for single family residential units in this area is higher than the water demands for the upper and lower areas of Zone 1, as reported in Table 4-6.

PCWA conducted a similar study of the Los Lagos neighborhood in 2003 (Brian Martin communication, Customer Services Department, September 17, 2003). The analysis evaluated total demand versus total connections, and therefore did not factor dwelling unit densities or other account information into the analysis. The 2003 study reported a water demand of 1.67 ac-ft/yr per customer for the Los Lagos development, which is higher than the results reported above. Possible explanations for the differences include construction water use, landscape-only meter influences, or other water uses not accounted for in the single family residential land use category in the billing information analyzed for this study.

PCWA provides wholesale water to San Juan Water District to serve the Granite Bay area. Annual supply volumes to SJWD were used to calibrate the unit water use demand factors. Water demands calibrated more closely with supply using the higher water demand factor (1.67 ac-ft/yr) for the Granite Bay area, as opposed to the 2004 neighborhood specific analysis presented above. Therefore, 1.67 ac-ft/yr/customer is used to calculate future water demands in Chapter 6. For the master meter neighborhoods, the raw water component was not included due to lack of data, resulting in lower unit water demands.

In addition to providing close calibration as discussed above, the 1.67 ac-ft/yr demand factor is considered a more accurate estimate of future demands using the land use projection categories in this analysis. The land use categories from Placer County used in this analysis do not include specific categories for non-parcel landscaping demands in developments (such as entrance areas, frontage, lakes, paths, etc.). Therefore, the non-parcel water demand must be accounted for in the provided residential land use categories. The higher unit water use demand factor determined from calibration allows these uses to be counted and is used for the future demand projections for planning subareas Granite Bay - SJWD and Granite Bay - PCWA.

4.4 Unaccounted-for Water

PCWA has two types of unaccounted-for water. The first type is the unaccounted-for water occurring in the raw water transmission system between the water source and the delivery points to the municipal water treatment plants and raw water customers. The second type is the unaccounted-for water occurring in the treated water system between the surface water treatment plants and the retail customers. Treated water system unaccounted-for water use is unmetered water use such as for fire protection and training, system and street flushing, sewer cleaning, construction, system leaks, tank overflows, and unauthorized connections. Unaccounted-for water also includes plant water because production is based on influent meters. Unaccounted-for water can also result from meter inaccuracies. Tables 4-10 and 4-11 present the historical unaccounted for water for the treated water systems in Zone 1 and 2. An unaccounted-for percentage of 15.6 percent is applied to the unit water demand factors in most instances as presented in Appendix F.

Table 4-10. Zone 1 Historical Unaccounted-for Treated Water

Year	Water sales ac-ft/yr	Water production ac-ft/yr	Unaccounted – for water, ac-ft/yr ¹	Unaccounted – for water, % of annual water production
1985	10,260	12,199	1,989	15.9%
1986	10,808	13,604	2,796	20.6%
1987	12,018	14,336	2,318	16.2%
1988	12,541	14,354	1,814	12.6%
1989	13,776	14,677	901	6.1%
1990	14,251	16,126	1,875	11.6%
1991	15,317	17,143	1,827	10.7%
1992	15,983	19,408	3,425	17.6%
1993	16,164	19,375	3,211	16.6%
1994	17,625	20,311	2,686	13.2%
1995	16,999	19,795	2,797	14.1%
1996	18,006	20,649	2,643	12.8%
1997	19,875	24,072	4,197	17.4%
1998	17,711	20,787	3,076	14.8%
1999	21,232	25,580	4,613	18.0%
2000	22,866	27,897	5,031	18.0%
2001	24,324	29,191	4,867	16.7%
2002	26,646	31,678	5,032	15.9%
2003	27,960	32,335	4,375	13.5%
2004	33,129	38,035	4,906	12.9%
Average				14.8%

Notes:

¹ Includes water used at water treatment plants for backwashing and other uses.

Includes deliveries to City of Lincoln.

ac-ft/yr = acre-ft per year

Table 4-11. Zone 2 Historical Unaccounted for Treated Water

Year	Water sales ac-ft/yr ¹	Water production ac-ft/yr	Unaccounted - for water, ac-ft/yr	Unaccounted - for water, percent of annual water production
1994	69	71	3	3.7%
1995	58	65	7	11.5%
1996	67	77	10	13.2%
1997	70	79	10	12.4%
1998	55	63	8	12.1%
1999	64	76	13	16.4%
2000	66	73	7	9.6%
2001	69	69	0	0.0%
2002	66	78	12	15.4%
2003	60	NA	NA	NA
2004	71	NA	NA	NA
Average				10.5%

Notes:
Zone 2 was consolidated into Zone 1 in 2003
ac-ft/yr = acre-ft per year

4.5 High Annual Water Demand Adjustment

Water demands can vary year to year because of weather and other reasons. The 2004 unit water demands are adjusted for this analysis to account for the higher water demands that can occasionally occur. The adjustment is based on comparing the average use per account for Zone 1 for each year over the last 12 years to the 2004 average use per account, as shown in Table 4-12. The adjustment factor is applied to the unit water demand factors in order to define the high end of these annual variations. For this analysis, an adjustment factor of 1.045 (based on the 1994 to 2004 comparison of average use per account) is applied to the unit water demand factors.

Table 4-12. High Annual Water Demand Adjustment

Year	Average use per account (gpd/account) [*]	Factor to 2004 data ^{**}
1993	682	0.986
1994	723	1.045
1995	630	0.910
1996	674	0.974
1997	701	1.013
1998	607	0.877
1999	685	0.990
2000	651	0.940
2001	673	0.973
2002	699	1.010
2003	633	0.915
2004	692	1.000

Notes:
^{*}Includes metered use data from residential, commercial, and multi-unit classifications only.
Data for years 1993-1999 from Spink Report, 2000. Annual Water Sales data for 2000-2004 from PCWA monthly sales data.
^{**}Factor is ratio of average use per account for each year to 2004 use data.
gpd = gallons per day

4.6 Unit Water Use Results

There are two sets of land use based water use factors. The first set, presented in Table 4-13, is based on the Placer County land use categories and is used for growth Scenarios 1, 2, and 2b. The second set, presented in Table 4-14, is based on SACOG land use categories and is used to estimate water demands for growth Scenario 3. Demand factors used in the 2001 Discussion Paper are also presented as a comparison. Both sets of water demand factors include the annual demand adjustment factor and the unaccounted-for water factor.

PCWA is actively implementing BMPs per the California Urban Water Conservation Council (CUWCC) and the Water Forum Agreement. Some of the water savings from implementing these BMPs are reflected in the unit water demand analysis. Additional conservation measures would likely further reduce unit water demands, thereby reducing the projected buildout demands.

Table 4-13. Placer County Land Use Water Use Factors, Growth Scenarios 1, 2, and 2b

Land use classification	Discussion Paper				This analysis			
	Upper area		Lower area		Upper area		Lower area	
	gpd/DU	gpd/ac	gpd/DU	gpd/ac	gpd/DU	gpd/ac	gpd/DU	gpd/ac
High Density Residential 20.1+ DU/Ac.	--		--		212		230	
High Density Residential 15.1-20.0 DU/Ac.	188		188		232		371	
High Density Residential 10.1-15.0 DU/Ac.	239		332		326		386	
Medium Density Residential 7.1-10.0 DU/Ac.	341		536		440		539	
Medium Density Residential 5.1-7.0 DU/Ac.	421		609		495		608	
Low Density Residential 3.1-5.0 DU/Ac	570-783*		714-806*		613		703 1,802** 1,857***	
Low Density Residential 1.1-3.0 DU/Ac. Ac	750-775		900-1,137*		783		857 1,802** 1,857***	
Low Density Residential 0.1-1.0 DU/Ac.	906		1,442		769		998 1,802**	
Commercial		2,232		2,678		2,299		2,759
Professional Office		--		--		2,682		3,219
Industrial		2,603		3,124		2,682		3,219
Public/schools (average)		2,733		3,280		2,816		3,379
Rural Residential 1.1-2.3 Ac./DU ⁴	906		1,442		723		1,069 1,802**	
Rural Residential 2.31-4.6 Ac./DU	906		1,442		800		951 1,802**	
Rural Residential 4.61-10.0 Ac./DU	906		1,442		799		895 1,802**	
Rural Residential 10.1-20 Ac./DU	906		1,442		799		951 1,802**	
Agricultural or Timberland		906		1,442		5,251		5,251
Resort/Recreation		--		--		5,251		5,251
Recreation/Conservation		--		--		5,251		5,251
Open Space		3,077 (greenbelt irrigated) 50 (not irrigated)		3,693 (greenbelt irrigated) 50 (not irrigated)		5,251		5,251

Notes:
 Water use factors include high annual water demand and unaccounted-for water adjustments.
 Water use factors are applied to net acreage.
 * Factor range due to different densities used in 2001 Discussion Paper.
 ** 1,802 gpd/DU for Low Density Residential and Rural Residential land uses in Granite Bay - SJWD subarea.
 *** 1,857 gpd/DU for Low Density Residential land uses in Granite Bay - PCWA subarea.
 ac/DU = acre per dwelling unit
 DU/ac = dwelling unit per acre
 gpd/ac = gallons per acre
 gpd/DU = gallons per day per dwelling unit

**Table 4-14. SACOG Land Use Water Use Factors,
 Growth Scenario 3**

Land use classification	This analysis			
	Upper area		Lower area	
	gpd/DU	gpd/ac	gpd/DU	gpd/ac
6. High Density Residential	205		223	
5. Medium-High Density Residential	225		360	
33. New Area MF	316		375	
4. Medium Density Residential	382		420	
3. Low Density Residential	518		605	
2. Very Low Density Residential	759		831	
34. New Area SF	669		730	
24C. Low Density Mixed Residential	382		420	
25C. Medium Density Mixed Residential C	316		375	
31. Future Growth Area	669		730	
Additional Urban Reserve	669		730	
10. Community/Neighborhood Retail		2,942		3,532
16a. Community/Neighborhood Commercial/Office - Modified		2,882		3,460
8. High-Intensity Office		2,942		3,532
9. Moderate-Intensity Office		9,008		10,813
11. Regional Retail		2,882		3,460
16. Community/Neighborhood Commercial/Office		2,942		3,532
17. Regional Commercial/Office		3,243		3,893
18. Mixed Use Employment Focus		5,885		7,064
12. Light Industrial - Office		2,222		2,667
LI-Office		2,222		2,667
13. Light Industrial		1,621		1,946
14. Heavy Industrial		661		793
15. Public/Quasi-Public		2,732		3,278
31. Suburban Center/Corridor		2,882		3,460
32. Minor (Outer) Urban Center/Corridor		2,882		3,460
1. Rural Residential		'--		'--
I. Agriculture*		'--		'--
K. Open Space*		'--		'--
R. Employment Focus Mixed Use Center/Corridor*		2,882		3,217

Note:
 Water use factors include high annual demand and unaccounted-for water adjustments.
 ' Not included.
 gpd/ac = gallons per day per acre
 gpd/DU = gallons per day per dwelling unit

CHAPTER 5 WATER DEMAND PROJECTIONS

Water demand projections have been developed for the various growth scenarios presented in Chapter 3 and the water use characteristics discussed in Chapter 4. This chapter describes the methodology and results of combining land use scenarios with unit water demands to create the water demand projections for each growth scenario.

5.1 Methodology

As discussed in Chapter 4, the land use based demand projection method is used to project future water demands. The objective of this method is to forecast water demands based on expected future land uses and respective land use unit water demands.

The study area subareas and methodology for determining these boundaries are defined in Chapter 3 of this study. The boundaries were established in a GIS layer for use in the analysis. The land use data layer from the Placer County Planning Department and SACOG (depending on scenario) contains current land use types, acreage, and other information. Overlaying the subarea boundary layer with the land use database created a database that listed land use type and acreage for each planning subarea. Results were then pulled into a calculations database to determine total water demand.

The calculations database file converted the total gross acreage into total demand through a series of steps as described below. A sample output of the water demand results by subarea is presented in Table 5-1. A detailed description of the components of the output summary tables is presented below. The complete results output for all subareas are presented in Appendix F.

1. **Net acreage factor.** The net acreage factor is used to convert gross acreage to net acreage. Net acreage does not include non-water using land areas such as streets and easements. A detailed discussion of how the net acreage factors were determined for each growth scenario is provided in Chapter 3.
2. **Dwelling units per acre.** The DU/ac is multiplied by the net acreage to estimate the number of dwelling units. The number of DU/ac for each residential land use category is based on the existing median number of DU/ac for each residential land use category range based on an analysis of PCWA customer billing data.
3. **Unit water demand.** The unit water demand is reported as either gpd/DU for residential land use categories or gpd/ac for non-residential land use categories. The unit water demand factor multiplied by either the number of DUs for residential land use categories or the net acreage for non-residential land use categories is used to calculate water demand for each land use category. The determination of the unit water demand factors is described in detail in Chapter 4.
4. **Source water demand factor.** The source water demand factors consist of four categories: treated, municipal groundwater, private groundwater, and reclaimed. Each land use category in each subarea is assigned a source factor to account for expected water sources that will supply that land use. The source water demand factors add up to 1.0 for each land use category, and were determined based on PCWA staff knowledge, development plans, and other planning and operational documents. Reclaimed factors were determined by review of reuse master plans and

studies by the cities of Lincoln and Roseville, in addition to specific development plans and other information. The reclaimed factor was defined with the intent of using reclaimed water on large common area landscape parcels.

5. **Unaccounted-for water.** A percent unaccounted-for water is applied to determine the total required water supply, including demands from fire protection and training, system and street flushing, sewer cleaning, construction, system leaks, meter inaccuracies, and unauthorized connections. The determination of the percent unaccounted-for water is described in Chapter 4. An assumption for unaccounted-for water for treated water and for reclaimed water is used to develop the water demand projections. Unaccounted-for water is already included in the water use factors presented in Table 4-13.
6. **High annual water demand factor.** A factor of 1.045 is applied in the calculation of total water demand to adjust average water demand rates to higher demands to account for dry year demands, as described in Chapter 4. High annual water demand is already included in the water used factors presented in Table 4-13.

5.2 Treated Water Demand Projections

The projected treated water demands are grouped according to the five supply categories: treated, municipal groundwater, private groundwater, reclaimed, and raw water. These projected demands include groundwater and reclaimed water. The subarea demands are grouped into the macro areas and demands are presented for each alternative in Tables 5-2, 5-3, 5-4, and 5-5. Slight differences in acreages between Scenarios 1, 2, and 2b are the result of GIS mapping anomalies. Total demands for each scenario are compared in Figure 5-1. The demands are grouped into three macro areas. Areas that are or would be served by an expanded PCWA Zone 1 are shown in the “PCWA plus Lincoln Subtotal” group, which includes macro areas Auburn, Lincoln, Rocklin, Loomis/Granite Bay, and West Placer subareas. The “Roseville and SJWD Subtotal” group includes demands that are served by other agencies with both PCWA and non-PCWA supplies, and includes Roseville and SJWD. The “West Placer Subtotal” group includes the remaining areas in west Placer County that would be served by NID or are outside of PCWA’s ability to realistically serve due to infrastructure requirements. Detailed water demand projection results for each subarea per scenario are presented in Appendix F.

Table 5-2. Scenario 1 – General Plans, Projected Treated Water Demand, ac-ft/yr

PCWA Demand Areas	Treated	Groundwater		Reclaimed water	Total
		Municipal	Private		
Auburn	11,762	0	426	0	12,188
Lincoln	25,123	0	33	4,803	29,959
Rocklin	27,826	0	14	0	27,840
Loomis/Granite Bay	13,214	0	3,065	5	16,284
West Placer	24,778	0	1,163	4,188	30,129
PCWA plus Lincoln Subtotal:	102,703	0	4,701	8,996	116,400
Roseville	54,691	0	0	3,134	57,825
San Juan Water District	16,411	0	0	4	16,415
Roseville and SJWD Subtotal:	71,102	0	0	3,138	74,239
Remainder Area	0	982	487	0	1,469
NID Demand Areas	6,720	0	2,634	0	9,354
West Placer Subtotal:	6,720	982	3,121	0	10,823
West Placer County Total:	180,525	982	7,822	12,134	201,463

Note:
ac-ft/yr = acre-feet per year

Table 5-3. Scenario 2 – Enhanced General Plans, Projected Treated Water Demand, ac-ft/yr

PCWA Demand Areas	Treated	Groundwater		Reclaimed water	Total
		Municipal	Private		
Auburn	11,762	0	426	0	12,188
Lincoln	38,055	0	362	5,826	44,243
Rocklin	27,826	0	14	0	27,840
Loomis/Granite Bay	13,214	0	3,061	5	16,284
West Placer	40,157	0	1,438	7,483	49,078
PCWA plus Lincoln Subtotal:	131,014	0	5,301	13,314	149,633
Roseville	58,095	0	0	7,875	65,970
San Juan Water District	16,411	0	0	4	16,415
Roseville and SJWD Subtotal:	74,506	0	0	7,879	82,385
Remainder Area	29	982	632	0	1,643
NID Demand Areas	6,732	0	2,632	0	9,364
West Placer Subtotal:	6,761	982	3,264	0	11,007
West Placer County Total:	212,281	982	8,565	21,193	243,025

Note:
ac-ft/yr = acre-feet per year

**Table 5-4. Scenario 2b – Enhanced General Plans Placer Vineyards BP,
 Projected Treated Water Demand, ac-ft/yr**

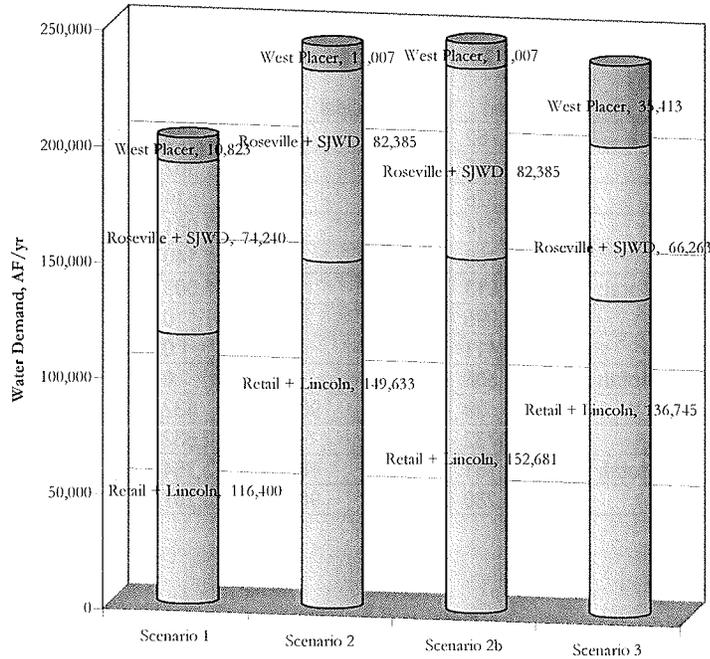
PCWA Demand Areas	Treated	Groundwater		Reclaimed water	Total
		Municipal	Private		
Auburn	11,762	0	426	0	12,188
Lincoln	38,055	0	362	5,826	44,243
Rocklin	27,826	0	14	0	27,840
Loomis/Granite Bay	13,214	0	3,061	5	16,284
West Placer	43,156	0	1,140	7,560	52,126
PCWA plus Lincoln Subtotal:	134,013	0	5,003	13,391	152,681
Roseville	58,095	0	0	7,875	65,970
San Juan Water District	16,411	0	0	4	16,415
Roseville and SJWD Subtotal:	74,506	0	0	7,879	82,385
Remainder Area	29	982	632	0	1,643
NID Demand Areas	6,732	0	2,632	0	9,364
Subtotal:	6,761	982	3,264	0	11,007
West Placer County Total:	215,280	982	8,267	21,270	246,073

Note:
 ac-ft/yr = acre-feet per year

Table 5-5. Scenario 3 – SACOG Preferred, Projected Treated Water Demand, ac-ft/yr

PCWA Demand Areas	Treated	Groundwater		Reclaimed water	Total
		Municipal	Private		
Auburn	12,936	0	342	0	13,278
Lincoln	30,555	2,196	37	2,404	35,192
Rocklin	25,786	0	8	0	25,794
Loomis/Granite Bay	14,708	0	3,929	5	18,642
West Placer	38,566	0	1,632	3,641	43,839
PCWA plus Lincoln Subtotal:	122,551	2,196	5,948	6,050	136,745
Roseville	49,717	0	0	2,207	51,924
San Juan Water District	14,335	0	0	4	14,339
Roseville and SJWD Subtotal:	64,052	0	0	2,211	66,263
Remainder Area	2,971	510	273	0	3,754
NID Demand Areas	28,414	0	3,245	0	31,659
West Placer Subtotal:	31,385	510	3,518	0	35,413
West Placer County Total:	217,988	2,706	9,466	8,261	238,421

Note:
 ac-ft/yr = acre-feet per year



Note:
 Includes groundwater and reclaimed water

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Figure 5-1. Scenario Treated Water Demands

5.3 Demand Comparison to Other Studies

The City of Roseville and San Juan Water District have conducted future water demand projections for their service areas. A comparison of the future water demand estimates in this study with demand projections from these other studies is provided in this section.

5.3.1 City of Roseville

The City of Roseville has recently completed a city-wide water supply strategy effort including water demand projection and unit water demand analysis. The resulting future water demands are compared to the results from this analysis for Scenario 2 in Table 5-6. Results for the initial study and a revised study are listed. In the revised study, the residential water demand factors were generally decreased, but most of the non residential water demand factors were increased, accounting for the overall increase in total demand.