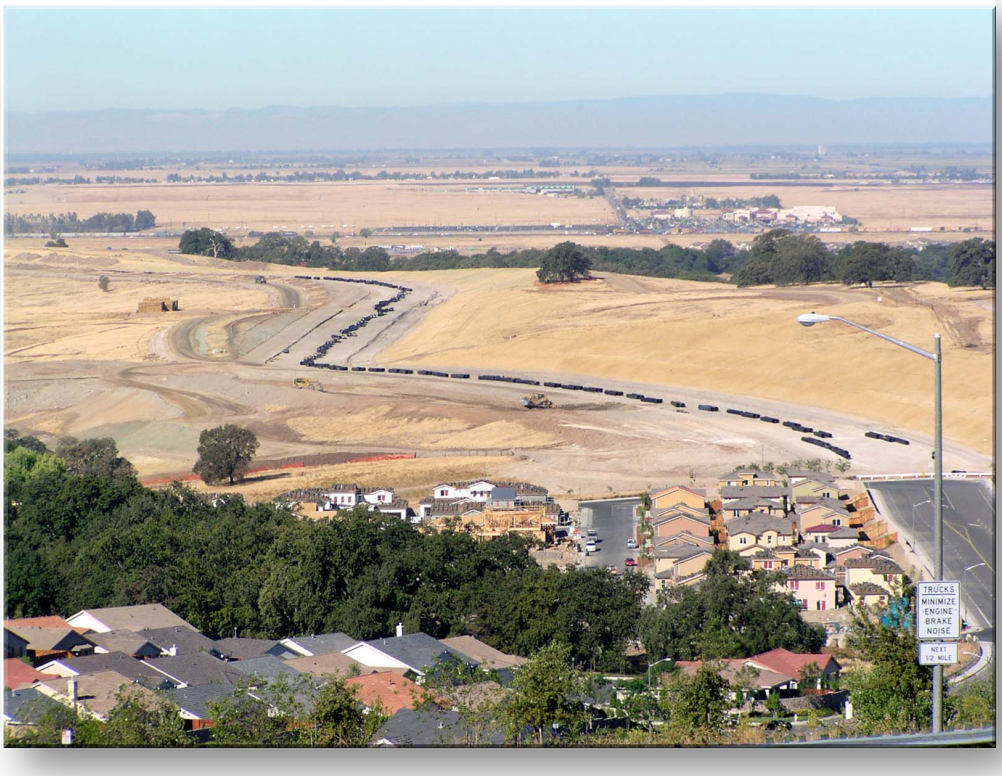
Placer County Water Agency
2010 Urban Water Management Plan



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Placer County Water Agency

2010 Urban Water Management Plan

Prepared by

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Comprehensive Water Planning

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CHAPTER 1. INTRODUCTION

Placer County Water Agency (PCWA) was created in 1957 by a special act of the California Legislature known as the Placer County Water Agency Act. PCWA has a five-member board of directors elected by district voters for four-year terms. The boundaries of PCWA are coterminous with the boundaries of Placer County.

PCWA carries out a broad range of responsibilities including water resource planning and management, retail and wholesale supply of water, and production of hydroelectric energy.

PCWA currently delivers approximately 116,500 acre-feet per year within its Western Water System, approximately 140 acre-feet per year within its Eastern Water System, and provides approximately 23,600 acre-feet per year of untreated water to neighboring purveyors for treatment and resale, serving a total population of over 200,000 people in Placer County directly or indirectly with treated and irrigation water. In addition, PCWA regularly makes surface water available for transfer to other purveyors in the state and to assist fishery protection goals in the lower American River during periods of drought.

PCWA has existing surface water contract rights and appropriative rights for up to 280,000 acre-feet per year, and access to groundwater under adopted groundwater management plans.

PCWA has prepared this Urban Water Management Plan (UWMP) to comply with the Urban Water Management Planning Act (UWMPA) requirements for urban water suppliers.

This UWMP addresses the current and future state of PCWA water supplies in relation to projected demands and assess the security of those supplies under dry year conditions. This UWMP provides verification that future demands, represented by existing General Plans within the land use jurisdictions served by PCWA, will not exceed projected supplies.

Note To DWR

Placer County Water Agency has written this UWMP primarily as a water resources planning tool and secondarily to satisfy the requirements of the UWMPA.

The body of the document presents and discusses data that DWR requests in its UWMP Guidebook.

To facilitate review by DWR for compliance with the UWMPA, data from the body of the document has been transferred into DWR Tables consistent with the organization of the tables in Section N of the 2010 UWMP Guidebook. These tables are in **Appendix A-1**.

Also, this UWMP has been reviewed for adequacy according to the UWMP Checklist as contained in Section I of the 2010 UWMP Guidebook. A completed checklist is included in **Appendix A-2**.

1.1 Urban Water Management Planning Act

Urban water suppliers must comply with the Urban Water Management Planning Act (the UWMP Act) and the Water Conservation Bill of 2009. For the purposes of the UWMP Act, urban water suppliers with 3,000 or more service connections or supplying 3,000 or more acre-feet of water per year are required to prepare a UWMP every five years.

Urban Water Management Planning Background

The UWMP Act requires urban water suppliers to report, describe, and evaluate:

- Water deliveries and uses
- Water supply sources
- Efficient water uses
- Demand Management Measures (DMMs), including implementation strategy and schedule

In addition, the Water Conservation Bill of 2009 requires urban water suppliers to report in their UWMPs base daily per capita water use (baseline), urban water use target, interim urban water use target, and compliance daily per capita water use.

The UWMP Act directs water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies are available to meet existing and future demands. Urban water suppliers are required to assess current demands and supplies over a 20-year planning horizon and consider various drought scenarios. The UWMP Act also requires water shortage contingency planning and drought response actions be included in a UWMP.

Public utilities with multiple service areas within their districts should include all service areas regardless of size and determine one urban water use target for the UWMP.

The normal UWMP submittal cycle requires that they be prepared and submitted in December of years ending in five and zero. However, because of recent changes in UWMP requirements, State law has extended the deadline for the 2010 Plans to July 1, 2011. Although submitted in 2011, 2010 UWMPs will be referred to as 2010 UWMPs because they include 2010 water data and to retain consistency with the five-year submittal cycle.

Based on legislative changes resulting from the November 2009 passage of SBX7-7 (the Water Conservation Bill of 2009), development of UWMPs will also enable water agencies and, in turn, the State of California to set targets and track progress toward decreasing daily per capita urban water use throughout the state. A UWMP, including discussion of the status

of a water supplier's implementation of DMMs, is required for an urban water supplier to be eligible for a water management grant or loan administered by DWR, the State Water Resources Control Board (State Water Board), or the Delta Stewardship Council. A current UWMP must also be maintained by the water supplier throughout the term of any grant or loan administered by DWR.

Changes to California law require that, beginning in 2016, water suppliers comply with water conservation requirements established by the Water Conservation Bill of 2009 in order to be eligible for State water grants or loans.

Retailer and Wholesaler Requirements

The California Water Code (CWC) indicates that both urban wholesale and retail water suppliers are to prepare UWMPs. Wholesale and retail suppliers are also to coordinate and provide water use and supply information to each other during preparation of their respective UWMPs. Generally, the UWMP Act refers to "urban water suppliers," and the Water Conservation Bill of 2009 indicates that "all water suppliers increase efficiency," thus supporting the UWMP efforts of both wholesale and retail urban water suppliers. There are several instances within the CWC, though, where the requirements for wholesale and retail urban water suppliers differ. These include:

- DMMs: Wholesale suppliers provide documentation for DMMs C, D, J, K, and L. Retail suppliers provide documentation for each DMM except J.
- Baselines and Targets: Only retail urban water suppliers are required to develop base daily per capita use, interim urban water use target, and urban water use target values.
- Water use reduction: Wholesale suppliers are to provide "an assessment of their present and proposed future measures, programs, and policies to help achieve the water use reductions". Retail suppliers are to "conduct at least one public hearing" that includes general discussion of "the urban retail water supplier's implementation plan for complying with" the Water Conservation Bill of 2009.

Lower income housing: Only retail urban water suppliers are required to address the lower income water supply projections required by CWC 10634(a).

1.2 Public Participation and Agency Coordination

The UWMPA requires a water purveyor to coordinate the preparation of its UWMP with other appropriate agencies in and around its service area. This includes other water suppliers that share a common source, water management agencies, and relevant public agencies. PCWA has prepared this UWMP in coordination with water utilities that receive wholesale water from PCWA. PCWA has also coordinated the preparation of this plan with other

appropriate local government agencies, as listed in **Table 1-1**. Copies of correspondence are included in **Appendix B-3**.

Table 1-1 – Public and Agency Coordination

Coordinating Agencies	Participated in developing the plan	Commented on the draft	Attended public meetings	Was sent a copy of the draft plan	Was sent a notice of intention to adopt
Placer County					√
City of Roseville	√				√
City of Rocklin				√	√
City of Lincoln	√				√
City of Auburn					√
City of Colfax					√
Town of Loomis					√
San Juan Water District					√
California American Water District					√
Nevada Irrigation District					√
Sacramento Suburban Water District		√			√
Truckee Donner Public Utility District		√		√	√
Folsom Lake Mutual Water Co.					√
Golden Hills Mutual Water Co.					√
Hidden Valley Community Association					√
Lakeview Hills Community Association					√
Willo-Glen Water Co.					√
Christian Valley Park CSD					√
Alpine Meadows Water Association					√
Dutch Flat Mutual Water Association					√
Heather Glen CSD					√
Meadow Vista County Water District					√
Weimar Water Co.					√
Midway Heights County Water District					√
Northstar Community Services District					√
Public					√

Note: The Public Draft UWMP was posted on the PCWA website during the public review period.

1.3 Plan Adoption

Prior to adoption of its UWMP, PCWA conducted a public hearing regarding its UWMP on June 16, 2011. A draft of the UWMP was made available for public inspection at PCWA's offices in Auburn, California, and posted on the PCWA website. General notice of the public hearing was provided through publication of the hearing date and time in the Auburn Journal on May 13, 2011 and May 20, 2011.[1] As part of its public hearing, PCWA requested community input regarding its implementation plan for complying with the water conservation requirements contained in CWC § 10608.20 et seq., including the implementation plan's economic impacts.[2] No comments were received at the hearing. Also, at the public hearing, PCWA adopted the method for determining its urban water use target pursuant to CWC § 10608.20(b). PCWA adopted its 2010 UWMP on June 16, 2011 with the passage of resolution 11-22.

[1] See **Appendix B-2** for copies of the published notices
[2] CWC § 10608.26

1.4 Previous Reports

PCWA has prepared several water planning reports in the past decade. These documents provide context for the analyses contained in PCWA's 2010 UWMP. Two key PCWA documents are the 2005 UWMP and the 2006 Integrated Water Resources Plan (2006 IWRP).

PCWA has prepared urban water management plans in 2000 and 2005. The 2005 Plan concluded that PCWA has sufficient water supplies in normal and multiple-dry year periods, and that water shortages could occur by 2030 in a year hydrologically similar to the driest year in recent history, but PCWA will produce groundwater to make up for any shortage.

The 2006 IWRP assesses build-out water demands in western Placer County, including service to new development projects in current general plans and identified specific plan subareas that are located in western Placer County. The IWRP also integrates a variety of water supplies managed by PCWA and other purveyors, including surface water, groundwater, and recycled water. In its comparison of demands and supplies throughout western Placer County, the 2006 IWRP concludes that there are adequate water supplies to meet demands throughout western Placer County in normal years, and that PCWA's dry-year shortage policies will allow it to effectively manage the projected supply shortages in single and multiple-dry year periods.

1.5 Plan Organization

This UWMP is organized as follows:

- Chapter 2 provides a description of PCWA's service area, including climate, supply facilities, and the water systems.
- Chapter 3 describes PCWA's current and future water supplies and the reliability of the supplies.
- Chapter 4 details the demands on PCWA's system, including the past and future estimated demands.
- Chapter 5 provides information regarding PCWA's demand management measures.
- Chapter 6 discusses PCWA's water shortage contingency plan.
- Chapter 7 discusses current and future recycled water use in PCWA's retail service area.
- Chapter 8 compares PCWA's supplies and demands in normal and dry years.

- The appendices include background information, details, and necessary supporting documents.

CHAPTER 2. PCWA WATER SYSTEM

2.1 PCWA Service Area

2.1.1 General Service Area Description

PCWA is a public water agency that provides untreated, treated and irrigation water directly and indirectly to wholesale and retail customers throughout Placer County.

PCWA's Eastern Water System provides groundwater to the Martis Valley area of Placer County adjacent to the City of Truckee. This service area is also designated as PCWA Zone 4.

The area served by the Western Water System extends from the community of Alta on the east, down the interstate 80 corridor, to the Sutter and Sacramento county lines on the west and south. The service area includes retail treated water deliveries to the communities of Alta, Monte Vista, Applegate, Colfax, Auburn, Loomis and Rocklin and much of the surrounding unincorporated areas. PCWA also provides wholesale treated water to the City of Lincoln, California American Water Company for use in their franchise area west of Roseville and south of Baseline Road, and to several relatively small mutual water companies throughout PCWA's western service area.

In addition to treated water service, PCWA provides irrigation water through its extensive canal system to individual customers, and untreated water for treatment and resale by other retail water purveyors. Irrigation water comprises about two-thirds of PCWA's Western Water System deliveries.

The Western Water System is a financial and operational amalgamation of four separate systems acquired or developed over time. Each of these underlying systems is designated as a PCWA Zone; numbered 1, 2, 3 and 5.

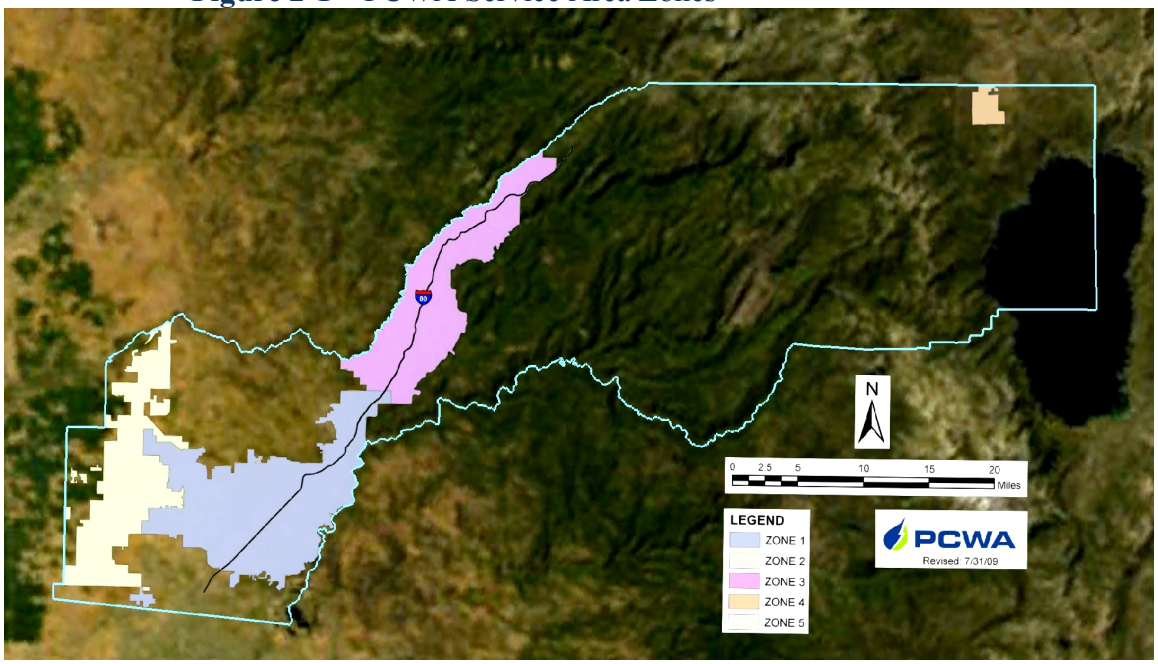
PCWA also provides untreated water from its Middle Fork American River Project into Folsom Lake for delivery to the San Juan Water District, the City of Roseville, and Sacramento Suburban Water District, each of which are required to prepare their own UWMPs. Deliveries to these customers are grouped under the general term of "Sales to Other Agencies."

PCWA's Place of Use for its Middle Fork American River Project water rights extends outside of the PCWA/Placer County boundary and includes groundwater recharge areas in northern Sacramento County that are partially overlain by the San Juan Water District and the Sacramento Suburban Water District.

In section 2.1.3, the five PCWA Zones are discussed.

Figure 2-1 shows the geographic extent of the PCWA service area.

Figure 2-1 – PCWA Service Area Zones



Note: Created using Google Earth Pro.

2.1.2 Climate

The climate variation across the PCWA service area is due to large changes in topography and elevation. Zone 1 and Zone 5 exist in the western portion of the county. Lower Zone 1 is an area with urban development and Zone 5 includes agricultural lands, both having weather typical to California's central valley with hot dry summers and cool wet winters. Upper Zone 1 consists of foothill development and climate with elevations up to about 1600 ft with hot dry summers and cold wet winters. Zone 3 extends from Zone 1 up to nearly 4000 ft and is characterized by sierra forest climate with warm summers, cold wet winters, and occasional snow. Zone 4 lies in the eastern part of the county at about 6000 ft and has a high sierra climate characterized by cool summers and cold winters with snow measured in feet.

Tables 2-1, 2-2 and 2-3 include the average reference evapotranspiration (ETo), precipitation and temperature at selected locations in the PCWA service area. Roseville and Auburn are used to represent climate in two distinct areas of the PCWA Zone 1 service area. Colfax is representative of the climate in the PCWA Zone 3 service area.

For purposes of documenting ETo, PCWA will be using Appendix A of the California Model Water Efficient Landscape Ordinance (MWELO). The MWELO contains the reference ETo by month as shown in **Tables 2-1, 2-2, and 2-3**. **Tables 2-1, 2-2, and 2-3** include ETo estimates for Roseville, Auburn and Colfax to reflect variations between lower and upper Zone 1 and Zone 3. Estimates for Zone 4 are not included because ETo is not used to calculate outdoor water demand for Zone 4 given the lack of residential landscaping or lawns.

ETo values for Roseville and Auburn have an additional column for data from local California Irrigation Management Information System (CIMIS) stations. Appendix A ETo represents the suggested ETo values presented in the MWELO.[3] For the purpose of maintaining the most accurate values, CIMIS station data is presented because it is most appropriate to the zone.

Temperature and precipitation numbers are from Western Regional Climate Center (WRCC) data stations. Both the Colfax and Auburn stations have been active since 1905 whereas the nearest station to Roseville was active in Rocklin from 1971 to 2000. Temperature values are provided as monthly averages for high and low temperatures.

Table 2-1 – Average ETo, Precipitation, and Temperature for Roseville

Roseville	Average Temperature, F	Average Rainfall, in	Appendix 4 Eto, in	CIMIS Average Eto, in
January	43.7	3.65	1.10	1.59
February	47.8	3.09	1.70	2.20
March	52.0	2.89	3.10	3.66
April	55.9	1.56	4.70	5.08
May	65.7	0.29	6.20	6.83
June	73.1	0.26	7.70	7.80
July	77.6	0.31	8.50	8.67
August	76.7	0.05	7.30	7.81
September	71.2	0.37	5.60	5.67
October	60.8	1.83	3.70	4.03
November	48.4	3.84	1.70	2.13
December	43.0	3.21	1.00	1.59
Annual	59.8	21.35	52.20	57.06

Note: ETo data from CIMIS station 131 Fair Oaks, 1997-present; Temperature and precipitation data from wrcc.dri.edu Rocklin station 047516 average 1971-2000

[3] Values in the MWELO appendix 4 match data from "Irrigation Scheduling" A Guide for Efficient On-Farm Water Management, University of California Division of Agriculture and Natural Resources, Publication 21454, published 1989.

Table 2-2 – Average ETo, Precipitation, and Temperature for Auburn

Auburn	Average Temperature, F	Average Rainfall, in	Appendix 4 Eto, in	CIMIS Average Eto, in
January	45.3	6.71	1.20	1.41
February	48.8	6.00	1.70	1.88
March	51.8	5.23	2.80	2.99
April	56.6	2.68	4.40	4.47
May	63.3	1.26	6.10	5.91
June	71.0	0.36	7.40	7.46
July	77.2	0.05	8.30	9.00
August	76.3	0.07	7.30	8.21
September	71.7	0.42	5.40	6.23
October	63.7	1.76	3.40	4.19
November	53.1	4.00	1.60	1.84
December	45.9	5.72	1.00	1.37
Annual	60.4	34.27	50.60	54.96

Note: ETo data from CIMIS station 195 Auburn, 2005-present; Temperature and precipitation data from wrcc.dri.edu Auburn station 040383 average 1905-2010

Table 2-3 – Average ETo, Precipitation, and Temperature for Colfax

Colfax	Average Temperature, F	Average Rainfall, in	Appendix 4 Eto, in
January	44.1	8.26	1.10
February	46.3	7.69	1.54
March	49.1	6.57	2.56
April	54.0	3.58	4.02
May	60.8	1.86	5.80
June	69.0	0.59	7.09
July	76.5	0.09	7.93
August	75.0	0.13	7.02
September	69.8	0.65	5.32
October	60.9	2.41	3.17
November	51.2	5.53	1.42
December	44.9	7.84	0.92
Annual	58.5	45.19	47.89

Note: Eto data from the MWELO, Temperature and precipitation data from wrcc.dri.edu Colfax station 041912 average 1905-2010

2.1.3 Service Zone Descriptions

This section describes PCWA's service areas. The PCWA service area includes five zones, each of which have unique water supply characteristics, and areas served by other water purveyors within Zone 1 and Zone 5, but including areas outside of these boundaries.

2.1.3.1 Zone 1

Zone 1 is the largest of the five zones, extending from the City of Auburn to the City of Lincoln and south to the border of the City of Roseville. PCWA provides retail service to most of Zone 1 and provides wholesale service to the City of Lincoln, California American Water Company, and small water associations. PCWA provides untreated water service to Christian Valley Park Community Service District which operates its own water treatment plant.

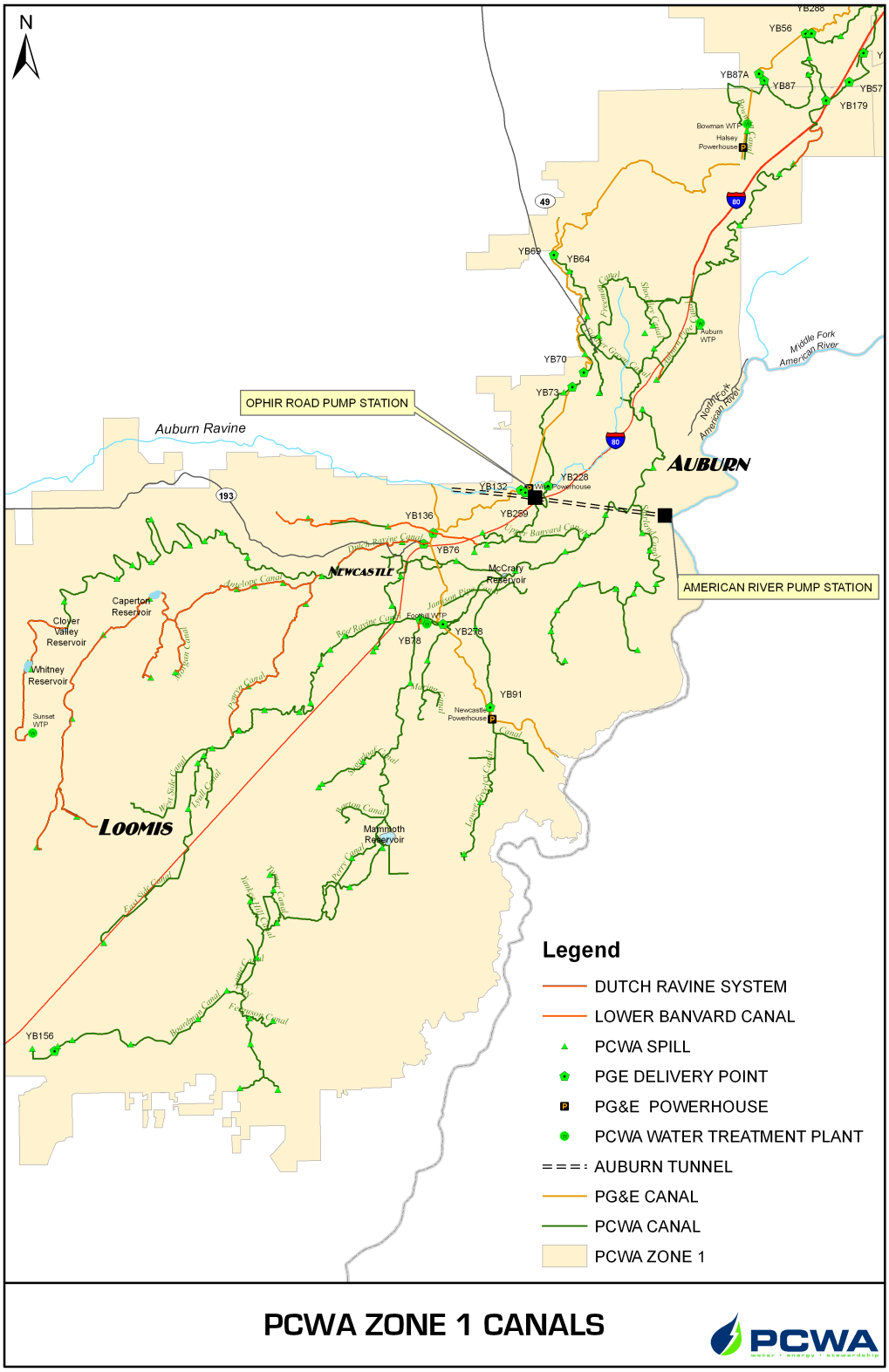
Water for Zone 1 is delivered by contract through PG&E's Drum-Spaulding hydroelectric system and also comes from PCWA's Middle-Fork American River project. PCWA operates four water treatment plants (WTPs) in Zone 1. The Zone 1 service area has 16 storage tanks with about 49 million gallons (MG) of storage capacity and 496 miles of treated water pipe. A graphical depiction of Zone 1 canals and supply infrastructure can be found in **Figure 2-2**.

Upper Zone 1 consists of the City of Auburn and surrounding communities. Due to its location, upper Zone 1 can only be supplied PG&E water. PG&E supplies water from the Bear and Yuba Rivers and delivers it to PCWA through the Bear River, Wise and South Canals. PCWA then treats this supply at the Auburn and Bowman WTPs prior to direct deliveries to its customers. It also delivers untreated water to treatment plants in lower Zone 1. The Auburn and Bowman WTPs have capacities of 8 million gallons per day (MGD) and 7 MGD respectively.

Lower Zone 1 includes the lower portion of the watershed below Auburn, including the communities of Newcastle, Penryn, and a portion of Granite Bay, as well as the Cities of Rocklin, and Lincoln, and the Town of Loomis. The primary water supply for lower Zone 1 is PG&E water from the Drum-Spaulding hydroelectric system. PCWA also uses water from the American River pursuant to its own water rights. PCWA pumps American River water near Auburn into the Auburn Tunnel, which connects to the Auburn Ravine where it can be distributed to Zone 5 irrigation water customers. PCWA can also pump water from the Auburn Tunnel up to its future WTP site at Ophir. From the Ophir site American River water can be diverted into PG&E's South Canal in emergency situations where it flows to PCWA's Foothill WTP. The lower Zone 1 WTPs are the Foothill and Sunset plants which have capacities of 55 MGD and 8 MGD respectively.[4]

[4] PCWA is currently increasing the capacity of the Foothill treatment plant to 58 MGD and should be completed in July 2011.

Figure 2-2 – Zone 1 Canal System



2.1.3.2 Zone 2

Zone 2 consists of 46 residential accounts south of the City of Roseville, in a community known as Bianchi Estates. PCWA supplied water to Bianchi Estates from two wells until 2003, at which time it was converted to surface water. This development receives treated water wheeled through the City of Roseville's system pursuant to an agreement between PCWA and Roseville. As Zone 2 is no longer fed by its wells, PCWA considers it part of Zone 1 for this UWMP, just as it was for the 2005 UWMP.

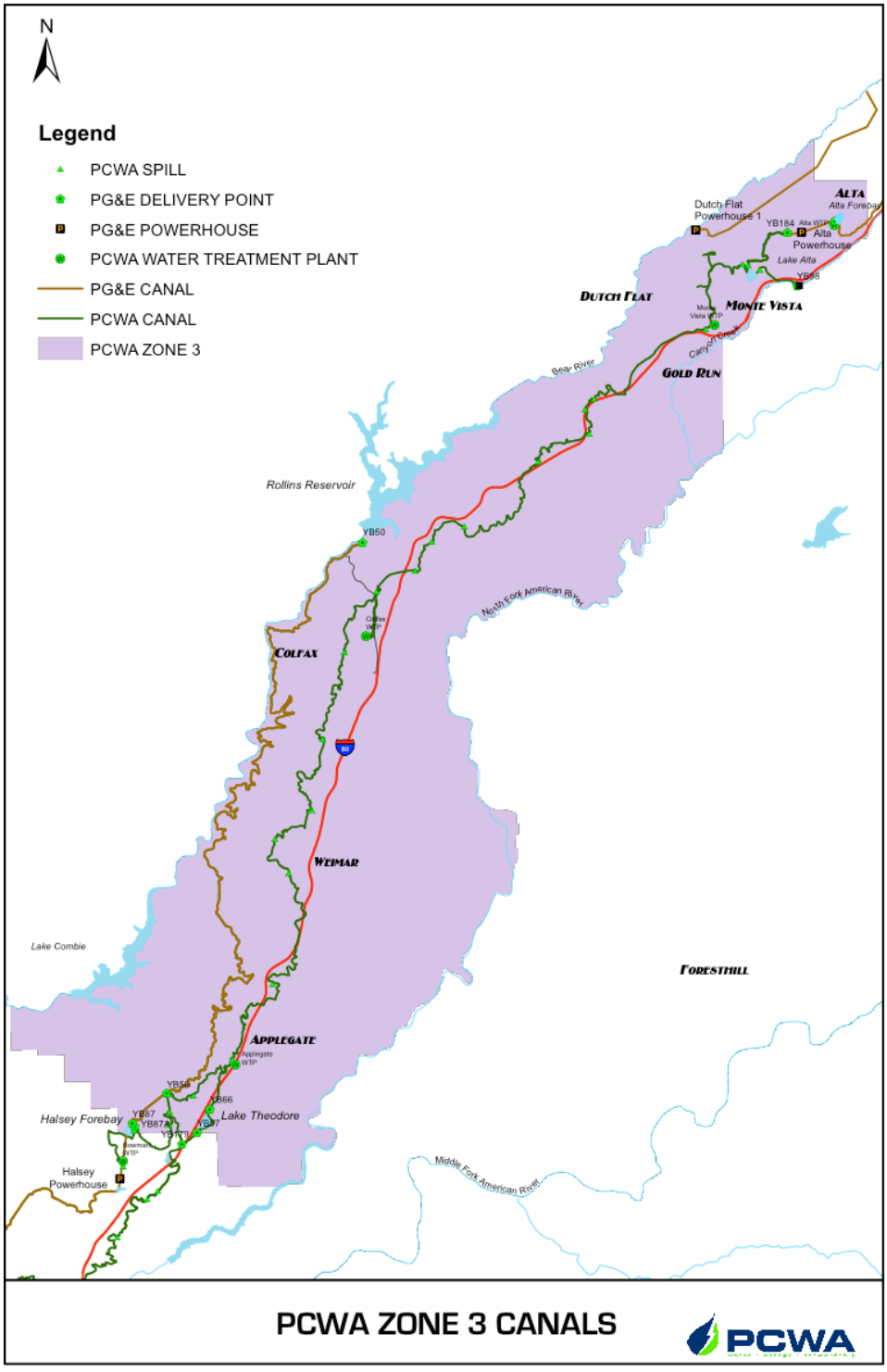
2.1.3.3 Zone 3

Zone 3 includes the communities of Applegate, Weimar, Meadow Vista, Colfax, Gold Run, Monte Vista, Dutch Flat, and Alta and in surrounding areas. Water purchased from PG&E enters PCWA's Boardman Canal from the Drum-Spaulding system. The Boardman Canal begins near Alta and runs along I-80 to Zone 1. The Boardman Canal serves as the main delivery method for water to users and treatment plants in Zone 3. PCWA's Zone 3 treatment plants include Alta (0.31 MGD), Monte Vista (0.142MGD), Colfax (1.24 MGD), and Applegate (0.12 MGD). There are about 27 miles of treated water piping and 2.16 MG of treated storage in Zone 3. A graphical depiction of Zone 3 canals and supply infrastructure can be found in **Figure 2-3**.

2.1.3.4 Zone 4

Zone 4 was established to serve Placer County developments in the Martis Valley near Truckee and the first well went into production in 1998. This zone is isolated from the rest of the PCWA system and is supplied by two wells. These wells, with a maximum production limit of about 1,400 gallons per minute (gpm) respectively feed multiple storage tanks with a total volume of about 6.1 MG. Water is distributed through about 26 miles of pipe. This system serves the Lahontan community as well as the Timilick, Hopkins Ranch, and Martis Camp developments. These communities are currently being built and are primarily seasonal residences on golf courses. No irrigation water is provided to the golf course as the owners operate their own wells.

Figure 2-3 – Zone 3 Canal System



2.1.3.5 Zone 5

Zone 5 was established in 2000 to provide irrigation water in a previously un-served area of Placer County generally west of the City of Lincoln. This zone is limited to commercial agriculture customers. The water supply in Zone 5 is delivered through Zone 1 infrastructure and sources including PG&E Drum-Spaulding and Middle Fork Project. PCWA currently serves water to 5400 acres in Zone 5. Zone 5 receives no treated water service.

2.1.3.6 Other Agencies

As discussed previously, PCWA provides untreated water to three water purveyors who treat and serve the water to their own customers including: San Juan Water District, Sacramento Suburban Water District and the City of Roseville. These purveyors serve customers that reside within and outside of Zone 1 and Zone 5.

2.1.3.7 Western Area

Because of the geographic overlap and the integration of supplies, and for ease of presenting demand information, the PCWA customers, both wholesale and retail, within Zone 1, Zone 5, and as otherwise within the boundaries of San Juan Water District, Sacramento Suburban Water District and the City of Roseville are collectively grouped under the term "Western Area Water Demands."

2.1.4 Service Area Demographics

The population served by PCWA represents a highly varied mix of users and user classes. This is due to the size of the service area, which includes a broad mix of residential population densities, as well as commercial, public, and industrial water use customers. A population estimate for PCWA was performed using DWR methods discussed in **Appendix C-3**. Future population for PCWA is estimated from predicted housing unit growth. Population estimates include the Placer County population and those only directly served retail treated water. The population is estimated for PCWA as shown in **Table 2-4**.

2.1.5 Retail Service Area Expansion

PCWA is authorized to provide water to all of Placer County. Expansion of PCWA's service area is not required for all new development. The City of Lincoln has been growing rapidly in the last decade from about 11,000 to 40,000 between 2000 and 2009.[5] This growth required no expansion of PCWA service as Lincoln buys the water wholesale and owns the retail distribution system that exists in the existing Zone 1 service area. Other development has required PCWA to expand service.

[5] Based on Department of Finance table E-4

Table 2-4 – Historic and Projected Population

Year	County Population	Retail Service Population
2000	248,399	73,219
2001	258,804	75,118
2002	271,384	80,423
2003	284,191	84,524
2004	296,735	87,658
2005	307,987	89,282
2006	318,026	91,928
2007	326,107	93,401
2008	333,766	93,926
2009	339,577	94,325
2010	347,543	101,938
2015	388,039	114,434
2020	428,535	126,930
2025	470,522	139,427
2030	512,509	151,923
2035	554,496	164,420

Note: DOF Table E-4 and P-1 with interpolation for some years, retail service population estimated as defined in Appendix C-3.

Zone 5 was the most recent addition to the system in 2000 but was easily handled due to the demand only being for raw water. Zone 4 was added in the late 1990s to accommodate residents of Lahontan and other new developments in the Martis Valley south of Truckee. This development is geographically isolated from other PCWA infrastructure and required PCWA to develop a separate service. To handle this demand PCWA drilled 2 wells to serve the development. This is likely to be the method that PCWA follows when handling other unincorporated developments removed from existing PCWA facilities. The majority of the un-served areas in Placer County are on National Forest land where large development is not expected.

CHAPTER 3. WATER SUPPLY CONDITIONS

PCWA uses surface water as its primary supply. PCWA also produces a limited amount of groundwater for use in Zone 4, and may produce groundwater in dry hydrologic conditions to meet demands in the Zone 1 service area. The Cities of Roseville and Lincoln produce recycled water, which may be available in the future for use in the PCWA retail service area. Chapter 3 describes PCWA's existing and planned water supplies, analyzes the reliability of these supplies, and identifies the extent of any water shortages.

3.1 Existing Surface Water Supplies

PCWA's primary surface water supplies consist of Middle Fork Project water from the American River, water purchased from Pacific Gas & Electric Company (PG&E) from the Yuba and Bear Rivers, and Central Valley Project water from the American River. PCWA also uses a limited amount of surface water from small creeks under pre-1914 water rights. Historically, PCWA has purchased surplus water from the South Sutter Water District for service to PCWA Zone 5 customers under Nevada Irrigation District's (NID) water rights.

A summary of PCWA's existing surface water supplies are provided in **Table 3-1** based upon the existing water rights currently held and the contracts to which PCWA is a party. The source, maximum available quantity, purpose of use and place of use are identified. Note that to the extent a supply may be used in more than one zone, the total use cannot exceed the maximum quantity available under the water right or contract, and that use of a given quantity of a supply in one zone precludes the use of the same water in another zone.

3.1.1 Pacific Gas & Electric Contracts

PCWA has two water supply contracts with PG&E, which provide options to purchase up to 125,400 af/yr for irrigation and domestic purposes. The underlying rights for the PG&E supply are PG&E's pre-1914 appropriative rights to water in the Yuba and Bear Rivers, which were established prior to the time that PG&E developed hydroelectric facilities throughout the Yuba and Bear River watersheds.

The water supply that PCWA purchases from PG&E is used to meet both treated and irrigation water demands in Zones 1, 2, 3, and 5. In 1968, PCWA purchased PG&E's lower Placer Water System, including its distribution canals and treated water systems and rights to delivery of 100,400 af/yr of water from PG&E's Drum-Spaulding Project to serve PCWA Zone 1 customers. This supply serves customers in the central portion of

Placer County along the Interstate 80 corridor, into the Loomis Basin, and north along Highway 65 to the City of Lincoln. The current contract term lasts until 2013.

Table 3-1 – Water Rights and Contract Entitlements

Supply	Source	Purpose of Use	Maximum Use af/yr	Place of Use Description	Place of Use by PCWA Zone			
					Zone 1	Zone 3	Zone 4	Zone 5
Middle Fork Project	American River	Irrigation, Domestic, Municipal and Industrial, Recreation	120,000	"Western Placer County"; Portions of Sacramento County, including San Juan Water District, Sacramento Suburban Water District, and Rio Linda WD service areas	√			√
Central Valley Project Contract	American River	Municipal and Industrial	35,000	Zone 1	√			
PG&E (Zone 1) Contract	Yuba and Bear Rivers	Irrigation and Domestic	100,400	Not specific as to POU	√			
PG&E (Zone 3) Contract	Yuba and Bear Rivers	Irrigation and Domestic	25,000	Zone 3		√		
South Sutter WD Contract	Yuba River	Irrigation	12,000	Zone 5				√
Pre-1914 Appropriative Right (S000959)	Canyon Creek	Irrigation and Domestic	40 cfs (Max.)	Alta, Colfax, Monte Vista and rural areas (Not limited to Zone 3)	√	√		√
Pre-1914 Appropriative Right (S000967)	Tributary To Auburn Ravine	Irrigation and Stock watering	Not Stated	"Boardman Canal" Area	√	√		Maybe
Pre-1914 Appropriative Right (S010397)	South Fork Dry Creek Tributary to Coon Creek	Irrigation	284	Localized Irrigation Just East of Auburn	√	√		Maybe
Pre-1914 Appropriative Right (S010398)	North Fork Dry Creek Tributary to Coon Creek	Irrigation	111	Localized Irrigation Just East of Auburn	√	√		Maybe

In 1984, PCWA purchased the remainder of PG&E's Placer County retail water system and entered a contract with PG&E for delivery of 25,000 af/yr from PG&E's Drum Spaulding Project for delivery to PCWA's Zone 3 customers. PCWA purchases water from PG&E at various buy points, and untreated water is placed into PCWA's Boardman Canal, which begins near Alta and extends southwest along the Interstate 80 corridor to near Lake Theodore, then into the Loomis Basin. From the Boardman Canal, PCWA delivers water to its four water treatment plant facilities located within Zone 3, other community water districts, and its irrigation water customers.

3.1.1.1 Legal, environmental, water quality and climatic factors affecting supply

- Legal Factors

Contract Term: The Zone 1 contract with PG&E for 100,400 af/yr will terminate in 2013, but PCWA expects the contract to be renewed after the expiration of the present term. While PCWA recognizes the fact that the price and other terms of the contract may change, it is not expecting a diminution in the available supply because any change in the available supply would injure consumptive water users receiving PG&E water in the PCWA service area.

FERC Relicensing: The Drum-Spaulding Hydroelectric Project is a Federal Energy Regulatory Commission (FERC) licensed facility, which is owned by PG&E. PG&E

provides wholesale water to PCWA for consumptive use in Placer County. PG&E is currently applying to the FERC for a new permit allowing it to operate the Drum-Spaulding Project (FERC Project No. 2310). PCWA is closely monitoring PG&E's application process and has submitted comments as appropriate to ensure that PCWA can continue receiving water under its PG&E contract. While federal law allows for FERC to adopt permit conditions that mandate minimum flows, reservoir levels or set temperature limitations related to operation of a hydroelectric facility, these provisions should not substantially affect the appropriation and distribution of water for consumptive purposes.[6]

- Climatic Factors

As for climatic factors affecting the PG&E supply, the source has been highly reliable during normal, single-dry and multiple-dry year periods. Between 1987 and 1992, when the State of California generally experienced a drought, PCWA had a full Yuba/Bear River supply each year. In 1977, PCWA did experience a 50% reduction in its PG&E supply. For conservative planning purposes, PCWA assumes that it will experience a 25% reduction in its PG&E supply during a multiple dry year period, and a 50% reduction in supply in a single driest year. PCWA has developed a raw water allocation strategy in Zone 1 for dry-year shortage conditions because the physical and geographic layout of PCWA's water supply and irrigation water delivery system is such that a reduction in PG&E supply cannot be reasonably mitigated with other sources of supply. The dry-year shortage strategy also relies on the fact that commercial agricultural customers can more easily switch their source of supply in a dry year to groundwater.

3.1.2 Middle Fork American River Water Rights

PCWA's Middle Fork American River Project (MFP) began operation in 1967 and primarily provides a water supply to PCWA wholesale customers that are currently able to take delivery from Folsom Reservoir. PCWA's MFP water right allows it to divert water from the American River at Auburn and Folsom Lake for irrigation, domestic, municipal, industrial, and recreational purposes. PCWA has signed an agreement with the United States Bureau of Reclamation limiting its diversions under these permitted rights to 120,000 af/yr. PCWA may divert water directly from the American River between November and June and also redivert water released from its MFP reservoirs during the remainder of the year. PCWA may use water under its permitted water rights in western Placer County, as well as portions of Sacramento County, including San Juan Water District, Sacramento Suburban Water District, and Rio Linda/Elverta Community Water District service areas. Currently, PCWA uses its MFP water right to meet its contractual obligations to wholesale customers that can take delivery from Folsom Reservoir, including the City of Roseville, San Juan Water District, and the Sacramento

[6] 16 U.S.C. § 821.

Suburban Water District. Relevant portions of documents identifying these rights are included in **Appendix D-1**.

3.1.2.1 Legal, environmental, water quality and climatic factors affecting supply

- Legal Factors

Though PCWA's MFP permit allows for it to divert water at Folsom Reservoir and at Auburn, PCWA only recently completed a new diversion facility on the American River at Auburn that will allow it to take full advantage of its MFP water right by pumping up to 35,500 acre-feet from its American River Pump Station (ARPS). PCWA will continue to use the American River water to meet agricultural water demands within its Zone 5 service area along the Auburn Ravine. PCWA has plans to expand the use of MFP water diverted at Auburn to meet increasing treated water needs in the Zone 1 system following construction of the proposed treatment plant at Ophir.

PCWA is currently in the process of petitioning the SWRCB for an extension of time to put its permitted MFP water supply to beneficial use. PCWA is preparing an Environmental Impact Report to assess potential environmental impacts of diverting the maximum permitted amount of 120,000 af/yr compared to the baseline diversion quantity. Though PCWA anticipates approval of its petition by the SWRCB, the ultimate outcome of the process is uncertain and has the potential to result in a reduction of the permitted quantity of water available for diversion by PCWA.

3.1.3 Central Valley Project Contract

PCWA has a Central Valley Project (CVP) water contract with the United States Bureau of Reclamation for delivery of no more than 35,000 af/yr.[7] The Amendatory Contract provides an indication of the reliability of the CVP water supply by stating that the average quantity of water made available to PCWA in the most recent five years was 31,000 af/yr. The current CVP contract expires in 2011. A Long Term Renewal Contract is awaiting formal approval by the United States Bureau of Reclamation. CVP water may be used for municipal and industrial purposes. PCWA's point of diversion for CVP water is Folsom Dam. Currently, the Amendatory Contract designates PCWA's Zone 1 as the service area for use of CVP water.

3.1.3.1 Legal, environmental, water quality and climatic factors affecting supply

- Legal Factors

[7] The most current version of the contract is the "Amendment to the Amendatory Contract," (Amendatory Contract) and is dated August 27, 2002.

Service Area: The key legal factor affecting the use of the CVP water supply is the place of use limitation in the Amendatory Contract, which provides that CVP water shall only be used in Zone 1. Because PCWA does not own or control any facilities that are capable of conveying CVP water from Folsom Dam to Zone 1, the availability of the water supply is affected. To efficiently deliver water to PCWA customers in Zone 1, PCWA would likely need to secure an additional point of diversion at Auburn.

PCWA has been pursuing the expansion of the allowable CVP service area to include most of western Placer County and portions of northern Sacramento County. This may allow PCWA to deliver CVP water to the City of Roseville and San Juan Water District, as well as Sacramento Suburban Water District in satisfaction of its contractual obligations.

An additional alternative for making use of the CVP water supply is use of the provision in the Amendatory Contract, which permits PCWA to transfer CVP water for use outside of PCWA's CVP service area to another CVP contractor. To transfer water under this provision, PCWA must satisfy the conditions contained in the Central Valley Project Improvement Act (CVPIA). Most notably, the transfer must comply with all applicable Federal, State and local laws and requirements for protection of the environment.

- Climatic Factors

Under the Amendatory Contract, the United States reserves the right to apportion the available CVP water supply among PCWA and other CVP water contractors. Generally, reductions in M&I deliveries should not exceed 25%, unless conditions are severe. Specifically, percentage reductions are generally made from the quantity of water historically used by the contractor rather than the maximum contract amount. Given that PCWA has yet to take delivery of water under its CVP contract, it is unclear how a reduction in supply against historical use could be made until the point in time PCWA has used water under the contract.

3.1.4 Pre-1914 Appropriative Rights

PCWA holds four pre-1914 appropriative water rights for diversion of water from various small creeks and their tributaries in western Placer County. PCWA has filed Statements of Diversion and Use (SOD) with the SWRCB for each water right.[8] The SODs claim rights to maximum annual diversion quantities as specified in **Table 3-1**. Only the most recent Supplemental Statement of Diversion and Use for S000959 contains diversion values. For the years 2006, 2007 and 2008, PCWA reported 3,031, 4,874, and 3,255 acre-feet respectively. The most recent Supplemental Statements of Diversion and Use

[8] The SODs on file with the SWRCB are: S000959, S000967, S010397, and S010398.

for the other three water rights indicate water use under the right but do not specify a quantity of water diverted. Based on diversion records for the past ten years, PCWA has diverted an average of 3,400 af/yr. PCWA will use 3,400 af/yr as the anticipated long-term available supply under these rights.

3.1.5 South Sutter Water District

PCWA is party to a surplus water supply contract with South Sutter Water District (SSWD). Water is made available because SSWD buys water from Nevada Irrigation District (NID) in excess of its current needs. PCWA's contract with SSWD provides that SSWD will purchase water from NID in excess of SSWD's needs in an amount requested by PCWA, which shall not exceed 12,000 af/yr. The water is to be made available for irrigation purposes in Zone 5. PCWA last took delivery of water under this contract in 2006. Given the uncertainty regarding potential deliveries under this contract, PCWA does not anticipate receiving surface water under this contract during the time horizon of this UWMP.

3.1.6 Water Forum Impacts

PCWA approved the Memorandum of Understanding for the Water Forum Agreement (WFA) in the year 2000. The WFA has two stated objectives: (1) to provide a reliable and safe water supply for the region's economic health and planned development to the year 2030, and (2) to preserve the fish, wildlife, recreational and aesthetic values of the lower American River.

Under the WFA, PCWA has agreed to limit its annual diversions of MFP water to 35,500 acre-feet in normal years.[9] In normal years, PCWA will also divert and use 35,000 acre-feet from the Sacramento and/or Feather Rivers if exchanges of equal amounts can be made with others.[10] If PCWA is unable to develop a diversion from the Sacramento and/or Feather Rivers the Water Forum members will negotiate with PCWA to find a mutually agreeable solution.[11]

In the drier and driest years, when Folsom Reservoir inflow is less than 950,000 acre-feet, PCWA agreed to divert and use 35,500 acre-feet from the American River. The WFA commits PCWA to additional releases of water from MFP reservoirs to mitigate for additional diversions at its Auburn and Folsom Lake points of diversion above WFA baseline volumes.[12] The releases are made on a sliding scale basis and begin when

[9] Water Forum Agreement, Specific Agreements and Mutual Commitments, Purveyor Specific Agreement, p. 262. The WFA uses the term "most years," which is defined as a year where the projected March through November unimpaired inflow to Folsom Reservoir is greater than 950,000 acre-feet.
[10] *Id.*
[11] Id.
[12] PCWA's baseline volume is 8,500 af/yr. The City of Roseville's baseline volume is 19,800 af/yr.

projected March through November Folsom inflow is 950,000 AF or less, and PCWA diversions increase above the baseline volumes. The releases are only made if there is a water transfer agreement in place with an entity that can divert the water for beneficial use below the confluence of the American and Sacramento Rivers. The maximum additional volume potentially released for Water Forum purposes in the driest year on record (1977) at PCWA's maximum use of MFP water is 47,000 AF. PCWA will also divert and use 35,000 acre-feet from the Sacramento and/or Feather River if it can secure exchanges as described under normal conditions.[13]

3.2 Groundwater Supplies

PCWA has historically produced a limited quantity of groundwater. Historic pumping by PCWA in western Placer County was limited to pumping for Bianchi Estates (Zone 2) and for the Sunset Industrial area. Pumping for Bianchi estates ceased in 2004, and since that time, PCWA has served Bianchi Estates with surface water under PCWA's PG&E and Middle Fork American River water supplies. PCWA maintains the Sunset Industrial well, though it has not been used for years due to customer concerns regarding water quality related to industrial use.

Pumping in western Placer County occurs from the North American Subbasin of the Sacramento Valley Groundwater Basin (DWR Subbasin 5-21.64). While PCWA does not currently produce groundwater from the North American Subbasin, its water supply plans, as discussed later in this section, anticipate the potential use by overlying users and groundwater appropriators of groundwater in dry hydrologic conditions, if surface water supplies are limited.

PCWA has historically, and continues to produce groundwater for Zone 4 in eastern Placer County. Currently, PCWA pumps groundwater through two wells. Future demands in Zone 4 will be met exclusively from groundwater. PCWA is planning to develop a third permanent groundwater production well in Zone 4 to serve planned development in and around the existing developments of Lahontan and Martis Camp, including Timlick. PCWA produces water for Zone 4 from the Martis Valley groundwater basin (DWR basin 6-67).

3.2.1 North American Subbasin Groundwater Conditions

Western Placer County lies within the northeastern section of the North American Subbasin, which is designated as DWR basin 5-21.64. The North American Subbasin lies in the eastern part of the Sacramento Groundwater Basin. The North American Subbasin comprises approximately 351,000 acres of which 39 percent, or approximately 133,000

[13] Id.

acres, are within Placer County's boundaries. Included within the subbasin are sections of western Placer, south Sutter, and northern Sacramento Counties. The subbasin is bounded on the north by the Bear River, to the west by the Feather and Sacramento Rivers, and to the south by the American River. The eastern boundary can be represented by a line extending north-south from the Bear River to Folsom Lake about 2 miles east of the City of Lincoln. This eastern boundary also represents the approximate location of the edge of the alluvial basin from the Sierra Nevada (DWR Bulletin 118, 2004). The North American Subbasin's approximate total storage is 4.9 million ac-ft of water, assuming an aquifer thickness of 200 feet across the total 351,000 acres of the basin and a specific yield of 7 percent (DWR Bulletin 118, 2004).

PCWA's 2006 Integrated Water Resources Plan estimates that about 97,000 acre-feet of groundwater was pumped in 2003 in the western Placer County portion of the North American Subbasin.[14] Of this total, groundwater production for agricultural use was estimated to be 90,000 acre-feet.[15] As discussed in more detail in the next section, the groundwater level in western Placer County has been relatively stable since the early 1980s, after three to four decades of declining levels. Because safe yield may be qualitatively indicated by stable groundwater levels over a period of years, the groundwater level stability in south western Placer County over the past 20-30 years is an indication that groundwater use and natural recharge have been in balance.[16] Moving forward, PCWA intends to provide water in a conjunctive use fashion, relying primarily on surface water during the normal years, and potentially using groundwater in dry years or relying on overlying users or other groundwater appropriators to use groundwater to replace potential shortage conditions (see discussion in Chapter 8). PCWA does not anticipate that pumping in excess of the "safe yield" will occur in the future."[17]

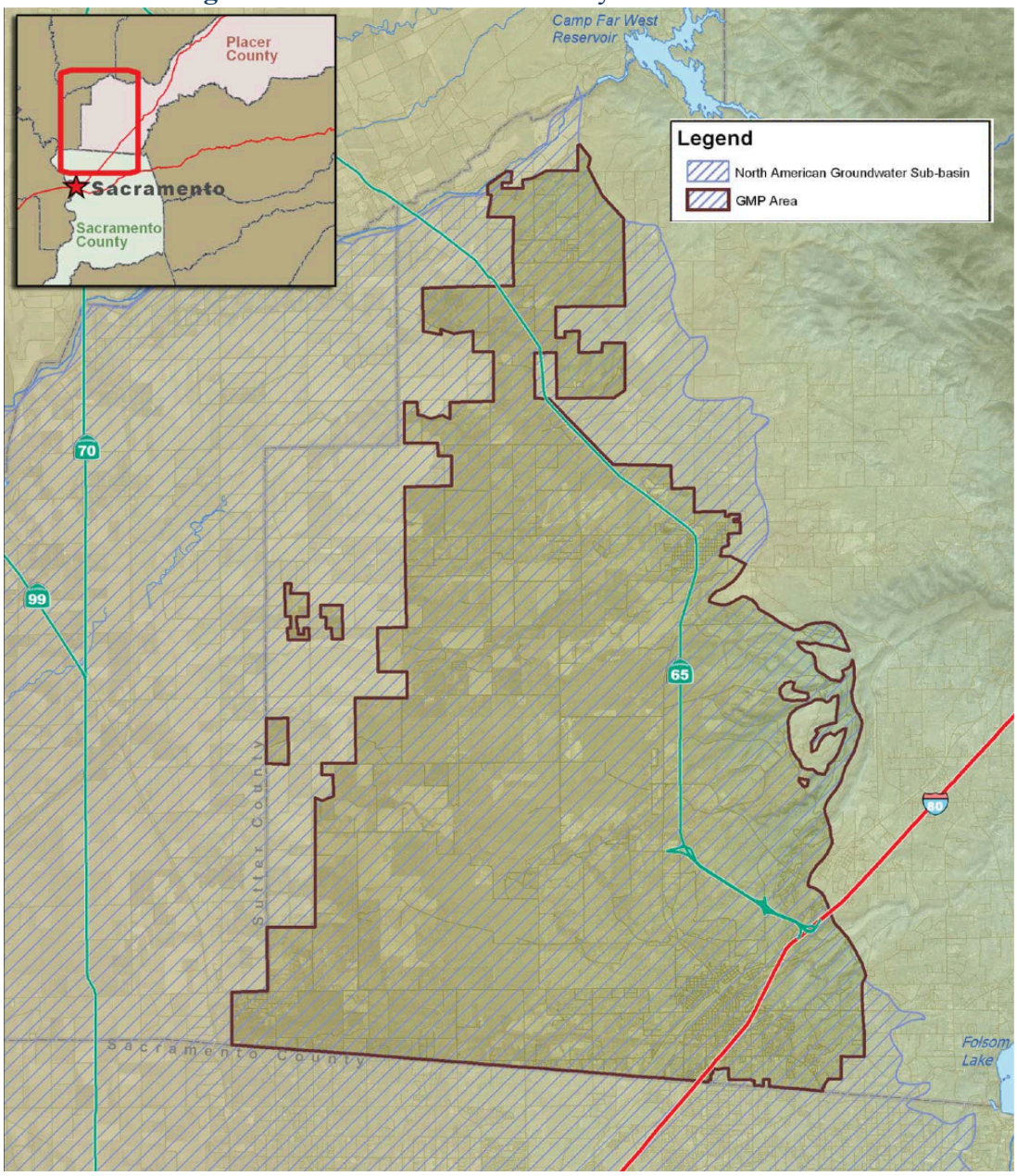
3.2.1.1 Western Placer County GMP

On September 6, 2007, the Placer County Water Agency adopted the Western Placer County Groundwater Management Plan (WPCGMP). (**See Appendix D-3**) The WPCGMP is designed to assist the City of Roseville, the City of Lincoln, Placer County Water Agency (PCWA), and the California American Water Company (CAW) in an effort to maintain a safe, sustainable and high-quality groundwater resource within a zone of the North American Subbasin.[18] The WPCGMP has as its objective the maintenance of groundwater resources to meet backup, emergency, and peak demands without adversely affecting other groundwater uses within the WPCGMP area. Moreover, the

[14] Table 7-1, 2006 IWRP, p. 7-3.
[15] *Id.*
[16] 2006 IWRP, p. 7-6.
[17] "Safe yield" is defined as the amount of groundwater that can continuously be withdrawn from a basin without adverse impact.
[18] WPCGMP, p. ES-1.

purpose of the WPCGMP is to provide a framework to coordinate groundwater management activities through a set of basin management objectives and specific implementation actions.[19] The "WPCGMP Area," which is located in southwestern Placer County, is shown in **Figure 3-1**.[20]

Figure 3-1 – Western Placer County GMP Service Area



The WPCGMP discusses historic groundwater elevation trends by analyzing 13 hydrographs for wells located within and adjacent to the WPCGMP Area through January

[19] WPCGMP, p. 1-3.
[20] Figure 3-1 appears as Figure 1-1 in the WPCGMP.

2007. (See WPCGMP, Section 2.1.5 and Figure 2-5.) The three wells analyzed in the WPCGMP located at the southern end of the WPCGMP Area show stabilized groundwater levels for the last 20-30 years starting in the mid-1980s and mid-1990s after 40-50 year declining trends.[21] As shown in **Figure 3-2**, since 2007, wells 10N05E08L002M and 11N05E18R001M have shown continued stability through November 2010.[22]

Also, since 2007, two additional wells that were not included in the WPCGMP analysis show stable groundwater levels west of the City of Roseville. (See hydrographs for Wells 11N05E16H001M and 11N05E17A004M in **Figure 3-2**.)

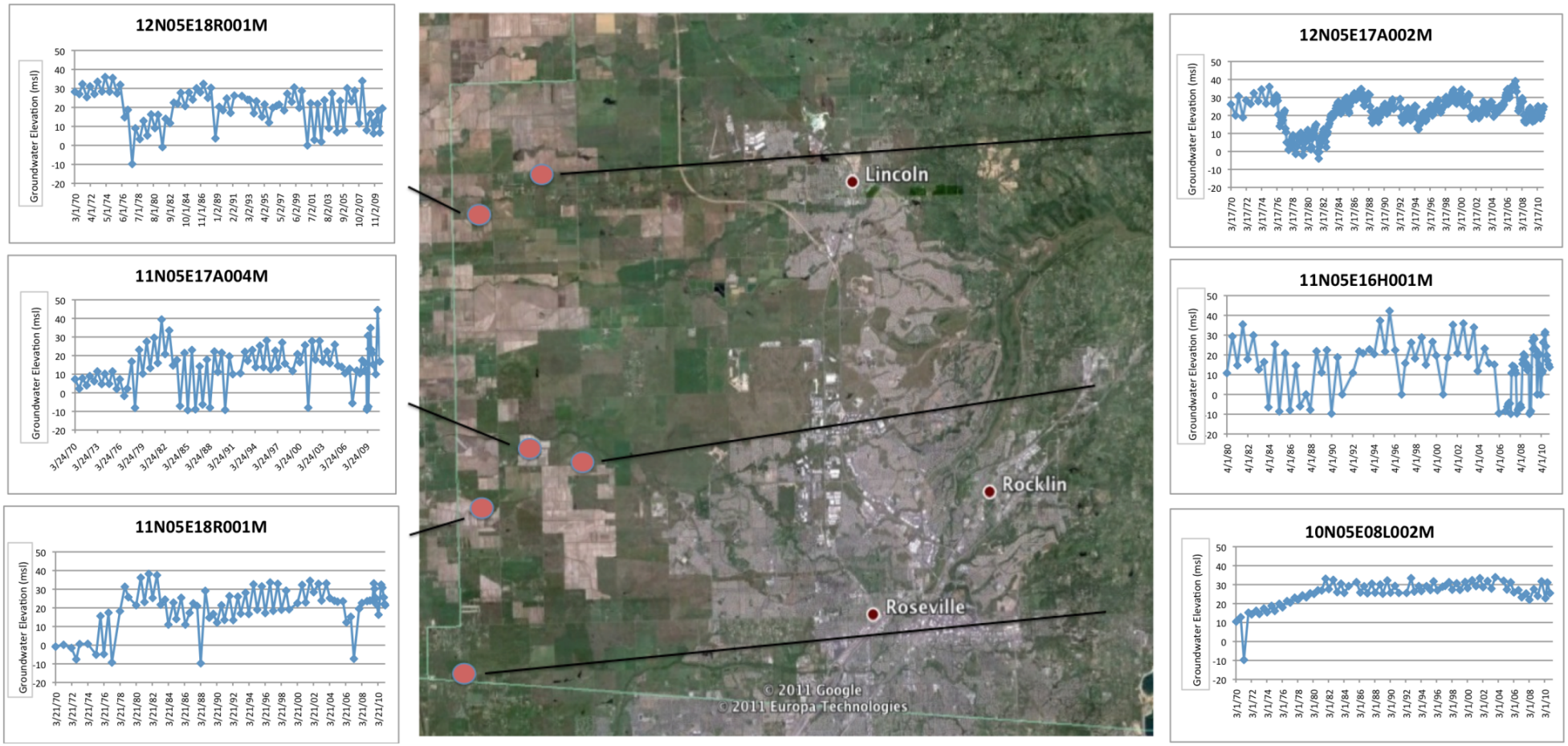
Further north in the WPCGMP Area, in and around the City of Lincoln, groundwater level trends were less consistent prior to 1960, but the hydrographs show groundwater level stability since the early 1960s. (See hydrographs for Wells 12N05E14R001 and 12N05E01R001. Since 2007, new measurements have not been taken at these well sites.)

The WPCGMP concludes that groundwater elevations, as evidenced by these hydrographs, as well as an extensive data review, indicates that groundwater elevations are not significantly declining in the vicinity of Lincoln. Further west of Lincoln, near the Placer-Sutter County border, groundwater elevations have also been stable over the past 20 years, exhibiting seasonal variation between about 10 feet above mean sea level (msl) and 30 feet above msl. (See the hydrograph for Well 12N05E18R001.) Since 2007, groundwater levels have remained stable. (See hydrographs for Wells 12N05E18R001M and 12N05E17A002M in **Figure 3-2**.)

[21] See discussion of Wells 10N05E08L002, 10N06E10C001M, and 10N05E12D001M in WPCGMP, p. 2-8.

[22] Current well level data was obtained from the DWR, Water Data Library at http://www.water.ca.gov/waterdatalibrary/groundwater/hydrographs/report_html.cfm?wellNumber=10N05E08L002M. Last checked on March 3, 2011.

Figure 3-2 – Western Placer County Groundwater Hydrographs



3.2.2 Martis Valley Basin Groundwater Conditions

PCWA pumps and serves groundwater to customers in the Martis Valley, which is located south of Truckee, California. The Martis Valley Groundwater Basin (MVGB) serves as the sole source of water for PCWA customers located in eastern Placer County. The MVGB (DWR Basin 6-67) sits between 5,700 and 5,900 feet above mean sea level, has a surface area of 35,000 square miles and is located in the North Lahontan hydrologic region.[23] The MVGB consists of basin-fill sedimentary units and interlayered basin-fill volcanic units.[24] The basin-fill sedimentary units provide the greatest opportunity for storage and extraction of groundwater.[25] The 1998 Martis Valley Groundwater Management Plan is included as **Appendix D-4**.

From 1990 through 2000, average basin groundwater levels remained relatively constant with seasonal water level variations as great as 10 feet.[26] Between 2005 and 2008, groundwater levels dropped an average of about 15-20 feet, and appear to have reached a new equilibrium since 2008.[27] However, as monitored by the Truckee-Donner Public Utility District (TDPUD), most municipal wells withdraw groundwater from the two lowest water-bearing units of the interlayered aquifer. These units did not experienced declining levels during this same time period.

In 2001 Nimbus Engineers concluded that there is a total subsurface storage volume of 484,000 acre-feet in the MVGB and that the sustainable yield of the MVGB is 24,000 af/yr.[28] In 2002, Kennedy/Jenks conducted a study, which agreed with the 24,000 af/yr estimate of safe yield, and suggested that this quantity may underestimate the safe yield.[29] While subsequent studies have suggested the sustainable yield may be as high as 34,000 af/yr, the TDPUD 2010 UWMP assumes there is a minimum of 24,000 af/yr for its comparison of supply and demand.[30]

The TDPUD 2010 UWMP projects build-out demand for the TDPUD of 11,314 af/yr and a demand of 7,610 af/yr for areas served by other purveyors (e.g., PCWA) and individual

[23] California Groundwater Bulletin 118, California Department of Water Resources, January 20, 2006 (Bulletin 118).
[24] 2010 Urban Water Management Plan, Truckee-Donner Public Utility District (TDPUD 2010 UWMP)
[25] Bulletin 118.
[26] Bulletin 118.
[27] Groundwater Level Data for Wells 17N17E19K001M and 17N17E29B001M, DWR Water Data Library, April 28, 2011.
[28] Bulletin 118.
[29] TDPUD 2010 UWMP.
[30] TDPUD 2010 UWMP.

private wells.[31] The build-out demand estimate is less than the sustainable yield estimate of 24,000 af/yr. Furthermore, it is reasonable to assume that in dry years, production could be increased for a short-term period of time to accommodate higher demands associated with reduced precipitation and still be well within the estimated safe yeild.

Table 3-2 provides the most recent 5-year groundwater production quantities in both the North American Subbasin and the Martis Valley Basin. Again, PCWA has not recently pumped groundwater from the North American Subbasin, and does not currently plan to pump groundwater on a regular basis over the planning horizon of the 2010 UWMP.

Table 3-2 – 5-Year History of PCWA Retail Groundwater Production

Year	North American Subbasin (af)	Martis Valley Basin (af)
2005	0	51
2006	0	73
2007	0	79
2008	0	160
2009	0	141
2010	0	133

PCWA has recently pumped groundwater from the Martis Valley Basin to supply customers in Zone 4, and anticipates continuing to do so through 2035 as presented in **Table 3-3**.

Table 3-3 – Projection of Groundwater Production in 5-Year Increments through 2035

Year	North American Subbasin (af)	Martis Valley Basin (af)
Current	0	172
2015	0	306
2020	0	439
2025	0	573
2030	0	707
2035	0	800

[31] The estimate of 7,610 af/yr originates from the Technical Memorandum on Water Demand and Net Depletion for Martis Valley Groundwater Basin, February 12, 2002, prepared by David C. Antonucci for PCWA

3.3 Desalination

There are currently no plans to develop desalinated water supplies.

3.4 Recycled Water Supplies

Chapter 7 discusses the recycled water supplies that PCWA anticipates will be developed and potentially available as a supply in its retail service area. Recycled water supplies will only be available in Zones 1 and 5. **Table 3-4** presents the supplies that PCWA estimates will be available to serve demands in PCWA retail service areas adjacent to the City of Lincoln and in its service areas west of the City of Roseville.

Table 3-4 – Recycled Water Supplies

User type	2015	2020	2025	2030	2035	2040	BO
	af/yr	af/yr	af/yr	af/yr	af/yr	af/yr	af/yr
Agricultural irrigation	0	0	0	0	0	0	0
Landscape irrigation	938	1,877	2,492	3,106	3,721	4,336	4,336
Commercial irrigation	436	436	436	436	436	2,617	2,617
Golf course irrigation	0	0	0	0	0	0	0
Industrial reuse	1,068	2,136	2,136	2,136	2,136	2,136	2,136
Total	2,443	4,449	5,064	5,678	6,293	9,089	9,089

3.5 Transfer and Exchange Opportunities

In dry years, PCWA has historically transferred water above and beyond the volume needed to satisfy local demands. Typically, water has been transferred to entities below the confluence of the American and Sacramento Rivers in order to benefit the values associated with the Water Forum Agreement. Recent historic dry year water transfer volumes have been 20,000 AF.

As local consumptive uses increase in the future, water transfers will continue to occur as part of the Agency's commitment to the Water Forum. Mitigation water for Water Forum purposes will only be released from MFP storage in the event that a purchase contract is in place with a buyer that has physical diversion facilities below the confluence of the American and Sacramento Rivers. Future transfer volume under buildout conditions and the driest year on record (1977) could be as high as 47,000 AF.

3.6 Current and Projected Water Supplies

In normal years, PCWA anticipates its Zone 1 PG&E contract will provide for delivery of 100,400 af/yr, its Middle Fork American River water rights will yield a supply of 120,000 af/yr. Beginning in the year 2020, PCWA anticipates its Central Valley Project contract will yield at least 31,000 af/yr. Also, PCWA's pre-1914 appropriative rights are

available for deliveries in Zone 1.[32] The estimated quantity of water available to the Agency under its appropriative water rights is 3,400 af/yr. Because PCWA has not taken delivery of water under its SSWD contract since 2006, PCWA anticipates that the SSWD supply will not be available in the foreseeable future. Based on the recycled water analysis in Chapter 7, recycled water is projected to be available in the PCWA retail service area starting in 2015.

Table 3-5 summarizes PCWA's projected water supplies for Zones 1 and 5 through buildout conditions beyond 2040.

Table 3-5 – Zone 1 and 5 Projected Water Supplies

Supply	Current	2015	2020	2025	2030	2035	2040	BO
	af/yr	af/yr	af/yr	af/yr	af/yr	af/yr	af/yr	af/yr
PG&E	100,400	100,400	100,400	100,400	100,400	100,400	100,400	100,400
MFP	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
CVP	0	0	31,000	31,000	31,000	31,000	31,000	31,000
Pre-1914	3,400	3,400	3,400	3,400	3,400	3,400	3,400	3,400
Recycled Water	0	2,443	4,885	5,936	6,987	8,038	9,089	9,089
Desal., Transfers	0	0	0	0	0	0	0	0
TOTAL	223,800	226,243	259,685	260,736	261,787	262,838	263,889	263,889

In Zone 3, PCWA anticipates its PG&E supply will be available in an amount up to 25,000 af/yr. **Table 3-6** presents the estimated water supplies and their associated quantities available in Zone 3 through 2035.

Table 3-6 – Zone 3 Projected Water Supplies

Supply	Now	2015	2020	2025	2030	2035	2040	BO
	af/yr	af/yr	af/yr	af/yr	af/yr	af/yr	af/yr	af/yr
PG&E	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Recycled Water	0	0	0	0	0	0	0	0
Groundwater	0	0	0	0	0	0	0	0
TOTAL	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000

Zone 4 will be served exclusively with groundwater, which PCWA anticipates being available in an amount equivalent to projected demand. **Table 3-7** presents the supply projection for Zone 4.

Table 3-7 – Zone 4 Projected Water Supplies

Supply	Now	2015	2020	2025	2030	2035	2040	BO
	af/yr	af/yr	af/yr	af/yr	af/yr	af/yr	af/yr	af/yr
Groundwater	172	306	439	573	707	800	801	801
TOTAL	172	306	439	573	707	800	801	801

[32] Operationally, PCWA typically uses its Pre-1914 water rights supply in Zone 1. Yet, because the supply may also be used in Zone 3, to the extent it is used in Zone 3, then the quantity of water used in Zone 3 is unavailable for use in Zone 1.

3.7 Supply Reliability

This section presents the projected supplies available during normal, single and multiple dry year periods. The factors affecting the reliability of PCWA's water supplies are discussed in **Sections 3.1** and **3.2**. The single dry year supply values for the western and central areas of Placer County (i.e., Zones 1, 3 and 5) approximate the supplies that were available during the single driest year period in recent history (1976-1977). The multiple dry-year supply values approximate supply reductions that occurred during the 1987-1992 dry period.

3.7.1 Zone 1 - Normal Year Supply Reliability

Under normal conditions, PG&E estimates 100,400 af/yr is available for Zone 1. PCWA's modeling of the Middle Fork project over 70 years of the hydrologic record indicates that the Middle Fork Project could have supplied 120,000 af/yr in all years, including during the worst case three year dry period. Also, based on language in PCWA's Amendatory CVP contract, which states that the average quantity of water made available to PCWA in the most recent five years was 31,000 af/yr, PCWA estimates that this quantity will be available in future normal years. PCWA's pre-1914 appropriative rights will continue to be available during normal years in an amount equal to recent average diversions, as reported to the State Water Resources Control Board. While PCWA has not recently received surface water under its contract with SSWD, and is therefore not anticipating it will receive water in the near future, a surplus water supply from SSWD may be available in normal years. As buildout of the City of Lincoln and the planning areas west of the City of Roseville occurs, recycled water will be available on a regular basis, in both normal and dry years.

3.7.2 Zone 1 - Single Dry Year Supply Reliability

In the worst case scenario, if hydrologic conditions were similar to those experienced during the 1976-1977 drought period, PCWA plans to receive only 50% of its PG&E contract quantities in both Zone 1 and Zone 3. Also, PCWA's CVP supply would likely be reduced by as much as 25% compared to recent deliveries based on the Bureau of Reclamation's current municipal and industrial shortage policy. In a single dry year, the pre-1914 appropriative right supply quantity is assumed for purposes of this analysis to be reduced by 50%, given that the creeks from which PCWA diverts are runoff dependent. SSWD surface supplies will not be available in single dry years and during multiple dry year periods because it is considered by PCWA to be a surplus water supply.

Any potential shortfall in supply that may occur in Zone 1 under build-out conditions in a dry year may be addressed through groundwater production. Groundwater may be produced by overlying users and/or appropriators to meet demands, consistent with the

GMP discussed in Chapter 3.2.1. The extent to which groundwater may be produced is not certain because PCWA has various demand management mechanisms at its disposal that it may rely on prior to groundwater supplies to make up for any supply shortage .

3.7.3 Zone 1 - Multiple Dry Year Supply Reliability

During multiple dry year periods, PCWA anticipates that its PG&E and CVP supplies will be reduced by 25% each. While PCWA did not experience a reduction in its PG&E supply during the representative 1987-1992 dry year period, for conservative planning purposes, the PG&E contract is assumed to be reduced by 25%. Again, PCWA's CVP supply will likely be reduced by a maximum of 25% during multiple dry year conditions. During multiple dry year periods, the available Pre-1914 water supply is assumed for purposes of this analysis to be reduced by 50%.

Table 3-8 – Build out Supply Reliability for Zones 1 and 5

Supply	Average/ Normal	Single Dry Year	Multiple Dry Water Years			
			Year 1	Year 2	Year 3	Year 4
	af/yr	af/yr	af/yr	af/yr	af/yr	af/yr
Pacific Gas & Electric	100,400	50,200	75,300	75,300	75,300	75,300
Middle Fork [American River] Project	120,000	120,000	120,000	120,000	120,000	120,000
Central Valley Project	31,000	23,250	23,250	23,250	23,250	23,250
Pre-1914	3,400	1,700	1,700	1,700	1,700	1,700
Recycled Water	9,089	9,089	9,089	9,089	9,089	9,089
Desalination, Transfers, Exchanges	-	-	-	-	-	-
TOTAL	263,889	204,239	229,339	229,339	229,339	229,339

3.7.4 Zone 3 and Zone 4 – Normal, Single Dry Year and Multiple Dry Year Supply Reliability

Under normal conditions, 25,000 af/yr is available under the PG&E contract for use in Zone 3. Reductions during single dry and multiple dry year periods will be the same as those projected for Zone 1, such that PCWA assumes that the PG&E supply will be reduced by 50% in a single dry year and by 25% during a multiple dry year period.

Table 3-9 – Build out Supply Reliability for Zone 3

Supply	Average/ Normal	Single Dry Year	Multiple Dry Water Years			
			Year 1	Year 2	Year 3	Year 4
	af/yr	af/yr	af/yr	af/yr	af/yr	af/yr
PG&E	25,000	12,500	18,750	18,750	18,750	18,750
Recycled	0	0	0	0	0	0
Groundwater	-	-	-	-	-	-
TOTAL	25,000	12,500	18,750	18,750	18,750	18,750

Based on the discussion of groundwater conditions in the Martis Valley Basin in Section 3.2.2, groundwater will be available in an amount equivalent to the projected 2035 water demand in Zone 4. The use of groundwater supplies increase by 5% during single dry and multiple dry year periods as a reflection of the increase in demand of about 5% during those time periods, when additional landscape irrigation is assumed to occur

earlier in the season due to reduced precipitation. The supply indicated in **Table 3-10** is also adjusted upward to accommodate these conditions.

Table 3-10 – Build out Supply Reliability for Zone 4

Supply	Average/ Normal	Single Dry Year	Multiple Dry Water Years			
			Year 1	Year 2	Year 3	Year 4
	af/yr	af/yr	af/yr	af/yr	af/yr	af/yr
Groundwater	801	825	825	825	825	825
TOTAL	801	825	825	825	825	825

3.7.5 Supplementing Water Supplies

PCWA is still pursuing a transfer of a portion of its American River supplies to the Sacramento River such that it would be able to divert water from the Sacramento River for service in PCWA Zone 1. The transfer is intended to allow PCWA to use its Middle Fork American River Project supply to its full extent based on PCWA's existing Water Forum Purveyor Specific Agreement. It is also intended to allow PCWA to potentially divert CVP water supplies for use in Zone 1. PCWA has partnered with the Bureau of Reclamation on this investigation and has prepared an administrative draft of an environmental impact report for the diversion and conveyance project. Ultimately, PCWA will likely seek additional partners for this project to ensure its long-term viability. It is possible that water might be available from a Sacramento River diversion by 2020.

3.7.6 Wholesale Water Supply Projections

The written information provided by PCWA that quantifies water availability to its retail and wholesale customers is presented in **Table 3-11**. The quantities in **Table 3-11** reflect the supplies that are available throughout western Placer County (Zone 1, 2 and 5) and central Placer County (Zone 3). PCWA's PG&E supply is anticipated to be fully available in a normal year for deliveries through 2035. Also, water from the MFP is anticipated to be available for deliveries to Zone 1 and 5, and also to meet PCWA's contractual obligations to the City of Roseville, San Juan Water District and the Sacramento Suburban Water District. Assuming the infrastructure exists to bring the CVP supply to Zone 1 by 2020, the CVP supply is anticipated to be available at that time.

Table 3-11 – Wholesaler Sources of Water Through 2035

Wholesaler Sources of Surface Water Supply	Current	2015	2020	2025	2030	2035
Deliverable PG&E Supply (Zone 1 and 3)	125,400	125,400	125,400	125,400	125,400	125,400
Deliverable supply from Middle Fork American River and Central Valley Project supply to Zone 1	35,500	35,500	66,500	66,500	66,500	66,500
Deliverable supply from MFP and CVP to Roseville and San Juan Water District	55,000	55,000	55,000	55,000	55,000	55,000
Deliverable supply from MFP and CVP to Sacramento Suburban Water District	25,000	29,000	29,000	29,000	29,000	29,000
Remaining MFP and CVP supplies	35,500	31,500	500	500	500	500
TOTAL	276,400	276,400	276,400	276,400	276,400	276,400
Percent of Normal	100%	100%	100%	100%	100%	100%

The water supply reliability of PCWA's surface water supplies for its retail and wholesale customers in the western and central areas is shown in **Table 3-12**. In normal years PG&E, MFP and CVP supplies are assumed to be available in quantities consistent with a normal year in **Table 3-8**. In a single-dry year, PG&E supplies are reduced by 50%, and the CVP supply is reduced by 25%. Also, deliveries to SSWD are reduced to zero. In a multiple dry year period, PG&E supplies are reduced by 25% and the CVP supply is reduced by 25%. Again, deliveries to SSWD are reduced to zero. The "Deliverable Supply from the MFP and CVP to Zone 1 in Single Dry Years and Multiple Dry Year Periods assumes that PCWA can divert more water from the American River than it currently has agreed to under the Water Forum.

Table 3-12 – 2035 Wholesaler Supply Reliability

Wholesaler Sources of Surface Water Supply	Normal Water Year	Single Dry Year	Multiple Dry Water Years			
			Year 1	Year 2	Year 3	Year 4
	af/yr	af/yr	af/yr	af/yr	af/yr	af/yr
Deliverable PG&E Supply to Zone 1	100,400	50,200	75,300	75,300	75,300	75,300
Deliverable PG&E Supply to Zone 3	25,000	12,500	18,750	18,750	18,750	18,750
Deliverable supply from Middle Fork American River and Central Valley Project supply to Zone 1	66,500	94,250	88,250	88,250	88,250	88,250
Deliverable supply from MFP and CVP to Roseville and San Juan Water District	55,000	49,000	55,000	55,000	55,000	55,000
Deliverable supply from MFP and CVP to Sacramento Suburban Water District	29,000	0	0	0	0	0
Remaining MFP and CVP supplies	500	0	0	0	0	0
TOTAL	276,400	205,950	237,300	237,300	237,300	237,300
Percent of Normal	100%	100%	100%	100%	100%	100%

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CHAPTER 4. WATER DEMAND CONDITIONS

Understanding the quantities and characteristics of the demand for water, now and into the future, is essential to enable PCWA to adequately plan and manage its water supplies in the most effective manner. This section of the 2010 UWMP presents the current and future demands for PCWA's water supplies and describes their derivation. The section is organized as follows:

- Western Demand Area – As the predominant water demanding area, including the retail Zone 1[33], Zone 5 and the areas served by San Juan Water District, Sacramento Suburban Water District and the City of Roseville, this subsection presents historic demands and the derivation of future demands for retail treated, irrigation, wholesale treated and untreated[34] water categories, including land-use classifications, unit demand factors, and estimation of non-revenue water.

- Zone 3 – This subsection describes the historic and future water demands for this foothill to intermountain zone of PCWA's service, including derivation of demand factors and future growth.

- Zone 4 – This subsection describes the historic and future water demands of the isolated PCWA service area in Martis Valley.

- Summary of Demands – This subsection presents the sum of the projected demands for all the zones.

- Future Target Water Use – This subsection presents the calculation of baseline per-capita water use values, as required in §10608.16 et seq., and the resulting 2015 and 2020 water use targets.

As described under each zones' section below, the methodology for determining future demand varies for each zone due to (1) the unique characteristics of each zone and (2) the availability of pertinent data associated with existing demands and anticipated growth.

[33] Zone 1 includes the previous Zone 2 as it was connected to the Zone 1 system in 2003.
[34] The four classifications for water sales are defined as follows: (1) "retail treated" is water provided directly to municipal and industrial customers and meets all requirements for potable water use, (2) "irrigation" is water provided directly to customers that has not undergone any treatment, generally used by commercial agriculture and by rural residential customers for outdoor water needs, (3) "wholesale treated" is potable water treated at PCWA owned water treatment plants and sold to other water suppliers who then deliver to customers (PCWA does not directly serve the end-user), and (4) "untreated" is untreated water sold under contract to other water purveyors for subsequent treatment and delivery to customers.

Furthermore, as discussed in relation to wholesale treated and untreated water demands, contracts with retail water suppliers drive the ultimate demand from the perspective of PCWA, which may vary from the near-term demands based on the calculated customer demands of each retailer.

4.1 Western Area Water Demands

Although considered independent water service areas by PCWA, Zone 1 and Zone 5 are presented together in anticipation of future urban growth in Zone 1, which will displace land uses currently in Zone 5 – a zone that currently only includes raw water demands for commercial agricultural and rural irrigation. The geographic service areas of San Juan Water District, Sacramento Suburban Water District, and the City of Roseville are also included, since these purveyors share in the use of Middle Fork water rights (see Chapter 3). As presented in Chapter 2 (see **Figure 2-1**), Zone 1 is the largest zone in the PCWA service area and extends from the Placer County line south of the city of Roseville north to Lincoln and east to Auburn. Zone 5 is an agricultural area west of Zone 1 that stretches north nearly to Camp Far West Reservoir.

Currently, approximately thirty percent of the water demands in Zone 1 comprise treated water for urban uses, while two thirds of the demand is for raw water used for commercial agricultural and rural residential irrigation or is sold to other agencies within the Western Area. Zone 5 is supplied through Zone 1 facilities and is completely untreated agricultural water.[35] Anticipated urban development westward from Zone 1 into Zone 5 could potentially affect both the ratio of service type in Zone 1 as well as add a treated water demand into Zone 5.

The discussion below has been subdivided into the following sections to facilitate the presentation of data and methods used to derive the future demand projections for these zones:

- Historical water demands – this includes information on demands and trends from the historical records.
- Retail treated water demands – this includes information on current and future land-uses and service connections, current and future unit demand factors, and projected future demands.[36]

[35] Based on approximation from 2009 Water Sales Report
[36] To manage the level of detail presented in this section, the detailed methodology used to develop future demand factors and resulting demands is included in **Appendix C**.

- Irrigation water demands – this includes information on customer type as well as current and future demands.

- Wholesale treated water demands – this includes information on the contractual obligations to water purveyors as well as current and future demands.

- Untreated water demands – this includes information on the contractual obligations to San Juan Water District, Sacramento Suburban Water District and the City of Roseville, as well as current and future demands.

4.1.1 Historical Demands in the Western Area

Based on available records for water production, water sales and deliveries, **Table 4-1** reflects the magnitude and trends in the four types of water demands present in the Western Area of PCWA's service area.[37] Records for demands in Zone 5 only exist back to the year 2000 when Zone 5 was created to supply raw surface water to agriculture and rural areas of western Placer County.

Table 4-1 – Western Area Overall Historic Water Demands

Western Area (Values in AF/year)							
Year	Zone 1 Retail Treated	Zone 1 Irrigation	Zone 1 Wholesale Treated	Zone 5 Irrigation	**Zone Total**	Sales to Other Agencies	**Western Area Total**
2005	26,884	53,914	9,125	11,478	101,402	28,987	130,388
2006	27,178	54,202	10,032	7,251	98,663	27,142	125,806
2007	28,505	58,027	10,785	5,944	103,260	16,994	120,255
2008	30,456	62,534	10,886	8,768	112,645	34,626	147,271
2009	27,836	56,291	10,568	11,028	105,723	23,933	129,656

Note: Zone 1 retail treated data is from PCWA sales records. Zone 5 data for 2005 to 2009 is from PCWA retail sales records. Zone 1 irrigation data from 2005 to 2009 is calculated from total water into Zone 1 and Zone 5, minus the other demands.

4.1.2 Retail Treated Water Demand in Zone 1 and Zone 5

Retail treated water demands are a significant component of PCWA's long-term planning. Although representing less than one quarter of PCWA's current demands in the Western Area, this demand category will see the greatest percentage increase over the next several decades as a result of anticipated growth of urban areas within Placer County. Because of this anticipated increase in total water demand, understanding the

[37] The Western Area includes retail treated, irrigation and wholesale treated deliveries in Zone 1, irrigation deliveries in Zone 5, and untreated water sales to other agencies within or adjacent to Zone 1 and Zone 5.

characteristics of current demands and the anticipated characteristics of future demands requires detailed analysis. The primary characteristics that define retail treated demand are (1) the urban land uses and associated water service connections, and (2) the unit demand factors associated with each class of land use.

As the largest retail service zone in PCWA's system, the importance of accuracy of retail treated analysis in Zone 1 is important. The calculated values in Zone 1 treated retail have the most impact on usage numbers as changes in values of other service areas result in only slight variances. Zone 1 retail treated water demands account for over 96 percent of the retail treated demands in the entire PCWA service area.[38]

4.1.2.1 Land Use and Connections

The 2006 Integrated Regional Water Plan (IRWP) prepared by PCWA included an extensive review and assessment of an array of land-use planning documents from land-use authorities throughout Placer County. From unincorporated areas to existing City's with planned boundary expansions, the IRWP provided a representative picture of build-out conditions within the PCWA service area based on existing adopted land-planning documents. Among this projected growth will be new customers in Zone 1 and Zone 5 served directly by PCWA with retail treated water supplies.

As discussed in **Appendix C-3**, the summation of future growth to be served directly by PCWA with treated water is provided in **Table 4-2**.

[38] Based on 2009 PCWA sales report.

Table 4-2 – Zone 1 Build-out Numbers

Land-use Classes	Upper Zone 1	Lower Zone 1	Total
Residential DUs	**Number of Dwelling Units at Build-out**		
High density 20.1+ DU/Ac.	0	2,722	2,722
High density 15.1-20 DU/Ac.	0	18,059	18,059
High density 10.1-15 DU/Ac.	2,566	2,868	5,434
Medium density 7.1-10 DU/Ac.	769	38,761	39,530
Medium density 5.1-7 DU/Ac.	2,087	11,387	13,474
Low density 3.1-5 DU/Ac.	5,441	5,496	10,937
Low density 1.1-3 DU/Ac.	552	3,967	4,519
Low density 0.1-1 DU/Ac	140	2,341	2,481
Rural Residential 1.1-2.3 Ac./DU	391	622	1,013
Rural Residential 2.31-4.6 Ac./DU	1,303	2,805	4,108
Rural Residential 4.61-10 Ac.DU	185	138	323
Rural Residential 10.1-20 Ac./DU	4	697	701
Non-Residential Acres	**Total Acres at Build-out**		
Professional Office	81	1,383	1,464
Commercial	457	1,551	2,008
Industrial	621	3,436	4,057
Public	59	1,471	1,530

Note: Data is complied from the Integrated Water Resources Plan, August 2006. Further details are provided in **Appendix C-3**.

As presented in the left column of **Table 4-2** above, there is a range of land classifications from the IRWP (specifically, from Appendix F of the 2006 IWRP). For purposes of understanding how each classification increases, a comparison to current conditions is necessary. However, data to correlate each of the connections to a land-use type does not exist for the entire 35,000+ existing connections in Zone 1. Using a combination of existing demand factors (see next subsection) and 2009 water sales information, the existing connections were distributed across the array of land-use classifications. An estimated distribution was developed by adjusting the mix of existing connection across the land-use classifications until the calculated value was comparable to the 2009 data. This information is used later to help predict annual growth in each class until the build-out values are reached. More detailed explanation of this method can be found in **Appendix C-3**.

Since Zone 5 currently has no retail treated water supply connections, the existing retail treated connections exist in Zone 1. Zone 1 can be broken down into 2 sub areas referred to as *Upper* and *Lower* Zone 1. Upper Zone 1 is dominated by the city of Auburn. This service area is mostly urban/suburban. Around 40 percent of the connections are currently to low-density connections in the 3.1 to 5 dwelling unit per acre range. There

are also a large number of connections to medium and high-density dwelling units.[39] The largest classes of growth predicted in the upper zone are industrial and high density dwelling units with moderate growth in low density and rural residential dwelling units. This is consistent with the creation of a more urban area in Auburn and suburban developments pushing away from the development center as geographic restrictions allow.

Lower Zone 1 is a large area incorporating many urban and less developed areas. The retail treated service is dominated by medium and high-density demands, especially within the City of Rocklin and the surrounding areas. This is likely to remain the case as the cities, towns and communities within the service area grow. The largest classes of growth predicted in the lower zone are industrial land uses and medium and high-density developments. This growth prediction is consistent with growth trends, which are tending to see more emphasis on higher density housing products and fewer large-lot developments. This will likely increase the number of connections for the zone in the future but reduce water demand as yards become smaller or are replaced with community space where irrigation efficiency can be controlled.

These growth predictions are represented in **Table 4-3**. Urban and industrial expansion is consistent with the population growth predictions from earlier documents such as the 2005 UWMP. Based on current growth trends, some of the land classes will be near the build-out prediction numbers from the 2006 IWRP of 2030 such as the High-Density (20.1+ DU/Ac) and commercial land classes.[40]

[39] Based on Appendix F data for Dwelling Units from 2006 PCWA IWRP
[40] **Appendix C-3** growth estimates

Table 4-3 – Current and Future Development Predictions for Zone 1

Land-use Classes Zone 1	2010	2015	2020	2025	2030	2035	2040	Buildout
Residential DUs								
High density 20.1+ DU/Ac.	2,544	2,569	2,595	2,620	2,646	2,671	2,697	2,722
High density 15.1-20 DU/Ac.	4,724	5,477	6,229	6,982	7,734	8,487	9,239	18,059
High density 10.1-15 DU/Ac.	789	914	1,040	1,165	1,291	1,417	1,542	5,434
Medium density 7.1-10 DU/Ac.	8,326	9,566	10,806	12,046	13,285	14,525	15,765	39,530
Medium density 5.1-7 DU/Ac.	6,998	7,920	8,842	9,764	10,686	11,608	12,530	13,474
Low density 3.1-5 DU/Ac.	6,817	7,413	8,009	8,604	9,200	9,796	10,391	10,933
Low density 1.1-3 DU/Ac.	2,452	2,745	3,038	3,331	3,624	3,916	4,209	4,502
Low density 0.1-1 DU/Ac	848	971	1,095	1,218	1,341	1,464	1,587	2,481
Rural Residential 1.1-2.3 Ac./DU	387	449	510	572	634	695	757	1,013
Rural Residential 2.31-4.6 Ac./DU	1,395	1,617	1,840	2,062	2,284	2,506	2,729	4,108
Rural Residential 4.61-10 Ac.DU	362	412	462	512	562	612	662	1,024
Non-Residential Acres								
Professional Office	770	869	968	1,067	1,167	1,266	1,365	1,464
Commercial	1,349	1,443	1,537	1,631	1,725	1,820	1,914	2,008
Industrial	172	288	404	520	636	752	868	4,057
Public	383	443	504	565	626	687	748	1,530

Note: Includes Numbers From Both Upper and Lower Zone 1. Growth Limited to Current Trends. Class Build-out Times Vary.

4.1.2.2 Demand Factors

The purpose of this section is to represent and explain the unit water demand factors associated with each land classification and the basis for their determination.

4.1.2.2.1 Existing Unit Water Demand Factors

The unit water demand factors obtained from the "Appendix F" tables prepared for the 2006 IWRP, as updated in December 2010[41], were used to represent the existing unit demand factors of existing PCWA customers. The Appendix F values, as updated, reflect actual customer data that was analyzed for purposes of the IWRP and are believed to still reflect existing customer conditions for the various land-use classifications.

To provide confidence in the use of these factors, a comparison of the estimated demand to the 2009 reported Zone 1 water sales was completed. The estimated demand is calculated from the number of dwelling units or acreage associated with each land classification (see **Table 4-3**) and its related demand factor (see **Table 4-4**). Due to differences in climate between upper and lower Zone 1, demand factors are represented on **Table 4-4** divided into upper and lower categories. The comparison of the estimated demand to 2009 reported water sales indicates a slight variation, where the estimated demand is about 8 percent higher than the 2009 reported water sales. However, reported sales in 2007 and 2008 were greater than the estimated demand. With the demand factors

[41] As provided by Mr. Tony Firenzi in an email to Mr. Aaron Ferguson on December 6, 2010 that provided refinements to the 2006 IWRP Table 4-13 to reflect a previously identified error in the 2006 table.

producing an estimate that is both above and below recent recorded use, the factors are deemed acceptable for generating demands of current land uses in Zone 1. These demand factors are for Zone 1 only and will not accurately represent demands for the other zones.

4.1.2.2.2 Future Unit Water Demand Factors

The future unit water demand factors are separated into two categories: (1) those for new construction, and (2) those for existing customers. The unit water demand factors for new construction were developed using the methods detailed in **Appendix C-3**. These factors reflect the impact from several recent changes, including, but not limited to, (1) a focus on new housing products with a greater house-to-landscape area ratio (e.g. large houses built on smaller lots, resulting in less landscaped area), (2) the State's Model Efficient Model Landscape Ordinance, and (3) the State's mandatory Green Building Standards Code (CAL Green Code), which will requires the installation of water-efficient indoor infrastructure for all new projects after January 1, 2011. The reflection of each of these on unit demand factors is detailed in **Appendix C-3**.

The future demand factors for existing customers, however, represents anticipated reductions resulting from PCWA's conservation efforts and other externalities that will help reduce the unit demands (e.g. some conservation occurs without agency input such as the purchase of replacement of water using devices absent any PCWA rebate). The demand factors are provided for each land classification and by upper and lower areas of Zone 1 to account for the climate differences between Auburn and Roseville. **Table 4-5** summarizes the future demand factors for Zone 1 for existing customers and new construction.

Table 4-4 – Existing Demand Factors and Existing Demand.

Land-use Classes Upper Zone 1	Demand Factor (AF/year per unit)	Existing Number of Units (Dus or acres)	Estimated Demand (AF/year)
Residential			
High density 10.1-15 DU/Ac.	0.29	394	114
Medium density 7.1-10 DU/Ac.	0.40	650	260
Medium density 5.1-7 DU/Ac.	0.45	1624	731
Low density 3.1-5 DU/Ac.	0.55	2598	1,429
Low density 1.1-3 DU/Ac.	0.79	541	428
Low density 0.1-1 DU/Ac	0.92	106	98
Rural Residential 1.1-2.3 Ac./DU	0.92	170	156
Rural Residential 2.31-4.6 Ac./DU	0.97	579	562
Rural Residential 4.61 + Ac.DU	0.81	115	93
Non-Residential			
Professional Office	2.10	53	111
Commercial	2.10	334	701
Industrial	2.40	0	0
Public	2.50	15	37
Land-use Classes Lower Zone 1			
Residential			
High density 20.1+ DU/Ac.	0.21	2544	534
High density 15.1-20 DU/Ac.	0.34	4724	1,606
High density 10.1-15 DU/Ac.	0.35	394	138
Medium density 7.1-10 DU/Ac.	0.49	7677	3,762
Medium density 5.1-7 DU/Ac.	0.55	5374	2,956
Low density 3.1-5 DU/Ac.	0.64	4219	2,700
Low density 3.1-5 DU/Ac. (GB)	1.68	3	5
Low density 1.1-3 DU/Ac.	0.93	1911	1,777
Low density 1.1-3 DU/Ac. (GB)	1.68	8	13
Low density 0.1-1 DU/Ac	1.34	742	995
Rural Residential 1.1-2.3 Ac./DU	1.45	217	315
Rural Residential 2.31-4.6 Ac./DU	1.08	816	881
Rural Residential 4.61 + Ac.DU	1.20	247	297
Non-Residential			
Professional Office	2.40	717	1,722
Commercial	2.40	1015	2,436
Industrial	2.90	172	498
Public	3.10	368	1,140
Total Estimate of Current Demand			26,494
Total Demand From 2009 Sales Data			24,484

Note: Demand factors are from updated values presented in the 2006 IWRP and sales data demand is for 2009.

Table 4-5 – Retail Treated Future Unit Water Demand Factors

(Values in AF/year per unit type) Upper Zone 1	Existing Customers								New Construction
	2010	2015	2020	2025	2030	2035	2040	BO	
Residential									
High density 10.1-15 DU/Ac.	0.29	0.29	0.28	0.28	0.27	0.27	0.27	0.27	0.20
Medium density 7.1-10 DU/Ac.	0.40	0.39	0.38	0.37	0.36	0.36	0.36	0.36	0.32
Medium density 5.1-7 DU/Ac.	0.45	0.43	0.41	0.40	0.39	0.39	0.39	0.39	0.38
Low density 3.1-5 DU/Ac.	0.55	0.53	0.50	0.49	0.48	0.48	0.48	0.48	0.47
Low density 1.1-3 DU/Ac.	0.79	0.75	0.71	0.69	0.67	0.67	0.67	0.67	0.82
Low density 0.1-1 DU/Ac	0.92	0.90	0.87	0.85	0.83	0.83	0.83	0.83	0.82
Rural Residential 1.1-2.3 Ac./DU	0.92	0.90	0.87	0.85	0.83	0.83	0.83	0.83	0.94
Rural Residential 2.31-4.6 Ac./DU	0.97	0.95	0.92	0.90	0.87	0.87	0.87	0.87	0.75
Rural Residential 4.61 + Ac.DU	0.81	0.79	0.77	0.75	0.73	0.73	0.73	0.73	0.65
Non-Residential									
Professional Office	2.10	2.05	2.00	1.95	1.90	1.90	1.90	1.90	1.90
Commercial	2.10	2.05	2.00	1.95	1.90	1.90	1.90	1.90	1.90
Industrial	2.40	2.34	2.28	2.23	2.17	2.17	2.17	2.17	2.17
Public	2.50	2.44	2.38	2.32	2.26	2.26	2.26	2.26	2.26
Lower Zone 1									
Residential									
High density 20.1+ DU/Ac.	0.21	0.21	0.20	0.20	0.19	0.19	0.19	0.19	0.18
High density 15.1-20 DU/Ac.	0.34	0.33	0.32	0.31	0.30	0.30	0.30	0.30	0.18
High density 10.1-15 DU/Ac.	0.35	0.34	0.32	0.31	0.30	0.30	0.30	0.30	0.20
Medium density 7.1-10 DU/Ac.	0.49	0.47	0.44	0.42	0.40	0.40	0.40	0.40	0.32
Medium density 5.1-7 DU/Ac.	0.55	0.53	0.50	0.48	0.46	0.46	0.46	0.46	0.39
Low density 3.1-5 DU/Ac.	0.64	0.61	0.58	0.56	0.53	0.53	0.53	0.53	0.48
Low density 3.1-5 DU/Ac. (GB)	1.68	1.56	1.43	1.38	1.32	1.32	1.32	1.32	0.86
Low density 1.1-3 DU/Ac.	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.84
Low density 1.1-3 DU/Ac. (GB)	1.68	1.56	1.43	1.40	1.36	1.36	1.36	1.36	1.39
Low density 0.1-1 DU/Ac	1.34	1.28	1.21	1.18	1.15	1.15	1.15	1.15	0.84
Rural Residential 1.1-2.3 Ac./DU	1.45	1.39	1.33	1.30	1.26	1.26	1.26	1.26	0.96
Rural Residential 2.31-4.6 Ac./DU	1.08	1.06	1.03	1.01	0.98	0.98	0.98	0.98	0.77
Rural Residential 4.61 + Ac.DU	1.20	1.17	1.14	1.11	1.08	1.08	1.08	1.08	0.66
Non-Residential									
Professional Office	2.40	2.34	2.28	2.23	2.17	2.17	2.17	2.17	2.17
Commercial	2.40	2.34	2.28	2.23	2.17	2.17	2.17	2.17	2.17
Industrial	2.90	2.83	2.76	2.69	2.62	2.62	2.62	2.62	2.62
Public	3.10	3.03	2.95	2.88	2.80	2.80	2.80	2.80	2.80

Note: New construction demand factors discussed in Appendix C. Current and yearly demand factors are for existing buildings and represent small reductions in consumption due to conservation measures.

4.1.2.3 Non-Revenue Water

Non-revenue water represents that portion of water treated at PCWA's treatment plants but not accounted for in the retail treated water sales data. Often, non-revenue water reflects water that is lost due to system leaks, operational losses, fire protection, construction water, system flushing, unauthorized connections and inaccurate meters. In most instances, the predominant source of non-revenue water is from system losses. And, for PCWA, fire protection and construction water is metered and billed so is not considered part of this value.

Since the delivery system in this zone is metered for all retail treated water accounts, PCWA is able to have a fairly accurate data set to assess the quantity of non-revenue water[42]. There is currently no estimate of unauthorized connections or the associated consumption. Using the water treatment production values and the Zone 1 retail treated water sales data, system losses were calculated (see **Table 4-6**). For purposes of estimating the non-revenue water associated with the existing distribution system, a 12 percent value was assumed for current conditions, decreasing to 10 percent by 2020 as a result of on-going efforts by PCWA to fix identified system leaks.

The new treated water distribution systems associated with future growth are expected to have even less non-revenue water as a percentage of the water sales. For purposes of estimating future demand from new connections, the non-revenue water value is assumed to be 8 percent of production.

Table 4-6 – Zone 1 Retail Treated Non-Revenue Water

Year	WTP Production Total (AF/year)	Water Sales Totals (AF/year)	Estimated Non-Revenue Water (%)
2005	26,884	24,368	9.4%
2006	27,178	25,424	6.5%
2007	28,505	26,565	6.8%
2008	30,456	27,283	10.4%
2009	27,836	24,521	11.9%

4.1.2.4 Projected Retail Treated Water Demand

The future retail treated water demand for Zone 1 was calculated using the methods described above and detailed in **Appendix C-3**. Due to the anticipated urban growth in Zone 1 and expanding into Zone 5, the projected retail treated water demand shows a steady rise between current demands and those projected in 20 years. Even with an expected reduction in unit demand factors through on-going conservation and the lower factors expected with new construction, the anticipated growth still results in an expansion of overall demand. The estimated retail treated demands are summarized in **Table 4-25**, located toward the end of this section.

4.1.3 Irrigation (Untreated) Water Demand in Zone 1 and Zone 5

Irrigation water is sold by PCWA directly to end-users. This supply is a non-potable supply generally used for commercial agriculture, irrigation customers, landscape greenbelts, and metered irrigation. The information presented below provides further details about these customers, their current demands, and projections of future demands.

[42] Unmetered connections are limited and are estimated to use less than 1 acre-foot per year.

In total, the Zone 1 and Zone 5 irrigation water service currently represents about 70 percent of the total Zone 1 and Zone 5 water sales by volume, but represents many fewer accounts – about 3,100 accounts compared to 35,000 retail treated water accounts.[43]

- Commercial Agriculture - Commercial agriculture is supplied to a little over 300 accounts and represents nearly 30 percent of the Zone 1 and Zone 5 irrigation water demands.[44] With planned growth by the City of Lincoln westward into Zone 5, PCWA expects the Zone 5 demands to decrease significantly over the next twenty to thirty years.[45] Demands from the Zone 1 commercial agricultural customers are expected to remain similar to current sales.

- Irrigation Customers – With nearly 2,800 accounts, irrigation customers represent nearly 70 percent of the Zone 1 irrigation water sales. These customers include the many rural residences within Zone 1 that receive "ditch water" for use in gardens, for landscaping, for small pastures, to maintain stock water sources and small ponds, and other rural residential needs. For purposes of long-term planning, PCWA anticipates the demands from this class of customers to be similar to recent sales, with expected annual variations depending on the length of the irrigation season.[46] There are no customers in Zone 5 with this classification.

- Landscape – The landscape designation is used by PCWA to represent greenbelts irrigated with irrigation water supplies. With only about 30 active accounts, this category of "customer" still represents a sizable quantity of demand – accounting for approximately 15 percent of the current Zone 1 irrigation demand. With adoption of the Model Water Landscape Efficiency Ordinance (MWLEO), the demand of existing customers is expected to decrease, but new urban growth is anticipated to add new landscape accounts, adding to the total demand. For purposes of long-term planning, PCWA anticipates this demand to remain consistent with existing total sales.

- Metered – This classification of irrigation demand has very insignificant demands, reflecting less than 1 percent of recent annual irrigation deliveries. PCWA anticipates these demands will remain consistent into the future.

[43] 2009 PCWA Sales Report
[44] Based on 2009 PCWA Sales Report
[45] Although Zone 5 covers a large geographic area of rural western Placer County (see **Figure 2-1**), only about 4,400 acres currently receive irrigation water from PCWA. Most of these lands are within the identified westward growth area of the City of Lincoln and will be displaced with urban uses served by the City of Lincoln.
[46] It is PCWA's experience that irrigation water deliveries to irrigation customers vary depending on the timing of spring rainfall. When the rainy season is short, irrigation events begin earlier, increasing annual demand when compared to years when rain continues well into spring.

Table 4-7 – Irrigation Demands for Zone 1 and Zone 5

(Values in AF/year)	2010	2015	2020	2025	2030	2035	2040
Commercial Agriculture	13,149	13,149	13,149	13,149	13,149	13,149	13,149
Growers Untreated (Zone 5)	11,038	11,038	9,483	7,928	6,373	4,803	3,263
Irrigation Customers	32,500	32,500	32,500	32,500	32,500	32,500	32,500
Landscape	10,375	10,375	10,375	10,375	10,375	10,375	10,375
Metered	271	271	271	271	271	271	271
Total	67,333	67,333	65,778	64,223	62,668	61,098	59,558

Note: Numbers taken on trends from sales reports and not assumed to follow the same growth as residential demands.

4.1.4 Wholesale Treated Water Demand in Zone 1

In addition to being a retail purveyor of treated and raw water suppliers, PCWA also wholesales treated water to a number of retail water systems located within Zone 1. This section presents the current and projected demands associated with these wholesale arrangements, and the basis for those projections.

- City of Lincoln – The City of Lincoln is the largest retail customer of wholesale treated water from PCWA, receiving about 90 percent of the wholesale treated water currently sold by PCWA. The City has a renewable contract with the PCWA for treated surface water. PCWA, based on the City's current General Plan, will supply to the City limits, on a "first-come- first-served" basis, the volume of potable surface water required to meet maximum day demands for build-out of the City limits. With significant growth occurring over the last decade, the City has steadily increased its demand for treated water from PCWA under the first-come-first served basis. According to the City's 2008 General Plan Update, the City anticipates needing up to 34,000 acre-feet of treated water from PCWA by 2050 to meet an expected population of over 130,000 residents. With significant slow down in growth occurring over the last few years, the rate of incremental increase in demand has also slowed. But with recently completed and in-progress specific plans for new development projects, the City still anticipates moving steadily toward the projected 2050 demand for 34,000 acre-feet. Although conservation mandates and new building codes may result in lower per-capita demands for this anticipated growth, the City is also relying on treated water from the Nevada Irrigation District, from local groundwater, and from recycled water to serve the total needs well in excess of 34,000 acre-feet. Therefore, PCWA is anticipating that the City will still seek the full potential of 34,000 acre-feet at build-out conditions. The associated demand

projections are reflected in Table 4-8 and is based on information in the City's General Plan as well as the 2009 Village 7 Draft EIR.[47]

- California American Water – With multiple retail service areas around greater Sacramento, California American (Cal Am) specifically receives wholesale treated supplies from PCWA for its West Placer community (located in western Placer County just southwest of the City of Roseville). Currently, this Cal Am service area receives about 10 percent of the PCWA wholesale treated supplies. Although the general area of Cal Am's West Placer service area is anticipated to grow, it is unclear at this time whether the new demands would be met by PCWA directly or through an expanded wholesale agreement with Cal Am. For purposes of PCWA's long-term planning, the anticipated growth in this general area has been included as part of the retail treated water demands discussed previously. With this assumption, the Cal Am supplies will be projected to reduce slight from existing sales values. The reduction will result from conservation by existing customers.

- Other Retailers – Several small community retail water systems exist within Zone 1 (there are no retail suppliers in Zone 5). Generally organized as homeowner associations, these small retail systems include Folsom Lake Mutual Water Company, Golden Hills Mutual Water Company, Hidden Valley Community Association, Lakeview Hills Community Association, and Willow-Glen Water Company. Golden Hills Mutual Water Company, Hidden Valley Community Association, and Willow-Glen Water Company are each served by PCWA with a single master meter. Usage in these areas with master meters is averaged over the number of parcels served to calculate unit demands. These three systems also have a parallel raw water system that reduces treated demand. With most of these small retail systems serving communities that are built-out or are nearly build-out, PCWA does not anticipate growth within this category of wholesale treated water. Rather, PCWA anticipates future demands to be reduced slightly with the implementation of conservation measures over time. For purposes of projected demands, conservation is expected to reduce the current demand by 5 percent by 2020, with an additional 5 percent by 2030.

[47] See Table 4.9-24 in Chapter 4, page 4.9-56 of the June 2009 Village 7 Specific Plan Project Draft Environmental Impact Report.

Table 4-8 – Wholesale Treated Water Demand for Zone 1 and Zone 5

(Values in AF/year)	2010	2015	2020	2025	2030	2035	2040
City of Lincoln	9,327	15,205	19,667	24,129	28,592	30,395	32,197
Cal-Am Water Company	1,010	985	960	936	912	912	912
Others	334	326	317	309	301	301	301
Total	10,671	16,515	20,944	25,374	29,805	31,608	33,410

Note: Basis of future demands projections are described in the accompanying text.

4.1.5 Sales to Other Agencies in the Western Area

This section discusses the existing and future water demands associated with untreated water deliveries that are diverted at Folsom Reservoir and sold under contractual agreements to San Juan Water District, Sacramento Suburban Water District and the City of Roseville. Untreated water is supplied to water resellers who primarily use the water for municipal uses and who operate treatment facilities or use treatment facilities other than those operated by PCWA.

- San Juan Water District – San Juan Water District (SJWD) entered into a contract with PCWA for additional water supplies in 1977. Beginning in 1992, the contract increased the limits on deliveries to 25,000 acre-feet per year. In the 2006 IWRP, PCWA estimated the demand under this contract would be 16,400 acre-feet annually by 2030. SJWD has subcontracted 4,000 acre-feet of this contract to the City of Roseville to help meet its future demands, though this supply is only available in wet and normal years. With that quantity subtracted, SJWD has a maximum contract supply of 21,000 acre-feet in normal years.

- Sacramento Suburban Water District – Sacramento Suburban Water District (SSWD) entered into a "take-or-pay" contract with PCWA in 2000 to provide surface water supplies to aid with meeting the District's conjunctive use objectives. Initially set at 7,000 acre-feet annually, the contract maximum follows pre-established increases until it reaches the maximum contract quantity of 29,000 acre-feet annually from beginning in 2015 through the end of the contract in 2025. The contract may be extended by mutual agreement beyond 2025. No deliveries are allowed under the contract when the March through November unimpaired inflow to Folsom Reservoir is determined to be less than 1,600,000 acre-feet (with other restrictions also in place). This constraint effectively takes the contract to zero in dry years. Thus, in normal years (when March through November unimpaired inflow is projected to exceed 1,600,000 acre-feet), PCWA will recognize this contract as a demand for 29,000 acre-feet. In dry years, the demand will be zero.

- City of Roseville – Prior to 2010, the City's contract with PCWA provided for 10,000 acre-feet, with options for 20,000 acre-feet more. In 2010, the City exercised the options and entered a new consolidated contract with PCWA. This contract identified and agreed-upon increase in the contract quantity over the next several years, capping at 30,000 acre-feet annually after July 1, 2024. Between now and July 2024, the contract has several incremental steps that do not directly correspond to the 5-year planning increments of this UWMP. For purposes of long-term planning, PCWA has represented the City's demand as shown in **Table 4-9**.

Table 4-9 – Untreated Water Demand for Western Area

(Values in AF/year)		2010	2015	2020	2025	2030	2035	2040	BO
San Juan Water District		11,800	14,967	15,652	16,370	16,411	17,941	19,470	21,000
San Juan Water District to City of Roseville		0	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Sacramento Suburban Water District	**Normal Year**	14,000	29,000	29,000	29,000	29,000	29,000	29,000	29,000
	Dry Year	0	0	0	0	0	0	0	0
City of Roseville		9,600	10,000	20,000	30,000	30,000	30,000	30,000	30,000
Normal Year Total		35,400	57,967	68,652	79,370	79,411	80,941	82,470	84,000

4.1.6 Regional Water Supply Buffer

Because the planning horizon assumed by the land-planning authorities throughout the County is not always consistent (e.g. projections vary from 2030 to 2050), future land-planning updates may identify growth in the Western Area not currently contemplated. To accommodate this potential additional demand, PCWA has established a place-holder of 10,000 acre-feet of annual demand beginning in 2040.

4.1.7 Summary of Western Area Water Demands

As shown in **Table 4-10**, the total water demands for the Western Area anticipated by 2030, the planning horizon for the 2010 UWMP, indicate a growth in total demand of about 40 percent.

Table 4-10 – Summary of Western Area Water Demands

Normal Year	Total (AF/year)							
	2010	2015	2020	2025	2030	2035	2040	BO
Zone 1 Water Demands								
Retail Treated	30,506	32,166	33,854	36,039	38,238	41,309	44,400	69,701
Irrigation	56,295	56,295	56,295	56,295	56,295	56,295	56,295	56,295
Wholesale Treated	10,671	16,515	20,944	25,374	29,805	31,608	33,410	35,213
Untreated	35,400	57,967	68,652	79,370	79,411	80,941	92,470	94,000
Total Zone 1 Demand	132,872	162,944	179,745	197,078	203,749	210,152	226,575	255,209
Zone 5 Demand	11,038	11,038	9,483	7,928	6,373	4,803	3,263	1,699
Zone 1 and 5 Buffer	--	--	--	--	--	--	10,000	10,000
Total	143,910	173,981	189,228	205,005	210,122	214,955	239,838	266,908

4.2 Zone 3 Water Demands

Zone 3 is the second largest zone in the PCWA system and extends through Applegate, Weimer, Meadow Vista, Colfax, Gold Run, Monte Vista, Dutch Flat, and Alta. See map in Chapter 2 (see **Figure 2-1**) for a depiction of actual service area. The predominant demand in Zone 3 is for untreated water, with only about 1,400 accounts served with retail treated water.[48]

4.2.1 Historical Demands

The data in **Table 4-11** indicates the rate of growth in the number of retail treated water connections and associated water treatment plant production serving the connections. Further explanation of the Zone 3 rate of growth is detailed in **Appendix C-3**.

Table 4-11 – Zone 3 Historic Connections and Treated Water Deliveries

Year	Connections	WTP Production (AF/year)	Average Connection Demand (AF/year)
2005	1,395	773	0.55
2006	1,416	790	0.56
2007	1,402	808	0.58
2008	1,405	879	0.63
2009	1,453	834	0.57

4.2.2 Retail Treated Water Demand

As with Zone 1, retail treated water demands in Zone 3 are an important component of PCWA's long-term planning. Although representing only a fraction of PCWA's current

[48] Based on approximation from 2009 Water Sales Report

demands, this demand category will increase slightly over the next several decades as a result of anticipated growth of mountain communities within Placer County. Because of this anticipated increase in demand, understanding the characteristics of current demands and the anticipated characteristics of future demands requires detailed analysis. The primary characteristics that generate retail treated demand are (1) the urban land uses and associated water service connections, and (2) the unit demand factors associated with each class of land use. This category for Zone 3 is small amounting to less than 8 percent of the Zone 3 demands and just over 2 percent of the total retail treated service demands of Zone 1 and Zone 3 combined.[49] Changes in this zone are unlikely to have significant impacts on the expected increase in total demands served by PCWA.

4.2.2.1 Land Use and Connections

To estimate future retail treated demand in Zone 3, an estimate of future growth in land uses is necessary. Mimicking the historic growth trends in the number of retail treated connections in Zone 3 over the past 15 years, a rate of 1 percent per year was assumed to reflect the future growth in this zone. The resulting prediction of future connections is presented in **Table 4-12**.

Table 4-12 – Current and Predicted Retail Connections in Zone 3

Land-use Classes Zone 3	2010	2015	2020	2025	2030	2035	2040
Residential DUs							
Multi Family 10+ DU/Ac.	403	424	444	465	485	506	526
Single Family 0-10 DU/Ac.	1,050	1,104	1,157	1,211	1,264	1,318	1,371
Non-Residiential Acres							
Commercial	117	123	129	135	141	147	153
Municipal	16	17	18	18	19	20	21
Landscape-Greenbelt	5	5	6	6	6	6	7

Note: Predicted numbers based on methodology that is discussed in **Appendix C-3**.

4.2.2.2 Demand Factors

The purpose of this section is to represent and explain the unit water demand factors associated with each land classification and the basis for their determination.

4.2.2.2.1 Existing Unit Water Demand Factors

The existing demand factors for Zone 3 were calculated using PCWA sales reports for 2009. The area in Zone 3 runs from the northeast corner of upper Zone 1 towards the Tahoe area, generally following the Interstate 80 highway corridor (see **Figure 2-1**). The residences in these mountainous regions tend to have less traditional landscaping, relying more on the native trees and vegetation. This translates to unit water demand factors lower than Zone 1. Division of the number accounts or dwelling units by the sales

[49] Based on 2009 PCWA Sales Report.

quantities yields demands for land classes. These demands per dwelling unit represent the current demand factors. The classes for Zone 3 are simplified from those in Zone 1 to include multifamily and single family residential classes, primarily to correlate with readily available classifications in PCWA water sales data.[50]

Non-residential demand factors are calculated in the same manor as the residential factors excluding the landscape demand factor. The demand factor for the Landscape-Greenbelt use category is a generic values used in all other zones. This results in higher demands than actual, since the higher elevation, mountainous climates generally do not result in plant evapotranspiration rates equal to those in the foothills or lower Zone 1. Because the resulting projected demand is minimal, efforts to refine the demand factor to reflect mountainous climates were not undertaken. Further, the use of this factor for landscaping provides a conservatively high demand projection. The existing demand is used to calculate the demand factor so the actual demand in **Table 4-13** is accurate except for the Landscape-Greenbelt category.

Table 4-13 – Existing Demand Factors and Existing Demand.

Land-use Classes Zone 3	Demand Factor (AF/Year per unit)	Actual Demand (AF/Year)
Residential DUs		
Multi Family 10+ DU/Ac.	0.17	70
Single Family 0-10 DU/Ac.	0.32	335
Non-Residential Acres		
Commercial	1.05	123
Municipal	1.93	31
Landscape-Greenbelt	4.75	24

Note: Source data calculation explained in **Appendix C-3**. Landscape-Greenbelt factor is generic and results in higher demand that would occur do to difference in climate from Zone 1

4.2.2.2.2 Future Demand Factors

The future demand factors were calculated as 10 percent less than the current demand factors to reflect similar conditions with new state landscaping and plumbing mandates, as well as housing products as described for Zone 1. Furthermore, existing demand factors were assumed to decrease by 10 percent as a result of continued conservation efforts of PCWA and naturally accruing water savings when replacing water-using appliances and fixtures. **Table 4-14** summarizes the future demand factors for Zone 3.

[50] Unlike Zone 1, Zone 3 has minimal retail demands and limited growth potential. Thus, the simplification of land classifications provides PCWA with an appropriate degree of data for use in long-term planning.

Table 4-14 – Future Demand Factors

Land-use Classes Zone 3 (AF/Year)	2010	2015	2020	2025	2030	2035	2040	New Construction
Residential DUs								
Multi Family 10+ DU/Ac.	0.17	0.17	0.16	0.16	0.15	0.15	0.15	0.14
Single Family 0-10 DU/Ac.	0.32	0.31	0.30	0.30	0.29	0.29	0.29	0.26
Non-Residential Acres								
Commercial	1.05	1.03	1.00	0.98	0.95	0.95	0.95	0.95
Municipal	1.93	1.88	1.83	1.79	1.74	1.74	1.74	1.74
Landscape-Greenbelt	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75

Note: See section *4.2.2.2.2* and **Appendix C-3** for details on how Zone 3 demand factors were calculated.

4.2.2.3 Non-Revenue Water

Non-revenue water represents that portion of water treated at PCWA's treatment plants but not accounted for in the retail treated water sales data. Often, non-revenue water reflects water that is lost due to system leaks, fire protection, construction water, unauthorized connections and inaccurate meters. In most instances, the predominant source of non-revenue water is from system losses. And, for PCWA, fire protection and construction water is metered and billed so is not considered part of this value.

Since the delivery system in this zone is metered for all retail treated water accounts, PCWA is able to have a fairly accurate data set to assess the quantity of non-revenue water. There is currently no estimate of unauthorized connections or the associated consumption. Using the water treatment production values and the Zone 3 retail treated water sales data, system losses were calculated (see **Table 4-15**). For purposes of estimating the non-revenue water associated with the existing distribution system, a 30 percent value was assumed for current conditions, decreasing to 25 percent by 2020 as a result of on-going efforts by PCWA to fix identified system leaks, with further improvements obtain in subsequent years. Though this seems like a high value, given the mountainous terrain and geology where distribution lines are placed, there are more opportunities for system leaks associated with high-pressure areas and a shortened pipe life.

The new treated water distributions systems associated with future growth are expected to have even less non-revenue water as a percentage of the water sales. For purposes of estimating future demand from new connections, the non-revenue water values was assumed to be 20 percent.

Table 4-15 – Non-Revenue Water

Year	WTP Production Total (AF/year)	Water Sales Totals (AF/year)	Estimated Non-Revenue Water (%)
2005	773	547	29%
2006	790	597	24%
2007	808	579	28%
2008	879	601	32%
2009	834	579	31%

4.2.2.4 Projected Retail Treated Water Demand

The total demand for Zone 3 is calculated using the same method as described previously for Zone 1 and as detailed in **Appendix C-3**. Growth in Zone 3 is estimated at around one percent per year, with demand likely to climb slowly or not at all as a result of implementation of conservation measures. The future demand values are presented in **Table 4-25** under the Zone 3 Retail Treated numbers.

4.2.3 Irrigation Water Demand in Zone 3

Irrigation water is sold by PCWA directly to end-users in Zone 3. This supply is a non-potable supply generally used for commercial agriculture, irrigation customers, landscape greenbelts, and metered irrigation. The information presented below provides further details about these customers, their current demands, and projections of future demands. In total, the Zone 3 irrigation water service currently represents over 90 percent of the total Zone 3 water sales by volume, but represents fewer accounts – about 525 accounts compared to 1,450 retail treated water accounts.[51]

- Commercial Agriculture - Commercial agriculture is supplied to only 17 accounts and represents only 5 percent of the Zone 3 irrigation water demands.[52] Demands from the Zone 3 commercial agricultural customers are expected to remain similar to current sales.

- Irrigation Customers – With nearly 300 accounts, irrigation customers represent about 60 percent of the Zone 3 irrigation water sales. These customers include the many rural residences within Zone 3 that receive "ditch water" for use in gardens, for landscaping, for small pastures, to maintain stock water sources and small ponds, and other rural residential needs. For purposes of long-term planning, PCWA anticipates

[51] Based on 2009 Sales Report
[52] Based on 2009 PCWA Sales Report

the demands from this class of customers to be similar to recent sales, with expected annual variations depending on the length of the irrigation season.[53]

- Landscape – The landscape designation is used by PCWA to represent greenbelts irrigated with irrigation water supplies. With only a few active accounts, this category of "customer" still represents a sizable quantity of demand – accounting for approximately 25 percent of the current Zone 3 irrigation demand. With adoption of the Model Water Landscape Efficiency Ordinance (MWLEO), the demand of existing customers is expected to decrease, but new urban growth is anticipated to add new landscape accounts, adding to the total demand. For purposes of long-term planning, PCWA anticipates this demand to remain consistent with existing total sales.

- Metered – This classification of irrigation demand has over 200 active accounts, but very insignificant demands, reflecting less than 1 percent of recent annual irrigation deliveries. PCWA anticipates these demands will remain consistent into the future.

Table 4-16 – Current and Future Irrigation Water Demands for Zone 3

(AF/Year)	2010	2015	2020	2025	2030	2035	2040
Commercial Agriculture	337	337	337	337	337	337	337
Irrigation Customers	4,120	4,120	4,120	4,120	4,120	4,120	4,120
Landscape	1,593	1,593	1,593	1,593	1,593	1,593	1,593
Metered	85	85	85	85	85	85	85
Total (including loss)	6,134	6,134	6,134	6,134	6,134	6,134	6,134

Note: Numbers taken from trends in sales reports and not assumed to follow the same growth as residential demands.

4.2.4 Untreated Water Sales to Other Agencies in the Central Area

This section presents the existing and anticipated future water demand of five small water purveyors that purchase untreated water from PCWA for treatment and delivery to a total of about 2,000 connections. These purveyors include: Alpine Meadows Water Association, Dutch Flat Water Association, Heather Glen CSD, Meadow Vista County Water District, and Weimar Water Company. Recent sales to these retail agencies have remained fairly consistent. For purposes of long-term planning, PCWA anticipates these demands to remain consistent with recent sales.

[53] It is PCWA's experience that irrigation water deliveries to irrigation customers vary depending on the timing of spring rainfall. When the rainy season is short, irrigation events begin earlier, increasing annual demand when compared to years when rain continues well into spring.

Table 4-17 – Untreated Water Demands for Zone 3

Normal Year (AF/Year)	2010	2015	2020	2025	2030	2035	2040
Alpine Meadows Water Association	117	117	117	117	117	117	117
Dutch Flat Water	2	2	2	2	2	2	2
Heather Glen CSD	32	32	32	32	32	32	32
Meadow Vista Count Water District	55	55	55	55	55	55	55
Weimar Water Co.	366	366	366	366	366	366	366
Total Normal Year	571	571	571	571	571	571	571

4.2.5 Summary of Zone 3 Water Demands

As shown in **Table 4-18**, the total water demands for Zone 3 anticipated by 2030, the planning horizon for the 2010 UWMP, indicate a very nominal growth in total demand of about one percent. This small increase is the result of limited growth and the adoption of conservation measures. Absent the growth, the demands in Zone 3 would likely decrease from existing quantities simply due to on-going conservation measures.

Table 4-18 – Summary of Current and Future Demands for Zone 3

Normal Year (AF/Year)	2010	2015	2020	2025	2030	2035	2040
Retail Treated Total Demand	762	769	749	764	753	782	811
Irrigation Total Demand	6,134	6,134	6,134	6,134	6,134	6,134	6,134
Untreated Total Demand	571	571	571	571	571	571	571
Total Zone 3 Demand	7,467	7,475	7,454	7,470	7,458	7,487	7,516

Note: The "2010" retail treated total demand is an estimate based upon the demand factors, land use and estimated non-revenue water circumstances and is nominally lower than the recent deliveries shown in Table 4-11.

4.3 Zone 4 Water Demands

Zone 4 is a small system removed from the rest of the PCWA system by geography, watershed, and climate. In the PCWA system, Zone 4 currently is limited to the boundaries of the Lahontan Subdivision, an exclusive golf and residential facility located just south of the town of Truckee, as well as a few existing and planned customers within the Martis Camp subdivision. See map in Chapter 2 for a depiction of actual service area. With fewer than 1,000 accounts, the demands are primarily for residential lots scattered throughout the existing golf courses – many of which are second homes or bare lots awaiting new home construction. [54] Water demands in Zone 4 are fully met by groundwater.

[54] Based on approximation from 2009 Water Sales Report and personal communications with PCWA staff

Land planning documents indicate that Zone 4 will also serve neighboring developments as they are constructed. Based on numbers from developers these developments will contain 1,674 houses when development reaches build-out.[55]

Since the Lahontan community has only existed since 1998 and consists mostly of summer homes, it is difficult establishing trends in demand. Demands presented in this section are estimated using best available information and recognition of the inconsistent use and partial build-out condition of the development. As demonstrated below, demand accounts for little more than one percent of PCWA's total retail treated demands, and thus could be considered insignificant in the overall summary. This demand is considered in the calculation of future target demands (see Section 4.5) but has no noticeable affect.

4.3.1 Historical Water Demands

The data in **Table 4-19** shows growth as new homes were constructed within the fairly new Lahontan development. This is consistent with a new subdivision with only one primary dwelling unit type. The initial heavy demand would be associated with development of the community and establishing the golf course, which, although established with PCWA water supplies, is now supplied by private wells. Zone 4 has only existed for a short time, providing only limited historical data to develop assumptions. With construction and other uses associated with initial development, in contrast to just residential use, the historic PCWA water sales data does not reflect anticipated residential use only. As the number of homes grows, the demands will normalize and allow for water sales data to serve as a reasonable basis for future calculations of average connection demands.

Table 4-19 – Historic Connections and Water Demands

Year	Connections	Production (AF/Year)	Average Connection Demand (AF/Year)
2005	178	44	0.25
2006	192	73	0.38
2007	206	79	0.38
2008	n/a	160	--
2009	297	141	0.48

Note: Average connection demand includes a loss factor of 10% due to being calculated from production numbers as opposed to sales data.

[55] Developments include: Lohanton, Martis Camp, Timlick, and Hopkins Ranch.

4.3.2 Retail Treated Water Demand

4.3.2.1 Land Use and Connections

As previously discussed, Zone 4 consists of an existing golf community in the Truckee area as well planned additional adjacent communities in the Martis Valley. The existing and planned housing is primarily large second homes with limited landscaping. The current estimate is for build-out to occur by 2035 for the Lahontan and other planned communities. The estimated number of dwelling units is a culmination of analysis of the land-planning documents development for these collective communities.

Table 4-20 – Current and Future Development for Zone 4

Land-use Classes Zone 4	2010	2015	2020	2025	2030	2035	2040
Residential Units (DUs)							
Single Family	297	572	847	1,122	1,396	1,671	1,671
Non-Residential (Acres)							
Commercial	18	35	51	68	85	85	85
Landscape-Greenbelt	1	1	1	1	1	1	1

Note: Build-out predicted by 2035.

4.3.2.2 Unit Water Demand Factors

The purpose of this section is to represent and explain the demand factors and the methods used to calculate them.

4.3.2.2.1 Existing Unit Water Demand Factors

The existing residential demand factors were calculated using the well production numbers and a 10 percent loss factor. This loss is simply an estimate due to the lack of data to make historical analysis. The resulting calculated demand matches approximately with what sales figures report validating this demand factor. Non-residential demand factors are based on sales. **Table 4-21** shows the demand factors used and the resulting calculated demand.

Table 4-21 – Existing demand factors and existing demand.

Land-use Classes Zone 4	Demand Factor (AF/Year per unit)	Calculated Demand (AF/Year)
Residential DUs		
Single Family	0.34	102
Non-Residential Acres		
Commercial	2.58	46
Landscape-Greenbelt	4.75	5

Note: Source data calculation explained in **Appendix C-3**. Landscape-Greenbelt factor is generic and results in higher demand that would occur do to difference in climate from Zone 1

4.3.2.2.2 Future Unit Water Demand Factors

The future demand factors were calculated as 10 percent less than the current demand factors to reflect similar residential construction but under new state landscaping and plumbing mandates. Furthermore, existing demand factors were assumed to only decrease by 5 percent as a result of continued conservation efforts of PCWA and naturally accruing water savings when replacing water-using appliances and fixtures. This limited savings reflect the relatively new nature of these houses and their seasonal use. **Table 4-14** summarizes the future demand factors for Zone 4.

Table 4-22 – Future Demand Factors

Land-use Classes Zone 4 (AF/Year per unit)	2010	2015	2020	2025	2030	2035	2040	New Construction
Residential DUs								
Single Family	0.34	0.34	0.33	0.33	0.32	0.32	0.32	0.31
Non-Residential Acres								
Commercial	2.58	2.52	2.45	2.39	2.33	2.33	2.33	2.33
Landscape-Greenbelt	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75

4.3.2.3 Non-Revenue Water

In Zone 4, non-revenue water represents that portion of water pumped by the PCWA groundwater wells but not accounted for in the metered charges to the customers. For Zone 4, these are primarily system losses. And estimate of these is calculated from water sales and well production data.

Table 4-23 – Non-Revenue Water

Year	WTP Production (AF/Year)	Assumed Loss (10%)	Customer Demand (AF/Year)
2005	51	5	46
2006	73	7	66
2007	79	8	71
2008	160	16	144
2009	141	14	127
2010	133	13	120

Note: Data doesn't not exist for long enough to develop an accurate estimate of system loss.

4.2.2.4 Projected Retail Treated Water Demand

The total demand for Zone 4 is calculated based on the build-out housing units, current demand factors, and is detailed in **Appendix C-3**. Growth in Zone 4 is estimated at around 10 percent per year based on calculations in **Appendix C-3**, but this is a new development and large houses are vulnerable to the economy. The growth of Zone 4 is subject to the most error as it is unique and there are limited examples of similar developments. The future demand values are presented in **Table 4-25** under the Zone 4

Retail Treated numbers. This represents a steady growth in Zone 4 of 14 percent consistent with the growth required to reach housing unit build-out by 2035. Future values do not represent estimates of rapid growth periods. Typical growth for this zone will not be steady.

4.3.3 Summary of Zone 4 Demands

As shown in **Table 4-24**, the total water demands for Zone 4 anticipated by 2035 indicate a significant growth in water demand of over 465% percent.

Table 4-24 – Summary Present and Future Demands for Zone 4

(AF/Year)	2010	2015	2020	2025	2030	2035	2040
Retail Treated Total Demand	172	306	439	573	707	800	801

Note: Based on demand factors and a 2035 build-out. The 2010 estimate is an approximation from PCWA sales data and is not expected to equate to a calculation of estimated demand factors and estimated number of dwelling units served under current conditions.

4.4 Summary of Water Demands

As shown in Table 4-25, PCWA's projected demands across its entire service area are projected to grow from current total demands of about 150,000 acre-feet per year to over 260,000 acre-feet per year at build-out – an increase of about 75 percent over current demand. Over the next 20 years, the planning horizon for the Urban Water Management Planning Act, this growth in demand reaches about 220,000 acre-feet annually, which represents a growth of about 40 percent.

Table 4-25 – Summary of Present and Future Demands System Wide

Normal Year (AF/Year)	2010	2015	2020	2025	2030	2035	2040	BO
Zone 1 Retail Treated	30,506	32,166	33,854	36,039	38,238	41,309	44,400	69,701
Zone 3 Retail Treated	762	769	749	764	753	782	811	811
Zone 4 Retail Treated	172	306	439	573	707	800	801	801
Total Retail Treated	31,440	33,242	35,043	37,377	39,698	42,891	46,011	71,312
Zone 1 Irrigation	56,295	56,295	56,295	56,295	56,295	56,295	56,295	56,295
Zone 3 Irrigation	6,134	6,134	6,134	6,134	6,134	6,134	6,134	6,134
Zone 5 Irrigation	11,038	11,038	9,483	7,928	6,373	4,803	3,263	1,699
Total Irrigation	73,467	73,467	71,912	70,357	68,802	67,232	65,692	64,128
Sales to Other Agencies	35,400	57,967	68,652	79,370	79,411	80,941	92,470	94,000
Zone 3 Untreated	571	571	571	571	571	571	571	571
Total Untreated	35,971	58,538	69,223	79,941	79,982	81,512	93,041	94,571
Zone 1 Wholesale Treated	10,671	16,515	20,944	25,374	29,805	31,608	33,410	35,213
Total Demand	151,548	181,762	197,122	213,048	218,287	223,242	238,154	265,225

4.4.1 Low Income Household Water Demand

California water code § 10631.1 requires water suppliers to include a projection of water use by lower income households as defined by §50097.5 of the Health and Safety Code. The housing element of the Placer County General Plan provides the income distribution used for this analysis.[56] This housing element, adopted in 2009, uses a 1999 data. The income limits for "lower income" are to come from Department of Housing and Policy Development. Only values for 2006 through 2010 are available so values were taken from 1999 US Department of Housing and Urban Development income limits. The 1999 Placer County "lower income" values for 2 person and 3 person households were $33,200 and $37,350 respectively.[57] As PCWA uses and estimate of between 2 and 3 people per household it is assumed that a dollar value between those two would be appropriate. While this could be calculated more accurately, the placer county housing element has an income split at less than $35,000 yearly income. This split correlates to 28.1% for unincorporated portions of Placer County and 27% for incorporated areas of Placer County. A weighted average of 27.4% of the 1999 Placer County population was considered "lower income". For lack of more recent income distributions, this 27.4% is assumed to remain constant into the future. Using 27.4% of the projected population, a weighted average of demand factors from medium and low density housing units of .42 AF/Yr, and 2.77 people per housing unit, the current and future demand from "lower income" customers is presented in **Table 4-26**.

Table 4-26 – Lower Income Demands

AF/Yr	2010	2015	2020	2025	2030	2035
Total Retail Treated	31,440	33,242	35,043	37,377	39,698	42,891
Lower Income	4,235	4,635	5,010	5,358	5,681	5,994
% of Treated	13.5%	13.9%	14.3%	14.3%	14.3%	14.0%

Note: Low Income demand factor adjusted to show linear reduction of 10% by 2030.

[56] Placer County General Plan- Housing Element, pg 21, Table 8- Household Income Distribution
[57] www.huduser.org/portal/datasets/il/fmr99rev/index.html

4.5 Future Target Water Use

4.5.1 Baseline Daily Per Capita Water Use Analysis

"Baseline per capita daily water use" is an urban retail water supplier's estimate of its average gross water use, reported in gallons per capita per day and calculated over a continuous 10-year period ending no earlier than December 31, 2004, and no later than December 31, 2010.[58] "Gross water use" is defined as the total volume of water, whether treated or untreated, entering the distribution system of an urban retail water supplier, excluding recycled water, water in long-term storage, water conveyed to another urban water supplier, and possibly water delivered for agricultural use.[59]

4.5.1.1 Distribution System

For this analysis, PCWA's "distribution system" includes all treatment and conveyance systems from the point raw water enters PCWA's surface water treatment plants serving Zones 1, 2, and Zone 3.[60] It also includes all treatment and conveyance systems from the point PCWA's groundwater wells produce water in Zone 4.[61] PCWA's "distribution system" does not include the small percentage of raw water deliveries for municipal and industrial purposes.[62]

4.5.1.2 Gross Water Use

To calculate "gross water use," PCWA treatment plant inflow data for the period 1995-2010 was totaled for the four water treatment plants serving Zones 1 and 2 (Foothill, Sunset, Auburn, Bowman) and the four water treatment plants serving Zone 3 (Alta,

[58] CWC § 10608.12(b)(1). This analysis currently only analyzes baseline daily per capita water use through 2009. At the point all relevant 2010 data is available, the calculations should be updated for purposes of inclusion in the 2010 UWMP. It is unlikely that use of the 2010 data will change the baseline daily per capita water calculations such that PCWA would select a new baseline period, but the 2010 data may be instructive when considering the existing per capita water use of the PCWA customers in the distribution system.

[59] CWC § 10608.12(g).

[60] For the period 1995-2003, the "distribution system" also includes all treatment and conveyance systems from the point PCWA's groundwater wells produced water in Zone 2.

[61] This analysis does not currently assess baseline daily per capita water use for Zone 4. Zone 4 is an isolated distribution system outside of Truckee California that supplies local groundwater to a limited number of new homes in a gated golf community. This service area has inconsistent use, due in part to the intermittent use of the homes by their owners.

[62] See *Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use*, October 1, 2010, p. 15, which provides that "In some systems, some retail customers receive water for municipal and industrial uses directly from transmission canals and pipes, in which case the retail water supplier may treat the sections of the transmission canals and pipes delivering water to the retail M&I customers as part of its distribution system." While PCWA serves customers raw water on a retail basis for municipal purposes throughout Zones 1 and 3, PCWA is not including these facilities and the customers receiving water there from in its "distribution system."

Colfax, Monte Vista and Applegate).[63] Total water entering the treatment plants is provided in **Table 4-27**.

Table 4-27 – Water Entering PCWA Treatment Plants

Base Years	Zones 1 and 2 (acre-feet)	Zone 3 (acre-feet)	Total (acre-feet)
1995	19,856	811	20,666
1997	24,145	737	24,882
1998	20,841	679	21,519
1999	25,670	672	26,342
2000	28,201	776	28,977
2001	29,275	839	30,114
2002	31,772	855	32,627
2003	32,388	842	33,229
2004	38,065	888	38,953
2005	36,009	773	36,783
2006	37,210	790	38,000
2007	39,290	808	40,098
2008	41,342	879	42,222
2009	38,404	834	39,238
2010	35,253	709	35,962

To calculate "Gross Water Use," the treated water conveyed to other water suppliers (Treated Wholesale Sales) in Zone 1 were subtracted from the total water entering the system. The totals are shown in **Table 4-28**.[64]

Table 4-28 – Zone 1 Treated Wholesale Sales

Retailer (Sales in AF/Year)	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Cal American Water Company	--	--	--	--	--	--	103	453	216	377	608	945	1,059	1,109	931	--
City of Lincoln	1,662	1,669	1,906	1,739	2,297	2,614	2,855	3,816	4,847	7,301	8,197	8,740	9,396	9,442	9,320	8,253
Folsom Lake Mutual Water Company	--	--	--	--	9	158	157	155	145	159	144	153	154	159	150	--
Golden Hills Mutual Water Company	--	--	--	--	2	36	35	31	29	34	28	31	30	34	29	--
Hidden Valley Community Association	--	--	--	--	7	70	73	75	68	72	76	95	80	69	70	--
Lakeview Hills Community Association	--	--	--	--	6	66	66	69	68	69	63	60	58	65	59	--
Willow-Glen Water Company	--	--	--	--	1	9	10	10	10	10	9	9	9	9	9	--
Total	1,662	1,669	1,906	1,739	2,321	2,954	3,299	4,609	5,383	8,022	9,125	10,032	10,785	10,886	10,568	8,253

PCWA has not historically used recycled water in its retail distribution system and therefore recycled water does not need to be excluded from the total volume of water entering the distribution system. Also, because PCWA's treated water distribution system storage is equal to approximately maximum day demand, and is intended to shed peaks and provide storage for short duration emergencies, there is not a significant change in PCWA's treated water storage volumes over the course of the year.[65]

[63] Treatment plant inflow data obtained from Tony Firenzi by e-mail on November 12, 2010 and February 9, 2011. Also, 2010 data was obtained from Jack Warren on January 13, 2011.
[64] Data obtained from Jack Warren on January 13, 2011. Data updated on February 23, 2011.
[65] E-mail communication from T. Firenzi, January 13, 2011.

Therefore, there is no adjustment made for water in long-term storage. Gross water use for Zones 1 and 2 as well as Zone 3 are provided in **Table 4-29**.

Table 4-29 – Gross Water Use

Base Years	Zones 1 and 2 (acre-feet)	Zone 3 (acre-feet)	Total (acre-feet)
1995	18,194	811	19,004
1996	19,049	709	19,758
1997	22,239	737	22,976
1998	19,102	679	19,780
1999	23,350	672	24,022
2000	25,246	776	26,023
2001	25,976	839	26,815
2002	27,162	855	28,018
2003	27,004	842	27,846
2004	30,043	888	30,931
2005	26,884	773	27,657
2006	27,178	790	27,968
2007	28,505	808	29,313
2008	30,456	879	31,336
2009	27,836	834	28,671

4.5.1.3 Population Analysis

The Department of Water Resources has identified three acceptable methodologies for estimating population during the period 1995-2010 for purposes of calculating baseline daily per capita water use. Because PCWA's treated retail water service boundaries do not substantially overlap with city boundaries in baseline years, nor does PCWA maintain a geographic information system map of its distribution area and a corresponding relationship with an association of local governments which maintains population data from the California Department of Finance (DOF) or the U.S. Census Bureau, PCWA anchored year 2000 residential connections to the 2000 Census Bureau population estimate and then scaled forward and backward using data for active residential connections.

First, population information for all Placer County census blocks was obtained from the U.S. Census Bureau web site using the procedures specified by the California Department of Water Resources.[66] The 'Total Population' and 'Group Quarters Population by Group Quarters Type' was selected from the "Census 2000 Summary File 1 (SF-1) 100-Percent Data" file. Using a PCWA map that identifies the areas receiving treated and raw water service, the Census Block Groups were identified.[67] Then, the specific Census Blocks in

[66] See Step 2 of Appendix A in *Methodologies for Calculating Baseline and Compliance Per Capita Urban Water Use.*
[67] The map titled "Parcels Served 1008" was provided by PCWA staff on January 31, 2011.

each Census Block Group were selected by identifying the treated water service areas in the map provided by PCWA. Only those Census Blocks to which the map indicates PCWA provides treated water service to at least half of the area were included for population analysis purposes.[68] The total year 2000 population identified by the U.S. Census Bureau for each Census Block is included, as well as the portion of the population in each Census Block residing in units receiving water service through a Single Family connection or Multi Family connection respectively. The population was assigned to a water service connection type by using Single Family connection and Multi Family connection ratios, which were developed from the U.S. Census Bureau's 'Census 2000 Summary File 3 (SF-3) Sample Data' file.

For purposes of this analysis, the following U.S. Census Bureau structure types were included in the Single Family connection category:

- 1 Detached Unit (in structure)
- 1 Attached Unit (in structure)
- 2 Units (in structure)

All remaining U.S. Census Bureau structure types were assigned to the Multifamily connection category, including:

- 3-4 Units (in structure)
- 5-9 Units (in structure)
- 10-19 Units (in structure)
- 20-49 Units (in structure)
- 50 or more Units (in structure)
- Mobile Home
- Boat, RV, Van, Etc.

Based on these assignments, the population in structure types receiving water through a Single Family connection was aggregated. The population in structure types receiving water through a Multifamily connection was calculated by subtracting the aggregated

[68] All Census Blocks receiving water service are identified in an electronic spreadsheet by PCWA water service zone. All Census Blocks included in the population total are colored in orange.

Single Family population total from the Total Population for each Census Block Group.[69] Then Single Family and Multifamily ratios were estimated for each Census Block Group by dividing the population in each category by the total population in each Census Block Group. These ratios were then used to allocate the population in the SF-1 database at the Census Block level in each Census Block Group.

Using the SF-1 database, the total population receiving water through a Single-Family connection and Multifamily connection respectively was estimated for Zone 1 and Zone 3 in the year 2000. The Census Block Groups were then assigned to Zone 1 and Zone 3 as shown in **Table 4-30** so that a unique population estimate could be generated for Zones 1 and 2, as well as Zone 3.

Table 4-30 – Census Block Group Zone Assignments

Zones 1 and 2	Zone 3
203001, 203002, 204001, 204002, 204003, 205002, 205003, 205005, 206012, 206013, 206021, 206022, 206023, 206024, 206025, 206043, 207041, 209021, 210041, 210051, 211031, 211032, 211033, 211034, 211041, 211051, 211061, 211071, 211072, 211081, 211082, 211091, 212001, 212002, 212003, 212004, 212005, 213012, 213031, 215012, 215013, 215021, 215022, 218012, 218021, 218022, 218023, 218024	219012, 219022, 220011, 220012, 220013, 220021, 220022, 220023

Based on these assignments, the total population in Zones 1 and 2, as well as Zone 3 was aggregated by Single Family connection and Multifamily unit. Using year 2000 connection data for Zones 1 and 2, as well as Zone 3 provided by PCWA, a persons-per-connection ratio was developed for the Single Family connection and Multifamily unit categories in both Zones 1 and 2, as well as Zone 3. The persons per connection ratios are provided in **Table 4-31**.

Table 4-31 – Year 2000 Population and Persons Per Connection Ratios

Zone	Connection Type	Year 2000 Population	Year 2000 Connections	Persons/ Connection
Zones 1 and 2	Single Family	59,631	20,322	2.93
	Multifamily	10,116	6,159	1.64
Zone 3	Single Family	2,721	904	3.01
	Multifamily	365	367	1.00

[69] The Multifamily population is calculated as the difference between Total Population and the Single Family connection population rather than aggregated from the assigned Multifamily structure types to properly capture the population residing in 'Group Quarters.' 'Group Quarters' are not within the definition of 'Occupied Housing Units,' which is the classification that the assigned structure types fall under.

4.5.1.4 Population for Non-Census Years

For non-census years (1995-1999 and 2001-2009), the population is estimated by multiplying the persons per connection ratios in **Table 4-31** by the number of connections in each category as shown in **Tables 4-32** and **4-33**.[70]

Table 4-32 – Zone 1 and 2 - Single Family and Multifamily Unit Connections

Year	Single Family Connections	Multi Family Units
1995	16,610	5,035
1996	17,136	5,194
1997	17,711	5,368
1998	17,997	5,455
1999	18,998	5,758
2000	20,322	6,159
2001	21,924	6,567
2002	23,732	6,567
2003	24,862	7,045
2004	25,774	7,324
2005	26,285	7,400
2006	27,007	7,721
2007	27,322	8,055
2008	27,500	8,057
2009	27,636	8,057

Table 4-33 – Zone 3 – Single Family and Multifamily Unit Connections

Year	Single Family Connections	Multi Family Units
1995	881	342
1996	879	342
1997	888	345
1998	906	352
1999	914	355
2000	932	362
2001	934	367
2002	945	367
2003	1,014	367
2004	1,027	369
2005	1,042	353
2006	1,045	371
2007	1,049	353
2008	1,052	353
2009	1,050	403

[70] Connection data provided by PCWA staff via e-mail on January 24, 2011 and as adjusted by PCWA in June for Zone 1 and Zone 3 connections from 1995 to 2000 as a result of variances in PCWA's pre-2000 and post-2000 accounting methodology.

The population estimates for the years 1995-2009 are included in **Tables 4-34** and **4-35**. These population estimates are used to assess baseline daily per capita water for Zones 1 and 2, as well as Zone 3 separately and also for Zones, 1, 2 and 3 combined.

Table 4-34 – Zones 1 and 2 –Single Family and Multifamily Population

Year	Single Family Population	Multifamily Population	Total
1995	48,741	8,268	57,009
1996	50,284	8,530	58,814
1997	51,969	8,816	60,785
1998	52,808	8,958	61,767
1999	55,748	9,457	65,205
2000	59,631	10,116	69,747
2001	63,856	10,833	74,688
2002	69,638	10,785	80,423
2003	72,953	11,570	84,524
2004	75,629	12,028	87,658
2005	77,129	12,153	89,282
2006	79,247	12,680	91,928
2007	80,172	13,229	93,401
2008	80,694	13,232	93,926
2009	81,093	13,232	94,325

Table 4-35 – Zone 3 – Historic Single Family and Multifamily Population

Year	Single Family Population	Multifamily Population	Total
1995	2,650	341	2,991
1996	2,646	340	2,986
1997	2,671	344	3,015
1998	2,728	351	3,079
1999	2,751	354	3,105
2000	2,806	361	3,167
2001	2,844	366	3,210
2002	2,844	365	3,209
2003	3,052	365	3,417
2004	3,091	367	3,458
2005	3,136	352	3,487
2006	3,145	369	3,514
2007	3,157	352	3,508
2008	3,166	352	3,517
2009	3,160	401	3,561

4.5.1.5 Baseline Water Use Calculation

Using the Gross Water Use data provided in **Table 4-29** and the population data provided in **Tables 4-34** and **4-35**, annual daily per capita water use was calculated, and the results are summarized in **Table 4-36**.

Table 4-36 – Zones 1, 2 and 3 Annual Daily Per Capita Water Use

Base Years	Distribution System Population	Gross Water Use (acre-feet)	Daily Per Capita Use (gpcd)
1995	60,000	19,004	283
1996	61,800	19,758	285
1997	63,800	22,976	321
1998	65,500	19,780	270
1999	69,000	24,022	311
2000	73,650	26,023	315
2001	78,294	26,815	306
2002	83,632	28,018	299
2003	87,941	27,846	283
2004	91,116	30,931	303
2005	92,770	27,657	266
2006	95,442	27,968	262
2007	96,909	29,313	270
2008	97,444	31,336	287
2009	97,887	28,671	261

From these annual figures, the baseline daily per capita water use was calculated for the six 10-year time periods ending no earlier than December 31, 2004 and no later than December 31, 2009. The results are provided in **Table 4-37**. Based on a review of the results, PCWA will select the 1995-2004 baseline daily per capita water use as its baseline period. The per capita water use during this period averaged 298 gallons per capita per day.

Table 4-37 – Zones 1, 2 and 3 Baseline Daily Per Capita Water Use

Period	GPCD	Chosen
1995-2004	298	√
1996-2005	296	
1997-2006	294	
1998-2007	288	
1999-2008	290	
2000-2009	285	

4.5.2 Water Use Target

4.5.2.1 Method 1 Target Calculation

One method that may be used to determine PCWA's "water use target" is to estimate eighty percent of PCWA's baseline daily per capita water use.[71] Using this target, 80% of PCWA's baseline daily per capita water use is **238 gpcd**. PCWA must also achieve an "interim water use target," which is the midpoint between its baseline daily per capita water use and its water use target.[72] Using Method 1 and the same water use target, PCWA's interim water use target is **268 gpcd**. PCWA would need to achieve its water use target by December 31, 2020 and its interim water use target by December 31, 2015.[73]

4.5.2.2 Method 4 Target Calculation

Alternatively, PCWA may adopt a target based on the methodology developed by the Department of Water Resources pursuant to CWC § 10608.20 (b)(4) (i.e., "Method 4"). DWR issued *Provisional Method 4 for Determining Water Use Targets* on February 16, 2011, which an urban water supplier selecting Method 4, must use to calculate its water use target. DWR developed the Method 4 Target Calculator to facilitate calculation of an urban water supplier's water use target. The Method 4 Target Calculator helps an urban water supplier calculate potential water savings in three unique sectors: (1) residential indoor; (2) commercial, industrial and institutional (CII), and (3) landscape water use, water loss and other unaccounted for water sectors. The combined potential savings from these sectors is subtracted from an urban water supplier's Base Daily Per Capita Water Use to develop its target.

There are two approaches for calculating potential residential indoor savings. An urban water supplier can use the default value of 15 gpcd, which was selected based on an analysis by DWR which found that an urban water supplier could achieve about this quantity of savings through implementation of toilet, showerhead, and clothes washer rebate and installation programs. Alternatively, an urban water supplier can calculate potential savings through implementation of rebate and installation programs by estimating the existing saturation rate for each type of appliance. Once estimated, the Target Method 4 Calculator projects potential additional installations necessary to achieve a target saturation rate and then estimates the associated water savings with achievement of the saturation rate. As for potential CII savings, the Target Method 4 Calculator assumes an urban water supplier can achieve a 10% water savings in the CII sector compared to CII use in the "mid-point" year of the 10-year period used to estimate

[71] CWC § 10608.20(b)(1).
[72] CWC § 10608.12(j).
[73] CWC § 10608.24(a)-(b).

its Base Daily Per Capita Water Use. In the landscaping and water loss sectors, the Target Method 4 Calculator projects potential savings by assuming an urban water supplier can achieve 21.6% savings from these sectors. The existing use in these sectors is calculated by subtracting indoor (default 70 gpcd) and mid-point CII use, measured in gpcd, from an urban water supplier's Base Daily Per Capita Water Use.

Based on the series of calculations shown in **Appendix C-5**, PCWA's water use target under Method 4 is **241.5 gpcd**. The assumed indoor savings is 15 gpcd because PCWA does not currently have a reliable indoor fixture and appliance saturation estimate for the mid-point year of the baseline period (1999), nor does it have sufficient rebate data for the Target Method 4 Calculator to estimate the 1999 saturation rate. PCWA estimates 5.3 gpcd of potential savings in the CII sector based on a mid-point year (1999) population of 69,000 persons, and a 1999 CII demand of 5,173 acre-feet as shown in **Table 4-38**.

Table 4-38 – 1999 CII Water Use by Sector

CII Estimate (acre-feet)	All Zones
Commercial	2,859
Industrial	1,092
Institutional (Mun.)	1,014
Construction	202
Other	6
Total	5,173

Note: Source 2006 PCWA Comprehensive Annual Financial Report, p. 62.

As for landscape irrigation and water loss savings potential, the Target Method 4 Calculator estimates that PCWA can save 35.1 gpcd, which is the product of multiplying PCWA's estimated per capita landscape and water loss demand of 162.5 gpcd by 21.6%.

Thus, total potential savings using the Target Method 4 Calculator is 56.5 gpcd. When subtracted from the Base Daily Per Capita Water Use of 298 gpcd, the 2020 water use target is 241.5 gpcd, and the 2015 interim water use target is 269.8 gpcd. These values are rounded to **241 gpcd** and **270 gpcd** accordingly.

4.5.2.3 Selection of a Water Use Target

Based on the analysis of both Method 1 and 4 targets, PCWA will select the 2020 water use target estimated using Method 4. Method 2 and Method 3 were not considered as reasonable due to Method 2 requiring substantial data collection, which is not appropriate for a system such as PCWA, and Method 3 being calculated from DWR's Draft 20x2020 Plan, which resulted in a regional target 50 gpcd less than the Method 1 target. The selected targets using Method 4 are shown **in Table 4-39**.

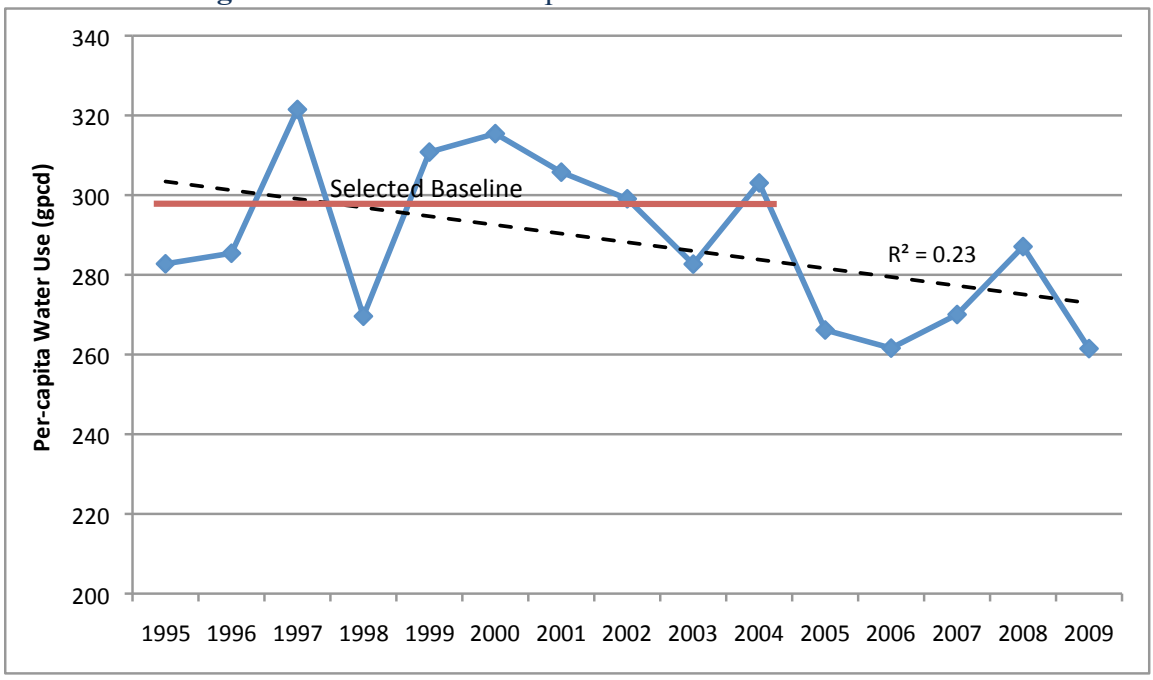
Table 4-39 – Selected 2015 Interim Target and 2020 Target

Period	Baseline	2015 Interim	2020 Target
	1995-2004	GPCD	GPCD
1995-2004	298	270	241

4.5.2.4 Analysis of Target Water Use and Historic Trends

As presented earlier in this Section, PCWA has calculated its average annual daily per-capita water use for each year from 1995 through 2009 (see Table 4-36). These values are plotted in **Figure 4-1**, accompanied by the chosen 1995-2004 baseline.

Figure 4-1 – Annual Per-capita Water Use and Selected Baseline



Understanding the Impact of Landscape Water Demand on Per-Capita Use

PCWA's service area is dominated by low-density suburban residential development. Approximately 95 percent of PCWA's retail treated water customers live in or near the Placer County cities of Auburn, Rocklin and Loomis. This service area has a gross density of about 2500 persons per square mile. Urban growth in this region has been very strong since the mid 1980's and was frequently noted as one of the fastest growing areas of the State between 1997 and 2006.

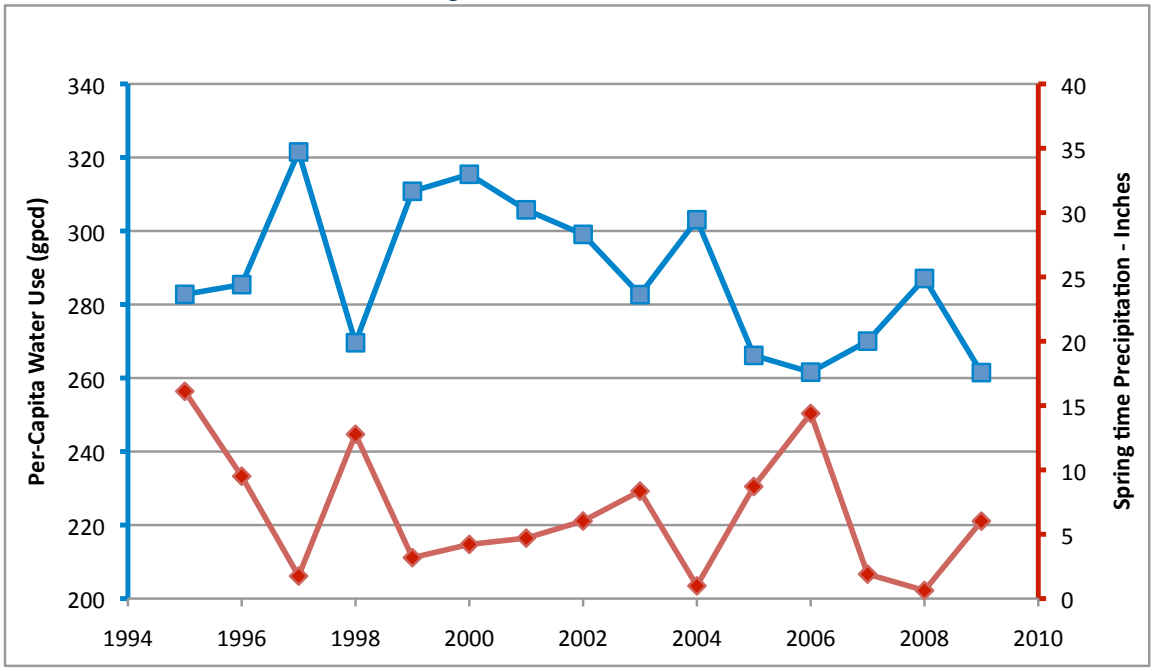
The single largest use of water by the Zone 1 retail treated water customers is landscape irrigation. To illustrate this fact, the average daily treated water production rate for the primary water treatment plants in Zone 1 in January 2006 was 15 million gallons per day (mgd), while the average production rate in July was 61 mgd – a difference driven by the

demands of irrigated landscape. This differential indicates that over 70 percent of PCWA's summer water use is for landscape irrigation. (These data include wholesale deliveries to the City of Lincoln and Cal American Water Company, which will each prepare its own UWMP, but who's summer demand is also driven by landscape irrigation.)

Normalizing Annual Per-capita Water Use

Discerning a pattern from the annual per-capita water use data shown in **Figure 4-1** is difficult. While the annual average use appears to trend downward slightly, the annual variance from the trend line is large ($R^2 = 0.23$), which affects the ability to draw meaningful conclusions from the raw data. Understanding that PCWA customers' water use is dominated by landscape irrigation, the relationship between precipitation, specifically springtime precipitation, and annual per-capita use was investigated to enable a better analysis of trends.

Figure 4-2 – Relationship of Springtime Precipitation to Annual Per-Capita Water Use



As shown in **Figure 4-2**, the annual per-capita water use and the total springtime precipitation (using March, April and May data measured at Folsom Dam) is highly variable from year to year. But, it is also discernable that an obvious and strong correlation exists between total springtime precipitation and annual per-capita water use. In years with high spring precipitation the annual average GPCD drops, while in years with low spring precipitation the annual average GPCD increases. This reflects the

expected reality of urban residential customers turning on irrigation systems early in spring when rainfall is sparse, or later in spring when rainfall is average or above average.

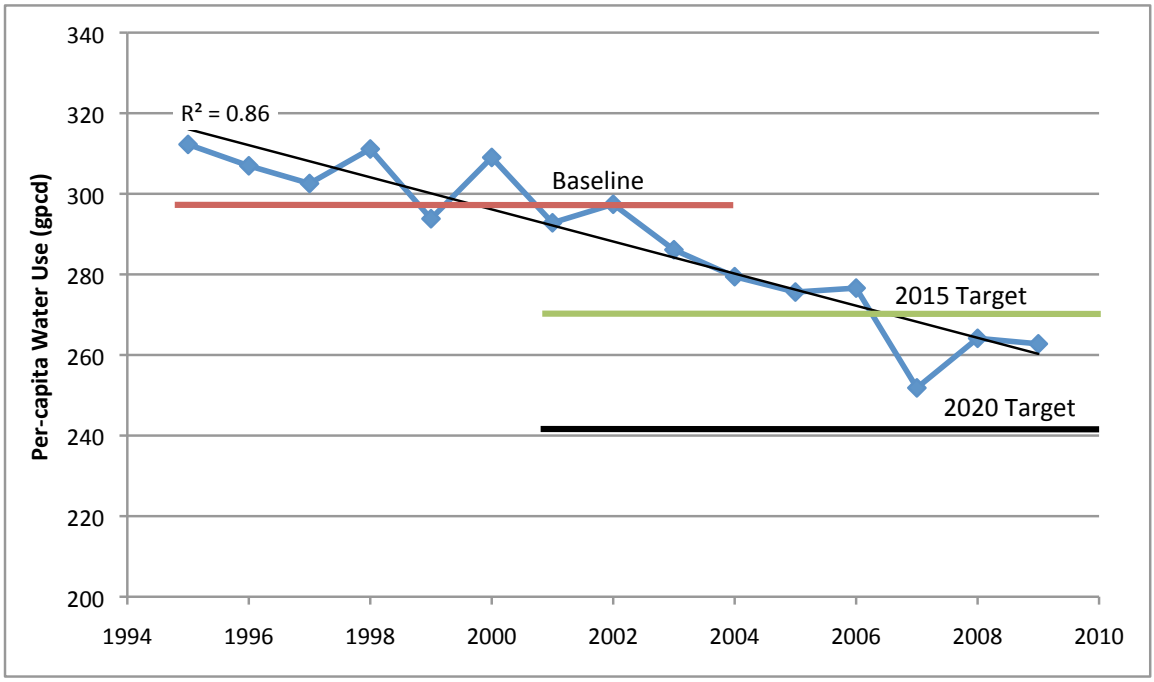
Given the strong correlation between the data sets, PCWA believes that "normalizing" the per-capita data to remove the effect of varied springtime precipitation would help with understanding possible trends in average per-capita use. In statistics, normalizing data involves calculating the number of standard deviations from the mean of each point of the control data (precipitation) and applying the same deviation as a correction to the correlated data (per-capita water use).

However, to also accommodate the customers' likely tendencies to "wait" to turn on irrigation systems in the early spring (March) if rainfall is sparse, versus not waiting as rainfall remains sparse into April and May, weighting was applied to the precipitation data. Precipitation in March was given a weight of 1; precipitation in April was judged to have a greater impact on irrigation and was given a weight of 2; and May was given a weight of 5. The deviation from the mean of the weighted spring precipitation data was calculated, and the resulting value was applied as a correction to the annual per-capita data. The resulting normalized per-capita water use, plotted with the 1995-2004 Baseline, the 2015 Interim Target and the 2020 Water Use Target, is presented in **Figure 4-3**.

The reader will note that scales on Figures 4-1, 4-2 and 4-3 indicating the per-capita water use are identical. The dramatic improvement in the consistency of the data when normalized for spring precipitation is a testament to the effect that landscape water use has on total water use in PCWA's system. The computer generated trend line has a much higher correlation to the normalized data ($R^2 = 0.86$) when compared to the trend line using the raw data (R2 = 0.23).

Normalizing the data to eliminate the effects of highly variable springtime precipitation on landscape water use provides PCWA with a representation of water use under average spring precipitation conditions, and dramatically improves the understanding of how PCWA customers' per-capita water use is changing over time. This improves PCWA's understanding of trends in relation to the identified 2015 Interim Target of 270 gpcd and the 2020 Water Use Target of 241 gpcd.

Figure 4-3 – Normalized Annual Per-Capita Water Use Trend



Note: The historic per-capita values from Table 4-36 were normalized to plot the line. Normalization included adjusting the values to account for normal and wet springs versus dry springs. The timing and quantity of spring precipitation will affect when customers generally begin irrigating outdoor landscaping.

Consistency with Expectations

To understand the data and representations in the previous figures, an understanding of the circumstances that have affected PCWA's water use over the period is necessary.

As previously noted, residential growth has been a significant factor over the period of analysis. The population of Placer County doubled in the 20 years between 1990 and 2010. This means that newer housing with current plumbing standards, smaller average lots sizes and newer distribution system piping have increasingly influenced the demands placed on PCWA – all factors that would drive per-capita water use lower.

In 1994 PCWA began participating in the Sacramento Area Water Forum along with most of the other water purveyors in the region. This interest based collaborative reached a comprehensive agreement to provide a reliable supply of water for the region's planned growth and to preserve the fishery, wildlife, recreational, and aesthetic values of the Lower American River. This Agreement committed PCWA to implement conservation best management practices. (Later these BMPs were conformed to the CUWCC BMPs.)

PCWA has always been fully metered (a legacy of the transfer of ownership of the Zone 1 system from PG&E to PCWA in 1968). Additionally, the geography and topography of PCWA's service area makes the water system relatively expensive to operate, resulting in

water rates that are higher than lower elevation and more compact neighboring purveyors. Implementing water use best management practices (BMPs), including inclining-block commodity pricing, with a fully metered system and relative high starting water rates, enabled PCWA to achieve immediate improvements in water use efficiency and sustain continued improvements as it ramped up BMP efforts, as required by the Water Forum, over time.

PCWA was an early adopter of water use efficiency practices both to protect the environment and as a tool for infrastructure cost management during a period of rapid growth. The consistent downward trend in normalized per-capita water use over the period of analysis, as shown in **Figure 4-3**, is reflective of the combined effects of strong growth, which raises the average efficiency of the built system, and increasing BMP implementation, to improve the efficiency of the legacy system. Assessing the trends shown in **Figure 4-3**, PCWA is clearly on track to meet the identified 2020 Water Use Target required with the 2009 passage of SBx7-7.

4.5.2.5 Minimum Water Use Reduction Requirement

PCWA must also comply with a minimum water use reduction requirement.[74] PCWA's 2020 water use target is 241. For each of the three five-year periods ending December 31, 2007, 2008 and 2009, 95 percent of average daily per capita water use was greater than 241 gpcd. Because PCWA's selected water use target is less than 95 percent of the average per capita water use for the three five-year periods ending December 31, 2007, 2008 and 2009, as shown in **Table 4-40**, PCWA will use 241 gpcd as its water use target.

Table 4-40 – 95% of 5-Yr. Baseline

Period	95% of 5-Yr. Baseline (gpcd)
2003-2007	263
2004-2008	264
2005-2009	256

4.5.3 Compliance Daily Per Capita Water Use

PCWA is to report to DWR on its progress in meeting its urban water use targets as part of its UWMPs submitted pursuant to CWC § 10631.[75] Thus, PCWA will need to report on its progress in both its 2015 and 2020 UWMPs, which are to be submitted to DWR by December 31, 2015 and December 31, 2020 respectively. As part of the progress reports, PCWA should include its "compliance daily per capita water use," which is the gross

[74] CWC § 10608.22 provides that "An urban retail water supplier's per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use over a continuous five-year period ending no earlier than December 31, 2007 and no later than December 31, 2010."
[75] CWC § 10608.40.

water use during the final year of the reporting period, reported in gallons per capita per day.[76] Documentation of compliance must include the basis for determining the estimates, including references to supporting data.

[76] CWC § 10608.12(e).

CHAPTER 5. WATER DEMAND MANAGEMENT MEASURES

5.1 Agency Participation

5.1.1 California Urban Water Conservation Council

CWC § 10631 requires that an UWMP include a description of the urban water supplier's water demand management measures. CWC § 10631 also provides that members of the California Urban Water Conservation Council (CUWCC) shall be deemed in compliance with the UWMPA demand management measure requirements by complying with all the provisions of the CUWCC MOU and by submitting the annual reports.[77]

PCWA signed the CUWCC MOU in 2003. As a signatory to the CUWCC MOU, PCWA is committed to implementing best management practices (BMP) designed to achieve water conservation across existing and future demand sectors. The CUWCC MOU requires that a water utility implement only the BMPs that are economically feasible. PCWA's continued implementation of the CUWCC BMPs should reduce some of the unit demand factors for its existing connections and help maintain the unit demand factors for future connections, which PCWA expects to be lower than historically realized for the same connection type.

When PCWA last submitted a report to the CUWCC in 2008, the CUWCC required implementation of fourteen identified BMPs, as numbered and described in **Table 5-1**. PCWA's 2008 report indicates that it is implementing all BMPs, as required in the CUWCC MOU.

[77] CWC § 10631(j).

Table 5-1 – Historic CUWCC BMPs

BMP Number and Name in 2008		Implementation by PCWA
1	Water Survey Programs for Single-Family Residential and Multi-Family Residential Customers	Yes
2	Residential Plumbing Retrofit	Yes
3	System Water Audits, Leak Detection and Repair	Yes
4	Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections	Yes
5	Large Landscape Conservation Programs and Incentives	Yes
6	High-Efficiency Clothes Washing Machine Financial Incentive Programs	Yes
7	Public Information Programs	Yes
8	School Education Programs	Yes
9	Conservation Programs for Commercial, Industrial and Institutional (CII) Accounts	Yes
10	Wholesale Agency Assistance Programs	Yes
11	Retail Conservation Pricing	Yes
12	Conservation Coordinator	Yes
13	Water Waste Prohibition	Yes
14	Residential ULFT Replacement Programs	Yes

After the time that PCWA prepared its 2005 UWMP and filed an annual report with the CUWCC in 2008, the CUWCC changed the name and number of each Best Management Practice (BMP). The CUWCC now organizes BMPs into five categories. Two categories, Utility Operations and Education, are "Foundational BMPs," because they are considered essential activities. The remaining BMPs are considered "Programmatic" and are organized into Residential, Commercial, Industrial, and Institutional and Landscape Categories. The list of BMPs and general implementation requirements are shown in **Table 5-2**.[78] PCWA has recently filed its annual reports for 2009 and 2010 with the CUWCC, it will do so according to the updated BMP standards. Because PCWA's most recent annual report submitted to CUWCC satisfies the requirements for implementation of demand management measures, PCWA has included its 2010 CUWCC report in **Appendix B-5**.

[78] The measures described in Table 5-2 are from the June 9, 2010 version of the CUWCC MOU.

Table 5-2 – CUWCC BMPs and Associated Standards

FOUNDATIONAL BMPS
1. Utility Operations Programs
1.1 Operations Practices
Staff and maintain the position of a trained conservation coordinator
Enact and enforce an ordinance designed to prevent water waste
Enact and enforce an ordinance designed to promote water efficient design in new development
Enact and enforce an ordinance designed to facilitate water shortage response measures
1.2 Water Loss Control
Compile a standard water audit and balance annually
Improve data accuracy and completeness of water audit during first four years
During 5th through 10th year, demonstrate progress in water loss control
1.3 Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections
Initiate volumetric billing for all metered customers within one year after signing MOU
Complete meter installations for all connections no later than July 1, 2012
Assess feasibility of moving mixed-use metered landscape uses to dedicated landscape meters
Develop a written plan, policy or program to test, repair or replace meters
1.4 Retail Conservation Pricing
Develop water rates such that 70% of revenue is generated from volumetric billing
Develop conservation pricing for retail sewer service
2. Education Programs
2.1 Public Information Programs
Implement public information programs to promote water conservation and water-conservation benefits
2.2 School Education Programs
Educate students about water conservation and efficient water use
PROGRAMMATIC BMPS
3. Residential
Develop a Residential Assistance Program - including leak detection assistance, conservation surveys, and efficiency suggestions, as well as provision of high-efficiency appliances
Perform site-specific landscape water surveys
Provide financial incentives for, or institute ordinances requiring, purchase of efficient clothes washers
Provide incentives or ordinances for replacement of toilets using 3.5 or more gallons per flush
4. Commercial, Industrial and Institutional
Implement measures to achieve water savings for Commercial, Industrial and Institutional (CII) accounts of 10% compared to baseline water use (i.e., 2008 water use by CII accounts)
5. Landscape
Identify accounts with at least one dedicated irrigation meter and assign an ETo based budget of no more than an average of 70% of ETo for metered irrigation uses; "Recreational" areas may be so designated and may use up to 100% of ETo
Provide notices to irrigation meter customers comparing actual use to the water budget
Offer site-specific technical assistance to those accounts at least 20% over budget
Target and market landscape surveys to CII accounts with mixed-use meters, and those CII accounts with large landscapes and offer financial incentives to both

For an urban water supplier to satisfy its demand management measure reporting obligation, it should submit CUWCC reports which document that the urban water supplier is in full compliance with the MOU. The 2010 UWMP Guidebook provides that an urban water supplier may "self-certify" its full compliance with the CUWCC MOU if the new CUWCC database is not completed or ready for use when the supplier is to release its plan for public review. For self-certification, an urban water supplier should submit all data required for documenting BMP, Flex Track Menu or gallons per capita day compliance and documentation that the coverage level for each BMP has been met.

PCWA plans to self-certify its full compliance with the CUWCC MOU. **Appendix B-5** contains the documentation that PCWA has submitted to the CUWCC.

5.1.2 Water Forum Agreement

As a signatory to the Water Forum Agreement, the PCWA will continue to implement a water conservation program that is consistent with the Water Conservation Element of the Water Forum Agreement. In 2005, the PCWA was fully implementing all sixteen Water Forum BMPs. Since 2005, the Water Forum has started to revise the Water Conservation Element of the Water Forum Agreement. Based on the version of the Water Conservation Element approved by the Water Forum Plenary on May 13, 2009, the Water Forum signatories agree that compliance with the CUWCC MOU satisfies the Water Forum Conservation Element. Therefore, the Water Forum will no longer judge compliance with the Water Conservation Element by considering whether a purveyor is implementing the sixteen Water Forum BMPs, and will only consider whether a purveyor is implementing the BMPs contained in the CUWCC MOU, and those in any future amendments of the CUWCC MOU.

5.2 Conservation Potential

5.2.1 Existing Connections

As PCWA continues to implement the CUWCC BMPs, the unit demand factors for existing connections should ultimately be lower. As noted in Chapter 5.1, PCWA was implementing all CUWCC BMPs listed in **Table 5-1** as of 2008, and will implement the CUWCC BMPs consistent with the standards identified in **Table 5-2**. PCWA is in the early stages of implementing many of the BMPs and expects additional savings from these measures in both the residential and nonresidential sectors.

In the residential sector, PCWA will continue to implement indoor and landscape surveys, as well as plumbing retrofit programs. It will also continue key rebate programs, including its ultra-low flush toilet and high-efficiency washing machine rebate programs. Also, PCWA will continue to implement the Foundational BMPs that are required for managing waste and water use during a shortage. In combination, the residential programs and the Foundational BMPs will result in lower future unit demands in the residential sector in Zones 1, 3, and 4. The range of anticipated unit demand savings by residential land-use classification in 2020 compared to the existing unit demand is shown in **Table 5-3**.

Table 5-3 – Zone 1 Existing Residential Connection Conservation Potential

Land Use Category	2020 Conservation Target Value	2030 Conservation Target Value
Upper Zone 1	%	% (below 2020)
High density	5%	5%
Medium density	5%-10%	5%
Low density	5%-10%	5%
Rural Residential	5%	5%
Lower Zone 1	%	% (below 2020)
High density	5%-8%	5%
Medium density	10%	8%
Low density	10%-15%	5%-8%
Rural Residential	5%-8%	5%
Zones 3 & 4	%	% (below 2020)
Multi Family	5%	5%
Single Family	5%	5%

In the nonresidential sector, PCWA will continue to implement programs designed to reduce CII water use by 10% from the base year of 2008 (with adjustments for prior conservation in this sector). The demand analysis in Chapter 4 assumes CII customers can reduce use by another 5% over the next 10 years, which is a conservative target given that PCWA may have to conserve 6-7% over baseline to reach the 2018 target and then has a few additional years to hit the 5% reduction requirement shown in **Table 5-4**. Additional CII savings are anticipated between 2020 and 2030 because PCWA will likely still be a signatory to the CUWCC MOU and actively implementing BMPs. The 2030 savings projection does recognize demand hardening and therefore the same savings value of 5% is applied to the 2020 demand value, as opposed to the existing value.

Table 5-4 – Zone 1 Existing Nonresidential Connection Conservation Potential

Non-Residential	2020 Conservation Target Value	2030 Conservation Target Value
Upper & Lower Zone 1	%	% (below 2020)
Professional Office	5%	5%
Commercial	5%	5%
Industrial	5%	5%
Public	5%	5%
Zones 3 & 4	%	% (below 2020)
Commercial	5%	5%
Public	5%	5%

5.2.2 Future Connections

Given recent state legislation, government regulations, and building trends discussed in **Appendix C-3**, the unit demand factors for most future PCWA connection types should have a lower unit demand than historically seen. The CUWCC requirements should also have an impact on PCWA's ability to maintain the unit demand factors for future connections. To clearly identify how state conservation mandates and CUWCC requirements might impact unit demands for future connection types, PCWA adjusts its unit demand factors over time to reflect the potential savings associated with the best management practices it is actively implementing (see Chapter 4).

While many of the CUWCC BMPs are focused on retrofitting existing infrastructure, some of the BMPs could be valuable for PCWA as they relate to water conservation efforts in new developments. These include Landscape Surveys (current CUWCC BMP 3) which could be designed in such a way as to try to ensure the MWELO Landscape Design requirements remain in place in the field.[79] CUWCC BMP 3 also requires interior surveys for Single and Multi-Family Residential customers, which could help determine whether customers are continuing to use water-efficient indoor appliances (e.g., those meeting the CAL Green Code specifications).[80]

Also, the CUWCC MOU recommends identifying opportunities for installation of dedicated irrigation meters, monitoring progress through billing, and then providing site-specific assistance for accounts 20% over budget. (CUWCC BMP 5) Taking the CUWCC recommendation one step further, the recently adopted CAL Green Code requires installation of separate meters or submeters in nonresidential construction landscapes that are between 1,000 and 2,500 square feet. Thus, irrigation submeters will be in place at many, if not all, future nonresidential sites. PCWA could use this meter data and provide site-specific assistance, which should help maintain a level of water use consistent with its water use planning assumptions.

[79] CUWCC BMP 3 provides that MOU signatories should perform site-specific landscape water surveys that shall include checking the irrigation system and timers for maintenance and repairs; estimating landscaped area; and developing a customer irrigation schedule based on precipitation, climate and landscape conditions.

[80] CUWCC MOU BMP 3 specifically provides that an MOU signatory should offer site-specific leak detection assistance, including a water conservation survey, water efficiency suggestions and/or an inspection, as well as providing WaterSense rated showerheads and faucet aerators.

Two additional BMPs that could help moderate water demands associated with future water service connections are (1) the use of a water conservation coordinator, and (2) enactment and enforcement of a water waste prohibition.[81] As PCWA already has a water conservation coordinator, continued efforts are likely to include implementation of CUWCC BMPs as appropriate in future developments. Also, PCWA will apply its water waste prohibition to new developments as well, which should be effective in limiting wasteful water uses.

[81] CUWCC MOU BMP 1.1(A) provides that a signatory shall designate a person as the agency's responsible conservation coordinator for program management. BMP 1.1(A) also requires a signatory to enact, enforce or support … ordinances … that (1) prohibit water waste … and (2) address irrigation, landscape, and industrial, commercial, and other design inefficiencies.

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CHAPTER 6. WATER SHORTAGE CONTINGENCY PLAN

As an urban water purveyor, Placer County Water Agency must meet the minimum health and safety requirements of a drinking water purveyor to Placer County communities at all times. PCWA has created a water shortage contingency plan to help meet this goal during water shortages. The full version of this plan can be found in **Appendix B-4**.

Given the diversity of PCWA's water systems, including multiple supplies and service to irrigation canals, commercial agriculture, treated water, and wholesale deliveries, the strategy for allocating water during shortages is complex. The system reliability and constraints are described in the Water Shortage Contingency Plan for both the Western Water System and the Eastern Water System.

For the Western Water System it is stated that the Agency's Middle Fork American River Supply is very reliable, whereas, its other supplies, including PG&E, are subject to 50% cutbacks. Given the physical constraints of the water delivery systems and the large difference between treated and irrigation demands dependent upon the reduced PG&E supply, more severe cuts in delivery must be implemented in irrigation canals than in the treated water systems. Additionally, state law and practical necessity dictate that public health and safety needs be prioritized, which reside in the treated water systems and include fire protection, sanitation, hospitals, schools, and other critical needs.

For the Eastern Water System it is stated that the groundwater supplies are very reliable and that the likely cause of a water shortage in this system is infrastructure failure.

Detailed discussion of water supply, water shortage actions, catastrophic failure, financial impacts, and prohibitions during shortages is provided in the Water Shortage Contingency Plan found in **Appendix B-4**. Additionally, a case study of the 2011 failure of PG&E's Bear River Canal is provided in the Plan. The Case Study describes the impacts on water supply and resulting PCWA actions.

6.1 Stages of Action

PCWA has developed a four-stage shortage contingency plan as shown in **Table 6-1**. The nomenclature of these stages has been conformed to a regional standard so that public messaging matches that of neighboring water purveyors during a water shortage. Each stage corresponds to an increased demand reduction target to align with anticipated supply availability. The shortage contingency plan includes voluntary and mandatory actions that expand under each stage, depending on the cause, severity, and anticipated

duration of the water supply shortage. The details of these stages are provided in the Water Shortage Contingency Plan.

Table 6-1 – Water Shortage Contingency Plan Stages

Stage	Type of Rationing Program	Percent Shortage
Normal	Supplies available to meet all demands	None
Stage 1	Probability that supplies will not meet demands	Up to 10%
Stage 2	Supplies will not be able to meet expected demands	10-25%
Stage 3	Supplies not meeting current demands	25-35%
Stage 4	Major failure of a supply, storage, or distribution system	50% and greater

6.2 Minimum Supply Available

Refer to **Section 3.7** for discussion of minimum supply availability. Any potential shortfall in supply that may occur may be addressed through combinations of demand reductions as detailed in the Water Shortage Contingency Plan, groundwater production from overlying users and groundwater appropriators, and the use of interties and supplemental sources, as may be available from neighboring water purveyors. Any use of groundwater produced by overlying users and/or appropriators to meet demands, would be consistent with the GMP discussed in Chapter 3.2.1.

CHAPTER 7. RECYCLED WATER PLAN

The purpose of this section is to describe the current and future state of recycled water resources in PCWA's service area. PCWA does not own or operate any wastewater treatment plants (WWTPs) but there are WWTPs within and serving the PCWA service areas. Title 22 of the California Code of Regulations defines the quality standards for recycled water and recycled water used is subject to those regulations. This section provides explanation of the quantity of wastewater generated as well as the planned and potential uses of Recycled Water in PCWA's service area.

7.1 General Description of Wastewater Treatment Systems in the Service Area

The PCWA has participated with the cities of Roseville, Lincoln and Auburn as well as Placer County in the development of a Recycled Water Plan. WWTPs serve areas of Zone 1, Zone 3, and Zone 4. Zone 1 is the only zone where recycled water is planned for future use. Table 7.1, below, shows the Recycled Water Plan participating agencies

Table 7-1 – Recycled Water Plan Participating Agencies

Agency Name	Agency Type	Plan Development Input
City of Roseville	Water/Wastewater Agency	Provided recycled water supply/demand information
City of Lincoln	Water/Wastewater Agency	Provided recycled water supply/demand information
County of Placer	Planning Agency	Provided proposed development information
Placer Nevada Wastewater Authority	Wastewater Agency	Provided recycled water supply/demand information
City of Auburn	Wastewater Agency	Provided capacity information

Note: contents taken from 2005 UWMP

PCWA's waste water system is varied. Zone 3 has small isolated sewer systems and in places like Colfax, recycled water systems have not been investigated. Other Zone 3 WWTPs, such as the one in Applegate, are shutting down and piping their sewage into other treatment plants for more efficient and cost effective centralized treatment. The Applegate WWTP project will close and send its wastewater to Auburn's SMD #1 treatment plant.[82] Many of the developments in Zone 3 are small and are served by individual septic systems.

PCWA's Zone 4 wastewater is collected in the Truckee Sanitary District for transmission to Tahoe-Truckee Sanitation Agency's regional treatment plant.[83] Despite being located close to Zone 4 development, no recycled water is available do to regulatory issues that are discussed in Section 7.3 in more detail. Wastewater in Zone 5 is handled with

[82] Initial Study/Environmental Assessment, Applegate Wastewater Treatment Plant Closure and Pipeline Project, September 2008
[83] 2005 Truckee Donner Public Utility District UWMP

individual septic systems. Properties in Zone 5 are not served with treated water by PCWA.

The cities of Lincoln and Roseville produce recycled water. Placer County and the City of Auburn WWTPs, however, do not produce water available for direct reuse, and it is unlikely that they will do so in the near future. The potential growth in development and demand for recycled water are driven by two things: (1) the need to expand small WWTPs in Placer and Nevada counties based on future growth projections, and (2) the more stringent NPDES requirements which will require WWTP operators to institute more expensive treatment processes. The 1998 Placer County Evaluation of Regional Wastewater Treatment Options suggested using one regional treatment plant as a more efficient long-term solution. This resulted in the formation of Placer Nevada Wastewater Authority (PNWA). The PNWA has contemplated, however, piping wastewater to a an expanded Lincoln WWTP, yet there is not currently an agreement in place among Lincoln, Placer County and Auburn to expand Lincoln's wastewater treatment plant. The regionalization of the wastewater system would allow for production of more recycled water but would not create any new recycled water supplies in Zone 1 or Zone 3.

7.2 Current Wastewater Use in the PCWA Service Area

PCWA does not own or operate any wastewater or recycled water facilities. Currently, the Cities of Lincoln and Roseville treat wastewater to a secondary level of treatment in line with recycled water standards and provide treated wastewater to customers within their respective water service areas. The quantity of water that may be available for use in the PCWA retail service area in the future is dependent on the recycled water use plans of both the Cities of Roseville and Lincoln. It is likely that in the future these cities will be able to provide recycled water to PCWA's customers.

The capacities of the major wastewater facilities that take wastewater from developments in the PCWA service areas are included on **Table 7-2**. It is important to note that the wastewater treatment plant serving customers in PCWA's Zone 4 is not located in Placer County and serves a large area where Zone 4 contributions are a small percentage of inflow. The capacity of the City of Lincoln's treatment plant lists a small current capacity but is planned for future expansion. Final capacity of the Lincoln plant could be as much as 25 mgd.

Table 7-2 – Major Wastewater Treatment Facilities Serving PCWA

Name	Service Area	Plant Capacity (mgd)	Discharge Location
Roseville Dry Creek WWTP	Southern Roseville	18	Dry Creek
Roseville Pleasant Grove WWTP	Northern Roseville	12	Pleasant Grove Creek
Lincoln WWTP	Lincoln	4.2	Land application and Auburn Ravine Creek
Auburn WWTP	Auburn	1.35	Auburn Ravine
SMD #1	North Auburn	2.64	Rock Creek to Grove Creek
Truckee Sanitation District	Zone 4 Developments	4.83	Aquifer Injection

Note: Lincoln WWTP expansion to 12 mgd by 2020 with final capacity at 25mgd. Data from 2008 PCWA UWMP update, 2006 PCWA IWRP, and 2005 Truckee Donner Public Utility District 2005 UWMP.

The quantity of wastewater collected and treated within the PCWA retail water service area is dependent on the treated water demand projections for PCWA's service zones as wastewater is derived from delivered supplies. In the 2005 UWMP, PCWA assumes that the quantity of wastewater generated is equal to approximately 40 percent of treated water use.[84] **Table 7-3** includes the quantity of wastewater collected, treated and then delivered in the PCWA and City of Lincoln retail service areas.[85]

Table 7-3 – Volume Collected and Treated and Meeting Recycled Water Standard (af/yr)

Type of Wastewater	2005	2010	2015	2020	2025	2030
Wastewater collected & treated in service area	12,000	16,000	20,000	26,000	30,000	33,000
Volume that meets recycled water standard	12,000	16,000	20,000	26,000	30,000	33,000

Since only a portion the treated wastewater treated has been put to beneficial use, some treated wastewater is discharged. The volume of treated wastewater in Table 7-3 that is not put to use is discharged and is presented in **Table 7-4**.[86] The values in these tables do not include numbers from the City of Roseville retail service area. Sacramento Suburban Water District plans to use recycled water but this usage is planned for areas outside of PCWA's service area.[87] San Juan Water District has no recycled water use or planned use as the Sacramento regional wastewater treatment plant is outside of its service area and well outside of the PCWA service area.[88]

[84] 2005 UWMP, p. 6-3.
[85] The quantity of wastewater generated from the City of Lincoln is only calculated based on the quantity of treated water PCWA plans to serve Lincoln under its contract with Lincoln. Lincoln will likely continue to produce a small quantity of groundwater, which when added to the treated water quantity would generate slightly more treated wastewater then reflected in Table 7-3.
[86] The quantities of water in Table 7-4 are equal to the remainder of the quantity treated in Table 7-3 and the quantities reflected in the PCWA retail service area in Table 7-10 and the quantity that will be used in the City of Lincoln's retail service area, as reflected in Table 7-8.
[87] 2005 Sacramento Suburban Water District UWMP
[88] 2005 San Juan Water District UWMP

Table 7-4 – Disposal of Wastewater (af/yr)

Method of disposal	Treatment Level	Current	2015	2020	2025	2030	2035	2040	BO
Discharge to creeks	Tertiary	10,931	8,681	4,767	4,580	4,399	4,576	4,761	14,882

In the 2005 UWMP a projection was made for future recycled water use within PCWA's service boundary. This projection is compared with the actual use presented in **Table 7-8** to show the development of recycled water use planning. This data does not include projected use in the City of Roseville.

Table 7-5 – Comparison of 2005's 2010 Projection and Actual 2010 Use (af)

Use type	2010 actual use	2005 Projection for 2010
Agricultural irrigation	0	0
Landscape irrigation	272	765
Commercial irrigation	0	0
Golf course irrigation	0	0
Wildlife habitat	0	0
Wetlands	0	0
Industrial reuse	0	0
Groundwater recharge	0	0
Seawater barrier	0	0
Geothermal/Energy	0	0
Indirect potable reuse	0	0
Total	272	765

Note: Recycled water use in only expected in zone 1 and zone 5.

7.3 Projected Recycled Water Use

7.3.1 City of Roseville

In December 2009, the South Placer Wastewater Authority (SPWA) completed the *South Placer Regional Wastewater and Recycled Water Systems Evaluation (South Placer Systems Evaluation)*.[89] The purpose of the South Placer Systems Evaluation was to provide SPWA with a new baseline characterization of its wastewater and recycled water systems for June 2004 and buildout conditions.[90] Wastewater generated in the SPWA service area flows to the two regional treatment facilities, the Dry Creek and Pleasant Grove WWTPs.[91]

[89] The South Placer Wastewater Authority is comprised of the City of Roseville, Placer County and South Placer Municipal Utilities District.
[90] South Placer Systems Evaluation, p. ES-1.
[91] *Id.*

For planning purposes, the SPWA has defined two recycled water supply service areas – the 2005 Regional Service Area Boundary and the Ultimate Service Area Boundary. Within the Ultimate Service Area Boundary are twelve "Urban Growth Areas (UGA)," which are planning areas adjacent to the 2005 Regional Service Area Boundary. Both service areas, along with the twelve UGAs, are shown in **Figure 7-1** below.[92] The South Placer Systems Evaluation considers the 2005 Regional Service Area and the twelve UGAs to be the buildout recycled water service area for purposes of the analysis.

The South Placer Systems Evaluation assessed existing (as of June 2004) recycled water demands, existing near term and potential recycled water demands, as well as the estimated recycled water demands for the twelve UGAs. Existing recycled water customers are those that were receiving water as of June 2004.[93] Existing near term customers are those that (as of June 2004) will be connected to the recycled water distribution system in the near future.[94] Most of the existing near future customers will use water for irrigation purposes, and will receive water directly from the recycled water distribution system.[95] Again, the UGAs are those planning areas located west of the 2005 Recycled Water Service Area. Importantly, the City of Roseville has a water service policy for the UGAs which provides that the City of Roseville will only serve a quantity of recycled water equal to the amount of wastewater generated during July Average Dry Weather Flow (ADWF) conditions.[96] Thus, while the July peak day demand may be such that land uses in a UGA could use a quantity of recycled water greater than the ADWF equivalent, the City of Roseville limits such deliveries. First, the City of Roseville requires storage facilities to meet a maximum July day demand. The City of Roseville provides for the difference between July peak day demand and the ADWF equivalent supply to be met with supplemental supplies, including additional recycled water, untreated groundwater, and potable water supplies.[97]

The South Placer Systems Evaluation provides an estimate of recycled water demands. **Table 7-6** summarizes the estimated demands for recycled water by PCWA demand planning area.[98] The demands represent the draw on available supplies that treated wastewater will have within those areas served by the City of Roseville. The South Placer Systems Evaluation estimates that the City of Roseville will ultimately deliver

[92] **Figure 7-1** appears as Figure ES-4 in the South Placer Systems Evaluation.
[93] South Placer Systems Evaluation, p. 6-2.
[94] South Placer Systems Evaluation, p. 6-5.
[95] *Id.*
[96] South Placer Systems Evaluation, p. 6-9. The City of Roseville refers to the July ADWF as the "committed [recycled water] supply."
[97] *Id*. Any additional supplies required over and above the recycled water supply delivered to the UGAs from the City of Roseville's facilities will be met with PCWA surface and/or groundwater supplies.
[98] The planning areas listed correspond to the demand planning areas developed for PCWA's 2006 IWRP.

about 20,000 af/yr of recycled water to meet demands within its retail service area and also within the retail water service area of PCWA.

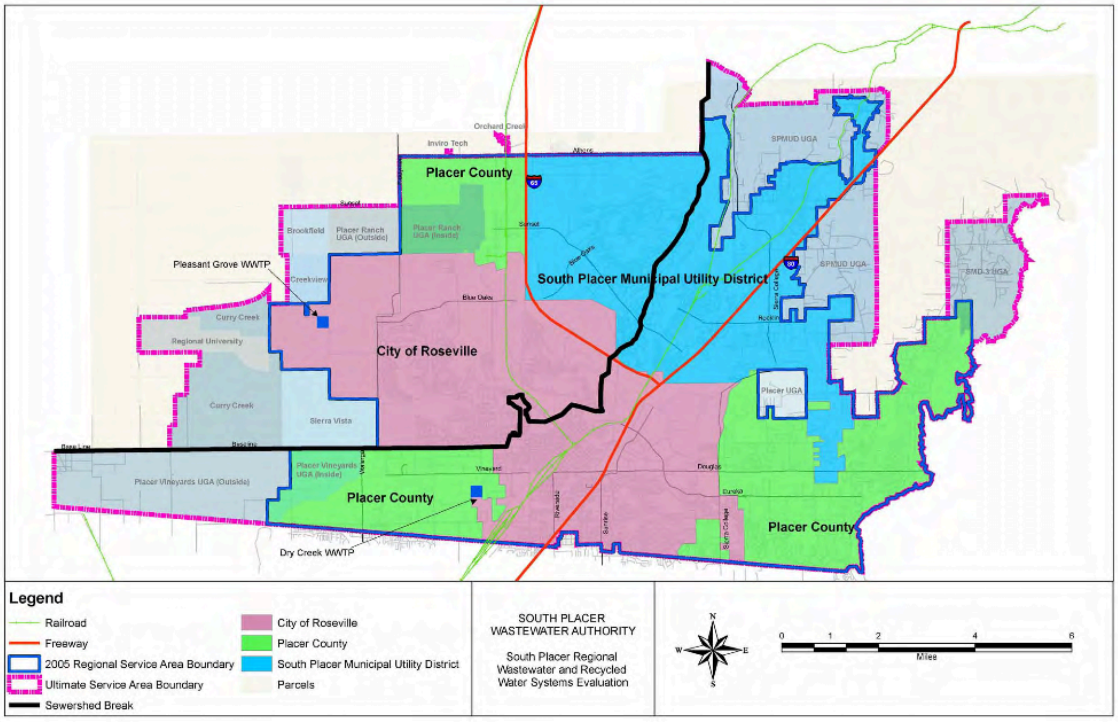
Table 7-6 – Recycled Water Demands Served by South Placer Regional Wastewater and Recycled Water Systems

Reclaimed Water Demand by Planning Area	Total Demand (AF/Year)	PCWA Retail	PCWA Retail (AF/Year)
City of Roseville; City of Roseville West; Dry Creek/East	7,803	No	-
Dry Creek/West (Placer Vineyards)	1,580	Yes	1,580
Curry Creek Community Plan	2,632	Yes	2,632
Sunset Industrial (Zone 1 and 5)	1,494	Yes	1,494
PCWA Zone 5 (South)	420	Yes	420
Dry Creek In stream Flow Requirement	4,481	No	-
Sacramento County Demand (Gibson Ranch/Cherry Island)	1,803	No	-
Total	20,213		6,126

The demands also effectively serve as the minimum potential recycled water supply that will be available in the planning areas adjacent to the City of Roseville service area that PCWA plans to provide retail potable water service to in the future once the areas are annexed to PCWA's Zone 1. Ultimately, the City of Roseville may have additional recycled water supplies available to meet demands in the UGAs, but the PCWA 2010 UWMP does not estimate the City of Roseville's potable water demands, which are required to determine the available supply from Roseville. Thus, the City of Roseville will be able to deliver recycled water to the UGAs as the treated water demand for each UGA materializes, but there is not an estimate of potential additional recycled water supplies that may be available to service PCWA's retail service areas.

For purposes of the supply and demand comparison, 6,126 af/yr will be used from the South Placer Regional Wastewater facilities to serve demands in future PCWA retail service areas as per the calculations in **Table 7-6**.

Figure 7-1 – South Placer Wastewater Authority Service Area



7.3.2 City of Lincoln

The City of Lincoln commenced operation of its new Wastewater Treatment and Reclamation Facility (WWTRF) in July, 2004. The current facility has an average dry weather flow (ADWF) of approximately 2.6 million gallons per day (Mgal/d), with a capacity of 4.2 Mgal/d. The facility produces Title 22 compliant tertiary treated effluent suitable for unrestricted use and reclamation.[99] The 2008 WWTRF Expansion Plan contemplates the expansion of the capacity of the WWTRF to accommodate an increase in flow as the City of Lincoln's treated water demand increases in the coming years. The 2008 WWTRF Expansion Plan also considers two expansion options that could accommodate the wastewater flows from the City of Auburn and/or Placer County as well. Currently, the City of Lincoln is discussing potential partnership arrangements with Placer County and the City of Auburn. Ultimately, if there is a partnership arrangement, the partner agencies will likely expand the WWTRF beyond the capacity that would be necessary if the City of Lincoln were to expand the WWTRF just to meet the wastewater treatment needs of its water service customers alone.

While plant capacity will dictate the potential recycled water supply from the WWTRF, treated water demand and the wastewater generated from such demand will drive the quantity of water available for reuse after treatment. Because it is not certain at this time

[99] City of Lincoln Wastewater Treatment and Reclamation Facility Expansion Plan, January, 2008, p. ES-1.

whether the City of Lincoln will partner with Placer County and/or the City of Auburn, the recycled water availability analysis that follows assumes the WWTRF is only treated wastewater generated by the City of Lincoln's treated water service customers.

The 2008 WWTRF Expansion Plan proposes an expansion increment of 2.1 Mgal/d ADWF for the City of Lincoln only. This expansion should provide sufficient capacity for the City of Lincoln until approximately the year 2018. This estimate is based on flow projections related to growth in the City of Lincoln's treated water service area. The expansion would also accommodate sewer service to the Thunder Valley Indian Casino located just south of Lincoln. With a 2.1 Mgal/d expansion, the new ADWF for the WWTRF would be 6.3 Mgal/d. As of January, 2008, the WWTRF Expansion Plan recommended that expansion construction take place between 2009-2010 so that the WWTRF would be at 6.3 Mgal/d ADWF by the end of 2011.[100] To date, the expansion has not occurred, and the City of Lincoln is awaiting resolution of its discussions with potential regional partners Placer County and the City of Auburn.

As for recycled water demands in and around the City of Lincoln, the City of Lincoln has identified existing and potential recycled water users.[101] The City of Lincoln identifies three recycled water use categories, including Agricultural Irrigation (i.e., crops) Landscape Irrigation (i.e., parks, golf courses, road medians, highway landscaping) and Industrial/Commercial (i.e., cooling, washing, and other process uses) uses. As of 2007, about 370 acres were in the process of being irrigated with recycled water from the WWTRF. Lincoln Recycled Water Technical Memo 1 (Memo 1) estimates a potential annual demand for these customers of 1,676 af/yr. Potential recycled water users are divided into three phases depending on the data of anticipated recycled water service. Phase 1 users are planned for service on or before 2009. Phase 2 users are planned for service on or before 2012. Phase 3 users are those with the potential for service after 2012.[102] If all users identified in Memo 1 demand recycled water, total demand could be as high as 6,822 af/yr.

[100] WWTRF Expansion Plan, p. ES-23.
[101] City of Lincoln, Technical Memorandum 1, Recycled Water Users Description and Phasing, April 16, 2007 (Lincoln Recycled Water Tech. Memo 1).
[102] The Lincoln Recycled Water Tech. Memo 1 indicates that the future phases do not include any new agricultural users, even though there is significant agricultural acreage in the City of Lincoln's city limits.

Table 7-7 – Existing and Potential Recycled Water Use in the City of Lincoln

Recycled Water Service	Million gal/Year	AF/Year
Existing (April, 2007)		
Agricultural Irrigation	546	1,676
Future Users		
Phase 1 (2007-09)	179	549
Phase 2 (2009-12)	218	669
Phase 3 (2012 -)	1,280	3,928
TOTAL	2,223	6,822

An expansion of the City of Lincoln WWTRF to 6.3 Mgal/d ADWF would be able to generate a recycled water supply of about 7,000 af/yr. While this is more than the total demand for all planned City of Lincoln recycled water uses, the fact that most recycled water demands are for agricultural crops and landscape irrigation may result in a situation where there would not be enough treated wastewater in the summer to meet the recycled water demands, and potentially too much in the winter months for the identified demands in Lincoln Recycled Water Tech. Memo 1. Thus, during some months, potable water would be necessary to make up the difference between the identified recycled water demand and the available recycled water supply. Also, recycled water supplies may then be available outside the City of Lincoln's retail water service boundary.

Based on the nature of each identified recycled water demand in the existing and future phases identified in Memo 1, a recycled water demand pattern was developed to determine the extent to which treated wastewater generated may be used by the identified land uses.[103] For the landscape demands, assuming the maximum flow for each phase as identified in Memo 1 is representative of demand in July, demands for every other month are calculated as a percentage of the July demand. For the non-irrigation demands, a constant demand pattern is used for each month based on the estimated values in Lincoln Recycled Water Tech. Memo 1. The potential demand pattern for all three phases is shown in **Table 7-8**, with a peak demand of as much as 15 Mgal/d being realized in July.

Assuming the City of Lincoln's wastewater treatment plant has a ADWF of 6.3 Mgal/d, then there is not going to be enough wastewater generated during the months of May through September to meet demands. Conversely, during all other months, there would likely be more treated wastewater generated than demand for the treated wastewater. **Table 7-8** provides an estimate of the treated wastewater that could be used if all recycled water demands were in place and a plant with 6.3 Mgal/d capacity was producing at the maximum rate. There would be about 4,300 af/yr that could be used by

[103] The landscape demand pattern was obtained from the 2006 IWRP, Table 8-6.

the identified demands, and about 2,800 af/yr might be available for use by other water purveyors with the ability to accommodate treated wastewater.

Wastewater available during the months of March, April and October could be used to meet irrigation demands, while the water available in January, February, November and December would be most valuable for use in industrial process water applications.

Table 7-8 – City of Lincoln Build out Wastewater Demand and Usable Supply

Month	% of Peak Month Demand	Demand (Mgal/d)	Mgal/d More Supply than Demand	Water Used (acre-feet)	Water Available (acre-feet)
January	0%	0.5	5.8	47.6	551.8
February	0%	0.5	5.8	43.0	498.4
March	7%	1.5	4.8	144.1	455.3
April	36%	5.7	0.6	526.3	53.7
May	62%	9.5	0.0	599.4	0.0
June	87%	13.1	0.0	580.0	0.0
July	100%	15.0	0.0	599.4	0.0
August	87%	13.1	0.0	599.4	0.0
September	63%	9.6	0.0	580.0	0.0
October	30%	4.8	1.5	461.1	138.2
November	0%	0.5	5.8	46.0	534.0
December	0%	0.5	5.8	47.6	551.8
Total	n/a	n/a	n/a	4,274	2,783

To generate as much as 7,000 af/yr in treated wastewater, total treated water demand would need to be about 17,500 af/yr, assuming 40% of treated water demand results in wastewater flows. The City of Lincoln's projected water demand is about 15,000 af/yr in 2015 and 20,000 af/yr in 2020. It is therefore possible that the City of Lincoln may have a water demand sufficient to generate a treated wastewater supply of 6.3 Mgal/d in about 2017 or 2018. If the City of Lincoln's demands continue to increase beyond 2020 and the City of Lincoln has to expand its treatment plant further, then it is possible that additional recycled water demands identified in Memo 1 could be met and that additional supplies would be available for use by other purveyors.

7.4 Technical and Economic Feasibility of Recycled Water Use

Under current plans, recycled water use in Western Placer County is expected to grow. Treatment levels at the City of Lincoln and City of Roseville wastewater treatment plants will produce tertiary treated wastewater. This water will be suitable as an alternative for demands that are traditionally met with both treated and raw water supplies, including agricultural crop irrigation, landscape irrigation and industrial process uses.

In the PCWA retail service area, Zone 1 and possibly Zone 5 are the only areas of expected recycled water use, with the recycled water source being either the City of Lincoln's or the City of Roseville's wastewater treatment plants. While the City of Lincoln's recycled water use is expected to grow as demands increase with anticipated development, the City of Lincoln may generate recycled water supplies that are available for use in the PCWA retail service area, as discussed in Section 7.2 and shown in **Table 7-8**. Recycled water from the City of Roseville's wastewater treatment plant is currently being planned for use in developments west of Roseville in the PCWA retail water service area. Currently, most of these areas are located in Zone 5, but must be annexed into Zone 1 to receive treated water service from PCWA. At the same time these developments come on line, they will likely be served with recycled water in amounts equivalent to ADWF generated by the development projects themselves, as discussed in Section 7.2.

As all of the water from the City of Lincoln's and City of Roseville's wastewater treatment plants will be of a quality that can be reused for designated purposes. The installation of transmission infrastructure will drive the ultimate delivery of treated wastewater to potential customers. There are plans for a "purple pipe" system that will feed areas west of the current city of Lincoln. This system will be built in stages. Extension of infrastructure beyond the City of Lincoln's boundaries to serve customers in PCWA's retail service area would require additional planning efforts not currently contemplated in the City of Lincoln's recycled water planning documents. There is the potential for use in areas of Zone 5 replacing raw water deliveries, but no specific system of conveyance is yet planned. For the future developments that will be served treated wastewater from the City of Roseville's wastewater treatment plants, Placer County will likely condition its land use development permits on installation of infrastructure capable of delivering treated wastewater. Also, the City of Roseville will likely require that development projects connecting to its wastewater treatment plants and receiving treated wastewater, will participate financially in the development and maintenance of the transmission system.

Zone 3 is not an area where implementation of recycled water use is feasible because the number of potential treated water customers that could use recycled water is limited and it is unlikely that recycled water could be provided cheaper than existing raw water supplies.

Zone 4 is not an area where implementation of a recycled water use plan is feasible. This is due to the regulatory restriction on the treatment plant receiving Zone 4 wastewater. In November 1990 the Truckee-Carson-Pyramid Lake Water Rights Settlement Act was

signed into law.[104] As part of this Act, Truckee Sanitation District would be required to undertake a number of actions prior to changing the method of its disposal of wastewater. This act would require any wastewater diverted from flow into the Truckee River to be replaced with transfer of other surface diversions or with groundwater pumping into the river. Replacing treated water flows into the river with other water sources is impractical and economically infeasible.

7.5 Future Actions to Encourage Recycled Water Use

There are no direct plans to encourage recycled water use at the individual customer level. PCWA does not own or operate any wastewater facilities. PCWA does not own any recycled water supplies. PCWA does not have an existing "purple pipe" system to convey recycled water. Yet, as the City of Lincoln expands its wastewater treatment facility there is a possibility for delivery to PCWA customers. As explained above, there is also the potential for delivery of recycled water supplies to the PCWA retail service areas from the City of Roseville's facilities. PCWA will encourage these cities to use recycled water and look for opportunities to deliver recycled water to its retail customers as a way to improve supply reliability. Projections of the effect of this encouragement are shown in **Table 7-9**.

Table 7-9 – Methods to Encourage Recycled Water Use (af/yr)

Actions	2015	2020	2025	2030	2035	2040	BO
Financial incentives	0	0	0	0	0	0	0
Water Quality	0	0	0	0	0	0	0
Supply Reliability	2,443	4,885	5,936	6,987	8,038	9,089	9,089
Total	2,443	4,885	5,936	6,987	8,038	9,089	9,089

7.6 Recycled Water Use Summary

Table 7-10 presents the potential recycled use in the PCWA retail service area. The demands that the South Placer Systems Evaluation identified are categorized as either Landscape Irrigation or Commercial (Landscape) Irrigation. Based on the time of the year that the City of Lincoln is likely to generate recycled water for use in the PCWA retail service area, about 2,100 af/yr is projected to be available for industrial uses by 2020 given the treated water build out demand projection for the City of Lincoln.

[104] Title II of Public Law 101-618 [104 Stat 3289, 3294].

Table 7-10 – Projected Recycled Water Use in PCWA Retail Service Area

User type	2015	2020	2025	2030	2035	2040	BO
	af/yr	af/yr	af/yr	af/yr	af/yr	af/yr	af/yr
Agricultural irrigation	0	0	0	0	0	0	0
Landscape irrigation	938	1,877	2,492	3,106	3,721	4,336	4,336
Commercial irrigation	436	872	1,309	1,745	2,181	2,617	2,617
Golf course irrigation	0	0	0	0	0	0	0
Industrial reuse	1,068	2,136	2,136	2,136	2,136	2,136	2,136
Total	2,443	4,885	5,936	6,987	8,038	9,089	9,089

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CHAPTER 8. INTEGRATION OF SUPPLY AND DEMAND

The purpose of this chapter is to compare the total water supply sources available to PCWA with the total projected water use, in five-year increments, for three different plausible water supply scenarios: (1) a normal water year, (2) a single-dry water year, and (3) multiple dry water years.

8.1 Normal Water Year Supply Demand Comparison

Under this water supply scenario, PCWA would anticipate full availability of supplies as detailed in Chapter 3. Using the demand projections detailed for each zone in Chapter 4, the following comparison tables were developed.

Table 8-1 – Western Area Supply and Demand Comparison (Normal Year)

Demand (AF/year)	Current	2015	2020	2025	2030	2035	2040	BO
Retail Treated	30,506	32,166	33,854	36,039	38,238	41,309	44,400	69,701
Irrigation	67,333	67,333	65,778	64,223	62,668	61,098	59,558	57,994
Wholesale Treated	10,671	16,515	20,944	25,374	29,805	31,608	33,410	35,213
Untreated Sale to Others	35,400	57,967	68,652	79,370	79,411	80,941	92,470	94,000
Total	143,910	173,981	189,228	205,005	210,122	214,955	229,838	256,908

Supply (AF/year)	Current	2015	2020	2025	2030	2035	2040	BO
PG&E	100,400	100,400	100,400	100,400	100,400	100,400	100,400	100,400
MFP	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
CVP	0	0	35,000	35,000	35,000	35,000	35,000	35,000
Pre-1914	3,400	3,400	3,400	3,400	3,400	3,400	3,400	3,400
Recycled Water	0	2,443	4,885	5,936	6,987	8,038	9,089	9,089
Desal., Transfers	0	0	0	0	0	0	0	0
Total	223,800	226,243	263,685	264,736	265,787	266,838	267,889	267,889

Difference	79,890	52,261	74,457	59,731	55,665	51,883	38,051	10,981
Difference as % of Supply	36%	23%	28%	23%	21%	19%	14%	4%
Difference as % of Demand	56%	30%	39%	29%	26%	24%	17%	4%

Table 8-2 – Zone 3 Supply and Demand Comparison (Normal Year)

Demand (AF/year)	Current	2015	2020	2025	2030	2035	2040	BO
Retail Treated	762	769	749	764	753	782	811	811
Irrigation	6,134	6,134	6,134	6,134	6,134	6,134	6,134	6,134
Untreated	571	571	571	571	571	571	571	571
Total	7,467	7,475	7,454	7,470	7,458	7,487	7,516	7,516

Supply (AF/year)	Current	2015	2020	2025	2030	2035	2040	BO
PG&E	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Recycled	0	0	0	0	0	0	0	0
Groundwater	0	0	0	0	0	0	0	0
Total	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000

Difference	17,533	17,525	17,546	17,530	17,542	17,513	17,484	17,484
Difference as % of Supply	70%	70%	70%	70%	70%	70%	70%	70%
Difference as % of Demand	235%	234%	235%	235%	235%	234%	233%	233%

Table 8-3 – Zone 4 Supply and Demand Comparison (Normal Year)

Demand (AF/year)	Current	2015	2020	2025	2030	2035	2040	BO
Retail Treated	172	306	439	573	707	800	801	801
Total	172	306	439	573	707	800	801	801

Supply (AF/year)	Current	2015	2020	2025	2030	2035	2040	BO
Groundwater	172	306	439	573	707	800	801	801
Total	172	306	439	573	707	800	801	801

Difference	0	0	0	0	0	0	0	0
Difference as % of Supply	0%	0%	0%	0%	0%	0%	0%	0%
Difference as % of Demand	0%	0%	0%	0%	0%	0%	0%	0%

The notable result of these comparisons include:

- At build-out, well beyond the planning horizon required by the Urban Water Management Planning Act, PCWA will be able to fully meet the normal year demands of all zones. In all years prior to build-out, PCWA will likely have supplies in excess of the demands, which would be used to serve other PCWA objectives.
- Although the Western Area shows ample water supplies, the CVP contract water does not have facilities currently in place to allow for its diversion and beneficial use. PCWA continues to work diligently with the U.S. Bureau of Reclamation and area purveyors to design, permit, fund and construct the needed infrastructure for future use of this contracted supply.
- Zone 3 has ample supply available to meet projected needs, allowing further flexibility in water portfolio management to help provide water supplies for drier conditions.
- Zone 4 will only pump the quantity of water necessary to meet the demand, but will not experience any shortage or surplus conditions.

8.2 Single Dry-Year Supply and Demand Comparison

Under this water supply scenario, PCWA would anticipate several conditions that vary from the normal-year analysis, including: (1) shortage in full availability of supplies as detailed in Chapter 3, and (2) increases and curtailments in projected demands. This latter category has been represented in the Table 8-4 through Table 8-6 based on the following adjustments:

- Retail treated and irrigation demands were increased for the single-dry year to reflect the generalized expansion of the landscape irrigation season when compared to the "normal year" due to limited rainfall in the single driest year. An analysis of the ratio of winter to summer demands indicates that about 60 percent of the treated water demands are for irrigation. Based upon review of the effects of springtime precipitation on treated water irrigation demands (see Section 4.5.2.4) and this ratio of indoor/outdoor demand, a determination was made that a lack of precipitation in the March through May spring period will increase the annual demand by about 8.5 percent above the average. Extrapolating these results to the untreated irrigation system, which has no base load of interior water use, we anticipate that a dry spring will increase the annual irrigation water demand by about 12 percent above the average. These values decrease slightly over the planning horizon as new housing designed with a lower percentage of water designated for irrigation change the overall relationship of indoor/outdoor demands.

  "Single dry-year" conditions, as used in the UWMP Act, generally refers to dry climatic conditions over the entire season of precipitation, generally November through May, which may result in a shortage of supply. In the context of this report, dry year (spring) demands may also occur in years with a plentiful seasonal supply due to earlier season precipitation. In such instances, the demands shown in **Table 8-1**, **Table 8-2**, and **Table 8-3** would also see an increase over the displayed average demand.

- The contract with Sacramento Suburban Water District does not allow PCWA untreated water to be supplied to the District when the March through November unimpaired inflow to Folsom Lake is projected to be less than 1,500,000 acre-feet. In dry years, unimpaired inflow to the lake is below this trigger, thus the contract disallows delivery. Under the "Now" condition, this results in 14,000 acre-feet subtracted from the "Untreated" demand category. For future years, the full contract amount of 29,000 acre-feet is removed.

- For purposes of long-term planning, PCWA intends to meet 100 percent of the estimated demand, although specific circumstances may trigger the Water Shortage Contingency Plan and target less than 100 percent for a given year.

Using the demand projections detailed for each service area in Chapter 4, coupled with the adjustments outlined above, the following comparison tables were developed.

Table 8-4 – Western Area Supply and Demand Comparison (Single Driest-Year)

Demand (AF/year)	Current	2015	2020	2025	2030	2035	2040	BO
Retail Treated	30,506	34,901	36,732	38,922	41,297	44,407	47,730	74,580
Irrigation	67,333	75,412	73,671	71,287	69,561	67,207	65,513	63,794
Wholesale Treated	10,671	16,515	20,944	25,374	29,805	31,608	33,410	35,213
Untreated Sale to Others	21,400	28,967	39,652	50,370	50,411	51,941	63,470	65,000
Total	129,910	155,795	170,999	185,953	191,074	195,163	210,123	238,587

Supply (AF/year)	Current	2015	2020	2025	2030	2035	2040	BO
PG&E	50,200	50,200	50,200	50,200	50,200	50,200	50,200	50,200
MFP (Zone 1 and 5)	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
CVP	0	0	23,250	23,250	23,250	23,250	23,250	23,250
Pre-1914	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700
Recycled Water	0	2443	4885	5936	6987	8038	9089	9089
Desal., Transfers	0	0	0	0	0	0	0	0
Total	171,900	174,343	200,035	201,086	202,137	203,188	204,239	204,239

Difference	41,990	18,547	29,036	15,133	11,063	8,025	(5,884)	(34,347)
Difference as % of Supply	24%	11%	15%	8%	5%	4%	(3%)	(17%)
Difference as % of Demand	32%	12%	17%	8%	6%	4%	(3%)	(14%)

Table 8-5 – Zone 3 Supply and Demand Comparison (Single Driest-Year)

Demand (AF/year)	Current	2015	2020	2025	2030	2035	2040	BO
Retail Treated	784	792	772	787	776	805	835	835
Irrigation	6,625	6,625	6,625	6,625	6,625	6,625	6,625	6,625
Untreated	571	571	571	571	571	571	571	571
Total	7,980	7,988	7,968	7,983	7,972	8,001	8,031	8,031

Supply (AF/year)	Current	2015	2020	2025	2030	2035	2040	BO
PG&E	12,500	12,500	12,500	12,500	12,500	12,500	12,500	12,500
Recycled	0	0	0	0	0	0	0	0
Groundwater	0	0	0	0	0	0	0	0
Total	12,500	12,500	12,500	12,500	12,500	12,500	12,500	12,500

Difference	4,520	4,512	4,532	4,517	4,528	4,499	4,469	4,469
Difference as % of Supply	36%	36%	36%	36%	36%	36%	36%	36%
Difference as % of Demand	57%	56%	57%	57%	57%	56%	56%	56%

Table 8-6 – Zone 4 Supply and Demand Comparison (Single Driest-Year)

Demand (AF/year)	Current	2015	2020	2025	2030	2035	2040	BO
Retail Treated	177	315	453	590	728	824	825	825
Total	177	315	453	590	728	824	825	825

Supply (AF/year)	Current	2015	2020	2025	2030	2035	2040	BO
Groundwater	177	315	453	590	728	824	825	825
TOTAL	177	315	453	590	728	824	825	825

Difference	0	0	0	0	0	0	0	0
Difference as % of Supply	0%	0%	0%	0%	0%	0%	0%	0%
Difference as % of Demand	0%	0%	0%	0%	0%	0%	0%	0%

The notable result of these comparisons include:

- For the planning horizon required for the Urban Water Management Planning Act (2030 for the 2010 Update), and even through 2035, PCWA will be able to fully meet the driest-year demands of all service areas.
- The identified potential surplus supplies provide PCWA flexibility in managing its water supply portfolio in dry years to best meet the needs of its customers.
- Depending on the timing of completion of facilities necessary to take delivery, the CVP supplies may not be fully available for use in the Western Area in the years noted. Furthermore, as described in Chapter 3, the shortage conditions that are applied to the PCWA contract may be tied to a reduction from historic use, as opposed to contract quantity. In such a scenario, shortage conditions may occur prior to 2030 in the Western Area. If this scenario were to occur, PCWA would take additional measures to reduce deliveries to irrigation water customers in Zone 1, such as placing restrictors on existing turnouts. PCWA would also trigger necessary measures detailed in the Water Shortage Contingency Plan to obtain reductions in the retail treated and raw water demands.
- Any potential shortfall in supply that may occur in Zone 1 under build-out conditions in a dry year – which are well beyond the planning horizon required in the Urban Water Management Planning Act – may be addressed through combinations of demand reductions (see the Water Shortage Contingency Plan), groundwater production from overlying users and groundwater appropriators, and the use of interties and supplemental sources, as may be available from neighboring water purveyors. Any use of groundwater produced by overlying users and/or appropriators to meet demands, would be consistent with the GMP discussed in Chapter 3.2.1.
- Even with significant reductions in water supplies available to Zone 3, the demand is not anticipated to increase significantly, allowing the full demand to be satisfied through projected build-out conditions.

8.3 Multiple Dry Year Supply and Demand Comparison

Under this water supply scenario, PCWA would anticipate many similar conditions that were assumed for the single-driest year analysis, including: (1) a shortage in availability of supplies different, but less restrictive than the single-driest (see Chapter 3), and (2) increases and curtailments in projected demands as represented in the driest-year scenario.

However, to represent multiple years, a five-year block of years is assumed for each 5-year reporting increment. Water supplies within each year of the five-year block follow a pattern of four dry years, followed by one normal year. However, as discussed in Chapter 3, the water supplies during the dry years are not as restricted as assumed for the driest-year.

To reflect the demands in each of the intervening years in the five-year block, the following assumptions are made:

- The fifth year, a normal year, reflects the estimated demand for the next standard 5-year increment (e.g. the 2015, 2020, 2025, etc. demand from Table 8-1 through 8-3 for each zone).
- Demand in the four prior years reflects a linear growth between each 5-year standard increment, but with the demand adjustments made to increase some demands and curtail others (as explained for the driest-year scenario under Chapter 8.2).

This resulting analysis has been represented in the Table 8-7 through Table 8-9. The analysis only covers the 5-year blocks through 2035.

Table 8-7 – Western Area Supply and Demand Comparison (Multiple Dry Years)

Part A: 2011 through 2015					
Demand (AF/year)	**2011**	**2012**	**2013**	**2014**	**2015**
Total	135,087	140,264	145,441	150,618	173,981
Supply (AF/year)	**2011**	**2012**	**2013**	**2014**	**2015**
Total	194,499	194,499	194,499	194,499	226,243
Difference	59,412	54,235	49,058	43,880	52,261
Difference as % of Supply	31%	28%	25%	23%	23%
Difference as % of Demand	44%	39%	34%	29%	30%

Part B: 2016 through 2020					
Demand (AF/year)	**2016**	**2017**	**2018**	**2019**	**2020**
Total	158,836	161,877	164,917	167,958	189,228
Supply (AF/year)	**2016**	**2017**	**2018**	**2019**	**2020**
Total	196,621	196,621	196,621	196,621	263,685
Difference	37,785	34,745	31,704	28,663	74,457
Difference as % of Supply	19%	18%	16%	15%	28%
Difference as % of Demand	24%	21%	19%	17%	39%

Part C: 2021 through 2025					
Demand (AF/year)	**2021**	**2022**	**2023**	**2024**	**2025**
Total	173,989	176,980	179,971	182,962	205,005
Supply (AF/year)	**2021**	**2022**	**2023**	**2024**	**2025**
Total	225,685	225,685	225,685	225,685	264,736
Difference	51,696	48,705	45,714	42,723	59,731
Difference as % of Supply	23%	22%	20%	19%	23%
Difference as % of Demand	30%	28%	25%	23%	29%

Part D: 2026 through 2030					
Demand (AF/year)	**2026**	**2027**	**2028**	**2029**	**2030**
Total	186,977	188,001	189,026	190,050	210,122
Supply (AF/year)	**2026**	**2027**	**2028**	**2029**	**2030**
Total	226,599	226,599	226,599	226,599	265,787
Difference	39,622	38,597	37,573	36,549	55,665
Difference as % of Supply	17%	17%	17%	16%	21%
Difference as % of Demand	21%	21%	20%	19%	26%

Part E: 2031 through 2035					
Demand (AF/year)	**2031**	**2032**	**2033**	**2034**	**2035**
Total	191,892	192,710	193,527	194,345	214,955
Supply (AF/year)	**2031**	**2032**	**2033**	**2034**	**2035**
Total	227,512	227,512	227,512	227,512	266,838
Difference	35,620	34,803	33,985	33,167	51,883
Difference as % of Supply	16%	15%	15%	15%	19%
Difference as % of Demand	19%	18%	18%	17%	24%

Table 8-8 – Zone 3 Supply and Demand Comparison (Multiple Dry Years)

Part A: 2011 through 2015					
Demand (AF/year)	**2011**	**2012**	**2013**	**2014**	**2015**
Total	7,982	7,984	7,985	7,987	7,475
Supply (AF/year)	**2011**	**2012**	**2013**	**2014**	**2015**
Total	18,750	18,750	18,750	18,750	25,000
Difference	10,768	10,766	10,765	10,763	17,525
Difference as % of Supply	57%	57%	57%	57%	70%
Difference as % of Demand	135%	135%	135%	135%	234%

Part B: 2016 through 2020					
Demand (AF/year)	**2016**	**2017**	**2018**	**2019**	**2020**
Total	7,984	7,980	7,976	7,972	7,454
Supply (AF/year)	**2016**	**2017**	**2018**	**2019**	**2020**
Total	18,750	18,750	18,750	18,750	25,000
Difference	10,766	10,770	10,774	10,778	17,546
Difference as % of Supply	57%	57%	57%	57%	70%
Difference as % of Demand	135%	135%	135%	135%	235%

Part C: 2021 through 2025					
Demand (AF/year)	**2021**	**2022**	**2023**	**2024**	**2025**
Total	7,971	7,974	7,977	7,980	7,470
Supply (AF/year)	**2021**	**2022**	**2023**	**2024**	**2025**
Total	18,750	18,750	18,750	18,750	25,000
Difference	10,779	10,776	10,773	10,770	17,530
Difference as % of Supply	57%	57%	57%	57%	70%
Difference as % of Demand	135%	135%	135%	135%	235%

Part D: 2026 through 2030					
Demand (AF/year)	**2026**	**2027**	**2028**	**2029**	**2030**
Total	7,981	7,979	7,976	7,974	7,458
Supply (AF/year)	**2026**	**2027**	**2028**	**2029**	**2030**
Total	18,750	18,750	18,750	18,750	25,000
Difference	10,769	10,771	10,774	10,776	17,542
Difference as % of Supply	57%	57%	57%	57%	70%
Difference as % of Demand	135%	135%	135%	135%	235%

Part E: 2031 through 2035					
Demand (AF/year)	**2031**	**2032**	**2033**	**2034**	**2035**
Total	7,978	7,983	7,989	7,995	7,487
Supply (AF/year)	**2031**	**2032**	**2033**	**2034**	**2035**
Total	18,750	18,750	18,750	18,750	25,000
Difference	10,772	10,767	10,761	10,755	17,513
Difference as % of Supply	57%	57%	57%	57%	70%
Difference as % of Demand	135%	135%	135%	135%	234%

Table 8-9 – Zone 4 Supply and Demand Comparison (Multiple Dry Years)

Part A: 2011 through 2015					
Demand (AF/year)	**2011**	**2012**	**2013**	**2014**	**2015**
Total	205	232	260	287	306
Supply (AF/year)	**2011**	**2012**	**2013**	**2014**	**2015**
Total	205	232	260	287	306
Difference	0	0	0	0	0
Difference as % of Supply	0%	0%	0%	0%	0%
Difference as % of Demand	0%	0%	0%	0%	0%

Part B: 2016 through 2020					
Demand (AF/year)	**2016**	**2017**	**2018**	**2019**	**2020**
Total	343	370	398	425	439
Supply (AF/year)	**2016**	**2017**	**2018**	**2019**	**2020**
Total	343	370	398	425	439
Difference	0	0	0	0	0
Difference as % of Supply	0%	0%	0%	0%	0%
Difference as % of Demand	0%	0%	0%	0%	0%

Part C: 2021 through 2025					
Demand (AF/year)	**2021**	**2022**	**2023**	**2024**	**2025**
Total	480	508	535	563	573
Supply (AF/year)	**2021**	**2022**	**2023**	**2024**	**2025**
Total	480	508	535	563	573
Difference	0	0	0	0	0
Difference as % of Supply	0%	0%	0%	0%	0%
Difference as % of Demand	0%	0%	0%	0%	0%

Part D: 2026 through 2030					
Demand (AF/year)	**2026**	**2027**	**2028**	**2029**	**2030**
Total	618	645	673	701	707
Supply (AF/year)	**2026**	**2027**	**2028**	**2029**	**2030**
Total	618	645	673	701	707
Difference	0	0	0	0	0
Difference as % of Supply	0%	0%	0%	0%	0%
Difference as % of Demand	0%	0%	0%	0%	0%

Part E: 2031 through 2035					
Demand (AF/year)	**2031**	**2032**	**2033**	**2034**	**2035**
Total	747	767	786	805	800
Supply (AF/year)	**2031**	**2032**	**2033**	**2034**	**2035**
Total	747	767	786	805	800
Difference	0	0	0	0	0
Difference as % of Supply	0%	0%	0%	0%	0%
Difference as % of Demand	0%	0%	0%	0%	0%

The notable results of these comparisons include:

- For the planning horizon required for the Urban Water Management Planning Act (2030 for the 2010 Update), and even through 2035, PCWA will be able to fully meet the demands of all zones during multiple dry year periods.
- The identified potential surplus supplies provide PCWA flexibility in managing its water supply portfolio in dry years to best meet the needs of its customers..
- Depending on the timing of completion of facilities necessary to take delivery, the CVP supplies may not be fully available for use in the Western Area in the years noted. Furthermore, as described in Chapter 3, the shortage conditions that are applied to the PCWA contract may be tied to a reduction from historic use, as opposed to contract quantity. In such a scenario, shortage conditions may occur prior to 2030 in the Western Area. If this scenario were to occur, PCWA would take additional measures to reduce deliveries to irrigation water customers in Zone 1, such as placing restrictors on existing turnouts. PCWA would also trigger necessary measures detailed in the Water Shortage Contingency Plan to obtain reductions in the retail treated water demands.