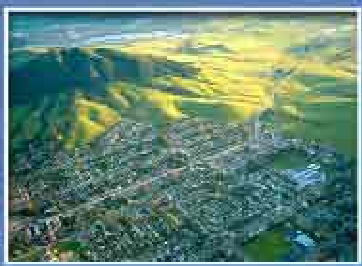
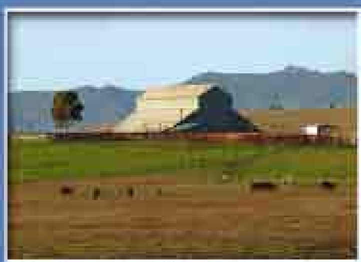
San Luis Obisspo County

Master Water Report

Volume II of III

MAY 2012





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SAN LUIS OBISPO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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San Luis Obispo County Flood Control and Water Conservation District

SAN LUIS OBISPO COUNTY MASTER WATER REPORT

May 2012

Expires on 3/31/13 **Expires on 6/30/12** **Expires on 12/31/13**

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San Luis Obispo County Flood Control and Water Conservation District

SAN LUIS OBISPO COUNTY MASTER WATER REPORT

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PART II: WATER RESOURCE ANALYSIS

4.1 OBJECTIVES

The purpose of this chapter is to evaluate and compare the available water supplies (apart from the untreated ocean) to the water demands for the different water planning areas. This was accomplished by reviewing or developing the following:

- Current water supplies and demands based on available information
- Forecast water demands and water supplies available in the future under current land use policies and designations
- Criteria under which there is a shortfall when looking at supplies versus demands
- Criteria for analyzing potential water resource management strategies, projects, programs, or policies
- Potential water resource management strategies, projects, programs, or policies to resolve potential supply deficiencies

4.2 OVERVIEW OF GROUNDWATER RESOURCES

The information presented below was extracted from Technical Memorandum Number 2, Water Supply Inventory and Assessment-Description of Water Resources, prepared by Wallace Group in association with Fugro West, Inc. and Cleath-Harris Geologists. For more detailed discussions on this information, please refer to Appendix B. This overview focuses on groundwater resources throughout the County.

4.2.1 North Coast Sub-Region

The North Coast Sub-Region is comprised of five Water Planning Areas (WPAs), including San Simeon (WPA 1), Cambria (WPA 2), Cayucos (WPA 3), Morro Bay (WPA 4), and Los Osos (WPA 5) summarized in Table 4.1. A brief description of the basins within each WPA is provided below, with details on groundwater supply aquifers, groundwater users, basin yield, water quality, and water availability.

Groundwater levels in North Coast Sub-Region basins are generally highest during the wet season, steadily decline from these levels during the dry season, and recover again to higher levels during the next wet season. Shallow alluvial deposits for these basins are typically more susceptible to drought impacts than deeper formation aquifers, since they have less groundwater in storage. Significant lowering of basin groundwater levels at or below sea level near the coast can lead to seawater intrusion and degradation of water quality in both shallow and deep aquifer zones.

Table 4.1 North Coast Sub-Region Groundwater Basins			
WPA No.	**WPA Name**	**Groundwater Basin Name**	**Safe Basin Yield (AFY)**
1	San Simeon	San Carpoforo Valley	No estimate available
		Arroyo de la Cruz Valley	1,244
		Pico Creek Valley	120
2	Cambria	San Simeon Valley	1,040
		Santa Rosa Valley	2,260
		Villa Valley	1,000(1)
3	Cayucos	Cayucos Valley	600(1)
		Old Valley	No estimate available
		Toro Valley	532
4	Morro Bay	Morro Valley	1,500
		Chorro Valley	2,210
5	Los Osos	Los Osos Valley	3,200

Notes:
1. 1958 Department of Water Resources estimate. There has been no subsequent basin study to confirm or update this estimate

4.2.1.1 San Simeon Water Planning Area (WPA) 1

Groundwater basin descriptions in WPA 1 include San Carpoforo Valley, Arroyo de la Cruz Valley, and Pico Creek Valley.

4.2.1.1.1 *San Carpoforo Valley Groundwater Basin*

The San Carpoforo Valley Groundwater Basin is located in WPA 1 of the North Coast sub-region (Figure 4.1) and is identified in California's Groundwater Bulletin 118 as Groundwater Basin Number 3-33 (DWR 2003). The basin underlies the San Carpoforo Valley, is 200 acres (0.3 square miles) in size, and is bounded by the Pacific Ocean and impermeable rocks. Recharge to the basin comes primarily from seepage of surface flows in San Carpoforo Creek and to a lesser extent percolation of precipitation and irrigation return flows. The groundwater storage capacity was estimated as 1,800 acre-feet (AF). There are no current estimates of actual groundwater in storage volumes. The volume of groundwater in storage likely fluctuates widely in response to seasonal variations in rainfall and pumping extractions.

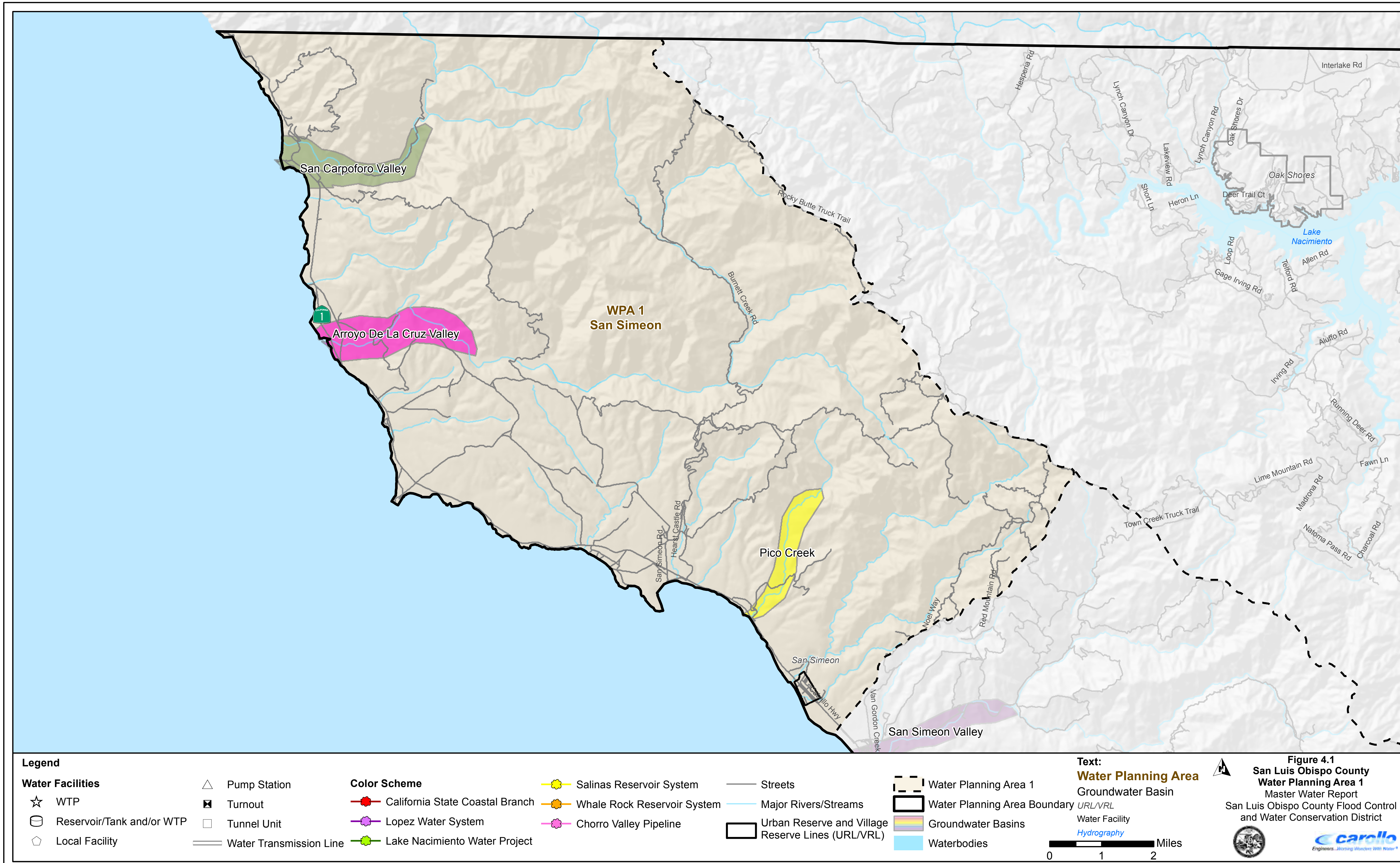


Figure 4.1
San Luis Obispo County
Water Planning Area 1
Master Water Report
San Luis Obispo County Flood Control and Water Conservation District

There are no municipal or public water purveyors in the basin. All pumping in the basin is for agricultural purposes and by overlying users. There are no estimates of basin yield. No information is available describing water quality in the basin. The primary constraints on water availability in the basin include physical limitations and potential water quality issues.

As discussed above, groundwater levels in this basin are typically highest during the wet season, steadily decline from these levels during the dry season, and recover again to higher levels during the next wet season. Published hydrogeologic information for this basin is compiled from older reports and may not be representative of current conditions. If the District requires more current or detailed information for this basin, new studies would be necessary. Information currently compiled by County departments (such as well logs for private wells or water quality for shared well systems) would be useful to these studies. Additional information may be available from the DWR and private sources.

4.2.1.1.2 *Arroyo De La Cruz Valley Groundwater Basin*

The Arroyo De La Cruz Valley Groundwater Basin is located in WPA 1 of the North Coast sub-region (Figure 4.1) and is identified in California's Groundwater Bulletin 118 as Groundwater Basin Number 3-34 (DWR 2003). The basin is 750 acres (1.2 square miles) in size and is bounded by the Pacific Ocean and impermeable rocks. Recharge to the basin comes primarily from percolation of surface flows in Arroyo de la Cruz, deep percolation of precipitation, and agricultural irrigation return flows. The groundwater storage capacity is estimated as 6,600 AF; however, the actual amount in groundwater storage is unknown. The volume of groundwater in storage likely fluctuates widely in response to seasonal variations in rainfall and pumping extractions.

There are no municipal or public water purveyors in the basin. All pumping in the basin is for agricultural purposes and by overlying users. The safe yield of the basin was estimated to be 1,244 AFY (Envicom, 1982). Groundwater samples taken from four wells from 1957 to 1985 show total dissolved solids concentration ranging from 211 to 381 mg/L. The primary constraints on water availability in the basin include physical limitations and potential water quality issues. Groundwater levels in the basin are likely highest during the wet season, steadily decline from these levels during the dry season, and recover again to higher levels during the next wet season.

Published hydrogeologic information for this basin is compiled from older reports and may not be representative of current conditions. If the District requires more current or detailed information, new studies would be necessary. Information currently compiled by County departments (such as well logs for private wells or water quality for shared well systems) would be useful to these studies. Additional information may be available from the DWR and private sources.

4.2.1.1.3 *Pico Creek Valley Groundwater Basin*

The Pico Creek Valley Groundwater Basin is located in WPA 1 of the North Coast sub-region (Figure 4.1). This basin is not formally defined under California's Groundwater

Bulletin 118 program. The basin is 62.5 acres (about one-tenth of a square mile) in size and underlies Pico Creek Valley (Cleath, 1986). The basin is bounded by the Pacific Ocean to the west and extends inland about 7,000 feet under the stream channel and floodplain of the Pico Creek. From the Pacific Ocean to about 1,200 feet inland, the basin is undeveloped. The Hearst Ranch is located from 1,200 feet inland to about 4,000 feet inland.

The main water-bearing unit in the basin is the Pico Creek alluvium (Cleath, 1986). Recharge to the basin comes primarily from seepage of surface flows in Pico Creek and deep percolation of precipitation. Historically, the creek flows during the winter months and does not flow during the summer months. The alluvium between the ocean and Hearst Ranch is divided into a shallow and a deep aquifer, where the two aquifers are separated by a clay zone that acts as an aquitard. The clay zone is not present upstream of the Hearst Ranch and the alluvium eastward from there forms a single aquifer.

The basin contains groundwater stored both above sea level and below sea level. The available groundwater in storage above sea level is about 40 AF (Cleath, 1986). Much of the groundwater in storage below sea level has experienced sea water intrusion and is of lesser water quality. The available groundwater in storage below sea level is less than 50 AF.

Water users in the basin include the San Simeon Community Services District (San Simeon CSD) and Hearst Ranch. The basin yield is estimated to be 120 AFY (Cleath, 1986). Contamination of water supply wells due to seawater intrusion is a major water quality concern in the basin (Cleath, 1986). Lowering of groundwater levels below sea level in the basin during the summer months when creek flows are absent and pumping is active can result in the landward migration of the sea water/fresh groundwater interface. Since at least the mid-1980s, sea water intrusion has occurred within the Pico Creek Valley Groundwater Basin (Cleath, 1986). Although seawater intrusion has increased salinity levels in groundwater pumped from local water supply wells, it has not degraded water quality to the point that the water is non-potable. The 2008 Consumer Confidence Report for two San Simeon CSD wells reported that measured concentrations of all analyzed contaminants were below their respective Maximum Contaminant Level (MCL) or Regulatory Action Level (AL) values.

The primary constraints on water availability in the basin include physical limitations and potential water quality issues. Currently the water supply of San Simeon CSD is at a certified Level III severity rating (resource capacity has been met or exceeded) due to unreliability of the groundwater supply to meet existing demands (SLO County, 2008). As a result, a moratorium on development has been in place since 1991.

4.2.1.2 Cambria WPA 2

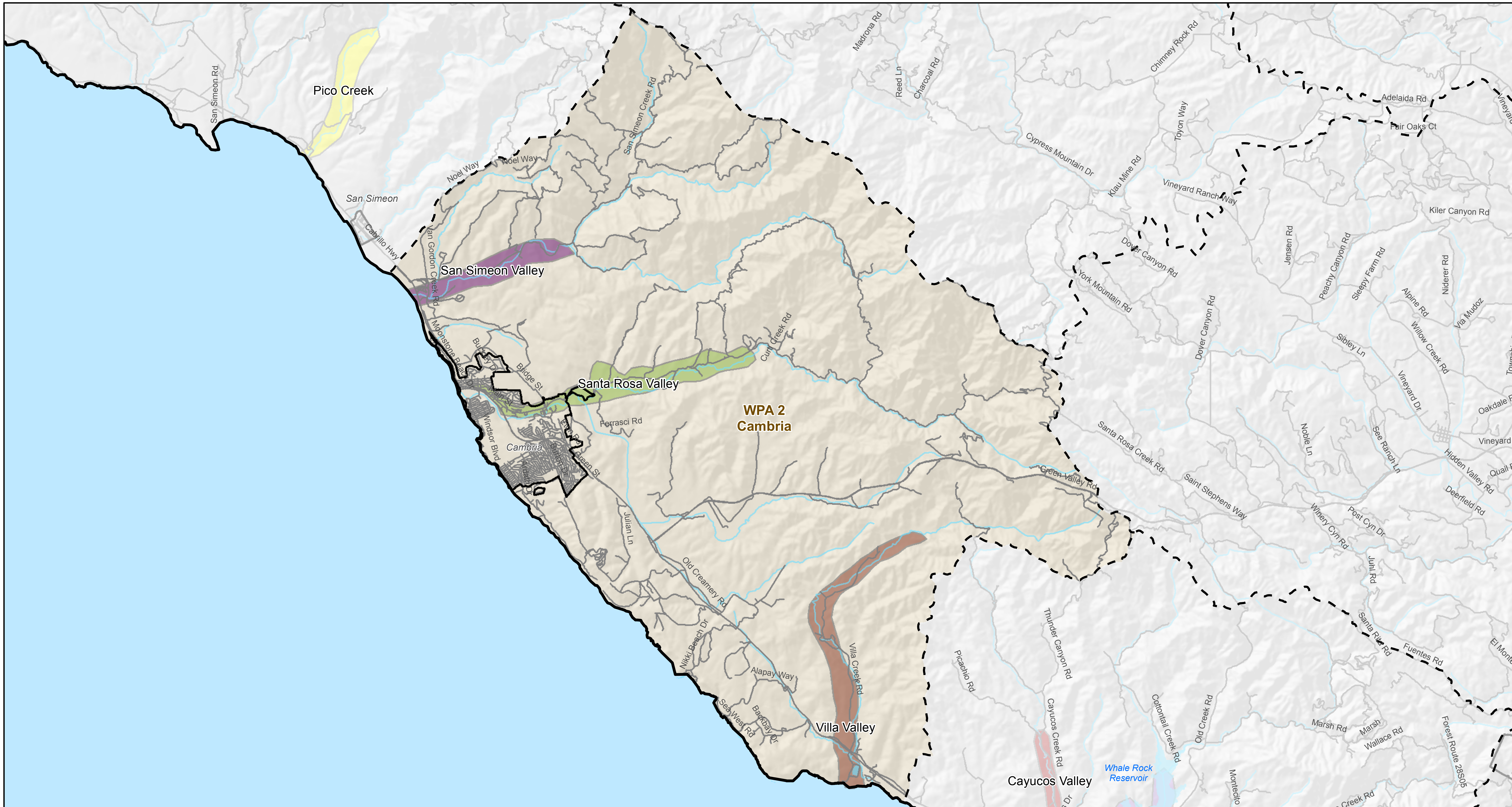
Groundwater basin descriptions in WPA 2 include San Simeon Valley, Santa Rosa Valley, Villa Valley.

4.2.1.2.1 *San Simeon Valley Groundwater Basin*

The San Simeon Valley Groundwater Basin is located in the WPA 2 of the North Coast sub-region (Figure 4.2) and is identified in California's Groundwater Bulletin 118 as Groundwater Basin Number 3-35 (DWR 2003). The basin underlies San Simeon Valley and is 620 acres (1 square mile) in size, and is bounded by the Pacific Ocean, the Santa Lucia Range, and impermeable rocks. Recharge to the basin comes primarily from seepage of surface flows in San Simeon and Van Gordon creeks, deep percolation of precipitation, and agricultural irrigation return flows.

Groundwater is found in alluvial deposits underlying San Simeon Creek (DWR 2003). The alluvium's thickness varies from about 100 feet beneath the center of the valley to more than 120 feet at the coast (Yates and Van Konyenburg, 1998). The groundwater storage capacity is estimated as 4,000 AF; however the actual amount in groundwater storage is unknown (DWR 2003). The volume of groundwater in storage likely fluctuates widely in response to seasonal variations in rainfall and pumping extractions.

Water users in the basin include the Cambria Community Services District (Cambria CSD) and overlying users. The safe yield of the basin was estimated to be 1,040 AFY (Cambria County Water District, 1976). Groundwater samples from 31 wells collected from 1955 to 1994 show total dissolved solids (TDS) concentration ranging from 46 to 2,210 mg/L (DWR 2003). Samples from three public supply wells show a TDS concentration range of 400 to 420 mg/L with an average concentration of 413 mg/L. Manganese concentrations in the downstream regions of the basin have exceeded the MCL, with a range of 0.002 to 1.6 mg/L (Yates and Van Konyenburg, 1998). The 2007 Consumer Confidence Report for Cambria CSD reported that measured concentrations of all analyzed contaminants were below their respective MCL or Regulatory AL values. In particular, the measured TDS concentration was 440 mg/L.



Legend

Water Facilities

- WTP
- Reservoir/Tank and/or WTP
- Local Facility
- Pump Station
- Turnout
- Tunnel Unit
- Water Transmission Line

Color Scheme

- California State Coastal Branch
- Lopez Water System
- Lake Nacimiento Water Project
- Salinas Reservoir System
- Whale Rock Reservoir System
- Chorro Valley Pipeline
- Streets
- Major Rivers/Streams
- Urban Reserve and Village Reserve Lines (URL/VRL)
- Water Planning Area 2
- Water Planning Area Boundary
- Groundwater Basins
- Waterbodies

Text:
Water Planning Area
Groundwater Basin
URL/VRL
Water Facility
Hydrography

0 1 2 Miles

Figure 4.2
San Luis Obispo County
Water Planning Area 2
Master Water Report
San Luis Obispo County Flood Control and Water Conservation District

The primary constraints on water availability in the basin include physical limitations and potential water quality issues. The State Water Resources Control Board (State Board) allows a maximum extraction of 1,230 AFY in the San Simeon Valley Groundwater Basin and a maximum dry season extraction of 370 AF (Cambria CSD Water Master Plan (WMP), 2008). Although the actual dates will vary each year depending on creek flows and rainfall occurrence, the dry season generally spans from May through October. In general, groundwater levels in the basin are typically highest during the wet season, steadily decline from these levels during the dry season, and recover again to higher levels during the next wet season. Currently the water supply of Cambria CSD is at a Level III severity rating (resource capacity has been met or exceeded) due to unreliability of the groundwater supply to meet existing demands (Cambria CSD WMP, 2008).

4.2.1.2.2 *Santa Rosa Valley Groundwater Basin*

The Santa Rosa Valley Groundwater Basin is located in WPA 2 of the North Coast sub-region (Figure 4.2) and is identified in California's Groundwater Bulletin 118 as Groundwater Basin Number 3-36 (DWR 2003). The basin underlies the Santa Rosa Valley, is 4,480 acres (7 square miles) in size, and is bounded by the Pacific Ocean and impermeable rocks. Recharge to the basin comes primarily from seepage of surface flows in Santa Rosa Creek and tributaries, deep percolation of precipitation, and residential/agricultural return flows.

According to Bulletin 118, the main water-bearing unit in the basin is unconfined alluvium (DWR 2003). The groundwater storage capacity of the basin has been estimated as 24,700 AF (DWR 1975). The volume of groundwater in storage likely fluctuates widely in response to seasonal variations in rainfall and pumping extractions. The actual amount of groundwater in storage is unknown.

Water users in the basin include the Cambria CSD and overlying users. The safe yield of the basin has been estimated to be 2,260 AFY (Cambria County Water District, 1976). Groundwater sampled from one public supply well had a total dissolved solids concentration of 680 mg/L. Increases in measured groundwater chloride concentration suggest the possibility of seawater intrusion into the basin (DWR 1975). From 1955 to 1975, measured chloride concentration increased from 80 mg/L to 933 mg/L (DWR 1975), where background chloride concentration typically range from 30 to 270 mg/L (Yates and Van Konyenburg, 1998).

The Cambria CSD's Urban Water Management Plan (UWMP) (Cambria CSD, 2005) noted the existence of an MtBE plume moving towards its Santa Rosa well field. The UWMP also noted that although the plume was still present at the time the UWMP was prepared, Cambria CSD was taking action to remove the MtBE from the groundwater through a remediation program.

The primary constraints on water availability in the basin include physical limitations and potential water quality issues. The State Board allows a maximum extraction of 518 AFY in the Santa Rosa Valley Groundwater Basin and a maximum dry season extraction of 260 AF (Cambria CSD WMP, 2008). The California Coastal Commission Coastal Development Permit defines the Santa Rosa Creek dry period as July 1 to November 20. In general, groundwater levels in the basin are typically highest during the wet season, steadily decline from these levels during the dry season, and recover again to higher levels during the next wet season. Currently the water supply of Cambria CSD is at a Level III severity rating (resource capacity has been met or exceeded) due to unreliability of the groundwater supply to meet existing demands (Cambria CSD WMP, 2008).

4.2.1.2.3 *Villa Valley Groundwater Basin*

The Villa Valley Groundwater Basin is located in WPA 2 in the North Coast sub-region (Figure 4.2) and encompasses approximately 980 acres (1.5 square miles). The basin is bounded by the Pacific Ocean and by relatively impermeable rocks. This basin has been designated by the DWR as Basin 3-37 (DWR 2003). Recharge to the basin comes primarily from seepage of surface flows in Villa Creek, deep percolation of precipitation, and residential/agricultural return flows.

The aquifer consists of alluvial deposits that are up to approximately 50 feet thick. There are no municipal or public water purveyors in the basin. All pumping in the basin is for agricultural and residential purposes by overlying users. The projected safe seasonal yield of the Villa Valley Groundwater Basin was historically estimated at 1,000 AFY (DWR 1958). There has been no subsequent basin study to confirm or update this estimate.

Seawater intrusion has been reported historically in the lower portion of the basin (DWR 1975). Upstream of sea water influence, the TDS concentration averaged 500 mg/L in samples collected from three wells between 1965 and 1970 (STORET Legacy Database).

Constraints on water availability in this basin include both physical limitations and water quality issues. Shallow alluvial deposits are typically more susceptible to drought impacts. For the upper Villa Valley, water level and well capacity declines during drought limit the availability of the resource, while in the lower valley area; sea water intrusion is the primary constraint.

Published hydrogeologic information for this basin is compiled from older reports and may not be representative of current conditions. If the District requires more current or detailed information for the Villa Valley Groundwater Basin, new studies would be necessary. Information currently compiled by County departments (such as well logs for private wells or water quality for shared well systems) would be useful for these studies. Additional information may be available from the DWR and private sources.

4.2.1.3 <u>Cayucos WPA 3</u>

Groundwater basin descriptions in WPA 3 include Cayucos Valley, Old Valley, and Toro Valley.

4.2.1.3.1 *Cayucos Valley Groundwater Basin*

The Cayucos Valley Groundwater Basin is located in WPA 3 in the North Coast sub-region (Figure 4.3) and encompasses approximately 580 acres (0.9 square miles). The basin is bounded by the Pacific Ocean and by relatively non-water bearing rock units (Cleath, T. S., 1988). This basin has been designated by the DWR as Basin 3-38. Recharge to the basin comes primarily from seepage of surface flows in Cayucos Creek, deep percolation of precipitation, and residential/agricultural return flows.

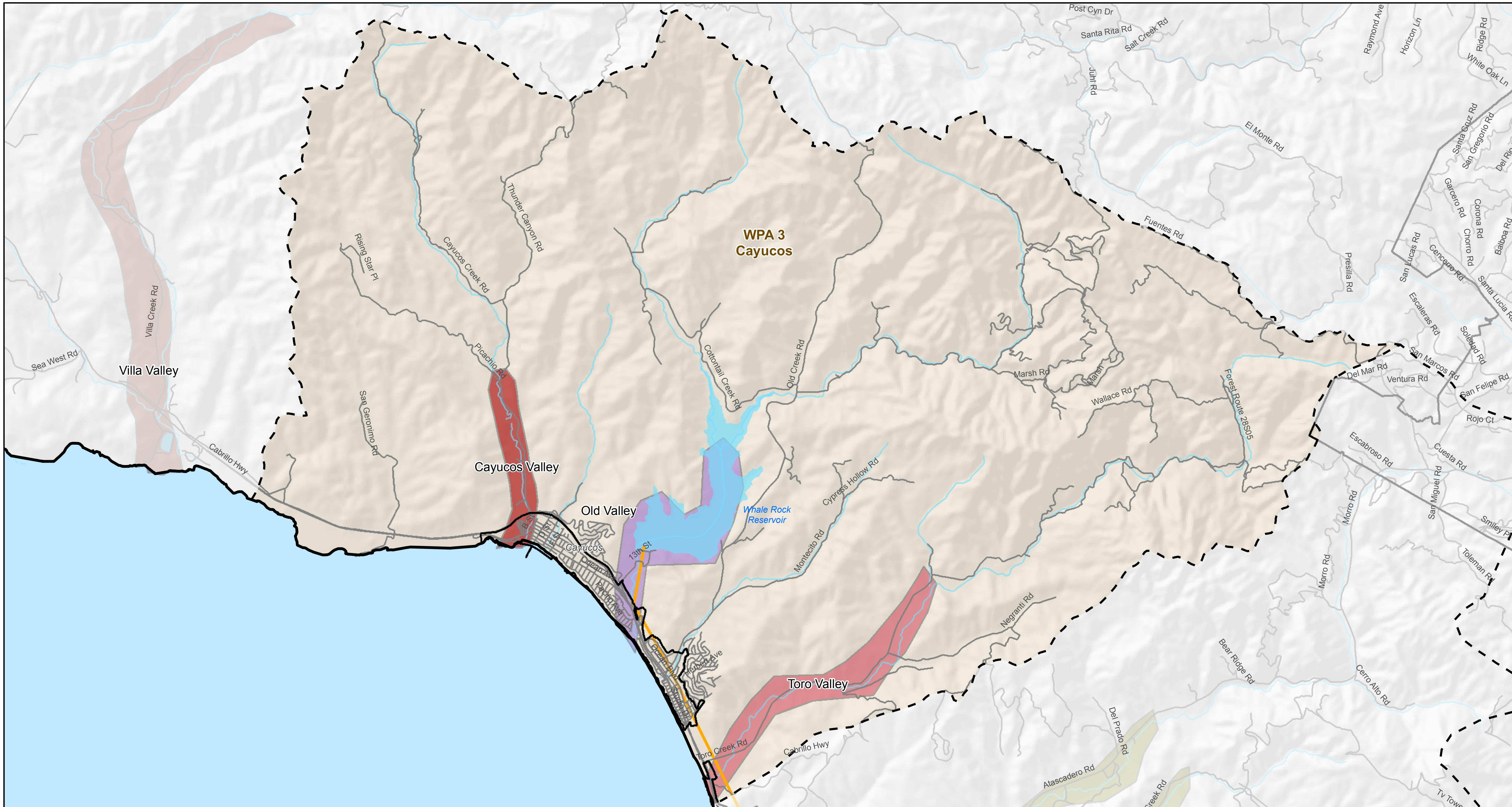
Basin groundwater users include a small public water system (mobile home park) and overlying residential and agricultural users. The Morro Rock Mutual Water Company and Paso Robles Beach Water Association service areas overlie a portion of the basin; however, these purveyors do not pump from the Cayucos Valley basin.

The water supply aquifer is within the alluvial deposits of Cayucos Creek, which are comprised of gravel, sand, silt and clay. These alluvial deposits extend up to an estimated 80 feet thick, and are at least 68 feet thick at a distance of one mile inland from the coast (Cleath, T. S., 1988). The projected safe seasonal yield of the Cayucos Valley Groundwater Basin was historically estimated at 600 AFY (DWR 1958). There has been no subsequent basin-wide studies to confirm or update this estimate. Estimated production from the basin was 350 AFY in 1987 (Cleath, T. S., 1988).

There is evidence of sea water intrusion in the basin extending to the mobile home park wells and ranch wells immediately upstream of Highway 1. The TDS concentration of groundwater upstream of the sea water influence is close to 500 mg/L (Cleath, T. S., 1988).

Constraints on water availability in this basin include both physical limitations and water quality issues. Water level and well capacity declines during drought will limit the availability of the resource, while in the lower valley area; sea water intrusion will be the primary constraint.

Some of the published hydrogeologic information for the Cayucos Valley Groundwater Basin is over 20 years old and may not be representative of current conditions. If the District requires more current or detailed information for this basin, new studies would be necessary. Information currently compiled by County departments (such as well logs for private wells or water quality for shared well systems) would be useful to these studies. Additional information may be available from the DWR and private sources.



Legend

Water Facilities

- ☆ WTP
- Reservoir/Tank and/or WTP
- Local Facility
- Pump Station
- Turnout
- Tunnel Unit
- Water Transmission Line

Color Scheme

- California State Coastal Branch
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- Salinas Reservoir System
- Whale Rock Reservoir System
- Chorro Valley Pipeline

- Streets
- Major Rivers/Streams
- Urban Reserve and Village Reserve Lines (URL/VRL)
- Water Planning Area 3
- Water Planning Area Boundary
- Groundwater Basins
- Waterbodies

Text:
Water Planning Area
Groundwater Basin
URL/VRL
Water Facility
Hydrography

0 0.75 1.5 Miles

Figure 4.3
San Luis Obispo County
Water Planning Area 3
Master Water Report
San Luis Obispo County Flood Control and Water Conservation District

4.2.1.3.2 *Old Valley Groundwater Basin*

The Old Valley Groundwater Basin is in WPA 3 in the North Coast sub-region (Figure 4.3) and encompasses approximately 750 acres (1.2 square miles). The basin is bounded by the Pacific Ocean and by relatively impermeable rocks. This basin, which includes Whale Rock Reservoir, was designated by the DWR as Basin 3-39. Basin recharge upstream of the reservoir comes primarily from deep percolation of precipitation and seepage from surface flows in Cottontail Creek and Old Creek. Below the dam, recharge includes dam underflow and seepage from reservoir releases.

Basin groundwater users downstream of Whale Rock reservoir include members of the Cayucos Area Water Organization (CAWO), which include Morro Rock Mutual Water Company (Morro Rock MWC), Paso Robles Beach Water Association (PRBWA), County Service Area 10A (CSA 10A), the Cayucos Cemetery District (CCD), and two landowners. The combined groundwater and Whale Rock Reservoir surface water allocation for CAWO in Old Valley is 600 AFY, distributed as follows:

- Morro Rock MWC: 170 AFY
- PRBWA: 222 AFY
- CSA 10A: 190 AFY (plus 25 AFY of San Luis Obispo’s entitlement via exchange for Lake Nacimiento water)
- CCD: 18 AFY
- Downstream land owners: 64 AFY

CAWO agencies receive water directly from the reservoir via the treatment plant and transmission pipeline. Mainini Ranch and Ogle also receive entitlements to 64 AFY of Whale Rock Reservoir. Upstream of the reservoir are residential and agricultural overlying users. Whale Rock Reservoir water users, including the City of San Luis Obispo, Cal Poly, and the California Men’s Colony, are discussed later in this section.

The water supply aquifer is within the alluvial deposits of Old Creek and upstream tributary valleys. These alluvial deposits extend up to an estimated 72 feet thick (Cleath & Associates, 1993, 1995). Production from wells in the lower Old Valley Groundwater Basin (below the reservoir) ranged from 389 to 603 AFY, with an average of 505 AFY between 1981 and 1992. The lower basin was estimated to have a yield capable of providing the entire 600 AFY CAWO allocation, although releases from the reservoir were necessary to preclude sea water intrusion (Cleath & Associates 1993, 1995). With direct deliveries of CAWO downstream entitlement to a water treatment plant beginning in 1997, re-evaluation of the yield in this part of the basin has not been a high priority. The TDS concentration of the groundwater below the reservoir averaged 440 mg/L in 2008 (CSA 10/10A, 2008).

Constraints on water availability in this basin include physical limitations, water rights, and environmental considerations. Shallow alluvial deposits upstream of the reservoir are susceptible to drought impacts, having limited groundwater in storage. For the area below the reservoir, dam underflow may provide a source of recharge. Water agreements limit the amount of groundwater available to the members of CAWO and downstream landowners in Old Valley.

4.2.1.3.3 *Toro Valley Groundwater Basin*

The Toro Valley Groundwater Basin is in WPA 3 in the North Coast sub-region (Figure 4.3) and encompasses approximately 510 acres (0.8 square miles). The basin is bounded by the Pacific Ocean and by generally non-water bearing rocks. This basin is designated by the DWR as Basin 3-40 (Cleath, T. S., 1988; DWR 2003). Basin recharge comes primarily from seepage of surface flows in Toro Creek, deep percolation of precipitation, and residential/agricultural return flows.

Basin water users include Chevron (with agricultural tenants), and overlying residential and agricultural users. The water supply aquifer is within the alluvial deposits drained by Toro Creek. These alluvial deposits extend up to an estimated 80 feet thick, and average approximately 50 feet thick in the lower portion of the basin (McClelland Engineers, 1988). The projected safe seasonal yield of the Toro Valley Groundwater Basin was historically estimated at 500 AFY (DWR 1958). Estimates of hydrologic budget items for 1987 conditions included 591 AFY of percolation of precipitation and 532 AFY of basin groundwater production. Given the shallow nature of alluvial deposits and limited groundwater in storage, the safe yield estimate for this Master Water Report Update is limited to the documented historical production that has not resulted in water supply problems, which to date has been up to 532 AFY.

Water quality data for a well approximately 0.7 miles inland of the coast between 1954 and 1987 indicates mild sea water intrusion at this location in the basin, with chloride concentrations up to 129 mg/L. The TDS concentration typically ranges between 400 and 700 mg/L (STORET Legacy Database and DWR 2003). In the lower basin area near Highway 1, petroleum hydrocarbon contamination associated with the Chevron marine terminal has been detected in groundwater and remedial activities are ongoing (GeoTracker Database).

Constraints on water availability in this basin include both physical limitations and water quality issues. Shallow alluvial deposits are typically more susceptible to drought impacts than deeper formation aquifers, having less groundwater in storage and consequently less capacity for resource utilization and banking. For the upper basin, water level and well capacity declines during drought will limit water availability, while in the lower valley area, sea water intrusion and petroleum hydrocarbon contamination are the primary constraints.

Some of the published hydrogeologic information for this groundwater basin is over 20 years old and may not be representative of current conditions. If the District requires more current or detailed information for this basin, new studies would be necessary. Information currently compiled by County departments (such as well logs for private wells or water quality for shared well systems) would be useful to these studies. Additional information may be available from the DWR and private sources.

4.2.1.4 Morro Bay WPA 4

Groundwater basin descriptions in WPA 4 include Morro Valley and Chorro Valley.

4.2.1.4.1 *Morro Valley Groundwater Basin*

The Morro Valley Groundwater Basin is in WPA 4 in the North Coast sub-region (Figure 4.4) and encompasses approximately 1,200 acres (1.9 square miles). The basin is bounded by the Pacific Ocean, the Morro Bay estuary, and by impermeable rock units. This basin is designated by the DWR as Basin 3-41. Most of the basin area is within unincorporated San Luis Obispo County, with the City of Morro Bay overlying the basin area southwest of the narrows near Highway 1 (DWR 2003). Recharge to the basin comes primarily from seepage of surface flows in Morro Creek and Little Morro Creek, deep percolation of precipitation, and residential/agricultural return flows. The water supply aquifers are predominantly within alluvial deposits drained by Morro Creek, which are comprised of gravel, sand, silt and clay. The alluvial deposits are typically up to 80 feet thick (Cleath & Associates, 2007).

Basin groundwater users include the City of Morro Bay, Morro Bay power plant, a cement plant, a small public water system (mobile home park), and residential and agricultural overlying users. The City of Morro Bay pumps sea water and Morro Creek underflow from the basin, the latter with a permitted allocation of 581 AFY from the State Board.

The existing perennial yield of the Morro Valley Groundwater Basin is estimated at 1,500 AFY. Groundwater modeling performed to evaluate the impacts of sea water well operation on the basin indicated that concurrent operation of the City of Morro Bay's sea water and fresh water supply wells could interfere during drought conditions such that the fresh water wells would be subject to sea water intrusion (Cleath & Associates, 1993a; 1993b).

Sea water intrusion and nitrates are the predominant concerns for water quality in this basin. In the mid-1980's TDS concentrations in groundwater downstream of the narrows near Highway 1 began to exceed 1,000 mg/L seasonally due to sea water intrusion. More recently, basin TDS concentrations (measured in 2007) were typically between 400 and 800 mg/L and increasing toward the coast, except for an area beneath agricultural fields in the lower valley where TDS concentrations reached 1000 mg/L, and nitrate concentrations reached 220 mg/L as nitrate (Cleath & Associates 1993a; 2007).

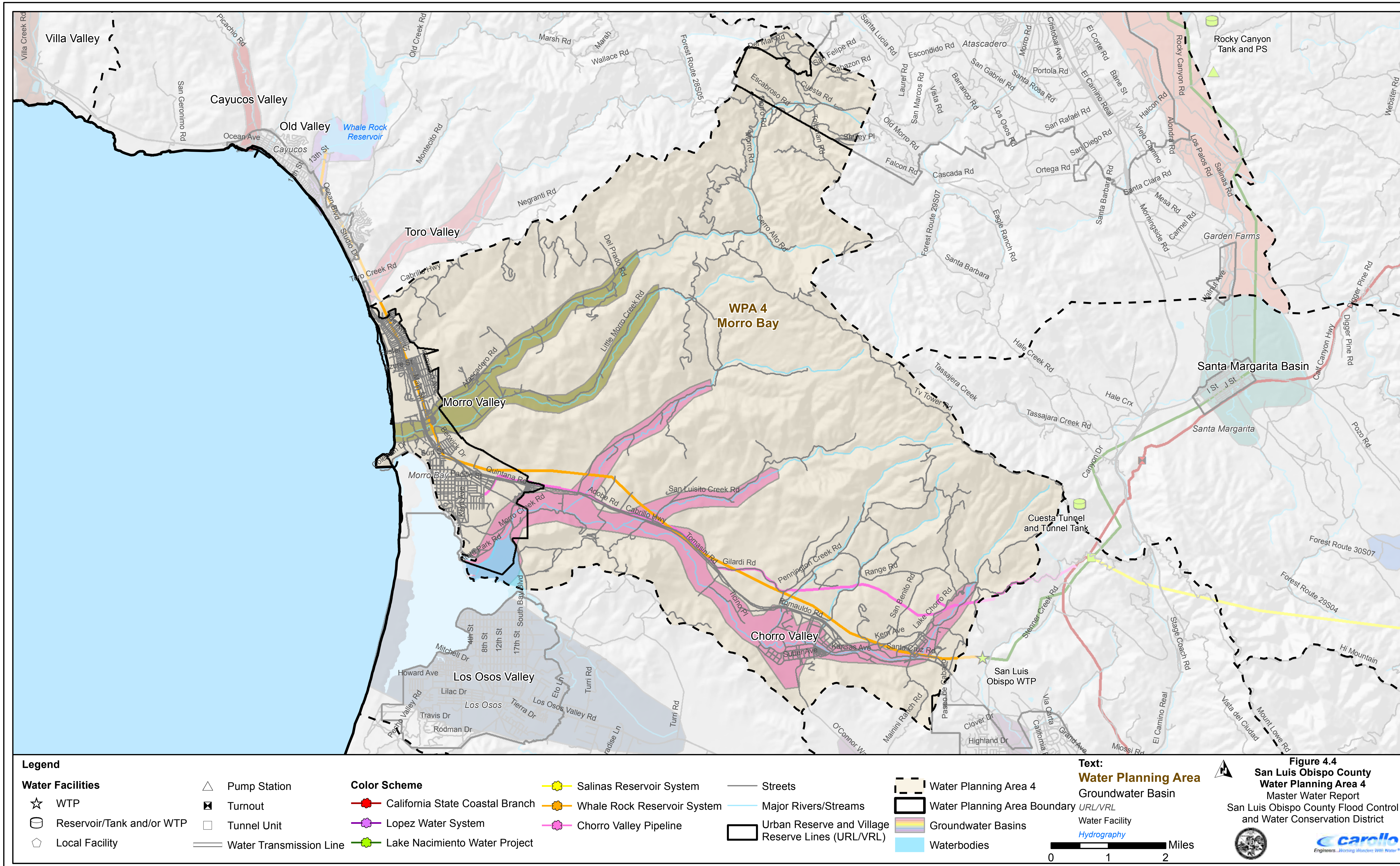


Figure 4.4
San Luis Obispo County
Water Planning Area 4
Master Water Report
San Luis Obispo County Flood Control and Water Conservation District

Primary constraints on water availability in this basin include physical limitations, water quality issues, and water rights. Shallow alluvial deposits are typically more susceptible to drought impacts. For the upper Morro Valley, water level and well capacity declines during drought would limit the availability of the resource, while in the lower valley area, sea water intrusion would be the primary constraint. Elevated nitrates are a constraint for drinking water availability at the City of Morro Bay well field, where appropriative water right permits from the State Board also limit production.

4.2.1.5 Chorro Valley Groundwater Basin

The Chorro Valley Groundwater Basin is in WPA 4 in the North Coast sub-region (Figure 4.4) and encompasses approximately 3,200 acres (5 square miles), although the effective extent of saturated basin deposits covers an estimated 1,900 acres (3 square miles). The basin is bounded by the Morro Bay estuary and elsewhere by impermeable rock units (Cleath-Harris Geologists, 2009). This basin is designated by the DWR as Basin 3-42. Most of the basin area is within unincorporated San Luis Obispo County, with the City of Morro Bay overlying the basin area near the Morro Bay estuary. Recharge to the basin comes primarily from seepage of surface flows in Chorro Creek and tributaries (including wastewater treatment plant discharges and releases from Chorro Reservoir), deep percolation of precipitation, and residential/agricultural return flows. The water supply aquifers are alluvial deposits drained by Chorro Creek, which are comprised of gravel, sand, silt and clay. These alluvial deposits are 50-70 feet thick downstream of Canet Road (Cleath-Harris Geologists, 2009).

Basin groundwater users include the City of Morro Bay, San Luis Obispo County, California State Parks, California State Polytechnic University, California National Guard, California Men's Colony, and residential and agricultural overlying users. The City of Morro Bay pumps Chorro Creek underflow from the basin and has appropriative rights to 1,142.5 AFY. Safe yield under drought conditions is estimated at 566 AFY through the State Board.

The perennial yield of the Chorro Valley basin is estimated for planning purposes at 2,210 AFY (Cleath & Associates, 1993a; DWR 1958). Nitrate concentrations are a concern for water quality in the lower portion of this basin. Sea water intrusion has been documented historically and is a potential future concern in the Chorro Flats area, should pumping patterns change significantly. Recent basin TDS concentrations (measured in 2008) were typically between 500 and 700 mg/L (DWR 1975; Cleath-Harris Geologists, 2009).

Constraints on groundwater availability in this basin include physical limitations, water quality issues, environmental demand, and water rights. In the Chorro Valley upstream of the Chorro Creek discharge point for the California Men's Colony wastewater treatment plant, water level and well capacity declines during drought will limit the availability of the resource. The wastewater plant discharges enter the basin as imported water sources, and therefore provide additional available water for basin wells and environmental demand below the discharge point. In the lower valley area, sea water intrusion would be a primary constraint during drought. The elevated nitrates are a constraint for drinking water availability at the City of Morro Bay well field where production is also limited by appropriative water right permits from the State Board. These permits for underflow production by the City of Morro Bay have also been conditioned to require minimum surface flows in Chorro Creek for Steelhead habitat protection.

4.2.1.6 <u>Los Osos WPA 5</u>

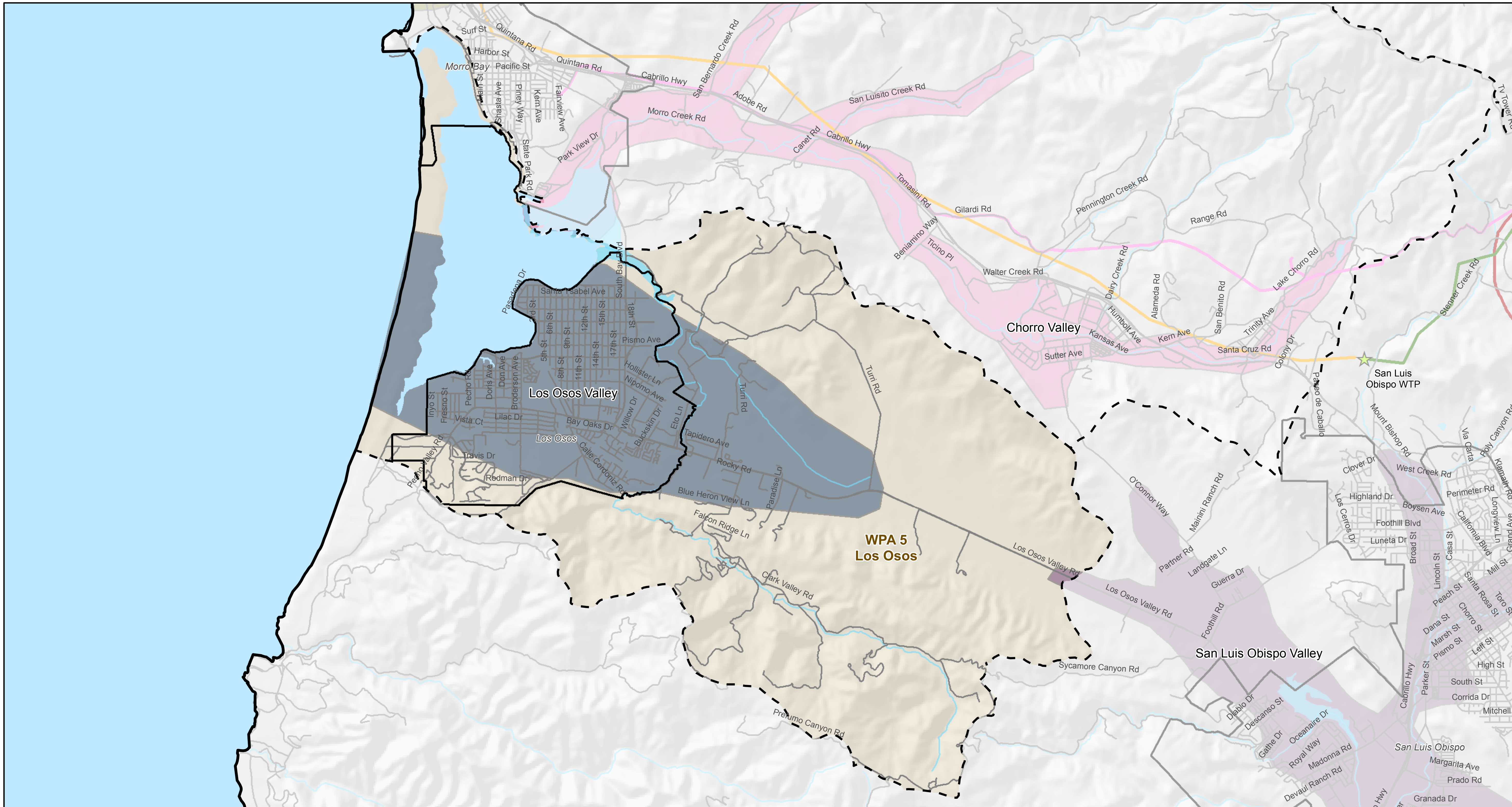
Groundwater basin descriptions in WPA 5 include Los Osos Valley.

4.2.1.6.1 *Los Osos Valley Groundwater Basin*

The Los Osos Valley Groundwater Basin is part of the North Coast sub-region (Figure 4.5) and encompasses approximately 10 square miles, of which 3.3 square miles underlie the Morro Bay estuary and sand spit, and 6.7 square miles underlie the communities of Los Osos, Baywood Park, and the Los Osos Creek Valley. The basin is bounded by the Pacific Ocean, and elsewhere by relatively impermeable rocks. The southern basin boundary also runs parallel to the main strand of the Los Osos fault. This basin is designated by the DWR as Basin 3-8 (DWR, 2003; Cleath & Associates, 2005). Freshwater recharge to the basin comes primarily from seepage of surface flows in Los Osos Creek, deep percolation of precipitation, and residential/agricultural return flows. Sea water intrusion is also a significant component of basin inflow under current conditions.

The basin is generally characterized as having five (5) zones. The upper aquifer (Zone C) reaches 200 feet thick. The lower aquifer (Zones D and E) is up to several hundred feet thick adjacent to the main strand of the Los Osos fault. There is also a perched aquifer less than 50 feet thick in the dune sands west of the Los Osos Creek Valley (Zone B), and a shallow alluvial aquifer typically 70 feet thick in the creek valley (Zone A). The lower aquifers extend beneath the alluvial aquifer in the creek valley (Yates and Wiese, 1988; Cleath & Associates, 2005, ISJ Working Group, 2010).

Basin groundwater users in the Los Osos Valley basin include Golden State Water Company, S&T Mutual, the Los Osos Community Services District, and overlying private well users. The three local water purveyors, along with the County of San Luis Obispo, are currently preparing a Basin Management Plan (BMP) under a court-approved Interlocutory Stipulated Judgment (ISJ Working Group).



Legend

Water Facilities
- WTP
- Reservoir/Tank and/or WTP
- Local Facility
- Pump Station
- Turnout
- Tunnel Unit
- Water Transmission Line

Color Scheme
- California State Coastal Branch
- Lopez Water System
- Lake Nacimiento Water Project
- Salinas Reservoir System
- Whale Rock Reservoir System
- Chorro Valley Pipeline

- Streets
- Major Rivers/Streams
- Urban Reserve and Village Reserve Lines (URL/VRL)
- Water Planning Area 5
- Water Planning Area Boundary
- Groundwater Basins
- Waterbodies

Text:
Water Planning Area
Groundwater Basin
URL/VRL
Water Facility
Hydrography

0 0.75 1.5 Miles

Figure 4.5
San Luis Obispo County
Water Planning Area 5
Master Water Report
San Luis Obispo County Flood Control and Water Conservation District

Estimates of the safe yield of the groundwater basin have been developed for the current condition, with existing septic systems in place, and assuming no new water development. The safe yield estimate of the basin under current conditions is 3,200 AFY (ISJ Working Group, 2010). Through the development of a BMP, it is the goal, among others, of the ISJ Working Group, to “provide for a continuously updated hydrologic assessment of the Basin, its water resources and safe yield.”

TDS concentrations are generally between 200 mg/L and 400 mg/L. Nitrates are the primary constituent of concern in the upper aquifer, with concentrations in excess of the State drinking water standard of 45 mg/L as nitrate throughout the urban area (Cleath & Associates, 2005, 2006a, 2006b).

Lower aquifer displays characteristics of sea water intrusion on the west side of the basin. TDS concentrations also vary significantly by location, and have been reported at up to 950 mg/L in west side supply wells, although average values in the urban area are closer to 500 mg/L. Sea water intrusion is the main concern for lower aquifer water quality (Cleath & Associates, 2005; GSWC, 2009).

The primary constraint on water availability in the Los Osos Valley Groundwater Basin is deteriorating water quality due to sea water intrusion and nitrate contamination. The County of San Luis Obispo has certified that the basin is currently at a Level III severity rating (resource capacity has been met or exceeded) due to sea water intrusion. Through the development of the BMP, the ISJ Working Group will be evaluating and identifying the management strategies to implement, in coordination with the County’s wastewater project, in order to improve conditions in the basin.

4.2.2 South Coast Sub-Region

The South Coast Sub-Region is comprised of four Water Planning Areas, including San Luis Obispo/Avila (WPA 6), South Coast (WPA 7), Huasna Valley (WPA 8), and Cuyama Valley (WPA 9) summarized in Table 4.2. A brief description of the basins within each WPA is provided below, with details on groundwater supply aquifers, groundwater users, basin yield, water quality, and water availability.

Table 4.2 South Coast Sub-Region Groundwater Basins				
WPA No.	**WPA Name**	**Groundwater Basin Name**	**Sub-basin/ Management Area**	**Safe Basin Yield (AFY)**
6	San Luis Obispo/Avila	San Luis Obispo Valley(1)	San Luis Valley	2,000
			Edna Valley	4,000
			Avila Valley	No estimate available
7	South Coast	Santa Maria Valley	Pismo Creek Valley	No estimate available
			Arroyo Grande Valley	No estimate available
			Nipomo Valley	No estimate available
			Northern Cities Management Area	5,600-6,800
			Nipomo Mesa Management Area	4,800-6,000(2)
			Santa Maria Valley Management Area	124,000(3)
8	Huasna Valley	Huasna Valley		No estimate available
9	Cuyama Valley	Cuyama Valley		10,000(4)

Notes:
1. A 1991 study reported a sustained yield of the entire San Luis Valley Groundwater Basin under existing conditions at 5,900 AFY.
2. DWR (2002) estimated the dependable yield (DWR 2002. Page ES21) at 4,800 AFY to 6,000 AFY, which was prior to the formal establishment of the NMMA.
3. Safe Yield in the San Luis Obispo County portion of the Santa Maria Valley was estimated between 11,100 AFY and 13,000 AFY prior to the formal establishment of the SMVMA (DWR 2002).
4. There is no separate yield estimate for the San Luis Obispo County portion of the basin.

4.2.2.1 San Luis Obispo/Avila WPA 6

The San Luis Obispo Valley Groundwater Basin is the only DWR-designated basin in WPA 6 (Figure 4.6). A rise in bedrock south of the San Luis Obispo Airport has created two separate subsurface drainage systems, which were designated as the San Luis Valley and Edna Valley Sub-basins in a draft 1997 DWR study. The extension of the San Luis Obispo Creek alluvial deposits between the Los Osos Valley Fault and the Pacific Ocean has been

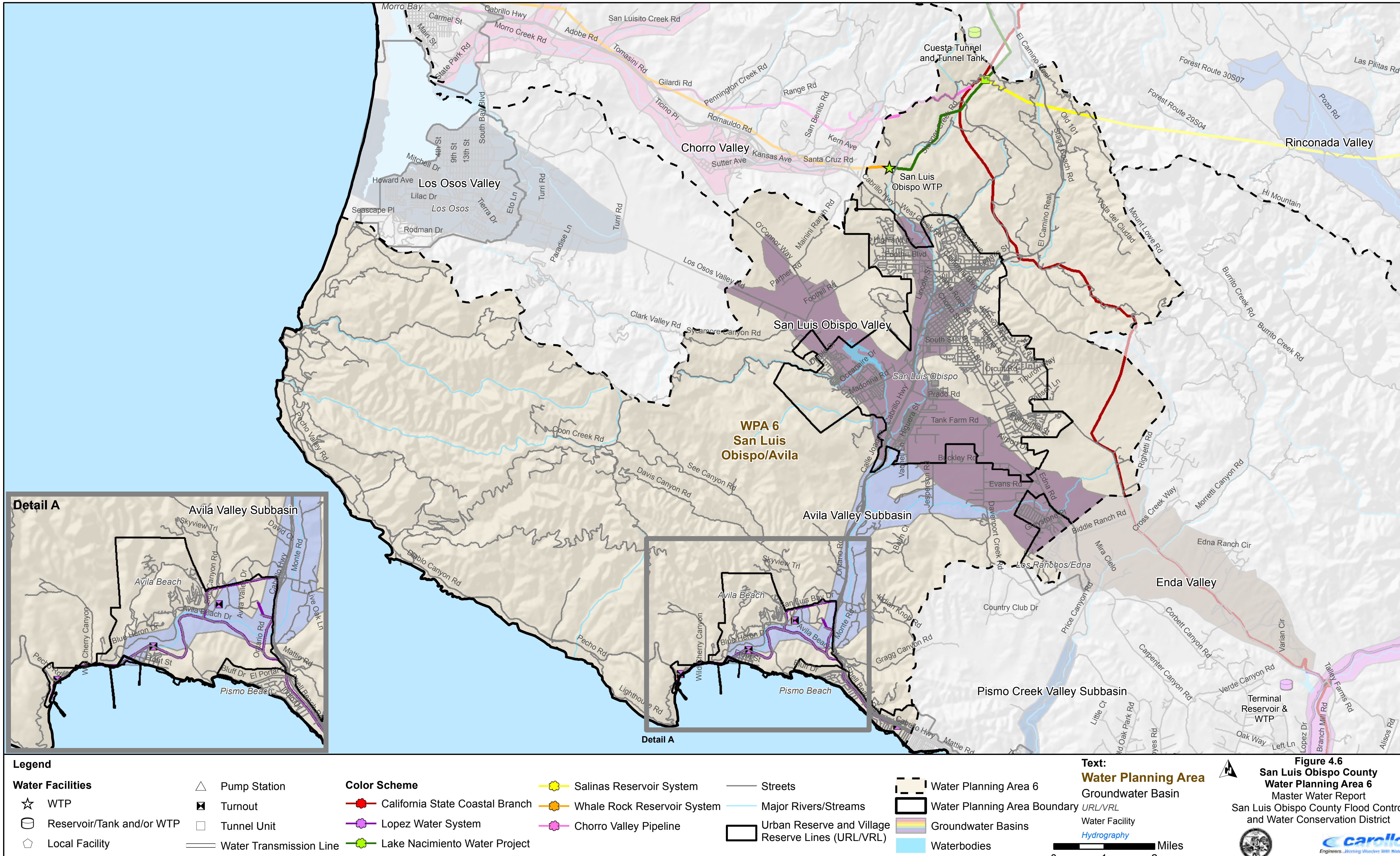


Figure 4.6
San Luis Obispo County
Water Planning Area 6
Master Water Report
San Luis Obispo County Flood Control and Water Conservation District

added herein as the Avila Valley Sub-basin. The San Luis Valley and Avila Valley Sub-basins of the San Luis Obispo Valley Groundwater Basin are in WPA 6, while the Edna Valley Sub-basin is in WPA 7.

4.2.2.1.1 *San Luis Obispo Valley Groundwater Basin*

The San Luis Obispo Valley Groundwater Basin is part of WPA 6 and WPA 7 and encompasses approximately 13,800 acres (21.6 square miles), including the newly defined Avila Valley Sub-basin (Figure 4.6). The two larger sub-basins underlie the San Luis and Edna Valleys and are bounded by the Santa Lucia Range, the San Luis Range and the Los Osos and Edna faults. The San Luis Valley (WPA 6) and Edna Valley (WPA 7) Sub-basins comprise Basin 3-9 as defined by the DWR (DWR 1997; 2003). The Edna Valley Sub-basin (approximately 4,700 acres) is entirely within unincorporated San Luis Obispo County, while the San Luis Valley Sub-basin (approximately 8,000 acres) includes both unincorporated County and the City of San Luis Obispo.

The safe yield of the entire San Luis Valley Groundwater Basin was determined in a 1991 study based on elements of recharge and discharge, and in a 1997 study using elements of recharge and discharge, the length of the drought periods and the recovery time following them, and an assessment of the behavior of the basin. The 1991 study reported a value of sustained yield of the entire basin under existing conditions at 5,900 AFY. The 1997 DWR study reported a long-term dependable yield value for the San Luis Valley Sub-basin at 2,000-2,500 AFY, and a long-term dependable yield value for the Edna Valley Sub-basin at 4,000-4,500 AFY. DWR‘s 1997 study remains in draft form, but is the only yield estimate that separates the two main basin areas. Therefore, the lower values from the 1997 study, which total 6,000 AFY and closely match the 1991 study value, are selected for planning purposes. In summary, the safe yield of the groundwater basin is estimated at 6,000 AFY, of which 2,000 AFY is assigned to the San Luis Valley Sub-basin, and 4,000 AFY to the Edna Valley Sub-basin (Boyle, 1991; DWR 1997).

The Avila Valley Sub-basin (WPA 6) encompasses approximately 1,100 acres along the San Luis Obispo Creek floodplain between the Los Osos Valley fault and the Pacific Ocean, a distance of close to 7 miles. If the District requires more current or detailed information for this basin, specific studies would be necessary. In preparation for any future studies, the District or other agency could begin collecting available information (such as well logs, pump information, or water quality data) from private and public sources to facilitate future work.

4.2.2.1.2 *San Luis Valley Sub-basin*

The San Luis Valley Sub-basin is generally shallower than the Edna Valley sub-basin. Water supply aquifers are mostly within the alluvial deposits and underlying Paso Robles Formation, with a few productive wells tapping marine sands near Highway 101 and Los Osos Valley Road. These alluvial deposits are up to 60 feet deep and directly overlie bedrock in the western and northern areas of the basin. The Paso Robles Formation deposits extend to depths of up to 150-200 feet below ground surface. Recharge to the basin comes primarily from seepage of surface flows in San Luis Obispo Creek and tributaries (including discharges from the City of San Luis Obispo Water Reclamation Facility), deep percolation of precipitation, and residential/ agricultural return flows.

Sub-basin groundwater users include the City of San Luis Obispo, California State Polytechnic University, San Luis Coastal Unified School District, Chevron, close to two dozen small public water systems serving various commercial, industrial, and residential properties, agricultural growers, and private residences.

TDS concentrations in the San Luis Valley Sub-basin ranged from 320-630 mg/L (480 mg/L average) in six basin wells tested in 1988. Water quality problems vary by location within the basin, with nitrates, salinity, hardness, and perchloroethylene (PCE) historically being the constituents of greatest concern. PCE contamination was a major issue for two wells used by the City of San Luis Obispo during the period from 1987-91. Two high-capacity wells were also shut down in the 1990s due to elevated nitrate concentrations. Hardness and TDS/chloride are more of a concern in the airport area (Cleath, T. S., 1987, 1988; Boyle, 1991).

The primary constraints on water availability in the San Luis Valley Sub-basin include physical limitations, water quality issues, and environmental demand. The shallow alluvial deposits are typically more susceptible to drought impacts. Elevated nitrates are a constraint for drinking water availability at some of the City of San Luis Obispo wells. Steelhead habitat protection in San Luis Obispo Creek would also be a potential constraint on groundwater availability. Wastewater discharges from the City of San Luis Obispo Water Reclamation Facility enter San Luis Obispo Creek near the Los Osos Valley Road overpass. Most of this water originates as imported water and provides additional recharge to wells downstream and to the riparian habitat.

4.2.2.1.3 *Avila Valley Sub-basin*

Downstream of the Los Osos Valley fault, the San Luis Obispo Valley Groundwater Basin follows the alluvial deposits of San Luis Obispo Creek and tributaries to the ocean at Avila Beach. These alluvial deposits are typically less than 60 feet deep and are comprised of river gravel and sand beds overlain by floodplain silts and sands. Wells in the alluvium produce as much as several hundred gallons per minute. Wells in the underlying older sedimentary and volcanic beds may produce more than 100 gallons per minute. Some of these deep wells produce warm water in the vicinity of Sycamore Mineral Springs and San Luis Bay Estates. Where these bedrock units occur downstream of the Marre weir and along the coast, brackish or sea water may be encountered.

Avila Valley Mutual Water Company (MWC) and San Miguelito MWC produce water from the Avila Valley Sub-basin as do the agricultural and private water wells of overlying users in the valley. No basin yield numbers have been published for this sub-basin.

The alluvium extends out to the ocean but the fresh water portion of the alluvium is upstream of the Marre weir at San Luis Bay Estates. Prior to installation of this weir in the early 1970s, seawater intrusion had occurred as far up the valley as the confluence with See Canyon Creek. Since the installation of the weir and with the supplemental flow from the City of San Luis Obispo wastewater treatment plant, there has not been any seawater intrusion documented upstream of the weir.

The primary constraints on water availability in the Avila Valley Sub-basin are physical limitations and environmental demand. Shallow alluvial deposits are typically more susceptible to drought impacts. Releases from the City of San Luis Obispo Water Reclamation Facility into San Luis Obispo Creek significantly offset storage losses during drought, but are also intended to support steelhead habitat. Below the Marre Weir, sea water intrusion is the primary constraint to water availability.

4.2.2.2 South Coast WPA 7

Groundwater basin descriptions in WPA 7 include the Edna Valley Sub-basin of the San Luis Obispo Valley Groundwater Basin, along with three sub-basins and three management areas of the Santa Maria Valley Groundwater Basin. Pismo Creek Valley, Arroyo Grande Valley, and Nipomo Valley are DWR-defined sub-basins of the Santa Maria Valley Groundwater Basin (DWR 2002). The Northern Cities Management Area (NCMA), Nipomo Mesa Management Area (NMMA), and Santa Maria Valley Management Area (SMVMA) are court-defined areas within the adjudicated boundary of the Santa Maria Valley Groundwater Basin (Figure 4.7).

4.2.2.2.1 *San Luis Obispo Valley Groundwater Basin*

The San Luis Obispo Valley Groundwater Basin was discussed above.

4.2.2.2.2 *Edna Valley Sub-basin*

The Edna Valley Sub-basin is part of WPA 7, rather than WPA 6, because surface and subsurface flow drains into the Santa Maria Valley Groundwater Basin (Figure 4.7).

Aquifers within the Edna Valley Sub-basin include alluvial deposits, the Paso Robles Formation, and underlying marine sands and shell beds. These basin materials are collectively thicker than basin strata in the San Luis Valley portion of the groundwater basin, reaching depths of over 300 feet (Boyle, 1991; DWR 1997). Recharge to the basin comes primarily from seepage of surface flows (Davenport Creek, West Corral de Piedra Creek, East Corral de Piedra Creek, and Cañada Verde), deep percolation of precipitation, and residential/agricultural return flows.

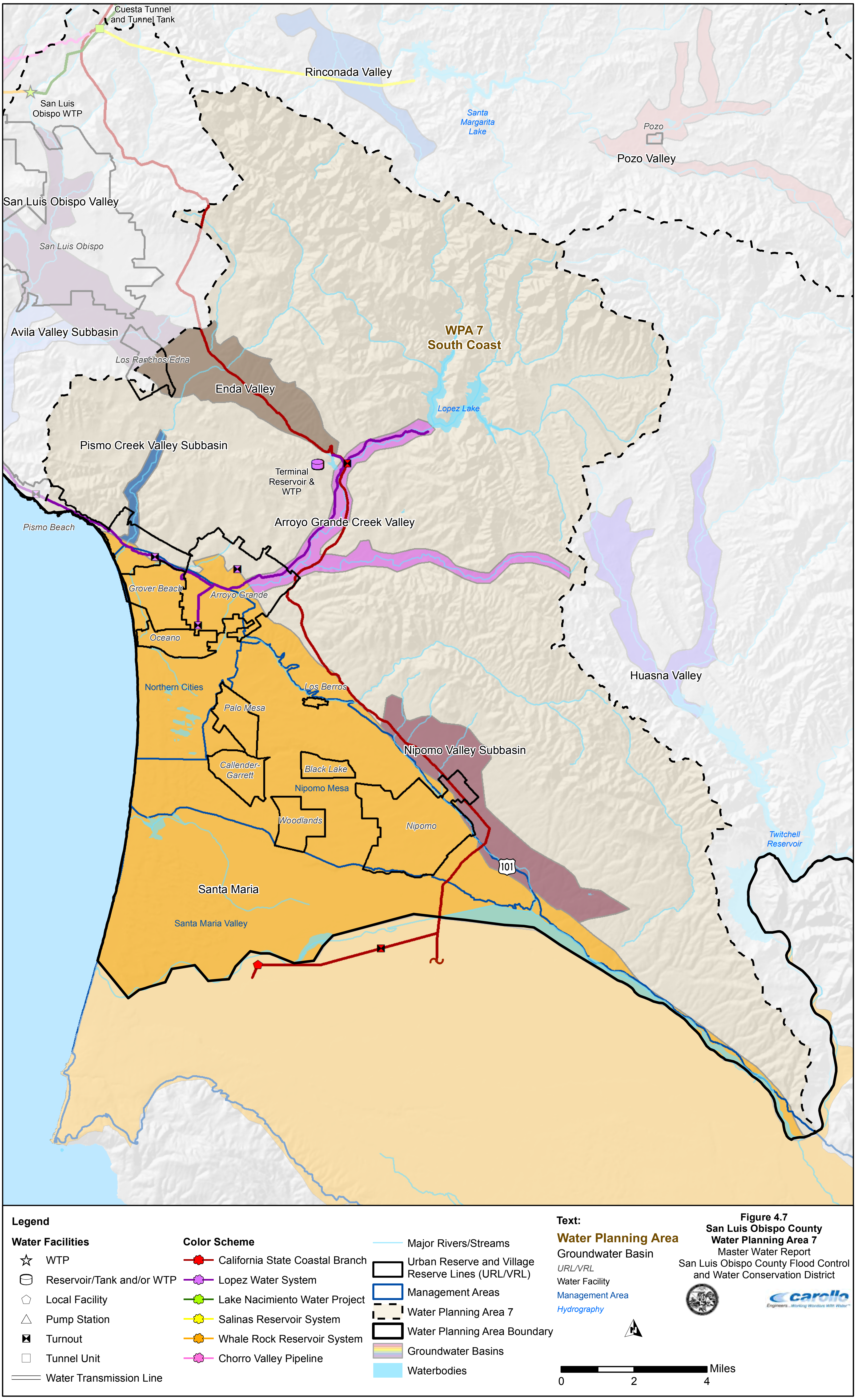


Figure 4.7
San Luis Obispo County
Water Planning Area 7
Master Water Report
San Luis Obispo County Flood Control and Water Conservation District

Sub-basin groundwater users include Golden State Water Company, San Luis Country Club (golf course), a few small public water systems, agricultural growers, and private residences. The estimated safe yield of the sub-basin is 4,000 AFY (DWR 1997; see San Luis Valley Sub-basin for additional details). The TDS concentration in the groundwater ranges from 630-780 mg/L (average 690 mg/L), based on public water company testing during 2008. The primary constraints on water availability in the Edna Valley portion of the basin are physical limitations and environmental demand. Lowering groundwater levels due to production in the basin may impact base flows to Pismo Creek, which support steelhead habitat.

4.2.2.2.3 *Santa Maria Valley Groundwater Basin*

The Santa Maria Valley Groundwater Basin is part of WPA 7 (Figure 4.7). There are two boundaries currently in use for this basin, one defined by the California DWR and one defined by the Superior Court of California. The court-defined boundary was developed by a technical committee for use in basin adjudication. This study divides the basin into the court-defined management areas but also includes descriptions on three sub-basins (Pismo Creek Valley, Arroyo Grande Valley, and Nipomo Valley) within the DWR-defined basin that are outside of the adjudicated area. These three alluvial valleys are referred to herein as sub-basins as defined by a 2002 DWR study of the area.

The Santa Maria Valley Groundwater Basin (DWR boundary, including sub-basins) encompasses approximately 184,000 acres (288 square miles), of which approximately 61,220 acres (95.7 square miles) are part of the South Coast Sub-Region within San Luis Obispo County (Figure 4.7). This groundwater basin underlies the Santa Maria Valley in the coastal portion of northern Santa Barbara and southern San Luis Obispo Counties. The basin also underlies Nipomo and Tri-Cities Mesas, Arroyo Grande Plain, with sub-basins in the Nipomo, Arroyo Grande and Pismo Creek Valleys. The basin is bounded on the north by the San Luis and Santa Lucia Ranges, on the east by the San Rafael Mountains, on the south by the Solomon Hills and the San Antonio Creek Valley Groundwater Basin, on the southwest by the Casmalia Hills, and on the west by the Pacific Ocean. In addition, three sub-basins have been identified in San Luis Obispo County that are separated from the main basin by the Wilmar Avenue fault. These are the Pismo Creek Valley (1,220 acres), Arroyo Grande Valley (3,860 acres), and Nipomo Valley (6,230 acres) Sub-basins. The Santa Maria Valley Groundwater Basin is designated by the DWR as Basin 3-9 (DWR 2002, 2003).

The Santa Maria Valley Groundwater Basin has been adjudicated. In 2005, the Superior Court of California entered a Judgment for a basin-wide groundwater litigation case that defined three basin management areas. These management areas are the Northern Cities Management Area (NCMA), the Nipomo Mesa Management Area (NMMA), and the Santa Maria Valley Management Area (SMVMA), which are used herein for planning by the County of San Luis Obispo. The Judgment incorporated a Stipulated Settlement which was made binding by the Court on the signatories, with a declaratory judgment and physical solution adjudged and decreed in the Judgment after Trial, dated January 25, 2008. The three DWR sub-basins included herein as separate basin components are outside of the adjudicated area.

The San Luis Obispo County portion of the SMVMA and the NMMA are in unincorporated County. The NCMA includes unincorporated County areas and the Cities of Pismo Beach, Arroyo Grande and Grover Beach. The City of Arroyo Grande also overlies a portion of the Arroyo Grande Sub-basin, and the City of Pismo Beach overlies a portion of the Pismo Creek Valley Sub-basin. The basin management areas and sub-basins are shown in Figure 4.7.

4.2.2.2.4 *Pismo Creek Valley Sub-basin*

The Pismo Creek Valley Sub-basin is part of the Santa Maria Valley Groundwater Basin as defined by the DWR but outside of the adjudicated basin area. Water supply aquifers are within alluvial deposits in Price Canyon, which is drained by Pismo Creek and its tributaries. The alluvium varies between 200 and 1,500 feet wide and is up to 60-70 feet thick (Cleath, 1986; DWR 2002; Fugro, 2009). Recharge to the sub-basin comes primarily from seepage from Pismo Creek and tributaries, from deep percolation of precipitation, and subsurface inflow from the Edna Valley Sub-basin.

Sub-basin groundwater users include residential and agricultural overlying users. Plains Exploration & Production Company (Oil Field) groundwater supply wells are not located in this sub-basin. The yield of the alluvial basin in the Spanish Spring ranch area has been estimated at 200 AFY, although this is before any consideration for environmental habitat demand (Fugro, 2009). Additional yield would be available from wells tapping the alluvium downstream of Spanish Springs Ranch, below the confluence of Las Cuevitas Creek, which drains the Indian Knob area. There is no estimate of the basin-wide yield.

Results of six groundwater samples collected from sub-basin wells in 1999 indicate a median TDS concentration of 620 mg/L. One well exceeded the State drinking water standards for TDS and sulfate, and most of the wells had iron and/or manganese concentrations above the drinking water standards (Fugro, 2009).

The primary constraints on water availability in the Pismo Creek Valley sub-basin are physical limitations and environmental demand. The shallow alluvial deposits are typically more susceptible to drought impacts. Steelhead habitat protection in Pismo Creek and tributaries would also be a potential constraint on groundwater availability.

4.2.2.2.5 *Arroyo Grande Valley Sub-basin*

The Arroyo Grande Valley Sub-basin is part of the Santa Maria Valley Groundwater Basin as defined by DWR but outside of the adjudicated basin area. Water supply aquifers are within alluvial deposits in Arroyo Grande Valley, which is drained by Arroyo Grande Creek. The alluvial deposits reach approximately 100 feet thick (DWR 2002). Recharge to the sub-basin comes primarily from seepage from Arroyo Grande Creek (including Lopez Reservoir releases) and tributaries, deep percolation of precipitation, and residential/agricultural return flows.

Sub-basin groundwater users include small public water systems (residential, commercial, and County park), and agricultural and residential overlying users. There is no estimated safe yield or existing developed yield value reported for this sub-basin. Groundwater levels in the Arroyo Grande Creek alluvium downstream of Lopez Dam are controlled by releases from Lopez reservoir, and have been fairly stable since 1969 (DWR 2002).

Historical groundwater quality in the Arroyo Grande Valley Sub-basin, based on samples collected in the 1980s, shows a progressive deterioration in a downstream direction. The general mineral character of groundwater in the valley changes upstream of the Tar Springs Creek confluence. The downstream section overlies a zone of multiple faults that may contribute highly mineralized water, along with irrigation water returns. With one exception, TDS, sulfate, and chloride concentrations in groundwater samples from wells in the upstream section met drinking water standards and the water was classified as suitable for agricultural irrigation. In the downstream section, TDS from wells typically exceeded 1,500 mg/L (the short term maximum drinking water standard), with sulfate concentrations exceeding the 500 mg/L upper limit for drinking water. The water was also classified as marginal to unsuitable for agricultural irrigation (DWR 2002).

The primary constraints on water availability in the Arroyo Grande Valley Sub-basin are water quality issues, environmental demand, and water rights. Although shallow alluvial deposits are typically more susceptible to drought impacts, releases from Lopez Reservoir provide greater dry period recharge than would otherwise exist. Groundwater quality in the lower sub-basin is marginal to poor, and steelhead habitat is present in Arroyo Grande Creek. The legal framework for Lopez Reservoir releases, downstream monitoring, and surface water allocations could also limit groundwater availability.

4.2.2.2.6 *Nipomo Valley Sub-basin*

The Nipomo Valley Sub-basin is part of the Santa Maria Valley Groundwater Basin as defined by DWR but outside of the adjudicated basin area. Sub-basin water supply aquifers are limited to the older alluvium, which covers the floor of the valley up to approximately 90 feet thick, thinning to negligible thickness toward the eastern edges of the sub-basin. This older alluvium continues to supply some wells, although bedrock formations underlying the alluvium have, over time, become a more important source of groundwater supply (DWR 2002). The fractured rock reservoirs that lie beneath the alluvial deposits cover a much larger area than the sub-basin limits, although the aquifer zones, which are defined by fracture permeability, are typically associated with particular strata and may be structurally complex. Recharge to the sub-basin comes primarily from seepage from Nipomo Creek, from deep percolation of precipitation, and residential/agricultural return flows.

Sub-basin groundwater users include residential and agricultural overlying users. The Nipomo Community Services District (Nipomo CSD) operates wells within the boundaries of the sub-basin, but these wells tap the deeper fractured rock reservoirs. There is no existing estimate for the perennial yield of this sub-basin.

Water quality is variable across the sub-basin, and the available data set does not distinguish between older alluvial wells and fractured rock wells, although most of the water represented is from the fractured rock reservoirs. Groundwater samples collected from 22 wells between 1962 and 2000 displayed the following characteristics: TDS concentrations ranged from 750 mg/L to 1,300 mg/L; sulfate concentrations between 200 and 340 mg/L; chloride concentrations between 64 and 130 mg/L; and nitrate concentrations from non-detect to 3.4 mg/L. Groundwater is classified as suitable to marginal under water quality guideline for irrigated agriculture (DWR 2002).

The primary constraints on water availability in the Nipomo Valley Sub-basin are physical limitations and water quality. The shallow alluvial deposits are typically more susceptible to drought impacts. The alluvial deposits also overlie and recharge fractured rock aquifers, and would experience declines in water levels and production during dry periods. Water availability in the fractures rock reservoirs can be highly variable, depending on the local structure, available storage capacity, and access to source of recharge. Water quality results indicate that State maximum allowable concentrations of some constituents are exceeded at some wells.

4.2.2.2.7 *Northern Cities Management Area*

The Northern Cities Management Area (NCMA) is part of the Santa Maria Valley Groundwater Basin adjudicated area. Water supply aquifers are within alluvial deposits, the Paso Robles Formation, the Careaga Formation and the Pismo Formation. The alluvium is tapped by wells in the Arroyo Grande Plain Hydrologic Subarea, where it reaches a maximum thickness of 130 feet. The Paso Robles Formation ranges from approximately 150 to 500 feet thick across the management area. The Careaga Formation is up to 300 feet thick south of the Santa Maria River fault, and absent north of the fault. North of the fault, the Pismo Formation underlies the Paso Robles Formation, reaching thicknesses of close to 600 feet along the coast (DWR 2002; Todd, 2007). Recharge to the management area comes primarily from seepage from Arroyo Grande Creek (including releases from Lopez Reservoir), from deep percolation of precipitation (includes storm water infiltration basins), subsurface inflow from the Nipomo Mesa with underflow from Pismo Creek, Meadow Creek, Arroyo Grande Creek, and Los Berros Creek alluvium, and residential/agricultural return flows.

Basin groundwater users in the NCMA include City of Pismo Beach, City of Arroyo Grande, City of Grover Beach, Oceano Community Services District (Oceano CSD), small public water systems (including Halcyon Water System), Lucia Mar Unified School District, and residential and agricultural overlying users.

The safe yield of the DWR’s Tri-Cities Mesa – Arroyo Grande Plain Hydrologic Subarea, reported as dependable yield, and was estimated between 4,000 AFY and 5,600 AFY prior to the formal establishment of the NCMA (DWR 2002). A 2007 Water Balance Study for the management area estimated total average annual recharge at 8,535 AFY, and an average annual groundwater production of 5,569 AFY between 1986 and 2004 without detectable sea water intrusion, supporting the DWR's 5,600 AFY safe yield value estimate (Todd, 2007). However, in 2009, evidence of seawater intrusion was detected at monitoring wells in the Oceano area, even though pumping within the NCMA did not exceed the safe yield of 5,600 AFY (NCMA, 2011).

The 2002 Groundwater Management Agreement (the "gentlemen's agreement") between the Northern Cities (with Oceano CSD) allocates an assumed safe yield of 9,500 AFY. The safe yield included subdivisions for agricultural irrigation (5,300 AFY), subsurface flow to the ocean (200 AFY) and urban uses (4,000 AFY). It also provided that urban groundwater allocations can be increased when land within the incorporated boundaries is converted from agricultural uses to urban uses, referred to as an agricultural conversion credit, or "ag credit." Accordingly, the Cities of Arroyo Grande and Grover Beach have increased their groundwater allocations through the conversion of agricultural uses to urban uses within their service areas. The 2010 Annual Report for the Northern Cities Management Area (NCMA) summarizes the groundwater allocations for the Northern Cities as follows:

Urban Area	Groundwater Allotment (from 2002 Groundwater Management Agreement), AFY	Ag Credit, AFY	Total, AFY
Arroyo Grande	1,202	112	1,314
Grover Beach	1,198	209	1,407
Pismo Beach	700	0	700
Oceano CSD	900	0	900
Total	**4,000**	**321**	**4,321**

The 9,500 AFY yield value was reportedly based on the 1979 DWR groundwater study for the Arroyo Grande area, although this value originated as the maximum estimated safe seasonal yield for the Arroyo Grande Subunit in the 1958 DWR report. The 2009 Annual Report for the NCMA acknowledges the historical 9,500 AFY yield value, but indicates that the allocation for basin outflow of 200 AFY is unreasonably low, and that a regional outflow on the order of 3,000 AFY is a reasonable approximation of subsurface outflow needed to prevent seawater intrusion (Todd, 2010).

Groundwater in the Tri-Cities Mesa portion of the NCMA (north of the Arroyo Grande Plain) has a median TDS value of 650 mg/L, based on data from 1992-2000. Six of 35 wells tested exceeded the State drinking water standard for nitrate, which has been a concern in the area. In the Arroyo Grande Plain, historical data between 1950 and 1987 indicated that approximately three-quarters of the wells sampled had TDS values between 500 to 1,500 mg/L, with half the wells reporting sulfate concentrations greater than 250 mg/L (DWR 2002).

Water availability in the NCMA is primarily constrained by water quality issues and water rights. Basin sediments in the management area extend offshore along several miles of coastline, where sea water intrusion is the greatest potential threat to the supply. Low coastal groundwater levels indicated a potential for seawater intrusion that was locally manifested in sentry wells 32S/13E N02 and N03 in 2009 after 3 dry years, with levels and water quality improving after an average rainfall year in 2010. The major purveyors have agreed to share the water resources through a cooperative agreement that also sets aside water for agricultural use and for basin outflow (Todd, 2007).

4.2.2.2.8 *Nipomo Mesa Management Area*

The Nipomo Mesa Management Area (NMMA) is part of the Santa Maria Valley Groundwater Basin adjudicated area. Water supply aquifers are within dune sands, the Paso Robles Formation, and the Careaga Formation (NMMA, 2008). DWR basin descriptions also include the Pismo Formation (DWR 2002).

The most productive and developed aquifers are in the alluvium and Paso Robles Formation. Dune sands forming the Nipomo Mesa reach a maximum thickness of close to 300 feet, although most of the sand is unsaturated. The Paso Robles Formation is the thickest and most extensive aquifer in the basin. The Paso Robles Formation in this area is up to 600 feet thick south of the Oceano fault and approximately 200 feet thick north of the fault. Further north beneath the Nipomo Mesa, the Paso Robles Formation is about 100 to 150 feet thick north of the Santa Maria River fault.

Careaga Formation sands are approximately 200-300 feet thick beneath the Nipomo Mesa and are completely missing north of the Santa Maria River fault. Pismo Formation sands are interpreted to underlie the Paso Robles Formation north of the Santa Maria River fault (DWR 2002).

The NMMA has defined a Shallow Aquifer and a Deep Aquifer. The Shallow Aquifer within the NMMA is considered to be an unconfined aquifer. The Deep Aquifer is considered to be confined (NMMA Technical Group, 2009). All production from wells used for public drinking water and industrial water is likely pumped from the Deep Aquifer (primarily the Paso Robles Formation (NMMA 2009 Annual Report). Recharge to the management area comes primarily from deep percolation of precipitation, subsurface inflow from the Santa Maria Valley, and residential/agricultural return flows.

Basin groundwater users in the Nipomo Mesa Management Area include Golden State Water Company, Rural Water Company, Woodlands Mutual Water Company (MWC), ConocoPhillips, Nipomo Community Services District (Nipomo CSD), Lucia Mar Unified School District, small public water systems (serving residential, industrial and nursery/greenhouse operations), and commercial, agricultural and residential overlying users.

DWR (2002) estimated the dependable yield (DWR 2002. Page ES21) for their study area to be between 4,800 AFY and 6,000 AFY, which was prior to the formal establishment of the NMMA. The DWR study area was approximately equivalent to the boundary of the NMMA. The 2009 Annual Report for the NMMA does not estimate safe yield, nor does it estimate the portion of rainfall that percolates downward recharging the shallow aquifer in a specific place, or the deep aquifer because of the uncertainty in the geometry of confined and unconfined aquifers.

Water quality varies in general mineral character across the Nipomo Mesa. The median TDS in 35 wells sampled between 1990 and 2000 was approximately 500 mg/L. Nitrate has been detected in excess of the drinking water standard in relatively few wells (DWR 2002; NMMA Technical Group, 2009).

According to the database maintained by the California Department of Public Health (CDPH), production wells used for public drinking and industrial use in the NMMA met drinking water quality standards in 2008. One of the ConocoPhillips production wells had a reported value of 1,000 mg/L TDS, the highest reported to the CDPH within the NMMA; the well is used for industrial processing (NMMA Technical Group, 2009).

The primary constraints on water availability in the NMMA would be physical limitations to the east, water quality on the west, and water rights. The base of permeable sediments rises toward the eastern boundary of the area, reducing groundwater in storage and increasing the susceptibility of wells to drought impacts and associated water level declines. To the west, where deeper sediments allow for greater storage fluctuations, sea water intrusion would limit the available fresh water.

The Nipomo Mesa Water Conservation Area is currently in a certified Level of Severity III for water supply (resource capacity has been met or exceeded), as defined by San Luis Obispo County. The County's Level of Severity III led to the preparation of a water conservation ordinance (San Luis Obispo County Code, Title 8 Chapter 8.92, effective September 25, 2008).

The NMMA Technical Group has established a groundwater monitoring plan that uses coastal and inland key wells to assess the condition of the basin. The 2008 Annual Report indicates that a potentially severe water shortage condition exists. This condition calls for voluntary actions under a response plan, with recommendations to draft a Well Management Plan and a conceptual plan to identify specific actions to be taken (NMMA Technical Group, 2009).

4.2.2.2.9 *Santa Maria Valley Management Area*

The Santa Maria Valley Management Area (SMVMA) is part of the Santa Maria Valley groundwater basin adjudicated area. Water supply aquifers are within alluvial deposits, the Paso Robles Formation, and the Careaga Formation. The alluvial deposits are up to 230 feet thick beneath the Santa Maria River. The Paso Robles Formation reaches up to 700 feet thick at the southern County border along the Santa Maria River. The Careaga Formation reaches a thickness of close to 700 feet beneath the Santa Maria Plain (DWR 2002). Recharge to the management area comes primarily from seepage of surface flows in the Santa Maria River (including releases from Twitchell reservoir), deep percolation of precipitation, and residential/agricultural return flows.

Basin groundwater users in the San Luis Obispo County portion of the SMVMA consist primarily of agricultural overlying users, with some residential overlying users and a small public water system.

The SMVMA, most of which is in Santa Barbara County, provided 124,000 AFY of average annual production to wells over a perennial yield study period without sea water intrusion or a decline in groundwater levels and storage (Luhdorff & Scalmanini, 2000). The 2008 Annual Report for the Management Area estimated 125,100 acre-feet of groundwater production in the basin for 2008, with no indications of severe water shortage (Luhdorff & Scalmanini, 2009). Safe Yield in the San Luis Obispo County portion of the Santa Maria Valley, reported as dependable yield, was estimated between 11,100 AFY and 13,000 AFY prior to the formal establishment of the SMVMA (DWR 2002).

Sulfate and TDS are the primary constituents of concern within the San Luis Obispo County portion of the SMVMA. TDS concentrations collected in four area wells between 1992 and 1998 ranged from approximately 750 mg/L to 1,300 mg/L, with a median of 1,200 mg/L, which exceeds the State drinking water standard upper limit of 1,000 mg/L. All the sulfate concentrations exceeded the recommended drinking water standard of 250 mg/L and some exceeded the upper limit of 500 mg/L. TDS was up to 800 mg/L greater in the alluvial aquifer, when compared to the underlying Paso Robles Formation aquifers. Nitrates are also a concern in several areas of the valley, although the majority of groundwater sample results in the San Luis Obispo County portion of the valley are below the MCL (DWR 2002).

The primary constraint on water availability in the San Luis Obispo County portion of the SMVMA would be water quality and water rights. A natural outflow of fresh water must be maintained, both in the deeper aquifer zones where sea water pressures are greatest, and in the shallow alluvial zones where irrigation returns are concentrated. The operation of Twitchell reservoir and the Superior Court Stipulated Judgment and Judgment after Trial affect groundwater availability.

4.2.2.3 Huasna Valley WPA 8

Huasna Valley Groundwater Basin is the only groundwater basin in WPA 8.

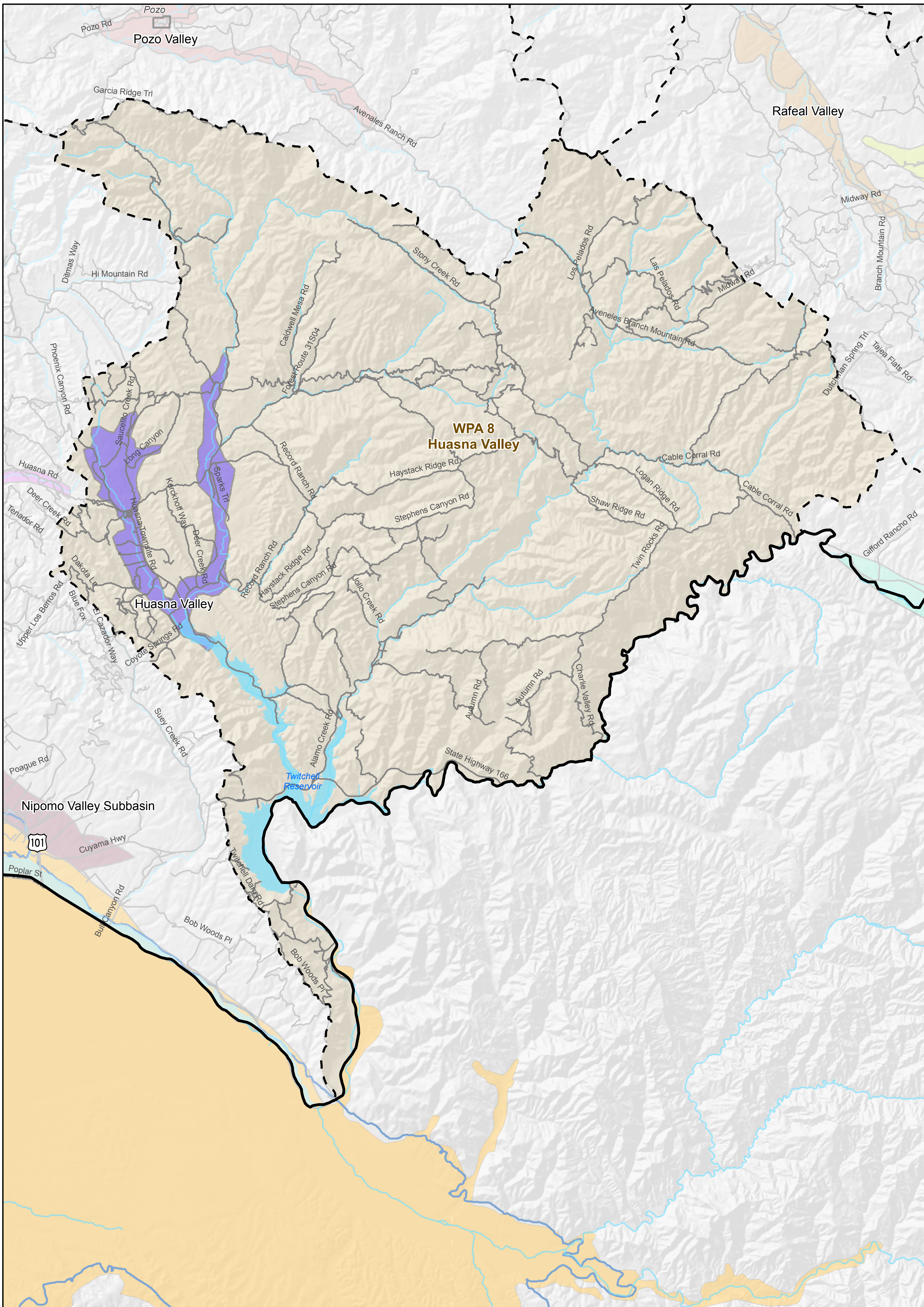
4.2.2.3.1 *Huasna Valley Groundwater Basin*

The Huasna Valley Groundwater Basin is part of the South Coast Sub-Region (Figure 4.8) and encompasses approximately 4,700 acres (7.3 square miles). The basin underlies valleys drained by two branches of Huasna Creek, which flow to Twitchell reservoir. Huasna Valley has been designated as Basin 3-45 and is entirely within unincorporated San Luis Obispo County (DWR 2003). Recharge to the basin comes primarily from seepage from Huasna River and tributaries, deep percolation of precipitation, residential/agricultural return flows, and from Twitchell reservoir seepage when the reservoir fills the lower valley. The basin aquifer consists of alluvial deposits drained by Huasna Creek and Huasna River (DWR 2003).

Basin water users are residential and agricultural overlying users. There is no existing estimate of basin safe yield or hydrologic budget items. No historical water quality data for the alluvial basin has been published in public documents or is available through the STORET Legacy Database.

Constraints on water availability in the Huasna Valley Groundwater Basin include physical limitations. Shallow alluvial deposits are typically more susceptible to drought impacts than deeper formation aquifers. Water availability in the sandstone and fractured reservoirs can be highly variable, depending on the local structure, available storage capacity, and access to source of recharge.

There is limited hydrogeologic information published for this basin. If the District requires more current or detailed information for this basin, new studies would be necessary. Information currently compiled by County departments (such as well logs for private wells or water quality for shared well systems) would be useful to these studies. Additional information may be available from the DWR and private sources.



Legend

Water Facilities

- ☆ WTP
- Reservoir/Tank and/or WTP
- Local Facility
- △ Pump Station
- Turnout
- ☐ Tunnel Unit
- Water Transmission Line

Color Scheme

- California State Coastal Branch
- Lopez Water System
- Lake Nacimiento Water Project
- Salinas Reservoir System
- Whale Rock Reservoir System
- Chorro Valley Pipeline
- Streets

- Major Rivers/Streams
- Urban Reserve and Village Reserve Lines (URL/VRL)
- Management Areas
- Water Planning Area 8
- Water Planning Area Boundary
- Groundwater Basins
- Waterbodies

Text:

Water Planning Area

Groundwater Basin

URL/VRL

Water Facility

Management Area

Hydrography

0 2 4 Miles

Figure 4.8
San Luis Obispo County
Water Planning Area 8
Master Water Report
San Luis Obispo County Flood Control and Water Conservation District

carollo
Engineers...Working Wonders With Water

4.2.2.4 Cuyama Valley WPA 9

The Cuyama Valley Groundwater Basin is the only groundwater basin in WPA 9.

4.2.2.4.1 *Cuyama Valley Groundwater Basin*

The Cuyama Valley Groundwater Basin is part of the South Coast Sub-Region (Figure 4.9) and encompasses approximately 147,200 acres (230 square miles), of which approximately 32,600 acres (51 square miles) are within San Luis Obispo County. The basin underlies the valley drained by the Cuyama River and is bounded on the north by the Caliente range and on the Southwest by the Sierra Madre Mountains. Cuyama Valley has been designated as Basin 3-13 and includes portions within unincorporated San Luis Obispo County, Santa Barbara County, Kern County, and Ventura County (DWR 2003). Recharge to the basin comes primarily from seepage from Cuyama River, deep percolation of precipitation, and residential/agricultural return flows.

The aquifer consists of alluvial deposits and older terrestrial deposits. The thickness of the alluvium is inferred to be from 150 to 250 feet (DWR 2003 after Upson and Worts 1951). Basin groundwater users in the San Luis Obispo portion of the basin include oil field operators and residential/agricultural overlying users. Perennial yield for the entire basin has been estimated between 9,000 and 13,000 AFY (Upson and Worts, 1951). The long-term potential recharge of the basin was estimated between 12,000-16,000 AFY, with an average of 13,000 AFY year (Singer and Swarzenski, 1970). A safe yield of 10,667 AFY gross (8,000 AFY net consumptive use) was estimated in 1992 (Baca et al., 1992). The most recent compilation of hydrologic budget information presents a groundwater budget in which total groundwater pumpage is 40,592 AFY, resulting in a deficit of 30,532 AFY (Anderson et al., 2009). This hydrologic budget compilation indicates a perennial yield on the order of 10,000 AFY, which is within the range of prior work. There is no separate yield estimate for the San Luis Obispo County portion of the basin.

Water quality within this basin generally deteriorates towards the west end of the basin, where the sediments thin. There is also poor quality water towards the northeast end of the basin at extreme depth. Although groundwater in the Cuyama Valley Groundwater Basin is only of fair chemical quality, it has been used successfully to irrigate most crops. Presumably this has been possible because the sodium content of most of the water is relatively low and the soils are quite permeable (County of Santa Barbara 2005 Groundwater Report; Upson and Worts, 1951; Singer and Swarzenski, 1970).

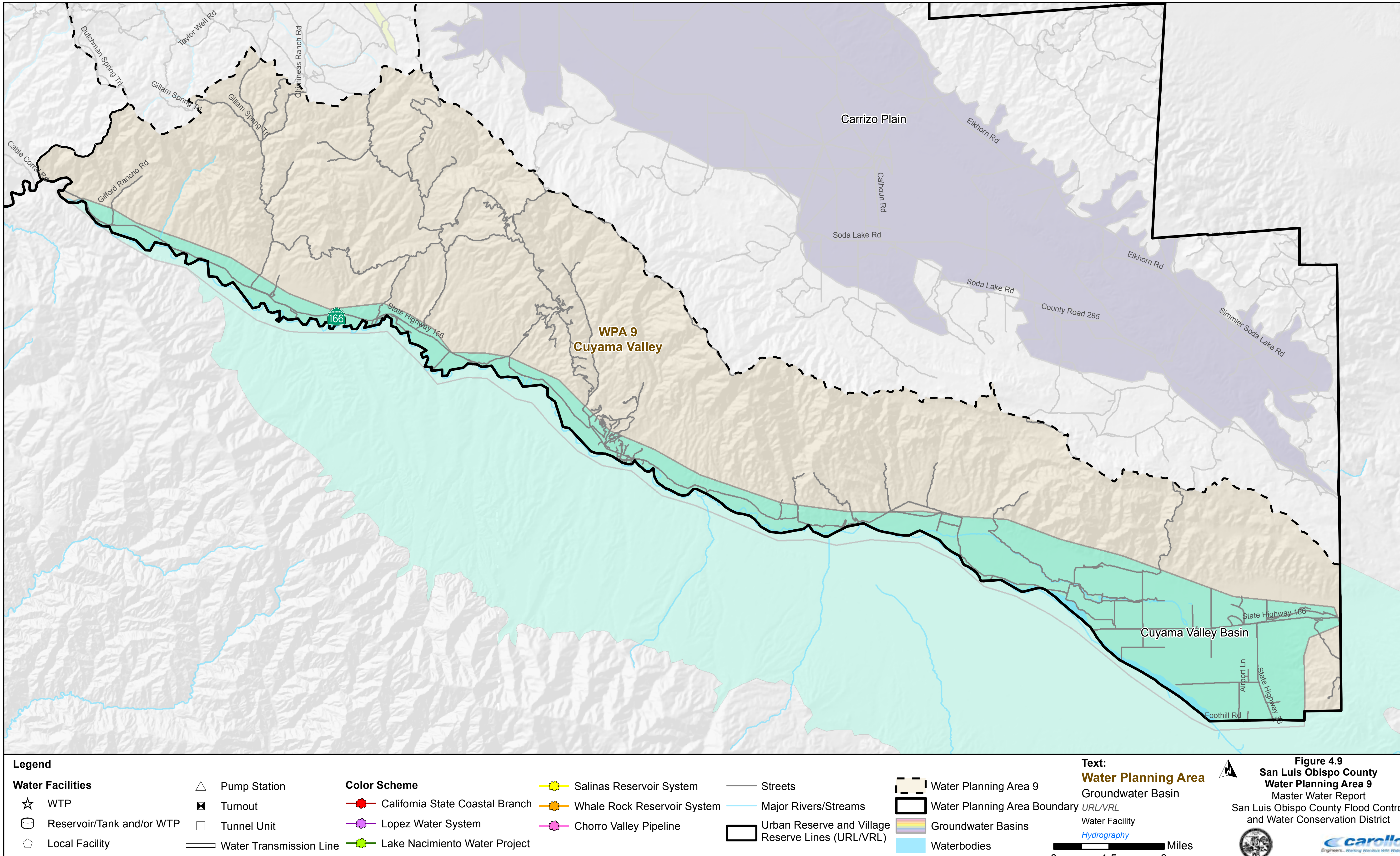


Figure 4.9
San Luis Obispo County
Water Planning Area 9
Master Water Report
San Luis Obispo County Flood Control and Water Conservation District

Analyses of water from three public supply wells show an average TDS content of 858 mg/L and a range from 755 to 1,000 mg/L. USGS analyses show TDS content as high as 1,750 mg/L. Because of constant cycling and evaporation of irrigation water in the basin, water quality has been deteriorating (DWR 2003; SBCWA 1996; SBCWA 2001).

Groundwater near the Caliente Range has high salinity. Nitrate content reached 400 mg/L in some shallow wells (DWR 2003; County of Santa Barbara Planning and Development Department, 1994).

Constraints on water availability in the Cuyama Valley Groundwater Basin are primarily physical limitations. The maximum potential yield that can be achieved through lowering water levels to increase natural stream flow seepage and to reduce subsurface outflow have been reached (production has exceeded this value). The County of San Luis Obispo Planning Department has determined that the basin is currently at a Level III severity rating (resource capacity has been met or exceeded) due to historical groundwater level declines and resulting groundwater storage losses.

In 1980, the Cuyama Valley Groundwater Basin was identified by the California Department of Water Resources as one of the eleven basins in “critical condition of overdraft. Although the groundwater basin is experiencing serious hydrologic impacts due to unsustainable groundwater pumping practices, a groundwater management plan for the basin does not exist. Since this basin lies within four counties, future efforts for a county groundwater management plan will likely be difficult (Andersen et al., 2009).

4.2.3 Inland Sub-Region

The Inland sub-region is comprised of seven WPAs, including Carrizo Plain (WPA 10), Rafael/Big Spring (WPA 11), Santa Margarita (WPA 12), Atascadero/Templeton (WPA 13), Salinas/Estrella (WPA 14), Cholame (WPA 15) and Nacimiento (WPA 16) summarized in Table 4.3. A brief description of the basins within each WPA is provided below, with details on groundwater supply aquifers, groundwater users, basin yield, water quality, and water availability.

Table 4.3 Inland Sub-Region Groundwater Basins				
WPA No.	**WPA Name**	**Groundwater Basin Name**	**Sub-basin/ Management Area**	**Estimated Safe Basin Yield (AFY)**
10	Carizzo Plain	Carizzo Plain		8,000-11,000
11	Rafael/Big Spring	Rafael Valley		No estimate available
		Big Spring Area		No estimate available
12	Santa Margarita	Santa Margarita Valley		No basin wide estimate available[1]
		Rinconada Valley		No estimate available
		Pozo Valley		1,000[2]
13	Atascadero/ Templeton	Paso Robles	Atascadero	16,400
14	Salinas/ Estrella	Paso Robles		97,700[3]
15	Cholame	Cholame Valley		No estimate available
16	Nacimiento	(none)		No estimate available

Notes:
1. The average annual yield of the basin in the vicinity of the proposed Santa Margarita Ranch development may be in the range of 400 to 600 AFY.
2. 1958 Department of Water Resources estimate. There has been no subsequent basin study to confirm or update this estimate.
3. Includes 16,400 AFY perennial yield from the Atascadero Groundwater Sub-basin.

4.2.3.1 Carrizo Plain WPA 10

Carrizo Plain is the only groundwater basin in WPA 10.

4.2.3.1.1 *Carrizo Plain Groundwater Basin*

The Carrizo Plain Groundwater Basin is located in WPA 10 (Figure 4.10) and is identified in California's Groundwater Bulletin 118 as Groundwater Basin Number 3-19 (DWR 2003). The basin is 173,000 acres (270 square miles) in size and is situated between the Temblor

Range to the east and the Caliente Range and San Juan Hills to the west. The basin has internal drainage to Soda Lake.

Groundwater in the basin is found in alluvium, the Paso Robles Formation, and the Morales Formation (DWR 2003). The upper alluvium and Paso Robles Formation deposits are more than 3,000 feet thick in the eastern portion of the basin and decrease in thickness to the west. Recharge to the basin is predominantly from percolation of stream flow and infiltration of precipitation.

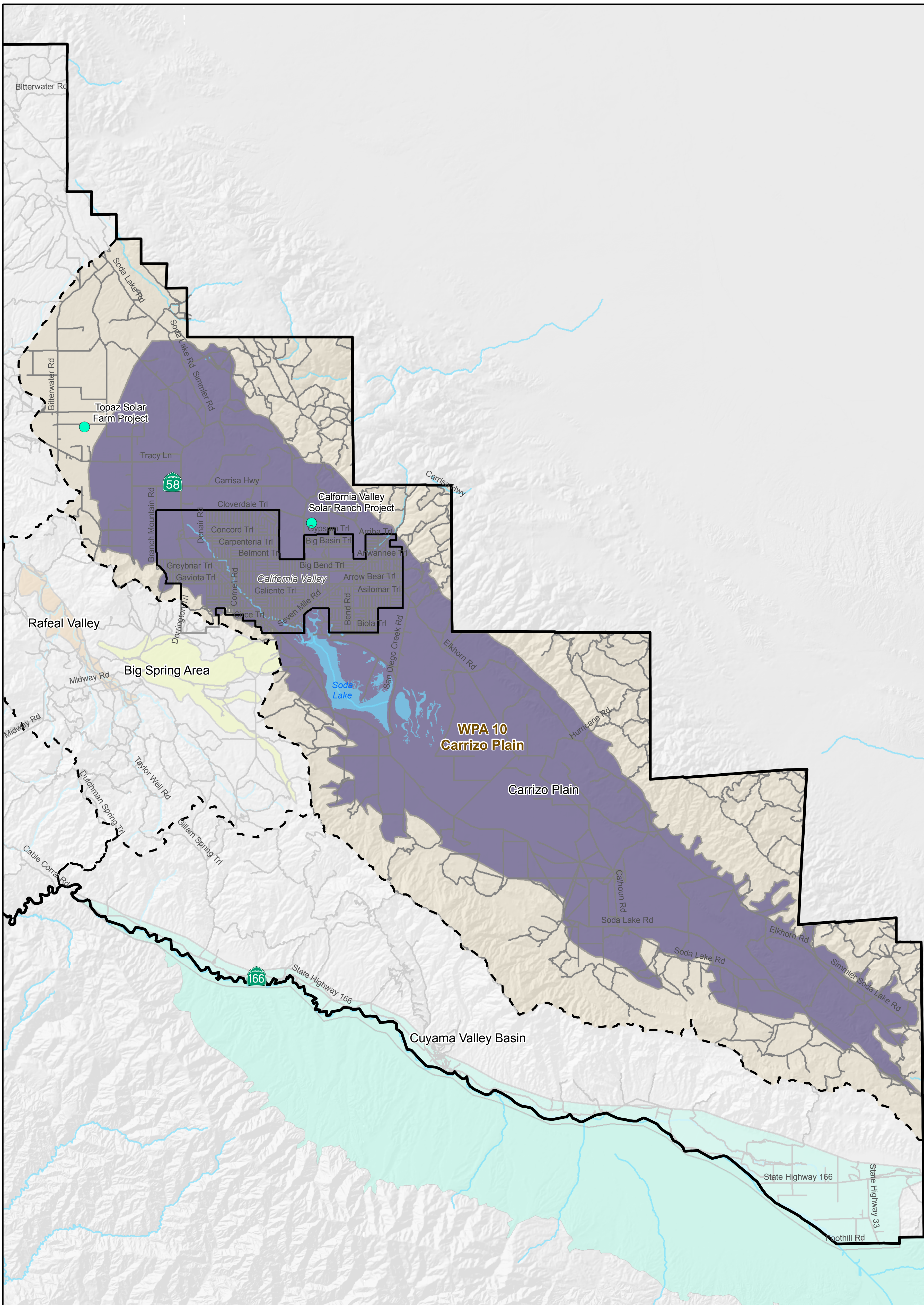
There is one small public water system serving the local school (part of the Atascadero Unified School District). All other pumping in the basin is for agricultural and residential purposes by overlying users. There are two proposed solar farms that will located within this WPA (Topaz Farms 550-MW; SunPower 250-MW).

The safe yield of the basin is estimated to be 600 AFY (DWR 1958). The Kemnitzer safe yield was estimated at 59,000 AFY (based on 1967 inflow/outflow analysis). Taking into consideration the methodologies used in previous studies, current and historical groundwater levels, and water quality, the solar project EIRs' water analyses conclude that a more reasonable safe yield on which to base planning decisions is between 8,000 to 11,000 AFY.

Groundwater samples from 79 wells collected from 1957 to 1985 show total dissolved solids concentration ranging from 161 to 94,750 mg/L (DWR 2003). Groundwater in the lower alluvium and upper Paso Robles Formation that both underlie Soda Lake are highly mineralized. Groundwater deeper in the confined Paso Robles Formation is of higher quality. Groundwater in the Morales Formation is likely brackish.

Constraints on water availability in the basin include physical limitations and water quality issues. The low safe yield estimate of this basin relative to its large size, and the high TDS concentrations in areas (e.g., Soda Lake) suggest that water availability in the region is limited. Other than water quality issues associated with the internal drainage structure of the basin, other constraints are not well defined.

Published hydrogeologic information for this basin is compiled from older reports and may not be representative of current conditions. If the District requires more current or detailed information for this basin, new studies would be necessary. Information currently compiled by County departments (such as well logs for private wells or water quality for shared well systems) would be useful to these studies. Additional information may be available from the DWR and private sources.



Legend

Water Facilities

- WTP
- Reservoir/Tank and/or WTP
- Local Facility
- Pump Station
- Turnout
- Tunnel Unit
- Water Transmission Line

Color Scheme

- California State Coastal Branch
- Lopez Water System
- Lake Nacimiento Water Project
- Salinas Reservoir System
- Whale Rock Reservoir System
- Chorro Valley Pipeline
- Solar Projects

- Streets
- Major Rivers/Streams
- Urban Reserve and Village Reserve Lines (URL/VRL)
- Water Planning Area 10
- Water Planning Area Boundary
- Groundwater Basins
- Waterbodies

Text:

Water Planning Area

Groundwater Basin

URL/VRL

Water Facility

Hydrography

0 2.5 5 Miles

Figure 4.10
San Luis Obispo County
Water Planning Area 10
Master Water Report
San Luis Obispo County Flood Control and Water Conservation District

4.2.3.2 Rafael Valley/Big Spring WPA 11

WPA 11 includes the Rafael Valley and Big Spring Area Groundwater Basins.

4.2.3.2.1 *Rafael Valley Groundwater Basin*

The Rafael Valley Groundwater Basin is located in the Inland Sub-Region (Figure 4.11) and is identified in California's Groundwater Bulletin 118 as Groundwater Basin Number 3-46 (DWR 2003). The basin underlies the Rafael Valley and is 2,990 acres (4.7 square miles) in size. The Rafael Valley is drained by the Rafael and San Juan creeks.

According to Bulletin 118, the main water-bearing unit in the basin is an alluvial aquifer (DWR 2003). There are no municipal or public water purveyors in the basin. All pumping in the basin is for agricultural purposes and by overlying users. No information is available describing basin yield or water quality for this basin.

Constraints on water availability in the Rafael Valley Groundwater Basin are primarily based on physical limitations. Shallow alluvial deposits are typically limited by available storage capacity and are therefore susceptible to drought impacts. In the Rafael Valley, the alluvial aquifer also overlies and recharges the underlying consolidated rock formations. Water availability in the consolidated rock reservoirs is highly variable, depending on the local structure, available storage capacity, and access to source of recharge.

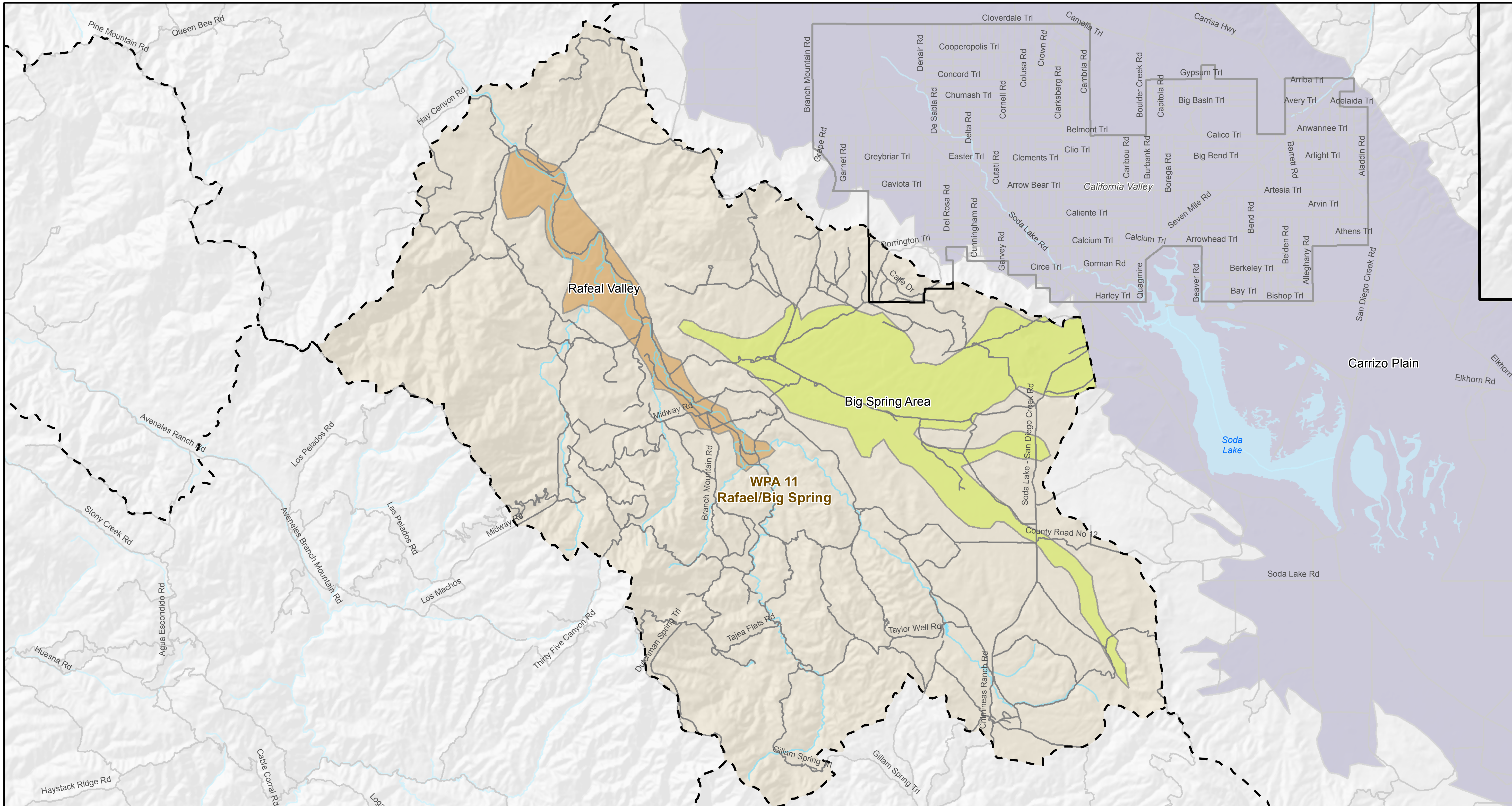
Published hydrogeologic information for this basin is very limited. If the District requires more current or detailed information for this basin, new studies would be necessary.

4.2.3.2.2 *Big Spring Area Groundwater Basin*

The Big Spring Area Groundwater Basin is located in the Inland Sub-Region (Figure 4.11) and is identified in California's Groundwater Bulletin 118 as Groundwater Basin Number 3-47 (DWR 2003). The basin is 7,320 acres (11.4 square miles) in size and underlies a valley that is drained by a tributary to San Juan Creek. According to Bulletin 118, the main water-bearing unit in the basin is Quaternary age alluvium (DWR 2003). No additional information is available describing the basin hydrogeology.

There are no municipal or public water purveyors in the basin. All pumping in the basin is for agricultural purposes and by overlying users. No information is available describing basin yield or water quality.

Constraints on water availability in this basin are primarily based on physical limitations. Shallow alluvial deposits are typically limited by available storage capacity and are therefore susceptible to drought impacts. In the Big Spring area, the alluvial aquifer also overlies and recharges the underlying consolidated rock formations. Water availability in the consolidated rock reservoirs is highly variable, depending on the local structure, available storage capacity, and access to source of recharge.



Legend

Water Facilities
- WTP
- Reservoir/Tank and/or WTP
- Local Facility
- Pump Station
- Turnout
- Tunnel Unit
- Water Transmission Line

Color Scheme
- California State Coastal Branch
- Lopez Water System
- Lake Nacimiento Water Project
- Salinas Reservoir System
- Whale Rock Reservoir System
- Chorro Valley Pipeline

- Streets
- Major Rivers/Streams
- Urban Reserve and Village Reserve Lines (URL/VRL)
- Water Planning Area 11
- Water Planning Area Boundary
- Groundwater Basins
- Waterbodies

Text:
Water Planning Area
Groundwater Basin
URL/VRL
Water Facility
Hydrography

0 1 2 Miles

Figure 4.11
San Luis Obispo County
Water Planning Area 11
Master Water Report
San Luis Obispo County Flood Control and Water Conservation District

Published hydrogeologic information for this basin is very limited. If the District requires more current or detailed information for this basin, new studies would be necessary.

4.2.3.3 Santa Margarita WPA 12

WPA 12 includes the Santa Margarita Valley, Rinconada Valley, and Pozo Valley Groundwater Basins.

4.2.3.3.1 *Santa Margarita Valley Groundwater Basin*

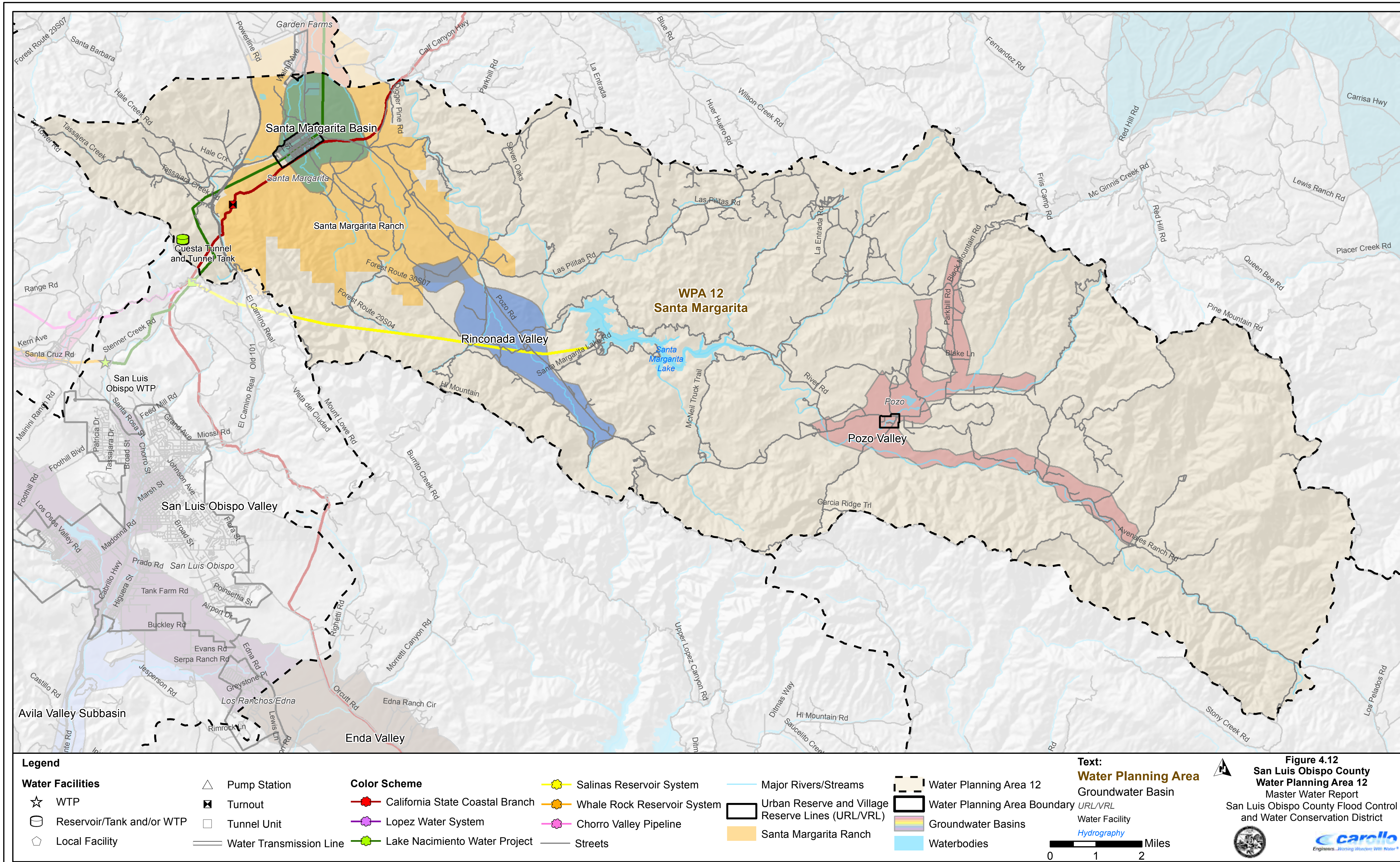
The Santa Margarita Valley Groundwater Basin is located in the Inland Sub-Region (Figure 4.12). The basin area includes the unincorporated town of Santa Margarita and surrounding rural residences and agricultural fields. The total drainage area associated with the basin consists of four watersheds that collectively drain in the northerly direction into the Salinas River. The major creeks associated with the four watersheds are the Santa Margarita Creek, the Yerba Buena Creek, Trout Creek, and Rinconada Creek.

The basin primarily contains four geologic units and supply aquifers: 1) the Younger Alluvium, 2) Older Alluvium, 3) Paso Robles Formation, and 4) Santa Margarita Formation. The shallow Younger Alluvium and Older Alluvium deposits occur along the active stream channels and along the eastern basin boundary. In particular, alluvial deposits associated with the Santa Margarita Creek extend from the ground surface to a depth of about 50 feet. Relative to the deeper Paso Robles and Santa Margarita Formations, the Younger and Older Alluvium have high hydraulic conductivities.

The deeper Paso Robles Formation ranges in thickness up to 300 to 400 feet. The Paso Robles Formation is found at depths in the range of 400 to 500 feet below ground surface. The Santa Margarita Formation overlies the Monterey Formation, which likely defines the effective base of fresh water in the basin area. The Santa Margarita Formation thickness likely ranges up to 1,000 feet. The Paso Robles and Santa Margarita Formations tapped by wells for water supply purposes are typically located in the Yerba Buena Creek area.

Water users in the Santa Margarita area include the unincorporated town of Santa Margarita and overlying users. Water service for the town of Santa Margarita is provided by County Service Area Number 23 (CSA 23). CSA 23 is owned/governed by the County of San Luis Obispo and is operated/managed by the Department of Public Works. Overlying users include rural residences and agricultural users.

No comprehensive studies to determine the perennial yield of the Santa Margarita Valley Groundwater Basin are known to exist. Based on an evaluation of available data used for the Santa Margarita Ranch (Ranch) Environmental Impact Analysis study, however, Hopkins (2006) indicated that the average annual yield of the basin in the vicinity of the proposed Ranch development may be in the range of 400 to 600 AFY. Although the Santa Margarita Creek alluvial aquifer serves as the primary source of water for the town of Santa Margarita, there is no safe yield estimate for this aquifer.


Santa Margarita Basin
Santa Margarita
Santa Margarita Ranch
Cuesta Tunnel and Tunnel Tank
WPA 12
Santa Margarita
Rinconada Valley
Santa Margarita Lake
Pozo
Pozo Valley
San Luis Obispo WTP
San Luis Obispo Valley
San Luis Obispo
Avila Valley Subbasin
Los Ranchos/Edna
Enda Valley
Garden Farms
Legend
Water Facilities
WTP
Reservoir/Tank and/or WTP
Local Facility
Pump Station
Turnout
Tunnel Unit
Water Transmission Line
Color Scheme
California State Coastal Branch
Lopez Water System
Lake Nacimiento Water Project
Salinas Reservoir System
Whale Rock Reservoir System
Chorro Valley Pipeline
Streets
Major Rivers/Streams
Urban Reserve and Village Reserve Lines (URL/VRL)
Santa Margarita Ranch
Water Planning Area 12
Water Planning Area Boundary
Groundwater Basins
Waterbodies
Text:
Water Planning Area
Groundwater Basin
URL/VRL
Water Facility
Hydrography
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0 1 2
Figure 4.12
San Luis Obispo County
Water Planning Area 12
Master Water Report
San Luis Obispo County Flood Control and Water Conservation District

The TDS concentration in wells constructed in the alluvial deposits and in the Santa Margarita Formation were reported to be 400 mg/L and 490 mg/L, respectively (Todd, 2004). Methylene blue active substances (MBAS) is an indicator of soaps and detergents, and is used to detect impacts of onsite wastewater disposal systems (e.g., septic tanks) on groundwater quality. MBAS was detected in two alluvial aquifer wells but not in any Santa Margarita Formation wells (Todd, 2004). Based on a review of available water quality data by Todd (2004), all shallow and deep wells sampled for nitrate have measured concentrations below the maximum contaminant level (MCL) of 45 mg/L. Total coliform, fecal coliform, and Escherichia coli data were reviewed by Todd (2004) and found to be suggestive, although not conclusive, of small impacts on both shallow and deep aquifer wells from local wastewater disposal systems.

The primary constraint on water availability in the basin concerns physical limitations. Although the alluvial aquifer is considered to be highly productive, it is shallow in vertical extent (i.e., 50 feet thick) and therefore highly susceptible to seasonal fluctuations in groundwater levels of about 15 to 20 feet. During dry water years or extended droughts, well yields may be significantly reduced due to low groundwater levels (Todd, 2004). Recharge in the shallow alluvial deposits for a particular year is dependent on rainfall, creek stream flows, and precipitation runoff generated in the four watersheds.

Wells developed in the Santa Margarita Formation generally do not have sufficient yields to reliably replace the wells in the alluvial aquifer. Hydrographs of deep wells indicate that groundwater levels have been trending downward there at least over the last decade (Hopkins, 2006).

4.2.3.3.2 *Rinconada Valley Groundwater Basin*

The Rinconada Valley Groundwater Basin is located in the Inland Sub-Region (Figure 4.12) and is identified in California's Groundwater Bulletin 118 as Groundwater Basin Number 3-43 (DWR 2003). The basin underlies the Rinconada Valley and is 2,580 acres (4 square miles) in size. The valley is drained by Rinconada Creek, which is tributary to the Salinas River.

There are no municipal or public water purveyors in the basin. All pumping in the basin is for agricultural purposes and by overlying users. No information is available describing basin yield or water quality in the basin. There is very limited information available for this basin. If the District requires more current or detailed information for this basin, new studies would be necessary.

Constraints on water availability in the Rinconada Valley basin are primarily based on physical limitations. Shallow alluvial deposits are typically limited by available storage capacity and are therefore susceptible to drought impacts. In the Rinconada Valley, the alluvial aquifer also overlies and recharges the underlying rock formations. Water availability in the consolidated rock formations is generally limited and highly variable, depending on the local structure, available storage capacity, and access to source of recharge.

4.2.3.3.3 *Pozo Valley Groundwater Basin*

The Pozo Valley Groundwater Basin is located in the Inland Sub-Region (Figure 4.12) and is identified in California's Groundwater Bulletin 118 as Groundwater Basin Number 3-44 (DWR 2003). The basin is 6,840 acres (10.7 square miles) in size and is bounded on all sides by low permeability rocks. The basin is drained by Pozo Creek and the Salinas River, both of which flow into Santa Margarita Lake.

According to Bulletin 118, alluvium is the main water-bearing unit in the basin (DWR 2003). The alluvium is up to 30 feet thick. Basin recharge occurs as percolation of stream flow, percolation of precipitation, and irrigation return flows.

There are some small public water systems in the basin. All other pumping is for residential and agricultural purposes by overlying users. The safe yield in the basin has been reported to be 1,000 AFY (DWR 1958). According to Bulletin 118, groundwater samples from 5 wells in the basin taken from 1951 to 1988 indicate TDS concentrations ranging from 287 to 676 mg/L (DWR 2003).

Constraints on water availability in this basin are physical limitations. Shallow alluvial deposits are typically limited by available storage capacity and are therefore susceptible to drought impacts. In the Pozo Valley, the alluvial aquifer also overlies and recharges the underlying rock formations. Water availability in the consolidated rock reservoirs is generally limited and highly variable, depending on the local structure, available storage capacity, and access to source of recharge.

Published hydrogeologic information for this basin is compiled from older reports and may not be representative of current conditions. If the District requires more current or detailed information for this basin, new studies would be necessary.

4.2.3.4 Atascadero/Templeton WPA 13

WPA 13 includes the Atascadero Sub-basin of the Paso Robles Groundwater Basin (see WPA 14 for Paso Robles Groundwater Basin description). WPA 13 also includes consolidated rock aquifers that are not a part of, or described by, the Paso Robles Groundwater Basin. No information on the yield and water quality of these aquifer formations is available.

4.2.3.4.1 *Atascadero Groundwater Sub-basin*

The Atascadero Groundwater Sub-basin is located in the Inland Sub-Region (Figure 4.13) and is a sub-basin within the Paso Robles Groundwater Basin. The northern boundary of the sub-basin is approximately the southern end of the City of Paso Robles and the southern sub-basin boundary is located just south of the community of Garden Farms.

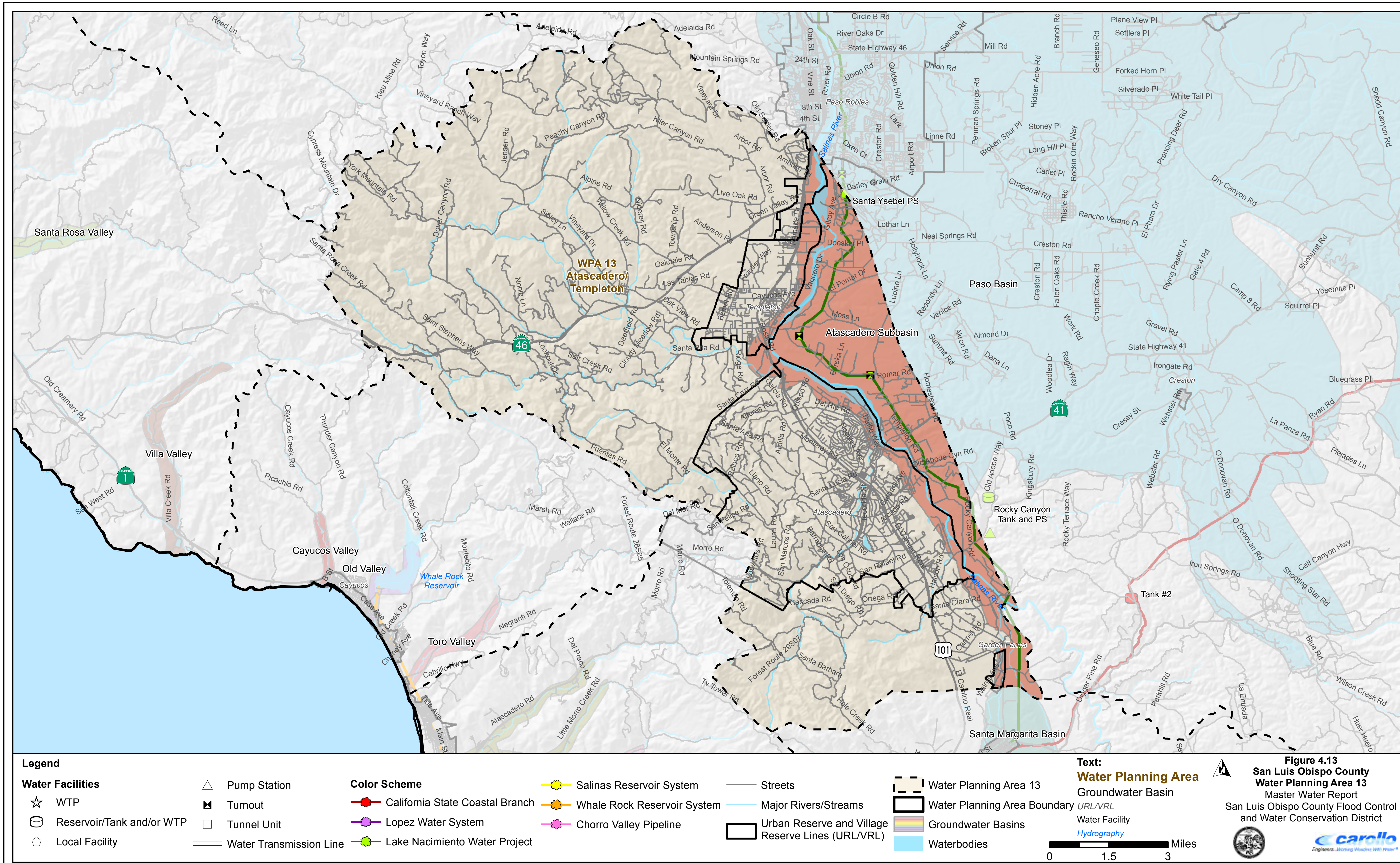


Figure 4.13
San Luis Obispo County
Water Planning Area 13
Master Water Report
San Luis Obispo County Flood Control
and Water Conservation District

The eastern boundary of the sub-basin is the Rinconada fault. Because the fault displaces the Paso Robles Formation, the hydraulic connection between the aquifer across the Rinconada fault is sufficiently restricted to warrant the classification of this area as a distinct sub-basin. Therefore, the Atascadero Groundwater Sub-basin of the Paso Robles Groundwater Basin is defined as that portion of the basin west of the Rinconada fault.

The Atascadero Groundwater Sub-basin includes the City of Atascadero and the communities of Templeton and Garden Farms. The Salinas River is the major hydrologic feature in the sub-basin. Outflow (primarily surface flow and Salinas River underflow) occurs in the northern direction from the sub-basin into the Estrella subarea of the Paso Robles Groundwater Basin.

Pumping test data from wells in the sub-basin suggest the presence of three aquifer groups with distinctly different hydraulic characteristics: 1) Alluvium along the floodplain of the Salinas River; 2) Paso Robles Formation deposits directly underlying the Salinas River alluvium; and 3) Paso Robles Formation deposits along the east side of the sub-basin that are not directly connected to the younger alluvium.

The Salinas River alluvium is an unconfined aquifer with a high hydraulic conductivity. The thickness of the alluvium ranges widely, with an estimated maximum thickness of 100 feet. Shallow wells up to 100 feet deep are located in the immediate vicinity of the Salinas River along its entire reach, typically tapping the younger alluvium and/or shallow Paso Robles Formation aquifer zones. Approximately half of the total pumping in the sub-basin is from these shallow, alluvial wells.

In the City of Atascadero area, the Paso Robles Formation underlies the younger Salinas River alluvium. Wells in the Paso Robles Formation in hydraulic communication with the overlying river alluvium tend to have higher hydraulic conductivity values when compared to wells that penetrate the portions of the Paso Robles Formation not in contact with the alluvium.

Paso Robles Formation deposits east of the Salinas River comprise the largest portion of the sub-basin. The deepest part of the formation is the area between Templeton and the Rinconada fault. In general, deep wells reach several hundred feet deep and tap the Paso Robles Formation.

The main source of recharge in the alluvium is the Salinas River. Recharge to the Paso Robles Formation occurs from the overlying Salinas River alluvium as well as from overlying channel deposits of the Santa Margarita, Atascadero, Graves, and Paso Robles creeks.

Water users in the basin include municipalities, communities, rural domestic residences, and agricultural users. The major water purveyors are the Atascadero Mutual Water Company (Atascadero MWC), Templeton Community Services District (Templeton CSD), and Garden Farms Mutual Water Company (Garden Farms MWC).

The perennial yield of the sub-basin was estimated to be 16,400 AFY (Fugro, 2002). Evaluation of water quality in the sub-basin is based on historical data from 1970 to 1997 collected and reviewed by Fugro (2002). TDS concentrations measured in wells along the Salinas River alluvium range from 317 to 857 mg/L. TDS concentrations measured in wells in the Paso Robles Formation range from 389 to 975 mg/L (Fugro, 2002). Water quality data from 11 wells and one spring in the sub-basin showed that no concentrations of contaminants exceed their respective MCL values (Fugro, 2002). The 2008 Water Quality Report for both Templeton CSD and Atascadero MWC found that none of the tested regulated and secondary substances in water samples exceeded their MCL values.

Primary constraints on water availability in the sub-basin include water rights and physical limitations. The rights to surface water flows in the Salinas River and associated pumping from the alluvium have been fully appropriated by the State Water Resources Control Board (State Board) and no plans exist to increase these demands beyond the current allocations. Full appropriation implies that no additional rights to the Salinas River flows are being issued by the State Board at this time nor is any additional pumping for existing rights being granted. Therefore, the Salinas River does not represent a future source of water supply that can be developed beyond its present appropriation.

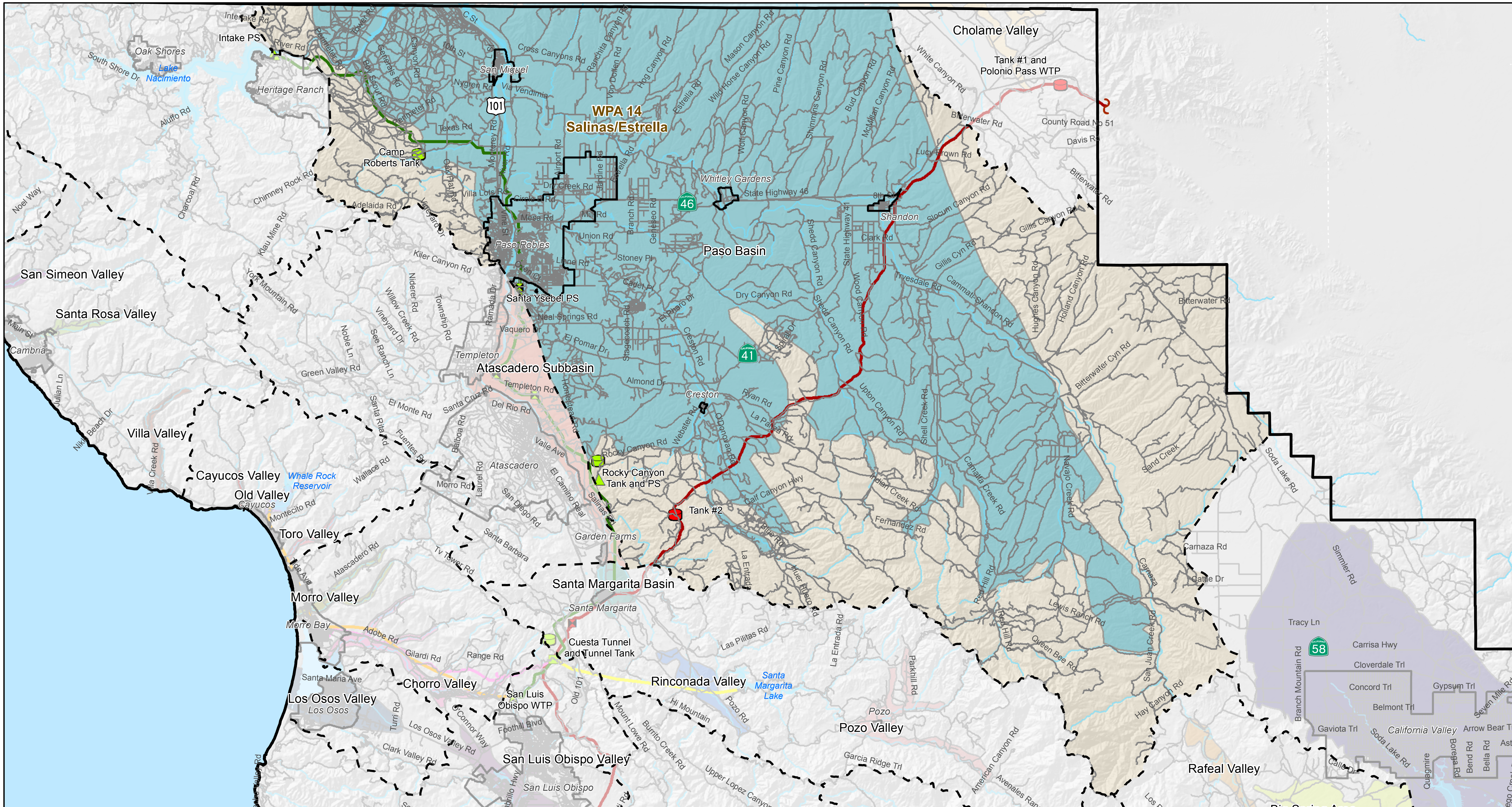
In terms of physical limitations, Todd (2009) estimated the gross groundwater pumping in the sub-basin during 2006 to be 15,545 AF, which is 95 percent of the sub-basin perennial yield of 16,400 AFY. Ongoing studies may revise the estimated outflow from the sub-basin. According to Fugro (2010), whereas total groundwater in storage in the main part of the Paso Robles Groundwater Basin is predominantly in the Paso Robles Formation, the Salinas River alluvium in the Atascadero Groundwater Sub-basin accounts for a significant percentage of the total groundwater storage in the sub-basin. Pumping from the alluvium should be accounted for separately from pumping from the Paso Robles Formation. Furthermore, Fugro opined that pumping in excess of the perennial yield in the sub-basin may not necessarily be reflected by decreasing groundwater levels in the Paso Robles Formation since significant pumping occurs in the alluvium.

4.2.3.5 Salinas/Estrella WPA 14

WPA 14 includes the Paso Robles Groundwater Basin (except for the Atascadero Sub-basin portion, which was discussed in WPA 13).

4.2.3.5.1 *Paso Robles Groundwater Basin*

The Paso Robles Groundwater Basin is part of the Inland Sub-Region (Figure 4.14). According to California’s Groundwater Bulletin 118, the entire Paso Robles Groundwater Basin is located within the greater Salinas Valley Groundwater Basin and is identified as Groundwater Basin Number 3-4.06. The Paso Robles Groundwater Basin is located



Legend

Water Facilities

- WTP
- Reservoir/Tank and/or WTP
- Local Facility
- Pump Station
- Turnout
- Tunnel Unit
- Water Transmission Line

Color Scheme

- California State Coastal Branch
- Lopez Water System
- Lake Nacimiento Water Project
- Salinas Reservoir System
- Whale Rock Reservoir System
- Chorro Valley Pipeline

- Streets
- Major Rivers/Streams
- Urban Reserve and Village Reserve Lines (URL/VRL)
- Water Planning Area 14
- Water Planning Area Boundary
- Groundwater Basins
- Waterbodies

Text:
Water Planning Area
Groundwater Basin
URL/VRL
Water Facility
Hydrography

0 2.5 5 Miles

Figure 4.14
San Luis Obispo County
Water Planning Area 14
Master Water Report
San Luis Obispo County Flood Control and Water Conservation District

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in both Monterey and San Luis Obispo counties and is 505,000 acres (790 square miles) in size. Roughly one-third of the areal extent of the Paso Robles Groundwater Basin extends into Monterey County. The basin ranges from the Garden Farms area south of Atascadero to San Ardo in Monterey County, and from the Highway 101 corridor east to Shandon.

In general, the Salinas River, Estrella Creek, San Juan Creek, Huer Huero Creek, and numerous other smaller channels that are tributary to these major rivers and creeks drain the basin. Groundwater in the basin is found in alluvium and in the Paso Robles Formation. In general, the alluvium is mostly unconfined, ranges in depth from 30 to 130 feet below ground surface, and is characterized by relatively high permeability. Most of the alluvium associated with the various rivers and creeks in the basin provide limited supplies of extractable groundwater. The Salinas River, however, is a significant source of groundwater to several municipalities located adjacent to and along its reach as well as a number of overlying users with appropriative or riparian rights. Groundwater in the alluvium is a principal source of recharge to the underlying Paso Robles Formation. The Paso Robles Formation is the most significant source of groundwater in the basin. Recharge to the basin derives from stream percolation of the alluvium underflow, infiltration of precipitation, and deep percolation of applied irrigation and wastewater discharge.

Water users in the basin include municipalities, communities, rural domestic residences, and agricultural users. The major municipal water purveyors include the Atascadero MWC, City of Paso Robles, Templeton CSD, CSA 16-1 (Shandon), and San Miguel Community Services District (San Miguel CSD). The San Luis Obispo County Environmental Health Department also identified 36 small commercial and community water systems that extract groundwater from the basin, including Garden Farms MWC and Green River Mutual Water Company. Overlying users include rural domestic residences and agricultural users.

The perennial yield of the Paso Robles Groundwater Basin (including the Atascadero Groundwater Sub-basin) is estimated to be 97,700 AFY (Fugro, 2005). A review of available data by Fugro (2002) found that groundwater quality in the basin is generally good. Five potential water quality issues, however, were identified (excluding the Atascadero Groundwater Sub-basin):

1. Increasing chlorides in the deep, historically artesian aquifer northeast of Creston
2. Increasing TDS and chlorides near San Miguel
3. Increasing nitrates in the Paso Robles Formation in the area north of Highway 46, between the Salinas River and the Huer Huero Creek;
4. Increasing nitrates in the Paso Robles Formation in the area south of San Miguel
5. Increasing TDS and chlorides in deeper aquifers near the confluence of the Salinas and Nacimiento Rivers

The 2009 Consumer Confidence Report for the City of Paso Robles reported no violations of MCL values for regulated substances and secondary substances in groundwater pumped by its wells. The 2007 Consumer Confidence Report for the San Miguel CSD reported a measured arsenic concentration of 11 µg/L (MCL for arsenic is 10 µg/L) and a measured barium concentration of 71.5 µg/L (MCL for barium is 2 µg/L). The 2008 Water Quality Report for CSA 16-1 found that none of the tested regulated and secondary substances in water samples exceeded their MCL values.

Primary constraints on water availability in the basin include water rights, water quality, and physical limitations. The rights to surface water flows in the Salinas River and associated pumping from the alluvium have been fully appropriated by the State Board and no future plans exist to increase these demands beyond the current allocations. Therefore, the Salinas River does not represent a future source of water supply that can be developed beyond its present appropriation. In terms of physical limitations, Todd (2009) estimated the total groundwater pumping in the basin during 2006 to be 88,154 AF, which is 90 percent of the basin perennial yield of 97,700 AFY.

Portions of the Paso Robles Groundwater Basin have experienced significant water level declines over the past 15 to 20 years (Fugro 2002, Fugro 2005, Todd 2007, Todd 2009). The causes of the water level declines include a range of groundwater uses in close proximity, including agricultural irrigation, municipal supply wells, golf course irrigation, and a relatively dense aggregation of rural (“ranchette”) users. The County Board of Supervisors has certified a Level of Severity III for the main Basin and a Level of Severity I for the Atascadero Sub-basin based on findings in the 2009 Resource Capacity Study and an updated pumping analysis for the basin. As a result of the certification, certain land use and monitoring actions will be implemented by the County.

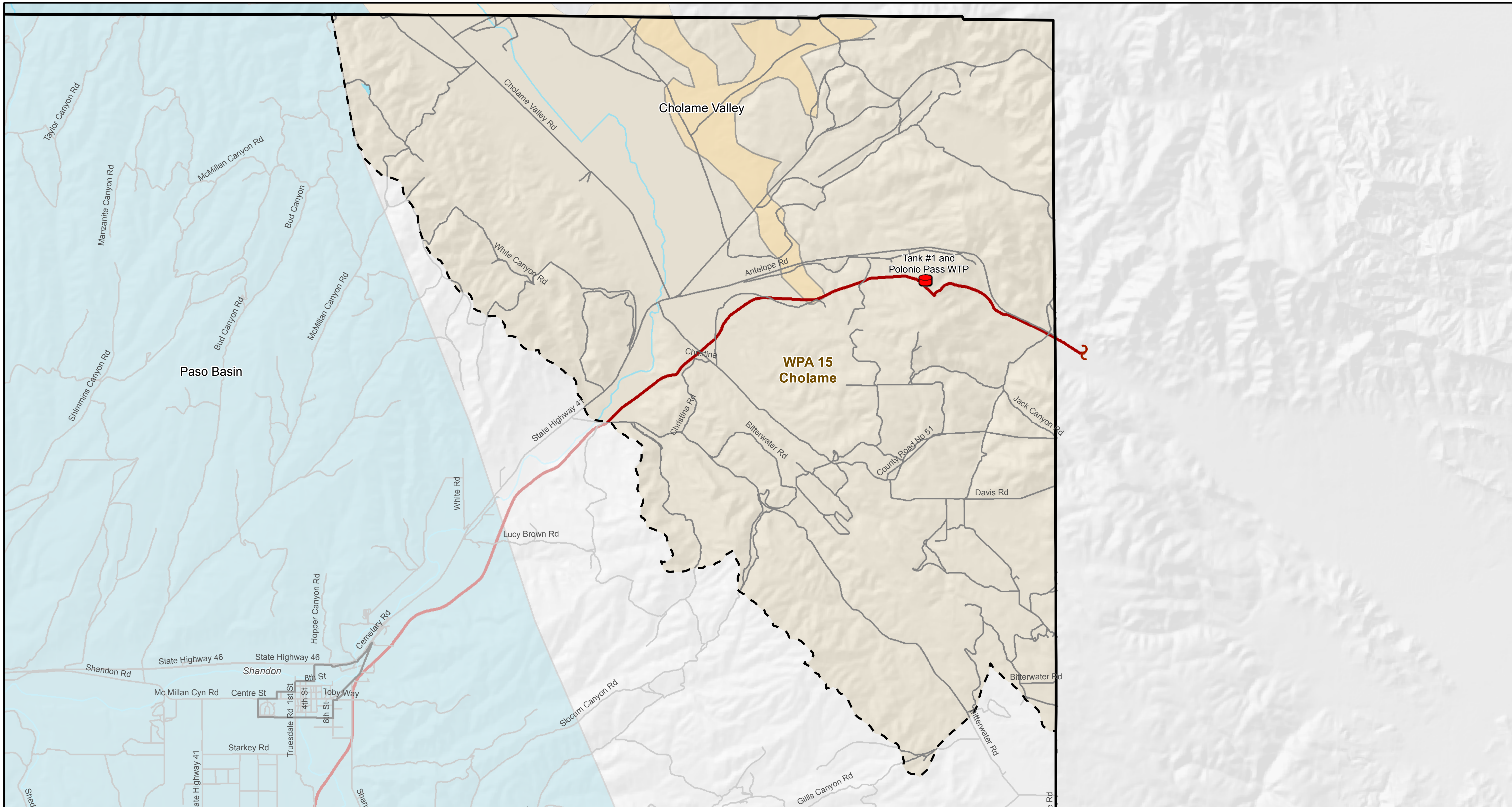
4.2.3.6 <u>Cholame Valley WPA 15</u>

Cholame Valley is the only groundwater basin in WPA 15.

4.2.3.6.1 *Cholame Valley Groundwater Basin*

The Cholame Valley Groundwater Basin is located in the Inland sub-region (Figure 15) and is identified in California’s Groundwater Bulletin 118 as Groundwater Basin Number 3-5 (DWR 2003). The basin is located in both Monterey and San Luis Obispo counties and is 39,800 acres (62 square miles) in size. The basin is comprised of alluvium and is bounded in the southwest by the Paso Robles Formation. The valley is drained by Cholame Creek. The depths of the wells in this area ranged from 100 to 665 feet. Most wells were located on the fringe of the basin in the upper canyon areas and are used primarily for domestic water supply.

There are some small public water systems in the San Luis Obispo County portion of the basin. All other pumping is for residential and agricultural purposes by overlying users. No



Legend

Water Facilities
- WTP
- Reservoir/Tank and/or WTP
- Local Facility
- Pump Station
- Turnout
- Tunnel Unit
- Water Transmission Line

Color Scheme
- California State Coastal Branch
- Lopez Water System
- Lake Nacimiento Water Project
- Salinas Reservoir System
- Whale Rock Reservoir System
- Chorro Valley Pipeline

- Streets
- Major Rivers/Streams
- Urban Reserve and Village Reserve Lines (URL/VRL)
- Water Planning Area 15
- Water Planning Area Boundary
- Groundwater Basins
- Waterbodies

Text:
Water Planning Area
Groundwater Basin
URL/VRL
Water Facility
Hydrography

0 1 2 Miles

Figure 4.15
San Luis Obispo County
Water Planning Area 15
Master Water Report
San Luis Obispo County Flood Control and Water Conservation District

carollo Engineers...Working Wonders With Water information is available describing basin yield. Very limited groundwater quality information has been published or described. Water quality data from non-specific sites indicate generally high concentrations of TDS, chlorides, sulfates, and boron (Chipping, et al., 1993). Constraints on water availability in this basin include physical limitations and water quality.

Published hydrogeologic information for this basin is limited. If the District requires more current or detailed information for this basin, new studies would be necessary.

4.2.3.7 Nacimiento WPA 16

There are no significant groundwater basins in WPA 16 (Figure 4.16). Public water systems such as Heritage Ranch Community Services District and the Nacimiento Water Company draw water from wells that rely on Nacimiento reservoir surface water or surface water releases.

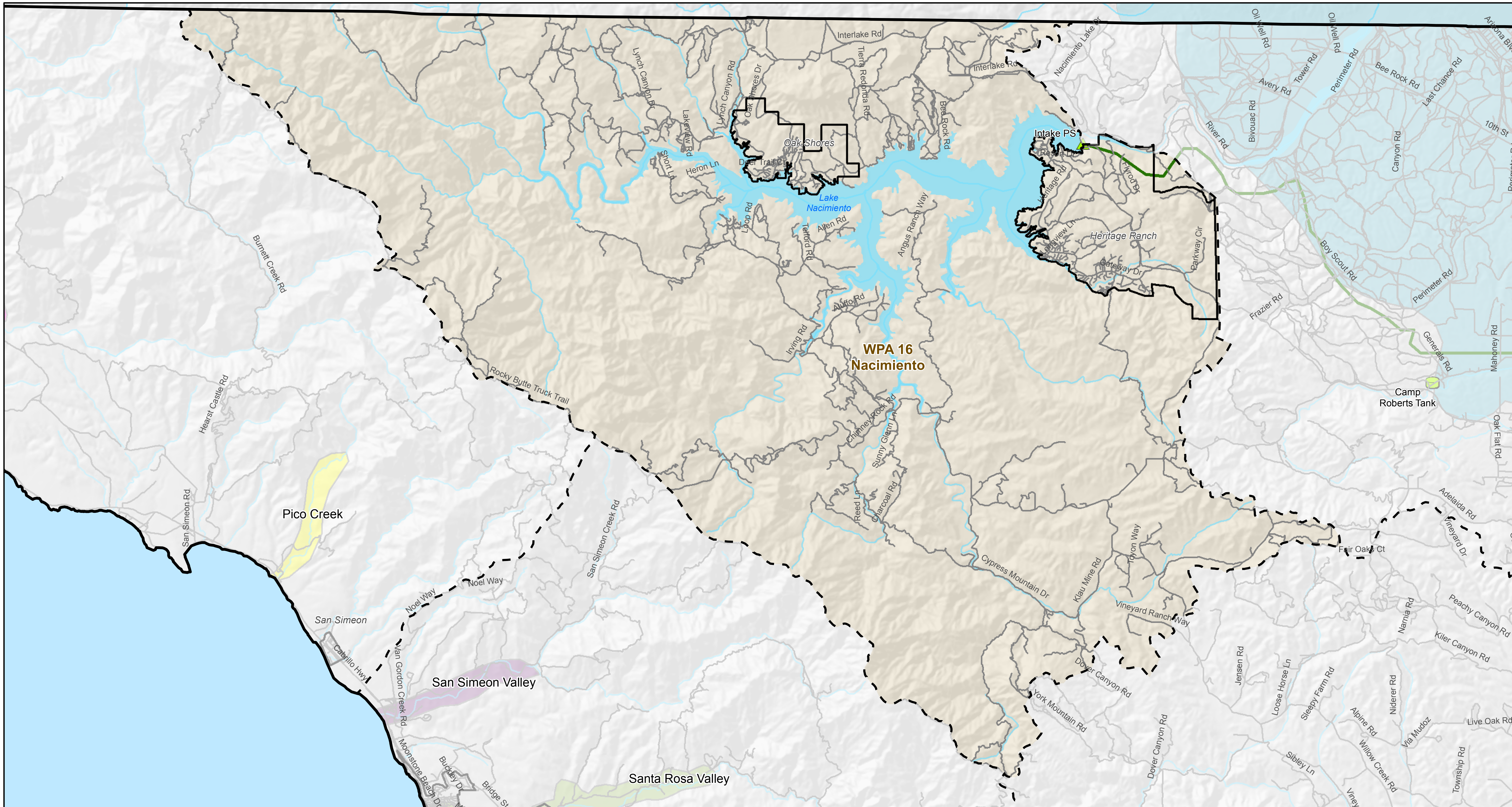
4.2.4 OTHER GROUNDWATER SUPPLY SOURCES

The groundwater basins described above comprise most of the groundwater supply sources in San Luis Obispo County. There are other areas, however, where groundwater wells tap fractured rock aquifers or other non-basin sources. Water resources in some of these areas have been studied on a multiple-parcel basis for specific planning issues or for small public water systems, but in most cases hydrogeologic data is only generated when a new well is drilled or a property is sold. Generally, available information is limited to specific wells; formation-wide data related to aquifer yield, water quality, or water availability is not available.

Table 4.4 lists some of the more developed supply sources of the County that are outside of groundwater basins discussed above. If the District requires more detailed information, focused studies would be necessary.

Table 4.4 Other Developed Supply Sources

Sub-Region	Area
North Coast	Villa/Cayucos/Old/Willow/Toro Creek Roads
Inland	Nacimiento/San Antonio Lakes
Inland	Adelaida
Inland	Park Hill
Inland	Templeton Hills
South Coast	San Luis Hills/Oak Park
South Coast	Nipomo Valley/Los Berros/Tematte Ridge



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Water Facilities

- WTP
- Reservoir/Tank and/or WTP
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Color Scheme

- California State Coastal Branch
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- Salinas Reservoir System
- Whale Rock Reservoir System
- Chorro Valley Pipeline
- Streets
- Major Rivers/Streams
- Urban Reserve and Village Reserve Lines (URL/VRL)
- Water Planning Area 16
- Water Planning Area Boundary
- Groundwater Basins
- Waterbodies

Text:
Water Planning Area
Groundwater Basin
URL/VRL
Water Facility
Hydrography

0 1 2 Miles

Figure 4.16
San Luis Obispo County
Water Planning Area 16
Master Water Report
San Luis Obispo County Flood Control and Water Conservation District

4.3 OVERVIEW OF SURFACE WATER SUPPLY

The information presented below was extracted from Technical Memorandum Number 3, Water Supply Inventory and Assessment – Water Supply, Demand and Water Quality, prepared by Wallace Group in association with Fugro West, Inc. and Cleath-Harris Geologists. For more detailed discussion on this information, please refer to **Appendix C**.

Water is drawn from a number of surface sources, both inside and outside of the County. This section describes the reservoirs that are used as water supply sources within the County. Allocations and key user agreements are described for each water source. Figure 4.17 shows the location of the transmission systems for these sources.

4.3.1 State Water Project

The California Department of Water Resources (DWR) owns and operates the State Water Project (SWP). In 1963 the District contracted with DWR for 25,000 AFY of State Water. The SWP began delivering water to the Central Coast in 1997 upon completion of the Coastal Branch conveyance and treatment facilities, serving Santa Barbara and San Luis Obispo Counties.

The treatment facility for State Water delivered through the Coastal Branch, known as the Polonio Pass Water Treatment Plant (PPWTP), is owned, operated and maintained by the Central Coast Water Authority (CCWA) for users in San Luis Obispo and Santa Barbara Counties. DWR owns the Coastal Branch transmission system, and they operate and maintain the raw water portion of the system. CCWA operates and maintains the treated water portion of the Coastal Branch. Agreements between CCWA, Santa Barbara County Flood Control and Water Conservation District and DWR are in place to establish these roles and relationships.

In San Luis Obispo County, decisions were made in the early 1990s by local municipalities and water purveyors that led to Water Service Amount (WSA) requests for portions of the District's allocation of State Water. After extensive policy discussions regarding the use of State Water, the District entered into Water Supply Agreements with the agencies identified in Table 4.5. Master Water Treatment and Coastal Branch construction agreements with CCWA were also approved for treatment of 4,830 AFY of State Water, the cumulative total of WSA requests.

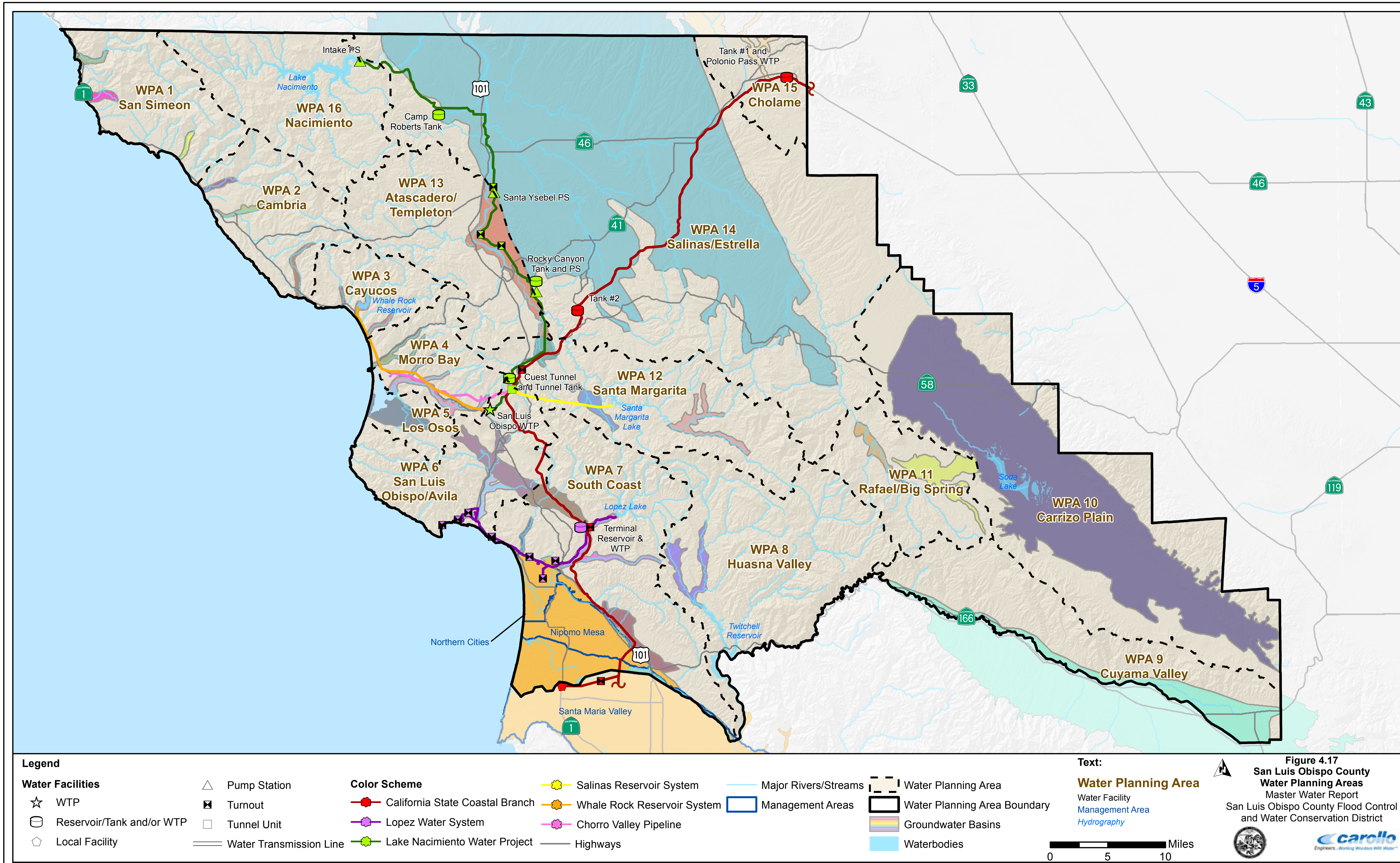

Figure 4.17
San Luis Obispo County
Water Planning Areas
Master Water Report
San Luis Obispo County Flood Control
and Water Conservation District

The SWP is considered a supplementary source of water supply since hydrologic variability, maintenance schedules, and repair requirements can cause reduced deliveries or complete shut down of the delivery system. Since delivery to the Central Coast began, the SWP has provided between 50 and 100 percent of the contracted allocations, but recently, drought coupled with pumping restrictions in consideration of endangered species habitat lowered that amount to 35 percent in 2008 and 40 percent in 2009. To receive a greater portion of State Water during these shortages (up to their full WSAs), most agencies have entered into “Drought Buffer Water Agreements” with the District for use of an additional portion of the District’s SWP allocation, as shown in Table 4.5. For example, when the SWP can only deliver 50 percent of contracted allocations, an agency with 100 AFY WSA and 100 AFY drought buffer allocation can still receive 100 AFY WSA – 50 percent of their 100 AFY allocation plus 50 percent of their 100 AFY drought buffer allocation equals 100 AFY.

Table 4.5 also illustrates that the District has 15,273 AFY of unsubscribed SWP allocation (District allocation (25,000 AFY) minus Total Reserved (9,727 AFY) equals 15,273 AFY), commonly referred to as the “excess allocation.” Hydraulics, treatment plant capacity, and contractual terms and conditions limit how the excess allocation can be used. The District is currently evaluating the available hydraulic capacity in the treated water portion of the Coastal Branch.

The following is a list of options for use of this excess allocation that will be explored further in this MWR:

- Direct delivery after contract-revision negotiation for use of any additional capacity available in the Coastal Branch treatment and conveyance facilities;
- As additional drought buffer water;
- Permanent, multi-year or single year transfer or exchange; and/or
- As a source of either groundwater recharge or surface storage.

Table 4.5 not only lists the WSA, drought buffer, and total reserve allocations for the District, but it also provides the average, maximum and minimum allocations based on the range of deliveries presented in Table 6.13 from the State Water Project Delivery Reliability Report 2007. The minimum, average, and maximum deliveries were 6, 66, and 100 percent of the maximum SWP Table A allocations, respectively. For long-term planning, it is assumed that SWP contractors will receive 66 percent of the maximum allocation in a given year.

Table 4.5	**State Water Project Water Service Amount**						
Contractor	**WSA**	**Drought Buffer**	**Total Reserved**	**6 percent Allocation Year (1977)(1)**	**66-69% Allocation Year(1)**	**100% Allocation Year(1)**	**WPA**
Chorro Valley Turnout							
Morro Bay, City of	1,313	2,290	3,603	216	1,313	1,313	4
California Men's Colony	400	400	800	48	400	400	4
County Operations Center	425	425	850	51	425	425	4
Cuesta College	200	200	400	24	200	200	4
Subtotal	**2,338**	**3,315**	**5,653**	**339**	**2,338**	**2,338**	
Lopez Turnout							
Pismo Beach, City of	1,240	1,240	2,480	149	1,240	1,240	7
Oceano CSD	750	0	750	45	495	750	7
San Miguelito MWC	275	275	550	33	275	275	6
Avila Beach CSD	100	0	100	6	66	100	6
Avila Valley MWC	20	60	80	5	20	20	6
San Luis Coastal USD	7	7	14	1	7	7	6
Subtotal	**2,392**	**1,582**	**3,974**	**238**	**2,403**	**2,392**	
Shandon	100	0	100	6	66	100	14
Subtotal	**100**	**0**	**100**	**6**	**66**	**100**	
Total	**4,830**	**4,897**	**9,727**	**584**	**4,507**	**4,830**	

Notes:
1. Minimum, average, and maximum allocations established in the State Water Project Delivery Reliability Report 2007 (August 2008), page 51, Table 6.13. This study used 66 percent for the average allocation year.

Many factors will affect future SWP deliveries to the District and SWP subcontractors within the County, including Delta pumping restrictions and climate change. Estimating the delivery reliability of the SWP depends on many issues, including possible future regulatory standards in the Delta, population growth, water conservation and recycled efforts, drought buffer purchases, and water transfers. DWR published the State Water Project Delivery Reliability Report 2007 (August 2008). The report estimates future (2027) SWP delivery reliability and incorporates the 2007 federal court ruling for Delta pumping and potential impacts of future climate change. When compared to previous reliability reports, total annual deliveries for 2027 show decreases in deliveries in most years if no actions are taken to address the factors causing the decrease in availability. It is important to recognize that actions to re-establish reliability are being evaluated by DWR State Water Contractors, and other State and Federal agencies. Future actions may include new environmental efforts as well as infrastructure improvements envisioned when the SWP was originally scoped in the 1960s.

Table 6.13 from the 2007 DWR reliability report contains the average, maximum, and minimum estimates of SWP Table A deliveries from the Delta under future conditions. Table 6.13 shows that average SWP delivery amounts may decrease from 8 to 11 percent of maximum SWP Table A amounts as compared to average SWP delivery amount estimates from previous reliability studies. In the 2005 DWR reliability report, delivery amounts were projected to be 77 percent of maximum SWP Table A amounts on average. The 2007 DWR reliability report projects delivery amounts to be 66 – 69 percent of maximum SWP Table A amounts on average. The decrease in deliveries is primarily due to flow targets related to Delta smelt, which reduces the amount of Delta water available for export by the SWP and the assumed hydrologic changes associated with climate change.

4.3.2 Nacimiento Water Project

The Monterey County Flood Control and Water Conservation District (now known as the Monterey County Water Resources Agency (MCWRA)) constructed the Nacimiento Dam in 1957. The dam and reservoir continue to be operated by MCWRA. The lake has a capacity of 377,900 acre-feet (AF) and a surface area of 5,727 acres. Water is collected from a 365 square mile watershed that is comprised of grazing lands and rugged wilderness.

In 1959, the District secured the rights to 17,500 AFY from Lake Nacimiento, with 1,750 AFY reserved for lakeside users and the Heritage Ranch Community Services District (Heritage Ranch CSD). After a long series of studies and negotiations, the Nacimiento Water Project (NWP) was initiated. The NWP is the single largest project that the District has ever undertaken. The total project cost, including design, construction, construction management, environmental permitting, and right-of-way, is approximately $176 million. Water deliveries have recently begun. The project will deliver raw lake water from Lake Nacimiento to communities within San Luis Obispo County. Participating entities and their contracted water amounts are listed in Table 4.6.

Table 4.6 Nacimiento Water Project Participants	
Participants	**Allocations (AFY)**
City of Paso Robles	4,000
Templeton CSD	250
City of San Luis Obispo	3,380
Atascadero Mutual Water Company	2,000
CSA 10 A (via exchange)[1]	25
Total	**9,655**

Notes:
1. See Whale Rock Reservoir Operating Agreements.

Though the participants have contracted for 9,655 AFY, the northern portions of the pipeline and appurtenances have been designed for the maximum allowable withdrawal amount of 15,750 AFY. Decreasing percentages of excess capacity are also designed into the southern reaches of the project. It is expected that additional allocations will be purchased in the future by existing participants or other entities. The mechanism by which the participation requests of other entities are considered varies depending on whether or not the entity was a part of the Environmental Impact Report (EIR). If the entity was a part of the EIR, it can proceed directly to the District Board of Supervisors for consideration. If it was not a part of the original EIR, it must consult with the Nacimiento Project Commission and obtain written support from existing participants that represent at least 55 percent of existing subscription amounts before proceeding to the District Board of Supervisors for consideration.

4.3.3 Whale Rock Reservoir

Whale Rock Reservoir is located on Old Creek Road approximately one-half mile east of the community of Cayucos. The State Department of Water Resources supervised the project’s planning, design, and construction. Construction took place between October 1958 and April 1961. The reservoir is jointly owned by the City of San Luis Obispo, the California Men's Colony, and Cal Poly. These three agencies, with the addition of a representative from the Department of Water Resources, form the Whale Rock Commission, which is responsible for operational policy and administration of the reservoir and related facilities. Day-to-day operation is provided by the City of San Luis Obispo.

Whale Rock reservoir is formed by an earthen dam and was able to store an estimated 40,662 acre-feet of water at the time of construction. The calculation of the yield available is coordinated with Salinas Reservoir using a safe annual yield computer model. The model also evaluates the effect of siltation. The Whale Rock Commission has budgeted for a siltation study to be undertaken in the near future.

Table 4.7 summarizes the current capacity rights for the joint right-holders (downstream water rights are accounted for separately). Each rights-holder manages reservoir withdrawals individually from their available water storage allocation. The Whale Rock Commission tracks withdrawals and reports available volume on a monthly basis.

Table 4.7 Whale Rock Reservoir Allocations

Water Users	Percent	Allocations (Acre-Feet)
City of San Luis Obispo	55.05	22,383
Cal Poly	33.71	13,707
California Men's Colony	11.24	4,570
Total	**100**	**40,660**

4.3.3.1 Operating Agreements

Several agreements establish policy for the operation of the Whale Rock system and actions of the member agencies. A brief description of the existing agreements that affect water delivery agreements and water rights are summarized below. Additional agreements are included in the Water Supply Inventory and Assessment Technical Memorandum in Appendix C.

A) Agreement for the construction and operation of the Whale Rock Project, 1957, set forth the project's capital cost distribution to the member agencies.

B) A supplemental operating agreement, 1960, established the Whale Rock Commission and apportioned the operating costs.

C) Downstream water rights agreement (the original 1958 agreement was amended in April 1996) defining water entitlements for adjacent and downstream water users. The Cayucos Area Water Organization (CAWO) affected by this agreement consists of three public water purveyors and the cemetery, all in the Cayucos area. In addition to the agencies, water entitlements were identified for two separate downstream land owners. Entitlements are as follows:

Table 4.8 Whale Rock Downstream Entitlements	
Water Users	**Downstream Water Entitlements (AFY)**
Cayucos Area Water Organization(CAWO)(1)	
Paso Robles Beach Water Association	222
Morro Rock Mutual Water Company	170
County Service Area 10A	190
Cayucos-Morro Bay Cemetery District	18
Mainini Ranch (Landowner)(2)	50
Ogle (Landowner)(2)	14
Total Downstream Entitlement	**664**

Notes:
1. The referenced agreement in Item C) above establishes the amount of 600 AFY to CAWO. The allocations to the CAWO members are part of an internal agreement amongst the members.
2. The agencies generally receive their entitlements via pipeline from the reservoir, while the land owners' entitlement is released from the reservoir.

D) An agreement for water allocation and operational policy between the agencies forming the Whale Rock Commission. The agreement established the accounting procedures to allow each agency to carry over excess or deficit water each year.

E) An agreement between the Whale Rock Commission and the California Men's Colony, 1990, to establish maintenance and operation criteria for the Chorro Booster pumps. The Commission installed the Chorro Booster pumps on the California Men's Colony turnout from the Whale Rock line to reduce system pressures required to provide full flow to the California Men's Colony water treatment plant. Pump and pump station maintenance, per the agreement, are the responsibility of the California Men's Colony.

F) An agreement between the Whale Rock Commission and the County of San Luis Obispo for connection to the Whale Rock pipeline, 1995, allowed a pipeline connection to deliver water to the Dairy Creek Golf Course. Typically, the golf course uses recycled water from the California Men's Colony. Under the terms of the agreement, water from Whale Rock Reservoir can be delivered when recycled water is not available.

G) Consent to common use agreement, 1996, between the Whale Rock Commission and the County of San Luis Obispo. The agreement allowed the installation of the State Water pipeline at seven locations within the existing Whale Rock pipeline easement.

H) A mutual aid agreement between the Whale Rock Commission and the City of Morro Bay, 2000, relative to water resources in the event of an emergency.

I) An exchange agreement, 2005, between CSA 10A and the City of San Luis Obispo allowing the delivery of up to 90 AFY of the City's Whale Rock water allocation to CSA 10A in exchange for CSA 10A's purchase of an equivalent amount of Nacimiento Water for delivery to the City. The anticipated need for CSA 10A is 25 AFY at build-out.

4.3.4 Lopez Lake/Reservoir

The District completed the Lopez Dam in 1968 to provide a reliable water supply for agricultural and municipal needs as well as flood protection for coastal communities. Lopez Reservoir has a capacity of 49,388 AF. The lake covers 950 acres and has 22 miles of oak covered shoreline. Allocations for Lopez Lake water are based on a percentage of the safe yield of the reservoir, which is 8,730 AFY. Of that amount, 4,530 AFY are for pipeline deliveries and 4,200 AFY are reserved for downstream releases. The dam, terminal reservoir, treatment and conveyance facilities are a part of Flood Control Zone 3 (Zone 3).

The agencies that contract for Lopez water in Zone 3 include the communities of Oceano, Grover Beach, Pismo Beach, Arroyo Grande, and County Service Area (CSA) 12 (including the Avila Beach area). Their allocations are shown in Table 4.9.

Table 4.9 Lopez Lake Allocations

Water Users	Allocation (AFY)
City of Pismo Beach	896
Oceano CSD	303
City of Grover Beach	800
City of Arroyo Grande	2,290
CSA 12	241
Total	**4,530**

Two issues could change the amount of water available to contractors and the safe yield. The Arroyo Grande Habitat Conservation Plan, which is currently being developed, will likely require additional downstream releases. An interim downstream release schedule has reduced the amount of water available to municipalities. Changes in operation of the dam are being considered for reducing spills and optimizing future deliveries. Additionally, the City of Pismo Beach, on behalf of the Zone 3 agencies, has taken the lead on conducting a study to consider the feasibility of modifying the dam to augment capacity of the reservoir.

4.3.5 Santa Margarita Lake/Salinas Reservoir

The Salinas Dam was built in 1941 by the War Department to supply water to Camp San Luis Obispo and, secondarily, to meet the water needs of the City of San Luis Obispo. The Salinas Reservoir (Santa Margarita Lake) captures water from a 112 square mile watershed and can currently store up to 23,843 acre-feet (AF). In 1947, the Salinas Dam and delivery system was transferred from the regular Army to the U.S. Army Corps of Engineers. Shortly thereafter, the District began operating this water supply for the City under a lease from the U.S. Army Corps of Engineers. Water from the reservoir is pumped through the Cuesta Tunnel (a one-mile long tunnel through the mountains of the Cuesta Ridge) and then flows by gravity to the City's Water Treatment Plant on Stenner Creek Road. Transfer of dam ownership to the District from the U.S Army Corps of Engineers is under consideration.

The original design of the dam included spillway gates that would have increased capacity to an estimated 45,000 AF, and an increase in safe annual yield of 1,650 AFY. Though these gates were not installed due to safety concerns, recent studies have shown that gates could be installed in conjunction with structural improvements to the dam. With its participation in the Nacimiento Water Project, the City has concluded that plans for expansion of the Salinas Reservoir should be put on hold. However, the City has requested to secure the license on the water rights to expand the reservoir's capacity.

The calculation of the yield available is coordinated with Whale Rock Reservoir using a safe annual yield computer model. The City's combined safe yield of the two reservoirs was 6,950 AFY in 2009. The model also accounts for the reduction in storage due to siltation.

4.3.6 Chorro Reservoir

(Information for this section was taken from an interview with John Kellerman, the Plant Manager at the California Men's Colony and from the 2003 Chorro Valley Study).

The Chorro Reservoir is less than one mile northeast of the California Men's Colony in the upper Chorro watershed. The Chorro Reservoir is part of the Chorro Valley Water System operated by CMC. The system provides storage, treatment and distribution to four major users:

- The California Men's Colony
- Camp San Luis Obispo (California National Guard)
- County Operations Center/Office of Education
- Cuesta Community College (Cuesta College)

The reservoir and treatment plant were constructed by the U.S. Army Corps of Engineers to provide water to Camp San Luis Obispo at the beginning of World War II. The net storage capacity of the Chorro Reservoir has decreased since it was constructed due to siltation, and was estimated to be 105 AF, based on a study prepared by DWR in 1989. More recent studies indicate that the capacity is currently closer to 90 acre-feet. Safe annual yield is considered to be 140 AFY, as the watershed provides more than can be stored in the reservoir, even in drought years. It is worth noting that water demand at Camp San Luis Obispo, both during the war and subsequently, has been met almost exclusively through surface flows to the reservoir from the Chorro watershed and from groundwater wells on the Camp property. Although the Salinas Reservoir waterline was extended from the Cuesta Water Tunnel to the Chorro Reservoir as part of the original improvements in World War II, the pipeline has only been used to convey water from the Salinas Reservoir to the Camp twice since construction.

Camp San Luis Obispo has priority rights to water from Chorro Reservoir, with 140 AFY of entitlement. CMC has right to any excess. The Mainini Ranch has an agreement with the Camp for a delivery of up to 25 AFY, but has only used an average of 5 to 7 AFY over the past decade. For further discussion on agreements related to the Chorro Reservoir, see the description of the Chorro Valley Water System in the Water Planning Area Number 4 discussion below.

4.4 OTHER WATER SUPPLY SOURCES

4.4.1 Twitchell Reservoir

Twitchell Dam is on the Cuyama River about 6 miles upstream from its junction with the Sisquoc River. Though the dam is located in Santa Barbara County and operated by the Santa Maria Valley Water Conservation District (SMVWCD), the reservoir straddles the county line and some agricultural land within San Luis Obispo County is irrigated from the Santa Maria Groundwater Basin replenished by the reservoir. The multiple-purpose Twitchell Reservoir has a total capacity of 224,300 AF. It stores floodwaters of the Cuyama River, which are released as needed to recharge the groundwater basin and to prevent sea water intrusion. The reservoir supplies on average 32,000 AFY of recharge to the Santa Maria Valley Groundwater Basin, though this value fluctuates significantly relative to annual precipitation. Because the reservoir is managed for flood control and groundwater recharge, the reservoir is empty much of the time. A majority of the groundwater flows towards the ocean, though a small gradient flows seasonally to the Nipomo Mesa.

4.4.2 Desalination

4.4.2.1 Morro Bay Desalination

In the County, there is only one operating desalination facility, that being the City of Morro Bay's desalination plant. In the past, the Morro Bay has used the salt water reverse osmosis (SWRO) treatment plant to treat water from saltwater wells and to remove nitrates from fresh water wells. Recently the Morro Bay completed the installation of two 450 gallons per minute (gpm) brackish water reverse osmosis (BWRO) treatment trains. The addition of these treatment processes will enable the Morro Bay to treat both fresh water and salt water wells simultaneously, and will also reduce the energy usage of the facility as well. The SWRO trains are designed to produce approximately 645 AFY of potable water from sea water. The BWRO system is capable of treating the entire 581 AF of Morro Basin groundwater that the Morro Bay can extract by permit.

The original capital cost for the BWRO system in 2003 was about $3.1 million. The operating costs for the facility vary widely depending on the amount the Morro Bay operates the plant. Based on a nearly continuous operation, the costs are about $1,700 per acre foot, including replacement of membranes and some appurtenances on a five-year cycle. With energy recovery equipment installed at a capital outlay of about $1 million, the operational cost for water would drop into the $1,100 -$1,300 per acre foot range.

4.4.2.2 Other Desalination Projects

The Cambria CSD has been striving to develop a seawater desalination plant to meet existing and future water demands. This plant, if implemented, is expected to produce up to 602 AFY. This plant will operate during the summer season to augment supply during the summer and high demand period (from summer tourism). A recycled water system is also planned, with an estimated 180 AFY made available for unrestricted irrigation use.

The City of Arroyo Grande, the City of Grover Beach, and the Oceano Community Services District participated in the evaluation of a desalination project to supplement their existing potable water sources. Currently, all three agencies receive water from various sources, including the California State Water Project, Lopez Lake Reservoir, and groundwater from the Arroyo Grande Plain Hydrologic Subarea that is part of the Santa Maria Valley Groundwater Basin. Recent projections of water supply shortfalls in the region motivated the agencies to conduct a more detailed study of desalination as a supplemental water supply. The study focused on utilizing the existing South San Luis Obispo County Sanitation District's (SSLOCSD) wastewater treatment plant to take advantage of utilizing the existing ocean outfall, while having the plant located near the ocean seawater source. The feasibility study, completed in 2008, was based on a 2,300 AFY seawater desalination facility. Some of the major points of interest and concern of this study include:

- Some 20 or more beach wells may be needed to provide enough seawater to produce the 2,300 AFY potable water.
- Permitting and environmental issues could be complex, and implementation could take eight years or longer.

Initial capital cost could be in the range of $35 million, and customer rates could be impacted by 18 percent to over 100 percent to fund the project, and would cost in the neighborhood of $2,300 per AF or more, on a 20-year life cycle basis.

4.4.3 Water Recycling

Several purveyors and agencies in the County recycle municipal wastewater. Details of each purveyor or sanitary agency's recycled water program are discussed later in this report. Recycled water qualities range from secondary quality (as defined by Title 22 California Code of Regulations (CCR)) to the highest level of treatment for unrestricted use.

The most established water recycling program in the County is that of the City of San Luis Obispo. The City of San Luis Obispo currently delivers 135 AFY to nearby golf courses, schools and commercial establishments, with expectations of increasing recycled water deliveries to 1,000 AFY. The City must also maintain discharge to San Luis Obispo Creek, and this flow amounts to approximately 1,800 AFY.

Other water recycling projects in the County include the following and are discussed briefly in the water supply sections for the respective communities:

- Nipomo CSD (Black Lake WWTP, Southland WWTP)
- California Men's Colony (Dairy Creek Golf Course)
- Templeton CSD (Meadowbrook WWTP/recharge Salinas River underflow)
- City of Atascadero WRF (Chalk Mountain Golf Course)
- Rural Water Company (Cypress Ridge Golf Course)
- Woodlands MWC (Monarch Dunes Golf Course)

A number of agencies have undertaken recycled water feasibility studies to determine the viability of developing recycled water projects. Such agencies include, but not limited to:

- San Simeon CSD
- Cambria CSD
- City of Morro Bay/Cayucos Joint WWTP
- City of Paso Robles
- South San Luis Obispo County Sanitation District (SSLOCSD) WWTP
- City of Pismo Beach
- City of Arroyo Grande
- Avila Beach CSD/Port San Luis
- Los Osos CSD

4.5 WATER CONSERVATION PROGRAMS

Water conservation programs are being implemented throughout the County. Most purveyors established water conservation programs during a prolonged drought in the early '90s. In the current drought, purveyors have been aggressively promoting conservation measures to their customers. Many have made mandatory conservation requirements part of the building code and others have provided incentives for voluntary conservation. Certain conservation measures are required as part of the State's Urban Water Management Plan (UWMP) program. Two voluntary organizations assist members to implement these and other conservation measures. The conservation element of the UWMP and the programs of the two agencies are described below.

4.5.1.1 Urban Water Management Plans:

California's Urban Water Management Planning Act (Act) requires that every urban water supplier that provides water to 3,000 or more customers, or that provides over 3,000 acre-feet of water annually, should prepare and implement a plan (UWMP). The purpose is to ensure that the appropriate level of reliability in its water service is sufficient to meet the needs of its customers during normal, dry, and multiple dry years. The Act requires that an UWMP contain a discussion of a water purveyor's water Demand Management Measures (DMMs), including a description of each DMM currently being implemented or scheduled for implementation, the schedule of implementation for all DMMs, and the methods, if any, the supplier will use to evaluate the effectiveness of DMMs. The Act identifies 14 specific DMMs:

1. Water conservation coordinator;
2. Water Survey Programs for single-family residential and multi-family residential customers;
3. Residential plumbing retrofit;
4. System water audits, leak detection, and repair;
5. Metering with commodity rates for all new connections and retrofit of existing connections;
6. Large landscape conservation programs and incentives;
7. High-efficiency washing machine rebate programs;
8. Public information programs;
9. School education programs;
10. Conservation programs for commercial, industrial, and institutional accounts;
11. Wholesale agency programs;
12. Conservation pricing;
13. Water waste prohibition; and
14. Residential ultra-low flush toilet replacement programs.

The UWMP must discuss each of these potential DMMs and any other measures the supplier is implementing or has scheduled for implementation through a five-year period. The entire UWMP is to be updated every five years. If the water supplier does not schedule a particular DMM for implementation, the UWMP must include a cost-benefit evaluation that takes into consideration the economic, environmental, social, health, customer impact, and technological factors.

In addition to DMMs, the UWMP must also include a Water Shortage Contingency Plan, containing information on actions to be undertaken in response to water supply shortages of varying severity. These actions generally begin with voluntary conservation measures during periods of moderate shortage or high demand and progress to increasingly stringent mandatory restrictions on water use during severe shortages. Most purveyors have put some level of these Contingency Plans into place during the current drought.

4.5.1.2 <u>Partners in Water Conservation:</u>

Partners in Water Conservation (PIWC) is a group of San Luis Obispo County water purveyors working together to provide the community with valuable information and educational opportunities on how to use water more efficiently, both indoors and outdoors. Members include:

- City of Arroyo Grande
- City of Grover Beach
- City of Morro Bay
- City of Paso Robles
- City of Pismo Beach
- City of San Luis Obispo
- County of San Luis Obispo
- Atascadero Mutual Water Company
- Cambria Community Services District
- Los Osos Community Services District
- Nipomo Community Services District
- Templeton Community Services District

The partnership has sponsored a number of programs and publications to promote conservation in the communities they serve. Some of their efforts include:

- Features of a Sustainable Landscape (brochure)
- Water Conserving Plants for Northern San Luis Obispo County (directory)
- Water Wise Landscape Workshops held annually in the summer
- Regular meetings of the membership to coordinate activities and to share lessons learned

In addition to joint activities, each of the members has water conservation programs in their service areas which are described in the discussion for each purveyor.

4.5.1.3 <u>Agricultural Water Conservation Programs</u>

The strategy to achieve agricultural water savings and benefits primarily includes improvements in on-farm technology and management. The strategy may be dependent on an array of factors such as funding availability, environmental stresses, desire to increase yield, education, water supply development, sustainability, and economics.

The Central Coast Vineyard Team (CCVT) is a network of 300 local farmers that promotes sustainable vineyard practices to protect the resources valuable to farms and communities. Their mission statement is to identify and promote the most environmentally safe, viticulturally and economically sustainable farming methods, while maintaining or improving quality and flavor of wine grapes.

CCVT has always focused on the whole farm using an integrated framework for resource protection, which includes education on water conservation Best Management Practices (BMPs). Given the increased focus on groundwater resources based on declining water levels, CCVT is committed to prioritizing water conservation in its programs.

CCVT developed topic specific tailgate meetings, which are characterized by in field demonstrations. Tailgates highlight growers who are successfully implementing specific water BMPs and provide hands-on opportunities for attendees to refine their skills and knowledge. This grower-to-grower approach, coupled with input from technical advisors, is an extremely effective outreach method.

Another program that promotes agricultural water conservation is the Agricultural Water Enhancement Program (AWEP). AWEP is a voluntary conservation initiative that provides financial and technical assistance to agricultural producers to implement activities on agricultural land for the purposes of conserving surface and groundwater, and improving water quality. As part of the Natural Resources Conservation Service (NRCS) Environmental Quality Incentives Program (EQIP), AWEP operates through contracts with producers to plan and implement conservation practices in project areas established through partnership agreements.

The Mobile Water Lab Program Irrigation Systems Evaluation is offered by the Cachuma Resource Conservation District and provides free irrigation system evaluations to turf irrigators. It evaluates systems individually and makes recommendations to improve performance. Over 800 evaluations have been performed on over 70,000 acres in San Luis Obispo and Santa Barbara Counties. Irrigation evaluations use standard procedures developed by Cal Poly and the California Department of Water Resources.

4.5.1.4 California Urban Water Conservation Council

The California Urban Water Conservation Council (CUWCC) was created to increase efficient water use statewide through partnerships among urban water agencies, public interest organizations, and private entities. The Council's goal is to integrate urban water conservation Best Management Practices (BMPs) into the planning and management of California's water resources. Members pledge to develop and implement 14 comprehensive conservation BMPs. These are identical to the 14 DMMs required by the UWMP Act. CUWCC offers an extensive array of resources to assist members in their conservation goals, including model municipal codes, sample surveys, conservation publications, descriptions of lessons learned from other members, and variety of technical resources to assist water suppliers in planning, estimating costs, and determining impact of BMP implementation.

County members include:

- City of Pismo Beach
- City of San Luis Obispo
- Central Coast Water Authority
- Golden State Water Company
- Atascadero Mutual Water Company
- Cambria Community Services District
- Nipomo Community Services District
- Templeton Community Services District

4.5.1.5 Decentralized Water Supply Opportunities

Considering that the majority of potable water supply at the household level is consumed for non-potable uses such as toilet flushing and outdoor irrigation, there are opportunities for homeowners and businesses to develop their own non-potable water sources on a small scale basis. Along those lines, two “green” technologies that have been given significant attention recently are graywater recycling and stormwater reuse/rainwater harvesting.

Typical graywater systems harvest wastewater from households or buildings that have not come into contact with toilet or kitchen sink waste. The harvested water is then filtered for distribution in underground irrigation systems. More elaborate systems can be designed to use graywater for toilet flushing, though plumbing codes make this option more complex. The San Luis Obispo Coalition of Appropriate Technology (SLO-COAT) as recently published a homeowner’s guide to the design and construction of relatively simple graywater systems that can be used for outdoor irrigation. The State is also revising plumbing codes to make graywater systems easier to install.

Promotion of stormwater reuse has been adopted by the SWRCB as part of the latest strategic plan, and is part of the State’s recently adopted water recycling policy. Stormwater reuse is considered a locally available, sustainable supply, consistent with implementation of the California Global Warming Solutions Act of 2006, and other State and regional efforts.

Rainwater harvesting is a form of stormwater reuse, usually practiced on a small scale by homeowners. Rainwater harvesting is the process of intercepting stormwater runoff from a surface (e.g. roof, parking area, land surface), and putting it to beneficial use. Intercepted stormwater can be collected, slowed down, and retained or routed through the site landscape using cisterns, microbasins, swales and other water harvesting structures. Water harvesting reduces dependence on dwindling groundwater reserves and expensive imported water. Capturing and using stormwater runoff also reduces site discharge and erosion, and the potential transport of stormwater pollutants.

Stormwater reuse can be promoted in a variety of ways. For example, the City of Tucson, Arizona became the first municipality in the country to require developers of commercial properties to harvest rainwater for landscaping. The new measure – approved by a unanimous vote by the City Council – requires that new developments meet 50 percent of their landscaping water requirements by capturing rainwater. The new rule went into effect June 1, 2010.

Consumer education is also a common approach to promoting stormwater capture and reuse. The City of Tucson has published its Water Harvesting Guidance Manual and the Texas Water Development Board has published the Texas Manual on Rainwater Harvesting. At the local level, SLO-COAT is planning to release a homeowner’s guide to Low Impact Development, which will emphasize simple techniques for stormwater capture and reuse at the household level.

The Atascadero Mutual Water Company has instituted a rebate program aimed at reducing landscape irrigation. One of the conservation measures supported by the program is the installation of rainwater harvesting systems at the household level, providing a rebate of up to $250 for storage tanks or cisterns designed to capture rainfall for use during dry periods.

Cambria CSD requires that residences built on properties larger than 8,000 square feet must have non-potable water collection cisterns for irrigation watering. 22 cisterns have been installed to date.

4.6 WATER SUPPLY, DEMAND, WATER QUALITY

The information presented below was extracted from Technical Memorandum Number 3, Water Supply Inventory and Assessment – Water Supply, Demand and Water Quality (Wallace Group et al., Appendix C), which summarizes urban water demand and supply, and from the Water Demand Methodology and Results Memorandum (ESA, Appendix D), which summarizes rural, agricultural, and environmental water demands.

This section presents an overview on water supply resources, demand and water quality throughout the County. Also described in this section are the different agreements/contracts of water purveyors in the County with respect to water allocations, and cooperative agreements between multiple parties for overall management of shared water resources. Also discussed are other water resources including recycled water and desalination.

Water is drawn from a number of surface sources, both inside and outside of the County. This section describes the reservoirs in and out of the County that are used as water supply sources within the County. It also includes a brief description of the State Water Project. Allocations and key user agreements are described for each water source. Figure 4.17 shows the location of the conveyance systems for these sources.

4.6.1 Total Water Demand

County water demand is divided into four categories: urban, rural, agricultural and environmental. Total demand is defined as the sum of urban, agricultural, and rural demand. Environmental water demand refers to the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat. Environmental water demand, while estimated and documented in a separate row in the summary tables, is not included in the total demand to differentiate between demands for urban, agricultural and rural users and those needed for environmental habitat.

The following discussion is an overview of the County water demands by water planning area. A detailed discussion follows this overview and provides more information on the individual users within each WPA.

Various data sources were used to arrive at the demands presented below and the projections for many of the users are not consistent. The County MWR demand summary is not intended to be conclusive, but offer a potential estimate and range of demands that could be experienced County-wide.

4.6.1.1 Method for Calculating Demand

The total water demand was calculated for existing and future conditions throughout the County. For calculating the existing water demand, this analysis utilized the most recent available data at the time the analysis was conducted. Details about the data were discussed earlier in this chapter. For future water demand, the study investigated the projected demand for the future if urban, rural and agricultural development progresses according to current general plans. The study created a geodatabase, which includes categories of water demand for existing and future conditions, as well as the total water demand, for each of the WPAs. For some areas in the County, this study relied on existing reports for the demand information. Water purveyors throughout the County were contacted about existing and future conservation. Specific conservation factors were applied to the future urban water demand projections for urban areas where these factors were available. More detail on the method for calculating water demand is available in Appendix D (Water Demand Methodology and Results Memorandum, ESA, January 2010).

4.6.1.2 Assumptions for Calculating Demand

Calculating the existing total water demand and projecting the future total water demand requires a number of assumptions, as well as review and analysis of existing data for each of the categories. Two general assumptions are outlined below while assumptions specific to each of the individual water demand categories are discussed within the individual category sections:

- Existing demands represent average annual use, in acre-feet per year (AFY). The demand can vary widely on smaller timescales, such as a daily or monthly demand. Rural water demand is based on an acre-foot per dwelling unit factors that were developed for coastal and inland hydrologic regions based on a review of average use in those areas from available use data in rural areas. Agricultural water demand is based on an acre-foot per acre per crop type factors that were developed for coastal and inland hydrologic regions based on a review of available studies, since actual usage data is limited. Use of water for ranching and pasture irrigation, among other uses not captured in pesticide reports, are not included. In Water Planning Areas where the majority of land is used for these purposes, the agricultural water demand may be significantly underestimated. Analysis of diversion rights records would help to address this issue in future updates to the Master Water Report.

- Future water demand is shown as a range whenever possible. For urban areas, the minimum projected future water demand accounts for conservation and the maximum projected future water demand represents a maximum buildout scenario as defined by water management plans, water master plans, or other purveyor provided information. The amount of future conservation was provided by and varied by purveyor. The projected demand is not associated with a particular year because the year of maximum buildout is unknown and varies between water planning areas. For agricultural demand, the range represents the difference between using low and high end values for existing and future irrigation efficiencies and rain totals. Consideration of recent shifts in agricultural production was included in the analysis for future agricultural demand as described in Appendix D (Water Demand Analysis Methodology and Results Memorandum, ESA). However, a comprehensive analysis of potential future agricultural cropping patterns based on a review of provisions in conservation easements, diversion permits and other scenarios was not included. For rural demand, the future range represents the difference between different development and conservation scenarios.

4.6.1.3 Total Demand by WPA

Table 4.10 summarizes the total water demand, including urban, agricultural, and rural water demand, as well as the environmental demand, developed for each of the 16 WPA's.

Table 4.10 Existing and Forecast Water Demand for All Water Planning Areas[1]					
WPA	**WPA Name/Category**	**Existing Demand (AFY)**	**Projected Demand (AFY)**		
1	**San Simeon**				
	Urban	108	250	--	250
	Agricultural	70	10	--	60
	Rural	20	50	--	50
	Total	**198**	**310**	**--**	**360**
	Environmental	72,980	72,980		
2	**Cambria**				
	Urban	706	1,009	--	1,514
	Agricultural	640	740	--	1,490
	Rural	100	190	--	220
	Total	**1,446**	**1,939**	**--**	**3,224**
	Environmental	51,460	51,460		
3	**Cayucos**				
	Urban	432	608	--	641
	Agricultural	520	430	--	800
	Rural	80	130	--	140
	Total	**1,032**	**1,168**	**--**	**1,581**
	Environmental	26,160	26,160		

Table 4.10 Existing and Forecast Water Demand for All Water Planning Areas[1]					
WPA	**WPA Name/Category**	**Existing Demand (AFY)**	**Projected Demand (AFY)**		
4	**Morro Bay**				
	Urban	3,112	3,532	--	3,532
	Agricultural	2,060	1,690	--	2,440
	Rural	120	190	--	220
	Total	**5,292**	**5,412**	**--**	**6,192**
	Environmental	27,880	27,880		
5	**Los Osos**				
	Urban	2,043	2,296	--	2,870
	Agricultural	3,290	2,750	--	3,770
	Rural	20	20	--	20
	Total	**5,353**	**5,066**	**--**	**6,660**
	Environmental	7,040	7,040		
6	**SLO/Avila**				
	Urban	7,878	9,641	--	10,149
	Agricultural	3,610	2,810	--	4,120
	Rural	460	610	--	660
	Total	**11,938**	**13,061**	**--**	**14,929**
	Environmental	33,030	33,030		

Table 4.10 Existing and Forecast Water Demand for All Water Planning Areas[1]					
WPA	WPA Name/Category	Existing Demand (AFY)	Projected Demand (AFY)		
7	**South Coast**				
	Urban	410	434	--	482
	Agricultural	19,920	16,610	--	23,830
	Rural	1,480	1,990	--	2,160
	NCMA[2]	9,636	12,363	--	13,826
	NMMA[2]	11,278	12,654	--	14,898
	SMVMA[2]	25,577	25,650	--	25,650
	Total	**68,301**	**69,701**	**--**	**80,846**
	Environmental	32,960	32,960		
8	**Huasna Valley**				
	Urban	0	0	--	0
	Agricultural	1,550	2,060	--	2,820
	Rural	90	360	--	450
	Total	**1,640**	**2,420**	**--**	**3,270**
	Environmental	25,020	25,020		
9	**Cuyama Valley**				
	Urban	0	0	--	0
	Agricultural	28,870	25,320	--	32,410
	Rural	10	80	--	100
	Total	**28,880**	**25,320**	**--**	**32,510**
	Environmental	Undetermined	Undetermined		

Table 4.10	Existing and Forecast Water Demand for All Water Planning Areas(1)				
WPA	**WPA Name/Category**	**Existing Demand (AFY)**	**Projected Demand (AFY)**		
10	**Carizzo Plain**				
	Urban	0	0	--	0
	Agricultural	800	680	--	890
	Rural(3)	210	9,610	--	12,740
	Total	**1,010**	**10,290**	**--**	**13,630**
	Environmental	Undetermined	Undetermined		
11	**Rafael/Big Spring**				
	Urban	0	0	--	0
	Agricultural	0	0	--	0
	Rural	0	470	--	620
	Total	**0**	**470**	**--**	**620**
	Environmental	Undetermined	Undetermined		
12	**Santa Margarita**				
	Urban	1,785	5,474	--	6,082
	Agricultural	1,770	1,720	--	2,680
	Rural	240	450	--	520
	Total	**3,795**	**7,644**	**--**	**9,282**
	Environmental	32,850	32,850		
13	**Atascadero/ Templeton**				
	Urban	12,358-12,403	12,650	--	13,681
	Agricultural	10,620	9,740	--	14,600
	Rural	1,480	1,810	--	1,930
	Total	**24,458-24,503**	**24,200**	**--**	**30,211**
	Environmental	41,010	41,010		

Table 4.10 Existing and Forecast Water Demand for All Water Planning Areas[1]					
WPA	**WPA Name/Category**	**Existing Demand (AFY)**	**Projected Demand (AFY)**		
14	**Salinas/Estrella**				
	Urban	4,635	9,349	--	11,644
	Agricultural	67,610	60,740	--	86,820
	Rural	3,590	5,570	--	6,230
	Total	**75,835**	**75,659**	**--**	**104,694**
	Environmental	Undetermined	Undetermined		
15	**Cholame Valley**				
	Urban	0	0	--	0
	Agricultural	80	60	--	80
	Rural	10	150	--	190
	Total	**90**	**210**	**--**	**270**
	Environmental	Undetermined	Undetermined		
16	**Nacimiento**				
	Urban	619	935	--	1,039
	Agricultural	3,860	4,740	--	7,120
	Rural	280	730	--	880
	Total	**4,759**	**6,405**	**--**	**9,039**
	Environmental	108,390	108,390		

Notes:

1. Urban demand: Low projected demand includes conservation factor of 0 to 20 percent, based on anticipated conservation. Agricultural demand: Affected by a wide range of conditions, including lack of data, weather conditions, changes in commodities and differences in irrigation practices. Future projections may not reflect the actual future water use or need, because of constant changes in farming practices. Projected agricultural demand may be significantly higher if more land is converted from dry to irrigated farming. Rural demand: Minimum projected rural demand reflects a 75 percent buildout scenario.
2. Demand for WPA 7 management areas is from 2009 or 2010 reports from NCMA (GEI, 2011), NMMA (NMMA, 2011), and SMVMA (Luhdorff and Scalmanini, 2009). SMVMA is approximated based on the proportion within San Luis Obispo County
3. Carrizo Plain rural demand projections are based on existing zoning, which includes the potential for extensive California Valley development. The actual development may be much lower than 75 percent due to limited groundwater and other factors.

4.6.2 Urban Water Demand

Urban water demand refers to residential, commercial, industrial, parks, institutional, and golf course water demand within many of the unincorporated communities and incorporated cities in the County. For purposes of the MWR, the urban water demand includes all unincorporated communities and incorporated cities in the County where water purveyors have provided water demand information for this project.

4.6.2.1 Sources of Information

Primary sources of data include the water system master plans (WSMP) and urban water management plans (UWMP) prepared by water purveyors, incorporated cities, and unincorporated communities. All of the urban areas have adopted a WSMP or UWMP during the last 10 years. Additionally, the County's 2008 Resource Management System Annual Resource Summary Report provides existing projected water demand and population for these areas (County, 2008). Each water purveyor was also provided the opportunity to comment and correct the water demand and supply information.

4.6.2.2 Method/Assumptions: Existing Use and Future Water Demand

Existing water use calculations and future water demand projections from WSMPs and UWMPs were used. UWMPs are available for incorporated cities and include existing and future water demand. WSMPs are available for unincorporated communities within Urban Reserve Lines (URLs) and some of the incorporated communities within the Village Reserve Lines (VRLs), and include existing and future water demand. Cities, community services districts, county service areas, or other water purveyors service the urban areas where water usage has been reported. The project team reviewed the UWMPs and WSMPs prepared by these water purveyors and provided a summary of the available existing and future urban water demand and supply presented in these documents. The urban water demand for individual areas in the County are associated with an ArcGIS® layer that includes the existing and future urban demand. The range of future demand represents different development and conservation scenarios.

4.6.2.3 Urban Water Demand by WPA

Table 4.11 summarizes the urban water demand for all the WPAs. WPAs 8, 9, 10, 11, and 15 do not have urban demand because there are no large population centers in these WPAs. The urban water demand is discussed in further detail in future sections of this chapter.

4.6.3 Agricultural Water Demand

Agricultural water demand refers to the annual applied water in all agricultural areas in the County. More detail on the method for calculating agricultural demand is available in Appendix D (Water Demand Methodology and Results Memorandum, ESA). The vineyard community in the North County is participating in a program led by the University of California, Davis, Cooperative Extension to estimate applied water per acre that will provide detailed information for the Estrella/Creston area and may serve as a model for implementation throughout the County.

Table 4.11 Urban Water Demand by Water Planning Area (1)

WPA No.	WPA Name	Existing (AFY)	Forecast (AFY)
1	San Simeon	108	250
2	Cambria	706	1,009 – 1,514
3	Cayucos	432	608 - 641
4	Morro Bay	3,112	3,532
5	Los Osos	2,043	2,296 - 2,870
6	San Luis Obispo/Avila	7,878	9,641 – 10,149
7	South Coast	410	434 - 482
	NCMA	6,141	9,583-11,046
	NMMA	6,878	8,314 – 8,808
12	Santa Margarita	1,819	5,571 - 6,190
13	Atascadero/Templeton	12,403	12,650 – 13,681
14	Salinas/Estrella	4,635	9,349 – 11,644
16	Nacimiento	619	987 - 1,039

Notes:
1. WPAs 8, 9, 10, 11, and 15, as well as SMVMA in WPA 7, do not have any urban water demand.

4.6.3.1 Sources of Information

The Agriculture/Crop ArcGIS® layer for the County from August 2008 was used to determine existing agricultural acreage for each crop group. This layer is updated yearly with information from the pesticide use permits growers obtain through the San Luis Obispo Department of Agriculture. These permits are not entirely accurate as they occasionally include permanent crops which are planned and include many annual crops which may or may not be planted based upon various factors (Isensee, 2009a). The number of crop rotations varies and is not identified in the Agriculture/Crop ArcGIS® layer. The majority of irrigated vegetables are rotated numerous times throughout the year. Coastal areas with available water may have multiple crops planted in a particular year (Isensee, 2009c).

The California Irrigation Management Information System (CIMIS) and University of California Cooperative Extension Leaflets 21426 to 21428 data were used as reference evapotranspiration (ETo) and crop coefficients (Kc) for areas where data were available

(CIMIS, 2009; Snyder et al., 1987, 1989a, 1989b). The rainfall data utilized is from County gages, the County Hydrology Report (County, 2005), and District maps (County, 2009). The project team contacted two UC Farm Advisors (Mark Battany and Mark Gaskell) in San Luis Obispo County and obtained information on frost protection and leaching requirements. Irrigation efficiency information was obtained from a Cachuma Resource Conservation District (CRCD) Irrigation Specialist (Kevin Peterson), as well as from Ms. Kris Beal O'Connor, the Central Coast Vineyard Team (CCVT) Executive Director. Additionally, the team used DWR estimates of the quantity of water applied to a specific crop per unit area (DWR 2009a).

4.6.3.2 Method/Assumptions: Existing Agricultural Demand

The agricultural crop ArcGIS® layer includes approximately 200 classifications of commodities. This included approximately 86,000 acres of rangeland and 42,000 acres of uncultivated agriculture. For purposes of this analysis, the irrigated commodities were categorized into seven groups (Table 4.12).

Table 4.12 Crop Group and Commodities Used for the Agricultural Demand Analysis

Crop Group	Primary Commodities
Alfalfa	alfalfa
Nursery	Christmas trees, miscellaneous nursery plants, flowers
Pasture	miscellaneous grasses, mixed pasture, sod/turf, sudangrass
Citrus	avocados, grapefruits, lemons, oranges, olives, kiwis, pomegranates
Deciduous	apples, apricots, berries, peaches, nectarines, plums, figs, pistachios, persimmons, pears, quince, strawberries
Vegetables	artichokes, beans, miscellaneous vegetables, mushrooms, onions, peas, peppers, tomatoes
Vineyard	wine grapes, table grapes

Avocados and citrus are included in the same crop group to be consistent with DWR crop groups (DWR 2001) and annual agricultural water use monitoring by Gene Melschau, a Nipomo farmer (Melschau, 2009). Although the groups are based on commodities that may have similar water requirements, the actual water usage will vary based on individual commodities, soil type, and number of rotations on individual parcels. Almonds are not included in the commodity (deciduous) list because most almond orchards in the County are not irrigated (Isensee, 2009b). The existing acreage of irrigated crops, as reported by growers, is shown in Table 4.13. The acreage changes on a monthly or annual basis and can be readily updated in ArcGIS® and annual applied water can be recalculated.

Table 4.13 Existing Irrigated Crop Acreage Determined in GIS[1]									
WPA #	**WPA Name**	**Alfalfa (ac)**	**Citrus (ac)**	**Deciduous (ac)**	**Nursery (ac)**	**Pasture (ac)**	**Vegetable (ac)**	**Vineyard (ac)**	**Total (ac)**
1	San Simeon		19					64	**83**
2	Cambria		343	26	2		188	45	**603**
3	Cayucos		345				107	5	**456**
4	Morro Bay		672		0	35	497	76	**1,281**
5	Los Osos			4	104	505	903	1	**1,515**
6	San Luis Obispo/Avila		219	182	40	209	881	538	**2,070**
7[2]	South Coast		4,018	24	208	530	3,231	3,198	**11,210**
8	Huasna Valley		19	5			160	472	**656**
9	Cuyama Valley			642			9,083	211	**9,936**
10	Carrizo Plain		250						**250**
12	Santa Margarita	15		7		55		974	**1,051**
13	Atascadero/Templeton		32	712	80	589	17	3,434	**4,864**
14	Salinas/Estrella	800	319	655	76	1,446	2,098	27,424	**32,818**
15	Cholame Valley		26						**26**
16	Nacimiento		45	780[3]		10		974	**1,809[4]**
	TOTAL	**815**	**6,307**	**3,037**	**510**	**3,377**	**17,166**	**37,416**	**68,629**

Notes:

1. Acreages were determined by aggregating County Crops ArcGIS® (2008) data, which is based on the pesticide use records, and crops identified in the County Land Use ArcGIS® (2009) data. These values are aggregated in a database file exported from ArcGIS® and summarized in a pivot table. The County Crops ArcGIS® data does not include any irrigated crop acreage in WPA 11.
2. The agricultural acreage determined in GIS for WPA 7 only includes areas outside of the NCMA, NMMA, and SMVMA. The amount of irrigated acreage for these management areas is approximately 1,600 acres for NCMA (Todd Engineers, 2009), 2,600 acres for NMMA (NMMA, 2009), and 10,500 acres for SMVMA (Luhdorff and Scalmanini, 2009). 99.9 percent of strawberries in the County are located in these three areas.
3. 780 acres might exceed the actual irrigated deciduous acreage, primarily because it appears to include walnut orchards, which are predominately dry-farmed.
4. The total for WPA 16 could be as low as 1,100 acres of irrigated crops in 2008.

The project team calculated the crop-specific applied water for these crop groups by utilizing information on crop evapotranspiration, contribution from rain or shallow water table, leaching requirements, irrigation efficiency, and frost protection. See Appendix D for more information on the equation that was used to calculate the annual crop-specific applied water for each of the water planning areas and for a detailed discussion of the parameters in the equation.

4.6.3.3 Method/Assumptions: Future Agricultural Demand

Similar methods and equations were used to calculate the future irrigation water requirements. The calculation of future agricultural demand is different from existing use due to changes in cropping patterns, weather patterns, and irrigation methods. Over the past 20 years, irrigation efficiencies have improved substantially. Although predicting future agricultural demand is very difficult, according to the Agricultural Commissioner and a CRCD Irrigation Specialist, irrigation efficiencies are likely to continue to improve due somewhat to site specific monitoring of soil water availability and crop needs, planting of root stock that is more drought tolerant, or modification of irrigation techniques based upon ongoing research (Isensee, 2009c; Peterson, 2009b). Growers may also face economic pressure due to increased pumping costs or other factors, or may have economic incentives for the development of higher water efficiencies (Isensee, 2009c). Therefore, this study assumed higher irrigation efficiencies for projected future agricultural demand than in existing demand calculations. More details about how the irrigation efficiencies were determined are included in Appendix D.

Based on recent trends in agriculture, much of the additional projected future irrigated land could be converted to vineyards. For purposes of this analysis, this study assumed that the 6,000 acres of hay and oats identified in the 2008 ArcGIS® crop layer would be converted to vineyards. The County has approximately 70,000 acres of farmland enrolled in the Federal Conservation Reserve Program (CRP) (USDA, 2009). Many of the existing CRP contracts will expire in the next 10 years. If there is sufficient water available, much of this farmland could enter into irrigated production (Isensee, 2009c). This study estimated future irrigated crop acreage by adding existing irrigated crop acreage plus inactive irrigated crop acreage and approximately 6,000 acres of future vineyards (converted from existing oat and hay acreage). The total future irrigated crop acreage, including WPA 7 management areas, was approximately 95,000 acres compared to existing crop acreage of about 83,000 acres. This analysis does not account for annual rotation from fallow to cultivated land. Projected future irrigated acreage is presented in Table 4.14.

Forecasting agricultural demand is affected by a wide range of conditions, including a lack of data about current agricultural demand; variations in soil types and weather conditions; changes in crop type, regulations, economics and trade agreements, tax policy, changes in land use, and irrigation practices. Future projections may not reflect the actual future water

Table 4.14 Forecast Irrigated Crop Acreage Determined in GIS[1]									
WPA #	WPA Name	Alfalfa (ac)	Citrus (ac)	Deciduous (ac)	Nursery (ac)	Pasture (ac)	Vegetable (ac)	Vineyard (ac)	Total (ac)
1	San Simeon		19					64	83
2	Cambria		409	28	2		395	457	1,291
3	Cayucos		477				108	13	598
4	Morro Bay		722		0	35	527	96	1,380
5	Los Osos		21	4	104	505	995	1	1,628
6	San Luis Obispo/Avila		224	182	40	209	920	542	2,117
7[2]	South Coast		4,048	44	209	703	3,378	3,740	12,122
8	Huasna Valley		19	5	4	97	160	670	954
9	Cuyama Valley			642			9,501	211	10,354
10	Carrizo Plain		251	1			3		255
12	Santa Margarita	15	4	9		95		1,284	1,406
13	Atascadero/Templeton		54	778	80	814	47	4,774	6,547
14	Salinas/Estrella	800	381	879	78	1,886	2,121	32,086	38,232
15	Cholame Valley		26						26
16	Nacimiento		48	846[3]		10		2,441[4]	3,345
	TOTAL	815	6,703	3,418	517	4,352	18,154	46,380	80,338

Notes:
1. The agricultural acreages were determined by aggregating County Crops ArcGIS® (2008) data, which is based on the pesticide use records, and crops identified in the County Land Use ArcGIS® (2009) data. These crop acreages are aggregated in a database file exported from ArcGIS® and inputted into spreadsheets. The County Crops ArcGIS® data does not include any irrigated crop acreage in WPA 11.
2. The agricultural acreage determined in GIS for WPA 7 only includes areas outside of the NCMA, NMMA, and SMVMA. The amount of irrigated acreage for these management areas is approximately 1,600 acres for NCMA (Todd Engineers, 2009), 2,600 acres for NMMA (NMMA, 2009), and 10,500 acres for SMVMA (Luhdorff and Scalmanini, 2009). 99.9 percent of strawberries in the County are located in these three areas.
3. To reach this total, there would have to be an expansion of irrigated orchards and a conversion of acres that are currently dry farmed to irrigated farmland in the future.
4. To reach this total, conversion from dry farming to vineyard production would likely be required.

use or need, because of variability in farming practices. Projected agricultural demand may be higher if more land is converted from dry to irrigated farming.

4.6.3.4 Agricultural Water Demand by WPA

Table 4.15 includes a summary of the calculated existing annual applied water by WPA. The table also includes a summary of the forecast future annual applied water by WPA. All agricultural water demands have been rounded to the 10s.

Table 4.15 Agricultural Water Demand by Water Planning Area [(1)]

Water Planning Area		Existing Demand (AFY)	Forecast Demand	
			Low Demand (AFY)	High Demand (AFY)
1	San Simeon	70	10	60
2	Cambria	640	740	1,490
3	Cayucos	520	430	800
4	Morro Bay	2,060	1,690	2,440
5	Los Osos	3,290	2,750	3,770
6	San Luis Obispo/Avila	3,610	2,810	4,120
7[(2)]	South Coast	19,920	16,610	23,830
8	Huasna Valley	1,550	2,060	2,820
9	Cuyama Valley	28,870	25,240	32,410
10	Carizzo Plain	800	680	890
12	Santa Margarita	1,770	1,720	2,680
13	Atascadero/Templeton	10,620	9,740	14,600
14	Salinas/Estrella	67,610	60,740	86,820
15	Cholame Valley	80	60	80
16	Nacimiento	3,860	4,740	7,120

Notes:
1. All agricultural demand values have been rounded to the 10s. The County Crops ArcGIS® data does not include any irrigated crop acreage in WPA 11.
2. The agricultural demand for WPA 7 in this table only includes areas outside of the NCMA, NMMA, and SMVMA.

4.6.4 Rural Water Demand

Rural water demand refers to water demand in unincorporated areas of the County that are not considered agricultural or urban.

4.6.4.1 Sources of Information

The County ArcGIS® land use data, including vacant and developed properties and potential subdivisions and units in the unincorporated areas of the County, were used to calculate a rural water demand. Additional sources include information from purveyors, water management plans, and the County's 2008 Resource Management System Annual Summary Report.

4.6.4.2 Method/Assumptions: Existing and Future Rural Demand

A water duty factor was applied to the number of dwelling units (DU) of unincorporated areas that are outside the urban and agricultural areas. The water duty factor associated with rural demand is an estimated average annual volume of water used by a particular rural user and is represented as AFY/DU.

Due to different climates and types of water usage, the water duty factors can vary widely between region and time of year. The water duty factor varies with the number of persons in each DU, the amount of landscaping, and the climate. Coastal areas require less water than inland areas due to greater evapotranspiration in the inland areas and more precipitation in the coastal areas. The water duty factor for each area was determined by utilizing water usage data available through the County, adjacent counties, and water purveyors. The study calculated a range for existing and future rural demand in each region based on the amount of development and conservation.

The study utilized the County Land Use ArcGIS® layer, which includes land use and potential DU per acre for all unincorporated areas of the County. See Appendix D for a description on the methods that the County used to prepare the land use data and for a detailed discussion of how the study utilized the County Land Use ArcGIS® database. For the rural demand analysis, all areas in the County that were accounted for with urban or agricultural water demand were excluded. Existing and projected future nurseries and vineyards present in the Land Use ArcGIS® layer were merged into the agriculture ArcGIS® layer and included in the agricultural demand analysis.

The rural water demand for each area was calculated by multiplying the number of dwelling units by a water duty factor. For future rural water demand, the potential residential demand was reduced by 25 percent to account for physical and environmental constraints on development. The 25 percent is based on a future County development of 75 percent of vacant land that is designated by the County as having development potential. In the future, this could be refined for specific planning areas. The County is developing a Countywide Rural Plan that will analyze different rural build-out scenarios. The rural demand for individual areas in the County was associated with an ArcGIS® layer, which includes the number of dwelling units, water duty factor, and calculated rural water demand for all unincorporated areas in the County that are not considered agricultural or urban. The study utilized input from the WRAC, regional, sub-regional, and other stakeholders to develop the rural water demand methodology.

4.6.4.3 Rural Water Demand by WPA

Appendix D provides a detailed discussion of the method the project used to calculate the existing and forecast future rural water demand. Table 4.16 summarizes an estimate of the existing rural demand and an estimate of the forecast future rural demand for all WPAs. According to existing County land use designations, much of the vacant rural land could be developed in the future if water and other resources were available.

Table 4.16 Existing and Future Rural Water Demand

Water Planning Area		Average Existing Rural Demand (AFY)(1)	Minimum Future Rural Demand (AFY)(2)(3)	Maximum Future Rural Demand (AFY)(2)
1	San Simeon	20	50	50
2	Cambria	100	190	220
3	Cayucos	80	130	140
4	Morro Bay	120	190	220
5	Los Osos	20	20	20
6	San Luis Obispo/Avila	450	610	660
7(4)	South Coast	1,480	1,990	2,160
8	Huasna Valley	90	360	450
9	Cuyama Valley	10	80	100
10	Carizzo Plain	210	9,610	12,740
12	Santa Margarita	0	470	620
13	Atascadero/Templeton	240	450	520
14	Salinas/Estrella	1,480	1,810	1,930
15	Cholame Valley	3,590	5,570	6,230
16	Nacimiento	10	150	190

Notes:
1. Water usage factor used for all existing rural residential units in WPA 1-7 is 0.8 AFY/DU and WPA 8-16 is 1.0 AFY/DU, for commercial/industrial areas was 1.5 AFY/DU.

Table 4.16 Existing and Future Rural Water Demand			
Water Planning Area	Average Existing Rural Demand (AFY)(1)	Minimum Future Rural Demand (AFY)(2)(3)	Maximum Future Rural Demand (AFY)(2)

2. Water usage factor used for all future residential units in WPA 1-7 is 0.6 AFY/DU and WPA 8-16 is 0.8 AFY/DU, for commercial/industrial areas was 1.5 AFY/DU.
3. Minimum demand represents 75 percent of potential development
4. The rural demand for WPA 7 only includes areas outside of the NCMA, NMMA, and SMVMA.

4.6.5 Environmental Demand

4.6.5.1 Definitions

Environmental water demand refers to the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes.

4.6.5.2 Method/Assumptions: Environmental Demand

A detailed discussion of the methods for determining the environmental demand is included in Appendix D. The environmental water demands were quantified for areas where data were available and unimpaired runoff data could be obtained, calculated, or estimated. The team utilized USGS and County existing stream gage data and obtained the critical stream flow data. Unimpaired runoff estimates were calculated by developing regional, multiple regression relationships that predict runoff at an ungaged, or partially gaged, location as a function of runoff at a gaged location. Once the estimated unimpaired runoff was established, the median annual discharge methodology to calculate an environmental water demand was used (Hatfield and Bruce, 2000). More detailed information on the approach is provided in the appendix.

The DWR has identified over 1,000 water rights applications and permits for San Luis Obispo County (DWR 2009b). For purposes of this analysis, the unimpaired mean annual discharge and environmental water demand is presented without including an analysis of the 1,000 diversion rights in the County. However, some of the established instream flow requirements are included. In order to obtain a better understanding of how much surface water is available for aquatic life, the District would need to identify and quantify all diversion rights and instream flow requirements in the watershed.

The mean annual discharge and environmental water demand estimates are shown in Table 4.17.

4.6.6 North Coast Sub-Region

This section describes water supply, water demand, and water quality for WPAs 1 through 4:

- San Simeon WPA 1: San Simeon CSD
- Cambria WPA 2: Cambria CSD
- Cayucos WPA 3: Cayucos Area Water Organization (Morro Rock Mutual Water Company, Paso Robles Beach Water Association, CSA 10A, Cayucos Cemetery District)
- Morro Bay WPA 4: City of Morro Bay and Chorro Valley Water System (California Men's Colony, Cuesta College, Camp San Luis Obispo, County Operations Center/Office of Education)
- Los Osos WPA 5: Community of Los Osos and vicinity (Golden State Water Company, Los Osos CSD, S&T Mutual Water Company)

The majority of existing rural parcels identified in the WPAs within the North Coast Sub-Region are classified as developed rural lands. The majority of vacant parcels in these WPAs that could be converted to rural residential in the future are vacant parcels with rural land use designations.

4.6.6.1 San Simeon WPA 1

The water supply sources for this WPA include Pico Creek Valley, San Carpoforo Valley, and Arroyo De La Cruz Valley Groundwater Basins, other groundwater supply sources, and State Water Resources Control Board (State Board) water diversions.

4.6.6.1.1 *San Simeon CSD*

Source: November 2007 Water System Master Plan and Wastewater Collection System Evaluation; Discussion with Water Committee August 2010.

Table 4.17 Mean Annual Discharge and Environmental Water Demand Estimates			
WPA No.(1)	WPA Name	Estimated Unimpaired Mean Annual Discharge (AFY)	Environmental Water Demand (AFY)
1	San Simeon	104,490	72,980
2	Cambria	87,050	51,460
3	Cayucos	33,340	26,160
4	Morro Bay	43,430	27,880
5	Los Osos	8,200	7,040
6	San Luis Obispo/Avila	45,820	33,030
7	South Coast	49,100	32,960
8	Huasna Valley	34,220	25,020
12	Santa Margarita	46,630	32,850
13	Atascadero/Templeton	74,090	41,010
16	Nacimiento	251,120(2)	108,390(2)

Notes:
1. The eastern portion of the County (i.e., WPAs 9, 10, 11, 14, and 15) was ultimately excluded from the environmental water demand analysis due to the lack of data and regional physiographic differences.
2. Estimates for WPA 16 environmental water demand include the watershed area for the Nacimiento River Index-station (162 square miles); though the Index-station is within WPA 16, most of the watershed area is not.

The San Simeon Community Services District (San Simeon CSD) supplies its customers with domestic water service, wastewater service, and fire protection, among other services. San Simeon is located along Highway 1 north of Cambria. The San Simeon CSD serves an area of approximately 100 acres, which includes approximately 320 residential dwelling units and over twice that number of hotel/motel units. Though the permanent residential population is estimated at 247, the tourist population can outnumber locals and varies with the season.

The build-out population is projected to reach 740 residents. The build-out population is the upper range from the San Simeon Community Plan, which assumes 530 dwelling units (DU) and 1.4 persons per DU. The commercial/retail sector constitutes over 70 percent of the annual demand. Build-out water demand is based on 3,426 gpd/acre for the non-residential sector and 72 gallons per capita per day (gpcd) consumption for residents. Existing and forecast demand are summarized in Table 4.18.

The San Simeon CSD depends on groundwater from the Pico Creek underflow. Though the State Board permits extraction of up to 140 AFY, groundwater studies indicate a safe yield of only 120 AFY, with 16 AFY used at Hearst Ranch. This leaves the San Simeon CSD with a safe yield of 104 AFY. The 2007 Water System Master Plan does not suggest future water supply alternatives, although historically San Simeon CSD has been water-short numerous times during dryer years. Because of the limitations and unreliability of the supply, a moratorium on development has been in place since 1991.

San Simeon CSD adopted an ordinance establishing a 3-stage conservation plan based on water supply conditions. The community has also gone through a retrofit program and the hotels and restaurants continuously have water conservation measures in place. Table 4.18 summarizes the water demand and supply for San Simeon CSD.

The San Simeon CSD plans to move forward with upgrading its wastewater treatment facility to use the treated effluent as recycled water. By July 2012, the facility will be producing Title 22 recycled water, but it will only be available to commercial trucks that connect to an on-site tank. The long-term plan is to construct a recycled water distribution system. Desalination or coordination with the Hearst Ranch on a groundwater source of supply to meet build-out needs are options under consideration.

Contamination of water supply wells due to seawater intrusion is a major water quality concern in the basin (Cleath, 1986). Lowering of groundwater levels below sea level in the basin during the summer months when creek flows are absent and pumping is active can result in the landward migration of the sea water/fresh groundwater interface. The landward flow of seawater into the estuary during winter high tides is also a contributing factor. Although seawater intrusion has increased salinity levels in groundwater pumped from local water supply wells, it has not degraded water quality to the point that the water is non-potable. The 2008 Consumer Confidence Report for two San Simeon CSD wells reported that measured concentrations of all analyzed contaminants were below their respective Maximum Contaminant Level (MCL) or Regulatory Action Level (AL) values.

4.6.6.1.2 *Rural Users*

The existing rural demand for WPA 1 is approximately 20 AFY and future is approximately 50 AFY.

Table 4.18 San Simeon CSD Demand and Supply	
	San Simeon CSD
Demand	
Existing Demand (AFY)	108[1]
Forecast Demand (AFY)	250[2][3]
Supply	
Pico Creek Valley Groundwater Basin (AFY)[4]	140
San Carpoforo Valley Groundwater Basin (AFY)[5]	0
Arroyo De La Cruz Valley Groundwater Basin (AFY)	0
Other Groundwater Supply Sources (AFY)	0
State Board Water Diversions (AFY)	0
Total Supply (AFY)	**140**

Notes:

1. Demands fluctuate between 70 and 140 AFY due to changes in tourism.
2. Extensive conservation program in place. No further conservation expected at build-out by San Simeon CSD.
3. Most recent master plan forecast a build-out demand of 224 AFY, but San Simeon CSD's current build-out demand estimate is 250 AFY.
4. Estimated safe basin yield of Pico Creek underflow is 120 AFY.
5. No estimates of basin yield exist.

4.6.6.1.3 *Agricultural Users*

The existing annual applied water for WPA 1 is approximately 70 AFY. The existing crops in this area include citrus and vineyards. The projected future annual applied water for WPA 1 ranges from approximately 10 to 60 AFY. The projected future agricultural demand is less than existing, due to increased irrigation efficiencies and no additional crops in this area. Given the current land use, the demand projection for WPA 1 in particular could be refined significantly by taking ranching operations water use and conservation easement provisions into account.

4.6.6.1.4 *Environmental*

The total unimpaired mean annual discharge in WPA 1 is approximately 104,490 AFY and environmental water demand is approximately 72,980 AFY. WPA 1 was divided into eight sub-watersheds and the unimpaired mean annual discharge and environmental water demand was calculated for each of these areas. Some of the creeks included in these sub-watersheds include San Carpoforo, Honda Arroyo, Arroyo de la Cruz, Arroyo de la Laguna, Arroyo del Osos, Arroyo del Corral, Arroyo Laguna, and Pico Creek.

4.6.6.1.5 *San Simeon WPA 1 Water Demand and Supply Summary*

Table 4.19 San Simeon WPA 1 Demand and Supply

	San Simeon CSD	Agriculture	Rural	Environmental
Demand				
Existing Demand (AFY)	108 (1)	70 (2)	20 (2)	
Forecast Demand (AFY)	250 (3)(4)	10 - 60 (2)	50 (2)	
Supply				
Pico Creek Valley Basin (AFY) (5)	140	(6)	(6)	
San Carpoforo Valley Basin (AFY) (7)	0	Uncertain	Uncertain	
Arroyo De La Cruz Valley Basin (AFY)	0	(8)(9)	(9)	
Other Groundwater Supply Sources (AFY)	0	Uncertain	Uncertain	
State Board Water Diversions (AFY)	0	(10)	(10)	
Total Supply (AFY)	**140**	**Uncertain**	**Uncertain**	
Environmental Water Demand				
Environmental Water Demand (AFY) (11)(13)				72,980
Unimpaired Mean Annual Discharge (AFY) (12)(13)				104,490

Notes:
1. Demands fluctuate between 70 and 140 AFY due to changes in tourism.
2. Agricultural and rural demand calculations do not account for livestock operations, and likely underestimates actual water demands. For example, Hearst Holdings Inc. makes up the majority of agriculture/rural land ownership in this WPA and has submitted surface water diversion reporting forms to the SWRCB estimating 1,829 AFY of irrigation, livestock and domestic usage for their property from surface sources.
3. Extensive conservation program in place. No further conservation expected at build-out by San Simeon CSD.
4. Most recent master plan forecast a build-out demand of 224 AFY, but San Simeon CSD's current build-out demand estimate is 250 AFY.
5. Estimated safe basin yield of Pico Creek underflow is 120 AFY
6. 70 AFY of Pico Creek livestock and domestic usage was reported by Hearst Holdings Inc. to the State Board in June 2010.
7. No estimates of basin yield exist
8. 1,607 AFY of Arroyo De La Cruz Underflow is reported in the State Board diversion database as a permitted appropriative water right for Hearst Holdings Inc.
9. Estimated safe basin yield is 1,244 AFY and all pumping is for agricultural or rural users
10. Diversions from sources other than the three basins noted above total 238 AFY according to diversion reporting forms to the SWRCB from Hearst Holdings Inc. (June 2010) and the SWRCB diversion database.
11. Environmental Water Demand is defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. The federally

Table 4.19 San Simeon WPA 1 Demand and Supply				
	San Simeon CSD	Agriculture	Rural	Environmental

threatened south-central California coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species for the development of a reasonable estimation of the amount of water needed to support this species.

12. Mean daily flow values from stream gaging stations representative of long-term, unimpaired (or natural) flow conditions were used to derive unimpaired mean annual discharge (MAD) estimates. The unimpaired MAD is the cumulative flow for the creeks within the water planning area that were included in the calculation.
13. The Environmental Water Demand and Unimpaired Mean Annual Discharge are calculated for the entire water planning area and not for individual streams.

4.6.6.2 Cambria WPA 2

The water supply sources for this WPA include San Simeon Valley, Santa Rosa Valley, and Villa Valley Groundwater Basins, other groundwater supply sources, and State Board water diversions.

4.6.6.2.1 *Cambria CSD*

Source: 2005 Cambria CSD Urban Water Management Plan, 2008 Water Master Plan EIR, Discussion with Engineering Manager August 2010, 2008/09 Resource Management System

The Cambria Community Services District (Cambria CSD) is an independent special district that provides water, wastewater, fire and other community services to its customers. Cambria is located is located along Highway 1, approximately 35 miles north of the City of San Luis Obispo.

Cambria's urban reserve line (URL) encompasses approximately 2,351 gross acres, with a net acreage of approximately 1,790 acres, not counting the land in the road rights of way and beach areas along the ocean. Cambria primarily consists of residential uses with combinations of commercial and public institutional uses along Main Street. The surrounding outlying areas are devoted to agricultural uses, primarily grazing.

Cambria's existing population is 6,284 residents and the build-out population ranges between 8,257 and 13,547 depending on assumptions. The current direction in Cambria is to plan for 7,719 (based on 4,650 dwelling units and 1.66 persons/DU). Existing and forecast demand are summarized in Table 4.20.

Table 4.20 Cambria CSD Demand and Supply	
	Cambria CSD
Demand	
Existing Demand (AFY)	706
Forecast Demand (AFY)	1,009 – 1,514(1)
Supply	
San Simeon Valley Groundwater Basin (AFY)(2)	1,230(4, 6)
Santa Rosa Valley Groundwater Basin (AFY)(3)	518(5, 6)
Villa Valley Groundwater Basin (AFY)	0
Other Groundwater Supply Sources (AFY)	0
State Board Water Diversions (AFY)	0
Total Supply (AFY)	**1,748**

Notes:

1. The low end of the demand range for Cambria CSD represents maintaining current conservation practices and is the lowest demand scenario from the district's water master plan. The Cambria CSD Water Master Plan presents several build-out scenarios with a range of annual demand projections from as low as 1,009 AFY to as high as 2,714 AFY. The high range of the forecast demand reflects a planning target for Scenario 4, a 50 percent quality of life increase in demand allowance and a 1.66 people/unit occupancy rate (Table 2.7, Assessment of Long-Term Water Supply Alternatives).
2. Estimated safe basin yield is 1,040 AFY
3. Estimated safe basin yield is 2,260 AFY
4. State Board allows Cambria CSD 1,230 AFY maximum extraction and 370 AF dry season extraction
5. State Board allows Cambria CSD 518 AFY maximum extraction and 260 AF dry season extraction
6. California Coastal Commission limits Cambria CSD total diversion from both San Simeon and Santa Rosa Creeks to 1,230 AFY

To meet current water demand, the Cambria CSD operates wells that draw from local groundwater aquifers along the San Simeon and Santa Rosa Creeks. Cambria CSD's water rights are subject to the regulatory authority of the State Board, and to a certain extent, conditions imposed under development permits issued by the California Coastal Commission (CCC). The current water rights diversion permits from the State Board allow Cambria CSD to pump a maximum of 1,118 acre-feet (AF) of water during the wet season, and 630 AF of water during the dry season , from both the San Simeon and Santa Rosa Valley Groundwater Basins. However, the current CCC Development Permit limits the total annual diversion from both creeks to no more than 1,230 AF of water. Additionally, the dry season date, duration, and beginning groundwater levels, limit the actual availability of groundwater from both basins. Currently the water supply of Cambria CSD is at a Level III severity rating (resource capacity has been met or exceeded) due to unreliability of the groundwater supply to meet existing demands.

To meet the additional water supply needs towards build-out and to increase water supply reliability, the Cambria CSD plans to construct a Seawater Desalination Plant to produce up to 602 AFY. This plant would operate during the dry season to augment supply during that period of high demand. A decentralized recycled water program is also planned, with an estimated 180 AFY made available for unrestricted irrigation use.

Historically, the Cambria CSD has used conservation as a means to extend its existing supplies. Since 1988, a plumbing retrofit program has required the installation of water efficient fixtures upon resale or remodel of a home. The program was expanded in 1990 to require water efficient fixtures for new construction and for existing buildings that require a new connection permit. Since that time, the Cambria CSD has initiated a number of other conservation measures, including rebate programs and plumbing requirements that have resulted in an estimated savings of 18.9 AFY. Table 4.21 summarizes the water demand and supply for Cambria CSD.

In 1999, the Cambria CSD learned of an MTBE contamination plume that was spreading towards its Santa Rosa well field. As a result, its existing Santa Rosa well field was shut down and an emergency well and treatment plant were constructed further upstream. The new treatment plant provides filtering, disinfection, as well as the removal of iron and manganese. The adjustments made in well locations and the additional treatment provided for the Santa Rosa Creek well have resulted in delivery of water to customers that meet both primary and secondary drinking water standards.

4.6.6.2.2 *Rural Users*

The existing rural demand for WPA 2 is approximately 100 AFY and future is approximately 190 to 220 AFY.

4.6.6.2.3 *Agricultural Users*

The existing annual applied water for WPA 2 is approximately 640 AFY. The existing crops in this area include citrus, deciduous, vegetable, and vineyards. The projected future annual applied water for WPA 2 ranges from approximately 740 to 1,490 AFY. The projected future agricultural demand is higher than existing due to increases in acreage of all of the existing crop groups, especially vegetables and vineyards.

4.6.6.2.4 *Environmental*

The total unimpaired mean annual discharge in WPA 2 is approximately 87,050 AFY and environmental water demand is approximately 51,460 AFY. WPA 2 was divided into three sub-watersheds and the unimpaired mean annual discharge and environmental water demand was calculated for each of these areas. Creeks in these sub-watersheds include San Simeon, Santa Rosa, and Villa Creek.

4.6.6.2.5 *Cambria WPA 2 Water Demand and Supply Summary*

Table 4.21 Cambria WPA 2 Demand and Supply

	Cambria CSD	Agriculture	Rural	Environmental
Demand				
Existing Demand (AFY)	706	640	100	
Forecast Demand (AFY)	1,009 - 1,514 (1)	740 - 1,490	190 - 220	
Supply				
San Simeon Valley Basin (AFY) (2)	1,230 (4)(6)	Uncertain	Uncertain	
Santa Rosa Valley Basin (AFY)(3)	518(5)(6)	Uncertain	Uncertain	
Villa Valley Basin (AFY)	0	(7)	(7)	
Other Groundwater Supply Sources (AFY)	0	Uncertain	Uncertain	
State Board Water Diversions (AFY)	0	(8)	(8)	
Total Supply (AFY)	**1,748**	**Uncertain**	**Uncertain**	
Environmental Water Demand				
Environmental Water Demand (AFY) (9)(11)				51,460
Unimpaired Mean Annual Discharge (AFY) (10)(11)				87,050

Notes:
1. The low end of the demand range for Cambria CSD represents maintaining current conservation practices and is the lowest demand scenario from the district's water master plan. The Cambria CSD Water Master Plan presents several build-out scenarios with a range of annual demand projections from as low as 1,009 AFY to as high as 2,714 AFY. The high range of the forecast demand reflects a planning target for Scenario 4, a 50% quality of life increase in demand allowance and a 1.66 people/unit occupancy rate (Table 2.7, Assessment of Long-Term Water Supply Alternatives).
2. Estimated safe basin yield is 1,040 AFY
3. Estimated safe basin yield is 2,260 AFY
4. State Board allows Cambria CSD 1,230 AFY maximum extraction and 370 AF dry season extraction
5. State Board allows Cambria CSD 518 AFY maximum extraction and 260 AF dry season extraction
6. California Coastal Commission limits Cambria CSD total diversion from both San Simeon and Santa Rosa Creeks to 1,230 AFY
7. Estimated safe basin yield is 1,000 AFY and all pumping is for agricultural or rural users
8. Diversions do not distinguish type of use. Potentially 158 AFY could be diverted for use to either

Table 4.21 Cambria WPA 2 Demand and Supply				
	Cambria CSD	Agriculture	Rural	Environmental

agriculture or rural residential.
9. Environmental Water Demand is defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. The federally threatened south-central California coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species for the development of a reasonable estimation of the amount of water needed to support this species.
10. Mean daily flow values from stream gaging stations representative of long-term, unimpaired (or natural) flow conditions were used to derive unimpaired mean annual discharge (MAD) estimates. The unimpaired MAD is the cumulative flow for the creeks within the water planning area that were included in the calculation.
11. The Environmental Water Demand and Unimpaired Mean Annual Discharge are calculated for the entire water planning area and not for individual streams.

4.6.6.3 Cayucos WPA 3

The water supply sources for this WPA include Whale Rock Reservoir, the Nacimiento Water Project, Cayucos Valley, Old Valley, and Toro Valley Groundwater Basins, other groundwater supply sources, and State Board water diversions.

4.6.6.3.1 *Cayucos Area Water Organization (Morro Rock Mutual Water Company, Paso Robles Beach Mutual Water Company, County Service Area 10A, Cayucos Cemetery District)*

Source*: 2007 Water Management Plan Update and 2003 CSA 10A Water System Master Plan*

Cayucos is a small oceanfront community with a mixture of vacation homes and full-time residences. A commercial sector serves both the residential and tourist population. The Cayucos Area Water Organization (CAWO) is made up of three member utilities and a cemetery district, the Morro Rock Mutual Water Company (Morro Rock MWC), the Paso Robles Beach Water Association (PRBWA), County Service Area 10A (CSA 10A) and Cayucos Cemetery District (CCD). CSA 10A operates a surface water treatment plant that delivers filtered and chlorinated water to the CAWO members. The three utility purveyors supply their customers with domestic water service, landscape irrigation and fire protection, among other services. The CCD uses the water for irrigation purposes. Existing and forecast demand are summarized in Table 4.22.

CAWO members receive water from Whale Rock Reservoir with a maximum total annual entitlement of 600 AFY, allocated to each member according to Table 4.22. Several wells are also available to CAWO members. The wells are primarily used as emergency back-up supplies. Most of the wells extract water from an aquifer that is replenished by recharge

Table 4.22 Cayucos Area Water Organization Demand and Supply				
	Morro Rock MWC[(1)]	**Paso Robles Beach Water Assoc.[(1)]**	**CSA 10A[(1)]**	**Cayucos Cemetery District[(1)]**
Demand				
Existing Demand (AFY)	121	163	132	16
Forecast Demand (AFY)	164 - 173	207 - 218	220 - 232	17 - 18
Supply				
Whale Rock (Supplies Urban Demands) (AFY)	170	222	190	18
Nacimiento Water Project (2010) (AFY)[(2)]	0	0	25 - 90	0
Cayucos Valley Groundwater Basin (AFY)[(3)]	0	0	0	0
Old Valley Groundwater Basin (AFY)[(4)]	0	0	0	0
Toro Valley Groundwater Basin (AFY)[(5)]	0	0	0	0
Other Groundwater Supply Sources (AFY)	0	0	0	0
State Board Water Diversions (AFY)	3[(6)]	0	0	0
Total Supply (AFY)	**173**	**222**	**215 - 280**	**18**

Notes:
1. The Cayucos Area Water Organization includes the Morro Rock MWC, the Paso Robles Beach Water Association, CSA 10A, and the Cayucos Cemetery District. The low end of the forecast demand range assumes 5% additional conservation (beyond what has already been accomplished) at build-out.
2. CSA 10A has procured 25 - 90 AFY of Nacimiento Water Project from City of San Luis Obispo. Water will be taken from Whale Rock. Agreement provisions allow for up to 90 AFY of NWP if necessary. Nacimiento water could be delivered to Morro Rock MWC or Paso Robles Beach Water Association, as part of this arrangement.
3. Estimated safe basin yield is 600 AFY and the majority of pumping is for agricultural or rural users, but a small public water system does serve a mobile home park.
4. Includes Whale Rock Reservoir. Most of the wells extract water that is replenished by recharge from Whale Rock Reservoir. Water drawn from these wells is also limited by the 664 AFY entitlement from Whale Rock Reservoir. Note that CAWO agencies receive water directly from the reservoir via pipeline and the treatment plant.
5. Estimated safe basin yield is 500 AFY and the majority of pumping is for agricultural or rural users
6. Only 3 AFY is diverted for a school and park irrigation, but up to 56 AFY is the permitted diversion from Little Cayucos Creek underflow. 56 AFY is part of the 600 AFY safe basin yield for the Cayucos Valley Basin. Due to water quality, the remaining 53 AFY could be used for domestic supply following treatment.

from Old Creek and Whale Rock Reservoir. Water drawn from these wells is also limited by the 600 AFY entitlement from the Whale Rock Reservoir. One Morro Rock MWC well draws from Little Cayucos Creek Valley and is not subject to this limitation. In addition to these agencies, Whale Rock Reservoir water entitlements are assigned to two downstream land owners (Mainini Ranch at 50 AFY and Ogle at 14 AFY). Therefore, the total reservoir entitlement to CAWO and the land owners is 664 AFY.

CSA 10A has procured an additional entitlement of 25 AFY through the Nacimiento Water Project. This water will be taken from the Whale Rock Reservoir in an exchange agreement with the City of San Luis Obispo. The agreement allows up to 90 AFY to be exchanged, which may be a way to address any future needs of the CAWO.

Aluminum has occasionally been found in delivered water at levels that exceed the secondary MCL of 200 ppb. The high aluminum levels are due to residue from the water treatment process. Better control of the treatment process has resulted in lower levels of aluminum in recent water quality tests. Manganese has been found in raw water from the CAWO well at levels that exceed the secondary MCL of 50 ppb. Since this well contributes less than one percent of the total supply, manganese is not detectable in delivered water.

4.6.6.3.2 *Rural Users*

The existing rural demand for WPA 3 is approximately 80 AFY and future range is from approximately 130 to 140 AFY.

4.6.6.3.3 *Agricultural Users*

The existing annual applied water for WPA 3 is approximately 520 AFY. The existing crops in this area include citrus, vegetables, and vineyards. The projected future annual applied water for WPA 3 ranges from approximately 430 to 800 AFY. The projected future agricultural demand is higher than existing due to increases in acreage of citrus, vegetables, and vineyards.

4.6.6.3.4 *Environmental*

For WPA 3, the total unimpaired mean annual discharge is approximately 33,340 AFY and environmental water demand is approximately 26,160 AFY. WPA 3 was divided into three sub-watersheds and the unimpaired mean annual discharge and environmental water demand was calculated for each of these areas. Creeks in these sub-watersheds include Cayucos and Toro Creek.

4.6.6.3.5 *Cayucos WPA 3 Water Demand and Supply Summary*

Table 4.23 Cayucos WPA 3 Supply and Demand							
	Morro Rock MWC(1)	**Paso Robles Beach Water Association(1)**	**CSA 10A(1)**	**Cayucos Cemetery District(1)**	**Agriculture**	**Rural**	**Environmental**
Demand							
Existing Demand (AFY)	121	163	132	16	520	80	
Forecast Demand (AFY)	164-173	207-218	220-232	17-18	430-800	130-140	
Supply							
Whale Rock (Supplies Urban Demands) (AFY)	170	222	190	18	0	0	
Whale Rock (Supplies Mainini Ranch and Ogle) (AFY)	-	-	-	-	64	0	
Nacimiento Water Project (2010) (AFY)(2)	0	0	25-90	0	0	0	
Cayucos Valley Basin (AFY)	0	0	0	0	(3)	(3)	
Old Valley Basin (AFY)(4)	-	-	-	-	-	-	
Toro Valley Basin (AFY)	0	0	0	0	(5)	(5)	
Other Groundwater Supply Sources (AFY)	0	0	0	0	Uncertain	Uncertain	
SWRCB Water Diversions (AFY)	3(6)	0	0	0	(7)	(7)	
Total Supply (AFY)	**173**	**222**	**215-280**	**18**	**Uncertain**	**Uncertain**	
Environmental Water Demand							
Environmental Water Demand (AFY)(8)(10)							26,160
Unimpaired Mean Annual Discharge (AFY)(9)(11)							33,340

Notes:
1. The Cayucos Area Water Organization includes the Morro Rock MWC, the Paso Robles Beach Water Association, CSA 10A, and the Cayucos Cemetery District. The low end of the forecast demand range assumes 5% additional conservation (beyond what has already been accomplished) at build-out.
2. CSA 10A has procured 25 - 90 AFY of Nacimiento Water Project via exchange with City of San Luis Obispo for Whale Rock Reservoir water. Agreement provisions allow for up to 90 AFY of NWP if necessary. Nacimiento water could be delivered to Morro Rock MWC or Paso Robles Beach Water Association, as part of this arrangement.
3. Estimated safe basin yield is 600 AFY and the majority of pumping is for agricultural or rural users, but a small public water system does serve a mobile home park.
4. Includes Whale Rock Reservoir. Most of the wells extract water that is replenished by recharge from Whale Rock Reservoir. Water drawn from these wells is also limited by the 664 AFY entitlement from Whale Rock Reservoir. Note that CAWO agencies receive water directly from the reservoir via pipeline and the treatment plant.
5. Estimated safe basin yield is 500 AFY and the majority of pumping is for agricultural or rural users
6. Only 3 AFY is diverted for a school and park irrigation, but up to 56 AFY is the permitted diversion from Little Cayucos Creek underflow. 56 AFY is part of the 600 AFY safe basin yield for the Cayucos Valley Basin. Due to water quality, the remaining 53 AFY could be used for domestic supply following treatment.
7. Diversions do not distinguish type of use. Potentially 65 AFY could be diverted for use to either agriculture or rural residential.
8. Environmental Water Demand is defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. The federally threatened south-central California coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species for the development of a reasonable estimation of the amount of water needed to support this species.
9. Mean daily flow values from stream gaging stations representative of long-term, unimpaired (or natural) flow conditions were used to derive unimpaired mean annual discharge (MAD) estimates. The unimpaired MAD is the cumulative flow for the creeks within the water planning area that were included in the calculation.
10. The Environmental Water Demand and Unimpaired Mean Annual Discharge are calculated for the entire water planning area and not for individual streams.

4.6.6.4 <u>Morro Bay WPA 4</u>

The water supply sources for this WPA include State Water Project water, desalination, Whale Rock Reservoir, Chorro Reservoir, Morro Valley and Chorro Valley Groundwater Basins, other groundwater supply sources, and State Board water diversions.

4.6.6.4.1 *City of Morro Bay*

Source*: City of Morro Bay 2005 UWMP and 2007 Morro Bay Nitrate Study*

The City of Morro Bay provides water service to over 5,500 connections, including over 10,000 residents, businesses, industrial facilities, and public facilities. The population estimate in 2005 was 10,270 according to the 2005 Urban Water Management Plan (2005 UWMP). Its coastal location attracts a large number of tourists during the summer and on weekends. The motels, hotels, restaurants, State Parks, and other facilities serving the tourist population add a significant water demand to the local population living primarily in single-family residences. The 2005 UWMP assumed a build-out population of 12,900, estimated to be achieved in 2028. The existing and forecast demand are summarized in Table 4.24.

The City has multiple sources of potable water. Two groundwater basins, the Chorro and Morro Valley Groundwater Basins, were used exclusively prior to the City's connection to the State Water Project. The City also operates a desalination plant and has mutual aid agreements with the California Men's Colony and the Whale Rock Commission for emergency supply.

The groundwater basins have encountered several water quality issues, including seawater intrusion, methyl tertiary butyl ether (MTBE) contamination, and excessive nitrates, forcing the City of Morro Bay to reduce extraction from groundwater sources. In addition, the State Board permitted allocation allows withdrawals from the Chorro Basin only when creek flows exceed 1.4 cubic feet per second (cfs). Nevertheless, strategic management of these sources should allow the City of Morro Bay to reliably extract 581 AFY from the Morro Basin and 566 AFY from the wells that penetrate the Chorro Basin, for a total of 1,147 AFY, even in dry years.

The City contracts with the District for 1,313 AFY of State Water. The City also has a Drought Buffer Water Agreement with the District for 2,290 AFY that will allow the City to receive its full 1,313 AFY allocation when the SWP can deliver at least 36.5 percent of contracted allocations (see SWP discussion). The City has been noted as being potentially interested in an additional 750 AFY of State Water and 1,500 AFY of Drought Buffer, should it become available (Additional/New Allocation Requests – Planning Purposes Only, 10/22/09).

The SWP shuts down for annual maintenance activities each fall/winter during which the City has used its alternative supplies. In 2008, the SWP shutdown took place when groundwater quality issues were limiting the City's use of well water. The shortfall was made up for through an agreement with the California Men's Colony to provide the City with water during that period.

The desalination plant was constructed in 1993 as a secondary supply during a drought. It has been used intermittently since that time, but raw water quality problems have limited its use. Plans to modernize the desalination plant should restore capacity to 645 AFY. Future needs could be met by doubling the desalination plant's capacity.

Other potential future supplies include the jointly operated Morro Bay - Cayucos Sanitary District Wastewater Treatment Plant. The plant is slated for a major upgrade in 2014. Production of tertiary effluent will be provided, and thus will provide increased opportunity for future water recycling to augment water supplies.

Since the early 1990s, the City has implemented a rigorous water conservation program to promote more efficient use of existing water resources. The City is a member of the County's Partners in Water Conservation. The water conservation program has had a significant impact, reducing average per capita water demand from 154 to about 129 gpcd (141 gpcd in dry years) or 8 to 16 percent. As noted in the City's 2005 Sewer Collection System Master Plan Update, flows in 2005 were lower than in 1986, even with a 10 percent increase in population.

Elements of the conservation program include:

- Progressively tiered water rate structure
- Creation of a developer funded low-flow toilet retrofit program
- Adoption of multi-level drought response program with increasing limits on irrigation and non-essential uses of potable water
- Promotion of many of the Water Conservation BMPs to be pursued by all contractors of the State Water Project, including an ongoing rebate program for homeowner installation of water-efficient appliances.

As mentioned above, groundwater quality issues are an ongoing concern, but the City's ability to obtain water from multiple sources and to blend them as needed to meet State drinking water standards has lessened the concerns that water quality issues could hamper the City from meeting future water demands.

4.6.6.4.2 *Chorro Valley Water System (California Men's Colony, Cuesta College Camp SLO (National Guard) County Operations Center/Office of Education)*

The California Men's Colony (CMC) is a state prison located on Highway 1 west of San Luis Obispo. The CMC operates its own water supply, treatment and distribution system for inmates and staff. CMC also wheels water to Camp San Luis Obispo (National Guard), Cuesta College, County Operations Center (includes Fleet Services, Water Quality

Laboratory, Juvenile Detention Center, County Jail, Office of Emergency Services), and County Office of Education. This system is also known as the Chorro Valley Water System. Existing and forecast demand are summarized in Table 4.24.

The CMC water system serves an inmate and staff population of 8,456. No expansion of this service population is planned, though a reduction in staff and inmate population is currently being considered by the legislature. Cuesta College can service up to 6,500 students; however, on any given day, it is estimated that student/faculty population is around 1,500. Camp San Luis Obispo's total population/employees on base was not available.

Table 4.24 summarizes the water demands for CMC, Camp San Luis Obispo, Cuesta College and County Operations Center/Office of Education. Other minor water demands for the fire station, Achievement House and Foster Ranch (6.22 AFY in total) are excluded from the individual summaries below.

CMC operates a 3.0 MGD water treatment facility at the Chorro Reservoir, and delivers water to Camp San Luis Obispo, Cuesta College, and County Operations Center/Office of Education. These entities receive water from three sources (and a fourth source for emergencies), as follows:

- Chorro Reservoir: This reservoir is located less than one mile northeast of CMC in the upper Chorro watershed. The reservoir and treatment plant were constructed by the US Army Corps of Engineers to provide water to Camp San Luis Obispo at the beginning of World War II. The net storage capacity of Chorro Reservoir has decreased since it was constructed due to sedimentation, and is currently about 90 AF, according to recent studies. Camp San Luis Obispo holds the first 140 AFY entitlement to this surface water; during surplus water years, any excess to the 140 AFY is used by CMC. Flow must be maintained in Chorro Creek downstream of the reservoir for riparian habitat enhancement.
- Whale Rock Reservoir: CMC is one of three owners (Cal Poly and the City of San Luis Obispo are the others) holding a partial entitlement to Whale Rock Reservoir. CMC owns an 11.24 percent share of the reservoir's capacity, which allows them to withdraw approximately 420 AFY. Raw lake water is pumped from Whale Rock Reservoir in Cayucos via a 30-inch diameter steel water main to the three owners. CMC's turnout delivers water to the CMC water treatment plant for treatment, prior to distribution.
- State Water: CMC contracts with the District for 400 AFY of State Water. CMC also has a Drought Buffer Water Agreement with the District for 400 AFY that will allow CMC to receive its 400 AFY allocation when the SWP can deliver at least 50 percent of contracted allocations (see State Water Project discussion). Cuesta College contracts with the District for 200 AFY of State Water and 200 AFY of Drought Buffer; however, CMC receives 60 AFY of this 200 AFY allocation per agreement for

Table 4.24 Morro Bay and Chorro Valley Water Demand and Supply

	Morro Bay	CMC[2]	Camp San Luis Obispo (National Guard)[2]	County Operations Center/Office of Education[2]	Cuesta College[2]
Demand					
Existing Demand (AFY)	1,620[1]	1,135	138	94	125
Forecast Demand (AFY)	2,040[1]	1,135	138	94	125
Supply					
State Water Project (AFY)[3]	1,313	735[4]	0	150[4]	140[4]
Desalination Plant (AFY)	645	0	0	0	0
Whale Rock Reservoir (AFY)	0[5]	420	0	25[6]	0
Chorro Reservoir (AFY)	0	25[7]	140	0	0
Morro Valley Basin (AFY)[8]	581	0	0	0	0
Chorro Valley Basin (AFY)[9]	566	0	200[10]	0	0
Other Groundwater Supply Sources (AFY)	0	0	0	0	0
Recycled Water (AFY)	0	0	0	0	0
SWRCB Water Diversions (AFY)	0	0	0	3	0
Total Supply (AFY)	**3,105**	**1,180**	**340**	**178**	**140**

Notes:

1. Water demands based on the 2005 Urban Water Management Plan (UWMP), which will be updated for the 2010 UWMP. Year 2009 demands were less than 1,620 AFY.
2. Part of Chorro Valley Water System.
3. State Water Project average allocation assumed 66 percent of contract water service amount.
4. CMC receives 60 AFY of Cuesta College 200 AFY allocation. County Operations Center provides up to 275 AFY from their 425 AFY State Water Project allocation to CMC. Totals in table reflect these agreements.
5. Mutual aid agreements with CMC and Whale Rock Commission for emergency supply only.

Table 4.24 Morro Bay and Chorro Valley Water Demand and Supply

	Morro Bay	CMC(2)	Camp San Luis Obispo (National Guard)(2)	County Operations Center/Office of Education(2)	Cuesta College(2)

6. 25 AFY of Whale Rock water provided by CMC as part of the County Well No. 1 development agreement.
7. Rights to any Chorro Reservoir excess from Camp San Luis Obispo.
8. Estimated safe basin yield is 1,500 AFY and the groundwater is used by urban, agriculture and rural users.
9. Perennial yield estimated at 2,210 AFY and the groundwater is used by urban, agriculture and rural users.
10. County Well No. 1.

wheeling the water to Cuesta College. The County Operations Center/Office of Education has a 425 AFY allocation of State Water and a 425 AFY allocation of Drought Buffer. The County Operations Center never fully utilizes this allocation, so CMC utilizes the excess State Water allocation per agreement. This study assumes that the County Operations Center receives 150 AFY and that CMC receives 275 AFY of the 425 AFY allocation.

- Groundwater Wells: CMC is in the process of rehabilitating an on-site well (County Well No. 1). Once rehabilitated, this well water source will be allocated to Camp San Luis Obispo; however, the water quality is such that it will be conveyed to the CMC water treatment plant, treated, and wheeled back to Camp San Luis Obispo for use.
- Salinas Reservoir Waterline: The Salinas Reservoir waterline was extended from the Cuesta Water Tunnel to the Chorro Reservoir as part of the original improvements in World War II. The pipeline has only been used to convey water from the Salinas Reservoir to Camp San Luis Obispo twice since construction.

The following summarizes the pertinent water related agreements between the various agencies.

- CMC/Cuesta College: CMC and Cuesta College entered into agreement on June 19, 2000, for water supply and wastewater treatment services. The term of this contract is indefinite. As indicated above, Cuesta College has a 200 AFY SWP allocation; however, CMC at this time utilizes 60 AFY of this allocation. Cuesta's allocation includes 200 AFY drought buffer. Furthermore, in the event State Water is not available, CMC is obligated to supply Cuesta with "replacement" water in an amount equal to Cuesta's allocation of 200 AFY (not including the 60 AFY currently being utilized by CMC).
- CMC/Camp San Luis Obispo: CMC agrees to process water at no cost to Camp San Luis Obispo. Camp San Luis Obispo has first rights to water from County Well No. 1. In exchange, Camp San Luis Obispo provides 25 AFY of Chorro Reservoir entitlement to CMC and CMC has free use of Camp San Luis Obispo hospital and firing range.
- CMC/County Operations Center: County Operations Center provides up to 275 AFY from its 425 AFY of State Water in exchange for wheeling the remaining 150 AFY. If the County Operations Center provides less than 275 AF, it will reimburse CMC for a pro rata share of potable water wheeling and capital improvement costs to the WWTP. If CMC uses more than 275 AFY from the County Operations Center, CMC will reimburse the County for variable costs of excess State Water used. The County Operations Center will fund any needed improvements to CMC operated facilities if CMC wheels more than 150 AFY.
- County Operations Center/State (CMC and Camp San Luis Obispo): Allows the State (CMC) to develop and pump from County Well No. 1. CMC will provide the County

Operations Center 25 AFY after well is developed. CMC and the County Operations Center will share pumped water equally after CMC uses first 150 AFY. Water provided to the County by CMC will be Whale Rock Water. State may terminate agreement if well production is below 100 AFY or well water quality cannot be used. The County Operations Center may terminate agreement if State uses water for new non-government purposes.

The CMC wastewater treatment facility, located southwest of the Cuesta College Campus, treats wastewater from CMC, Camp San Luis Obispo, Cuesta College, and the County Operations Center. Currently, the WWTP provides up to 275 AFY of tertiary treated effluent to the Dairy Creek Golf Course, owned and operated by the County of San Luis Obispo. Recycled water is also used to provide a minimum flow of 0.75 cfs in Chorro Creek for riparian habitat enhancement.

CMC is considering participation in the Nacimiento Water Project. CMC has contacted the District requesting from 200 AFY to 400 AFY of Nacimiento Water for future supply reliability and minor demand increases. Such allocation is available; however, it is uncertain at this time if they will participate due to costs and other factors. CMC has also expressed interest in any State Water that may become available.

CMC delivers excellent quality drinking water to its customers, from the three surface water supplies (Whale Rock, State Water, and Chorro Reservoir). Water consistently meets all primary drinking water standards, and levels of nitrates are very low (<2.3 mg/L). Total dissolved solids ranged from 357 to 440 mg/L, with an average of 389 mg/L.

4.6.6.4.3 *Rural Users*

The existing rural demand for WPA 4 is approximately 120 AFY and projected future range is from 190 to 220 AFY.

4.6.6.4.4 *Agricultural Users*

The existing annual applied water for WPA 4 is approximately 2,060 AFY. The existing crops in this area include citrus, irrigated pasture, vegetable, and vineyards. The projected future annual applied water for WPA 4 ranges from approximately 1,690 to 2,440 AFY. The projected future agricultural demand is higher than existing due to increases in acreage of citrus, vegetables, and vineyards.

4.6.6.4.5 *Environmental*

The unimpaired mean annual discharge for WPA 4 is approximately 43,430 AFY and environmental water demand is approximately 27,880 AFY. WPA 4 was divided into two sub-watersheds and the unimpaired mean annual discharge and environmental water demand was calculated for these sub-watersheds. Creeks in these sub-watersheds include Morro and Chorro Creek.

4.6.6.4.6 *Morro Bay WPA 4 Water Demand and Supply Summary*

Table 4.25 Morro Bay WPA 4 Supply and Demand								
	Morro Bay	**CMC[2]**	**Camp San Luis Obispo (National Guard)[2]**	**County Operations Center/Office of Education[2]**	**Cuesta College[2]**	**Agriculture**	**Rural**	**Environmental**
Demand								
Existing Demand (AFY)	1,620[1]	1,135	138	94	125	2,060	120	
Forecast Demand (AFY)	2,040[1]	1,135	138	94	125	1,690 - 2,440	190 - 220	
Supply								
State Water Project (AFY)[3]	1,313	735[4]	0	150[4]	140[4]	0	0	
Desalination Plant (AFY)	645	0	0	0	0	0	0	
Whale Rock Reservoir (AFY)	0[5]	420	0	25[6]	0	0	0	
Chorro Reservoir (AFY)	0	25[7]	140	0	0	25[8]	0	
Morro Valley Basin (AFY)[9]	581	0	0	0	0	Uncertain[9]	Uncertain[9]	
Chorro Valley Basin (AFY)[10]	566	0	200[11]	0	0	Uncertain[10]	Uncertain[10]	
Other Groundwater Supply Sources (AFY)	0	0	0	0	0	Uncertain	Uncertain	
Recycled Water (AFY)	0	0	0	0	0	0	275[12]	
SWRCB Water Diversions (AFY)	0	0	0	3	0	[13]	[13]	
Total Supply (AFY)	**3,105**	**1,180**	**340**	**178**	**140**	**Uncertain**	**Uncertain**	
Environmental Water Demand								
Environmental Water Demand (AFY)[14][16]								27,880
Unimpaired Mean Annual Discharge (AFY)[15][16]								43,430

Notes:
1. Water demands based on the 2005 Urban Water Management Plan (UWMP), which will be updated for the 2010 UWMP. Year 2009 demands were less than 1,620 AFY.
2. Part of Chorro Valley Water System.
3. State Water Project average allocation assumed 66 percent of contract water service amount.
4. CMC receives 60 AFY of Cuesta College 200 AFY allocation. County Operations Center provides up to 275 AFY from their 425 AFY State Water Project allocation to CMC. Totals in table reflect these agreements.
5. Mutual aid agreements with CMC and Whale Rock Commission for emergency supply only.
6. 25 AFY of Whale Rock water provided by CMC as part of the County Well No. 1 development agreement.
7. Rights to any Chorro Reservoir excess from Camp San Luis Obispo.
8. Mainini Ranch has agreement with Camp San Luis Obispo for a delivery of up to 25 AFY.
9. Estimated safe basin yield is 1,500 AFY and the groundwater is used by urban, agriculture and rural users.
10. Perennial yield estimated at 2,210 AFY and the groundwater is used by urban, agriculture and rural users.
11. County Well No. 1.
12. Dairy Creek Golf Course owned and operated by the County of San Luis Obispo.
13. Diversions do not distinguish type of use. Potentially 475 AFY could be diverted for use to either agriculture or rural residential.
14. Environmental Water Demand is defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. The federally threatened south-central California coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species for the development of a reasonable estimation of the amount of water needed to support this species.
15. Mean daily flow values from stream gaging stations representative of long-term, unimpaired (or natural) flow conditions were used to derive unimpaired mean annual discharge (MAD) estimates. The unimpaired MAD is the cumulative flow for the creeks within the water planning area that were included in the calculation.
16. The Environmental Water Demand and Unimpaired Mean Annual Discharge are calculated for the entire water planning area and not for individual streams.

4.6.6.5 <u>Los Osos WPA 5</u>

The water supply source for this WPA is the Los Osos Valley Groundwater Basin and State Board water diversions.

4.6.6.5.1 *Community of Los Osos (Los Osos CSD, Golden State Water Company, S&T Mutual Water Company)*

Source: 2002 Los Osos CSD Water Master Plan, GSWC files, 2009 CHG groundwater studies, Sea Water Intrusion in the Los Osos Groundwater Basin (presentation to Regional Water Quality Control Board), and the Interlocutory Stipulated Judgment (ISJ) Working Group's May 4, 2010 Los Osos Groundwater Basin Update

The community of Los Osos lies within the unincorporated coastal area of San Luis Obispo County, just south of the City of Morro Bay. Los Osos is bordered on the northwest by the Morro Bay Estuary and Morro Bay State Park; to the east by Los Osos Creek and its riparian corridor; and to the south and southwest by the Irish Hills and Montana de Oro State Park. The Los Osos Valley lies to the east of the community.

The community of Los Osos has been subject to a building moratorium since 1988, which has resulted in only limited development since that time. Upon completion of the wastewater project by the County, the moratorium may be lifted (subject to other resource issues such as water supply and habitat conservation).

The following three water purveyors serve the community of Los Osos:

- Los Osos Community Services District (Los Osos CSD)
- S & T Mutual Water Company (S&T MWC)
- Golden State Water Company (GSWC)

Los Osos consists of a mix of residential, commercial, agriculture, and recreational areas. Table 4.26, taken from various sources shows existing and future populations/connections in the service areas. Build-out projections for the GSWC service area have been revised in its updated Master Plan prepared in 2007. The revised plan projects that once the building moratorium is lifted, the number of water service connections will increase from 2,648 in 2006 to 4,381 by 2030.

Table 4.26	**Population Estimates and Connection Data for Urban Water Purveyors (2002 Los Osos CSD WMP, 2009 RMS, and GSWC Files)**	
Purveyor Name	**Existing (2008) Population**	**Build-out Population**
Los Osos CSD Water Service Area	8,500	9,324
S&T Mutual Water Company	525	535
	Existing (2006) Connections	**Build-out Connections**
GSWC Service Area	2,648	4,381

Existing and forecast demand are summarized in Table 4.27. The sole source of water for the Los Osos has been its groundwater basin. The Los Osos Valley Ground Water Basin under existing conditions, with existing septic systems in place and assuming no new water development, is estimated to have a safe basin yield of 3,200 AFY. This source is shared by the three water purveyors and many overlying private well users in the valley. After subtracting 1,100 AFY in agricultural irrigation, private domestic use and golf course irrigation, the purveyors have available for their use an estimated 2,100 AFY of sustainable safe yield.

Through the development of a basin management plan, one goal of the ISJ Working Group is to “provide for a continuously updated hydrologic assessment of the Basin, its water resources and safe yield.” The ISJ Working Group will be evaluating and identifying the management strategies to implement, in coordination with the County’s wastewater project, to improve conditions in the groundwater basin. Strategies under consideration include additional conservation, well relocation, use of shallow wells, nitrate removal, rainwater harvesting and graywater systems.

The County Planning Department has implemented an indoor retrofit-upon-sale program as a result of the County Board of Supervisors certifying a Level of Severity III for the groundwater basin. A mandatory fixture replacement program, which is part of the wastewater treatment facility project, will replace all toilets and urinals in the wastewater service area (also known as the “Prohibition Zone”) with low-flow devices. This action could reduce overall water consumption by 20 to 25 percent, with similar reductions expected in wastewater flows. The objective of fixture replacement program is to reduce indoor water use to 50 gallons per capita per day within the wastewater service area.

GSWC promotes conservation by providing free water conservation kits to all customers. Their outreach program is highlighted by an educational series explaining the “Five Golden

Table 4.27 Los Osos Area Demand and Supply			
	Los Osos CSD	**S&T MWC**	**Golden State Water Co.**
Demand			
Existing Demand (AFY)	951	94	998
Forecast Demand (AFY)	835-1,044(1)	77-96(1)	1,384-1,730(1)
Supply			
Los Osos Valley Basin (AFY)	(2)	(2)	(2)
Other Groundwater Supply Sources (AFY)	0	0	0
SWRCB Water Diversions (AFY)	0	0	0
Total Supply (AFY)	(2)	(2)	(2)

Notes:
1. The low end of the forecast demand range assumes 20 percent additional conservation (beyond what has already been accomplished) at build-out of current general plan.
2. Estimated safe basin yield is 3,200 AFY and all pumping is for urban, agricultural or rural users. Purveyors have 2,100 AFY available for their use. The remaining 1,100 AFY is used for agricultural irrigation, private domestic use, and golf course irrigation. (Los Osos Groundwater Basin Update, ISJ Working Group, May 4, 2010).

Rules" for water conservation, a series of video vignettes that explain simple ways that consumers can conserve water at home. GSWC also has a full-time Water Use Efficiency Manager and is a member of the California Urban Water Conservation Council (CUWCC).

Los Osos CSD is a member of San Luis Obispo County's Partners in Water Conservation. In addition, the District employs many of the Best Management Practices (BMPs) established by the CUWCC. Some of these BMPs worth mentioning include: offering free plumbing retrofit kits, providing public information, participating in grade school education programs, conducting water audits, and pricing water using a tiered rate structure.

Over the past three decades, Los Osos groundwater has been the focus of a number of studies. The main water quality concerns in the basin are nitrate and sea water intrusion. Excessive levels of nitrate in upper levels of the groundwater system have been attributed to the high density of individual septic systems. The Regional Water Quality Control Board (Regional Board) placed a development moratorium on the community until a centralized wastewater treatment plant could be built. As these individual systems are replaced with a centralized wastewater treatment system, it is expected that nitrate levels in groundwater will decrease over the next few decades. In the meantime, purveyors have reduced pumping from the upper (contaminated) aquifer and have drawn increasing amounts from lower aquifers to deliver water suitable for drinking. Seawater intrusion, however, continues to be a growing concern, with the average horizontal rate of intrusion between 2005 and 2010, based on the 250 mg/L isochlor, being 700 feet per year.

4.6.6.5.2 *Rural Users*

The existing rural demand for WPA 5 is 20 AFY and projected future demand is approximately the same. The majority of WPA 5 is composed of agricultural and urban areas, so there are only a small number of parcels in WPA 5 where there could be additional rural development.

4.6.6.5.3 *Agricultural Users*

The existing annual applied water for WPA 5 is approximately 3,290 AFY. The existing crops in this area include deciduous, nursery, pasture, vegetable, and vineyards. The projected future annual applied water for WPA 5 ranges from approximately 2,750 to 3,770 AFY. The existing annual applied water falls within the range of projected future agricultural demand.

4.6.6.5.4 *Environmental*

The unimpaired mean annual discharge for WPA 5 is approximately 8,200 AFY and environmental water demand is approximately 7,040 AFY. The analysis for WPA 5 analyzed the area as one watershed that includes Los Osos Creek and an area of approximately 23 square miles.

4.6.6.5.5 *Los Osos WPA 5 Water Demand and Supply Summary*

Table 4.28 Los Osos WPA 5 Demand and Supply

	Los Osos CSD	S&T MWC	Golden State Water Company	Agriculture	Rural	Environmental
Demand						
Existing Demand (AFY)	951	94	998	3,290	20	
Forecast Demand (AFY)	835-1,044(1)	77-96(1)	1,384-1,730(1)	2,750-3,770	20	
Supply						
Los Osos Valley Basin (AFY)	(2)	(2)	(2)	(2)	(2)	
Other Groundwater Supply Sources (AFY)	0	0	0	Uncertain	Uncertain	
SWRCB Water Diversions (AFY)	0	0	0	(3)	(3)	
Total Supply (AFY)	(2)	(2)	(2)	(2)	(2)	
Environmental Water Demand						
Environmental Water Demand (AFY)(4)(6)						7,040
Unimpaired Mean Annual Discharge (AFY)(5)(6)						8,200

Notes:
1. The low end of the forecast demand range assumes 20 percent additional conservation (beyond what has already been accomplished) at build-out of current general plan.
2. Estimated safe basin yield is 3,200 AFY and all pumping is for urban, agricultural or rural users. Purveyors have 2,100 AFY available for their use. The remaining 1,100 AFY is used for agricultural irrigation, private domestic use, and golf course irrigation (Los Osos Groundwater Basin Update, ISJ Working Group, May 4, 2010).
3. Diversions do not distinguish type of use. Potentially 46 AFY could be diverted for use to either agriculture or rural residential.
4. Environmental Water Demand is defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. The federally threatened south-central California coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species for the development of a reasonable estimation of the amount of water needed to support this species.
5. Mean daily flow values from stream gaging stations representative of long-term, unimpaired (or natural) flow conditions were used to derive unimpaired mean annual discharge (MAD) estimates. The unimpaired MAD is the cumulative flow for the creeks within the water planning area that were included in the calculation.
6. The Environmental Water Demand and Unimpaired Mean Annual Discharge are calculated for the entire water planning area and not for individual streams.

4.6.7 South Coast Sub-Region

This section describes water supply, water demand, and water quality for WPAs 6 through 9:

- San Luis Obispo/Avila WPA 6: City of San Luis Obispo (includes County airport), Cal Poly San Luis Obispo, Avila Beach CSD, Avila Valley MWC, San Miguelito MWC, CSA 12, and Port San Luis
- South Coast WPA 7: Golden State Water Company (Edna Valley), NCMA (Pismo Beach, Arroyo Grande, Grover Beach, Oceano CSD), NMMA (Golden State Water Company, Nipomo CSD, Rural Water Company, Woodlands MWC, ConocoPhillips), and SMVMA
- Huasna Valley WPA 8: Overlying users
- Cuyama Valley WPA 9: Overlying users

The majority of existing rural parcels identified in South Coast Sub-Region are classified as developed rural residential, rural suburban, or developed rural lands. The majority of vacant parcels could be converted to rural residential in the future with rural land use designations.

4.6.7.1 <u>San Luis Obispo/Avila WPA 6</u>

The water supply sources for this WPA include the State Water Project, Whale Rock Reservoir, Salinas Reservoir, Nacimiento Water Project, Lopez Lake Reservoir, San Luis Valley, Avila Valley and other groundwater basins, recycled water, and State Board water diversions.

4.6.7.1.1 *City of San Luis Obispo (includes County Airport)*

Source: 2005 City of SLO UWMP, 2009 Water Resources Status Report and City of San Luis Obispo 2010 General Plan Update, Chapter 8

The City of San Luis Obispo is located in a coastal valley approximately 10 miles inland from the Pacific Ocean. Historically, the City of San Luis Obispo has been the sole water purveyor within the its limits. This allowed the city to maintain uniformity of water service and distribution standards, and to be consistent in developing and implementing water policy. The City also serves the County Regional Airport and Cal Poly. Since Cal Poly has its own allocation of water from the Whale Rock Reservoir and has water resources that do not pass through the City's treatment plant, the University is discussed separately.

The City of San Luis Obispo has an existing (2010) population of 44,948 and a one percent residential growth cap which assists in projecting future annual water needs. The current General Plan estimates that the build-out population for the City will be approximately 57,200 people. The City's existing and forecast water demand are summarized in Table 4.29.

The City accounts for its water supplies by designating a portion of what is available for primary supply, reliability reserve and secondary supply. Primary supply is the average supply needed to meet build-out needs. Reliability reserve is a 20 percent buffer for future unforeseen or unpredictable long-term impacts to the City's available water resources such as loss of yield from an existing water supply source and impacts due to climate change. Secondary supply is the additional amount needed to supplement the primary and reliability supply to meet needs during short-term water supply shortages or peak demands.

The City of San Luis Obispo currently receives water from four sources; Salinas Reservoir (Santa Margarita Lake), Whale Rock Reservoir, local groundwater, and recycled water from the Water Reclamation Facility. The City has depended on imported supplies from Salinas Reservoir, located near the community of Santa Margarita, since 1944 and Whale Rock Reservoir, located near the community of Cayucos, since 1961. Whale Rock Reservoir provides water to the City of San Luis Obispo, California Poly, and the CMC as well as the members of CAWO in Cayucos. The safe yield from the Salinas and Whale Rock Reservoirs was 6,940 AFY in 2010, but siltation causes the yield to drop by approximately 10 AFY.

As a result of the onset of the drought in 1986, which lead to decreases in surface water supplies, the City activated its groundwater sources in 1989. The City currently uses a small amount of groundwater (~2 percent of total) for potable purposes, but does not count groundwater yield in its water supply portfolio. Even though the estimated safe yield of the basin is 2,000 AFY, nitrate and PCE contamination and drought make groundwater a less than reliable source.

The City of San Luis Obispo's Water Reclamation Facility (WRF) currently receives approximately 4.5 mgd (5,040 AFY) wastewater flows. The WRF provides tertiary treated effluent to an extensive recycled water distribution system that delivers recycled water to a number of customers in the southern area of the City, including Damon Garcia Sports Park, Laguna Golf Course, Laguna Middle School, Laguna Lake Park, and commercial centers such as Irish Hills Plaza. Currently, recycled water irrigation demand is 130 AFY, and the City anticipates customer demands to expand by 10 AFY to an anticipated maximum of 1,000 AFY. The City must also maintain stream flow to San Luis Obispo Creek, at a minimum average daily flow of 2.5 cfs (1.6 mgd, or 1,800 AFY). Effluent TDS quality of the recycled water is approximately 900 mg/L.

Future water sources include the Nacimiento Water Project, which is scheduled to go online in 2010/11, will supply up to 3,380 AFY to the City of San Luis Obispo. The City's Water Reclamation Facility will deliver up to 1,000 AFY of recycled water for irrigation and other approved uses. The tertiary recycled water is suitable for most uses other than swimming and drinking.

In June 1985, the City Council adopted the Annual Water Operational Plan policy, which established a procedure to monitor the City's water supply situation on an annual basis. An integral component of the policy was the establishment of a water demand management or conservation program aimed at instituting corrective measures ahead of any projected water supply deficit to maintain a dependable supply during critically dry periods. Water demand management has played an ever increasing role in the overall water supply development and management strategies since 1985. In 1990, the City adopted a multi-source water policy in an attempt to solve both short term water shortages and meet the City's long-term water needs.

The goal of the City’s water conservation program is to make efficient use of its water resources to protect both short- and long-term water supply reliability. This is accomplished by implementing water-efficiency programs that are consistent with accepted best management practices and comply with any State-mandated water use reductions, and mandatory water conservation measures when the City's water supplies are projected to last three years or less. The City is a member of Partners in Water Conservation and the CUWCC.

Surface water from both reservoirs is considered to be of high quality. Groundwater quality has been generally good, but PCE contamination and occasional spikes in the nitrate content of well water has caused the City to provide additional treatment for individual wells or to take certain wells out of production.

4.6.7.1.2 *Cal Poly San Luis Obispo*

Source: 2007 Cal Poly Master Plan and EIR

Cal Poly is located to the north of the City of San Luis Obispo. The university receives water from the City water system. Though it does not treat its own water, available supply is governed by entitlements from surface water sources. Cal Poly occupies 1,321 acres with a campus core of 155 acres. The university also owns ranches and other outlying properties comprising an additional 8,357 acres. Water demand includes extensive agricultural and landscape irrigation requirements. The supply and demand discussion below applies to the 1,321-acre campus area. In 2008, Cal Poly’s population was:

- Students: 19,471
- Faculty: 1,293
- Staff: 1,752
- Total: 22,516

At build-out, the total population could reach 23,100. Water demand is summarized in Table 4.29.

Cal Poly derives its water from groundwater sources and through surface water entitlements. For general use, the university owns entitlement to 33.7 percent of the storage capacity in Whale Rock Reservoir or approximately 13,707 acre-feet when the reservoir is full. Cal Poly's portion of the safe yield from the reservoir is calculated as 1,384 AFY, but diminishes approximately 2 AFY due to siltation. However, their allotment is based on volume and not on a flow rate, so Cal Poly is not bound by this limit. The City treats and delivers approximately 600 AFY to Cal Poly. The remainder is untreated water primarily used for agriculture and landscape irrigation, drawn directly from the Whale Rock raw water pipeline or from agricultural wells. The safe yield from groundwater is undocumented, but no decline in groundwater level has been noticed.

Future demands for domestic needs will be met by increasing the proportion of Whale Rock water treated by the City. Agricultural needs could be met in various ways, including increasing irrigation efficiency, withdrawing land from cultivation, using more groundwater, and other management practices.

Surface water from Whale Rock is considered to be of high quality. Groundwater quality has been generally good, though increases in nitrate levels have been measured in groundwater flowing through the aquifer as it passes under the Cal Poly campus.

4.6.7.1.3 *Avila Beach Community Services District*

Source: 2006 Draft Water Master Plan

The Avila Beach Community Services District (Avila Beach CSD) supplies its customers with domestic water service, wastewater service and fire protection, among other services. Avila Beach is an unincorporated coastal community. Avila Beach consists of a mix of residential, commercial, agriculture, and recreational areas. The community's population was 395 in 1998 at the beginning of the Unocal clean up of Avila Beach and reduced to 240 in 2006. The build-out population is projected to reach 672. Table 4.29 summarizes the existing and forecast water demand.

The water supply for the Avila Beach CSD is contracted through County Service Area 12 (CSA 12), and consists of both Lopez Reservoir (68 AFY) and State Water (100 AFY) allocations for a total supply of 168 AFY.

Water quality for both Lopez Lake and State Water treated sources meets both primary and secondary standards for drinking water, though regular monitoring of the treatment process is necessary to make appropriate adjustments to account for seasonal changes in the quality of Lopez Lake water.

4.6.7.1.4 *Avila Valley Mutual Water Company*

Source: 2008 Avila Valley MWC Consumer Confidence Report and personal communication with Avila Valley MWC Director Jerry Hartzell

Avila Valley Mutual Water Company (Avila Valley MWC) serves a small cluster of homes in the Avila Valley area. The service area is built out with a population of 65 residents (28 connections). The 2008 water demand was 32 AFY. Avila Valley MWC receives its water supply from surface sources. The Avila Valley MWC contracts with the District for a 20 AFY allocation of State Water and 60 AFY of Drought Buffer, which is distributed through Zone 3 facilities. 12 AFY allocation of Lopez Lake water procured from CSA 12, bringing its total supply to 32 AFY. The Avila Valley MWC also owns two wells for emergency backup purposes, but because of water quality issues, they are not used on a regular basis. Avila Valley MWC is interested in an additional 20 to 40 AFY of State Water if it becomes available.

The quality of Avila Valley MWC water is similar to others using water from Lopez Lake. Well water is of poor quality and would only be treated and used as an emergency backup in case of disruption to the surface supply.

4.6.7.1.5 *San Miguelito Mutual Water Company*

Source: 2008 San Miguelito MWC Consumer Confidence Report and personal communication with Director Rick Koon

San Miguelito Mutual Water Company (San Miguelito MWC) serves the San Luis Bay Estates area in the community of Avila Beach. The 2008 population served was 1,385 (620 connections) and a build-out population of 2,100 (930 connections). The water demand is summarized in Table 4.29.

The San Miguelito MWC receives its water supply from both surface and groundwater sources. It contracts with the District for a 275 AFY allocation of State Water and 275 AFY of Drought Buffer, which is wheeled through Zone 3 facilities. Additional water is pumped from three local wells that draw water from the aquifer fed by San Luis Obispo Creek. The San Miguelito MWC's goal is to provide consumers with a 70/30 blend of surface/well water, but problems with the well system have limited its contribution to 10 to 20 percent in recent years.

With a fully functioning water supply system, the San Miguelito MWC has adequate supply to meet both existing and future water requirements. San Miguelito MWC has been noted as being interested in an additional 10 AFY of State Water if it became available.

Quality of San Miguelito MWC water is similar to others using water from Lopez Lake. Raw well water is treated for iron and manganese removal and mixed with Lopez Lake water prior to delivery.

4.6.7.1.6 *County Service Area 12*

Source: 2005 Zone 3 UWMP

County Service Area 12 (CSA 12) provides 61 AFY of Lopez Reservoir water to customers in the rural area east of Avila Beach and transfers up to 100 AFY of Lopez Reservoir water through its piping system to Port San Luis. Port San Luis currently uses only 35 percent

Table 4.29 San Luis Obispo (includes County airport), Cal Poly San Luis Obispo, Avila Beach CSD, Avila Valley MWC, San Miguelito MWC, CSA 12, and Port San Luis Demand and Supply							
	San Luis Obispo (includes airport)	**Cal Poly San Luis Obispo**	**Avila Beach CSD**	**Avila Valley MWC**	**San Miguelito MWC**	**CSA-12**	**Port San Luis**
Demand							
Existing Demand (AFY)	6,389	1,040	51	32	263	68	35
Forecast Demand (AFY)	7,499-7,894(1)	1,479-1,557(1)	162-170(1)(15)	30-32(1)	373-393(1)	65-68(1)	33 - 35(1)
Supply							
State Water Project (AFY)(2)	0	0	66(3)	20	275	7(4)	0
Whale Rock Reservoir (AFY)	6,940(5)	1,384(6)	0	0	0	0	0
Salinas Reservoir (AFY)	(5)	0	0	0	0	0	0
Nacimiento Water Project (AFY)	3,380(7)	0	0	0	0	0	0
Lopez Lake Reservoir (AFY)	0	0	68	12	0	61	100
San Luis Valley Sub-basin (AFY)(8)	100	unmetered(9)	0	0	0	0	0
Avila Valley Sub-basin (AFY)(10)	0	0	0	Uncertain	118	Uncertain(11)	0
Other Groundwater Supply Sources (AFY)	0	0	0	0	0	0	0
Recycled Water (AFY)	130(14)	0	0	0	0	0	0
SWRCB Water Diversions (AFY)	0	45	0(12)	0	0	0	0
Loss of Availability due to Siltation to 2060 (AFY)	-500	0	0	0	0	0	0
Total Supply (AFY)	**9,950(15)**	**1,429**	**134**	**32**	**393**	**68**	**100**

Notes:
1. The low end of the forecast demand range assumes five percent additional conservation (beyond what has already been accomplished) at build-out for all urban users.
2. State Water Project average allocation assumed 66 percent of contract water service amount.
3. Avila Beach CSD has a 100 AFY allocation, but no drought buffer. Therefore, the 66 percent assumption for State Water Project delivery is 66 AFY.
4. 7 AFY of SWP water allocated to the San Luis Coastal Unified School District.
5. The City of San Luis Obispo's withdrawals from the Salinas Reservoir are coordinated with Whale Rock Reservoir. San Luis Obispo's combined safe yield of the two reservoirs was 6,940 AFY in 2010.
6. Includes 600 AFY of treated water delivered from the City of San Luis Obispo.
7. Nacimiento Water Project is scheduled to go online in 2010.
8. Estimated safe basin yield is 2,000 AFY and all pumping is for urban, agricultural or rural users. The City of San Luis Obispo's use is approximately 100 AFY, but the City does not consider their 500 AFY share of the safe yield as part of its water resource availability. The remaining 1,500 AFY is available for other urban users, agricultural irrigation, and private domestic use.
9. Cal Poly's agricultural wells contribute to the supply but are not metered. It is likely that the groundwater supply and on-going conservation measures would eliminate the possible future deficit.

Table 4.29 San Luis Obispo (includes County airport), Cal Poly San Luis Obispo, Avila Beach CSD, Avila Valley MWC, San Miguelito MWC, CSA 12, and Port San Luis Demand and Supply							
	San Luis Obispo (includes airport)	Cal Poly San Luis Obispo	Avila Beach CSD	Avila Valley MWC	San Miguelito MWC	CSA-12	Port San Luis

10. No basin yield numbers have been published for the Avila Valley Sub-basin.
11. Individual water users within CSA 12 boundary could request an exemption to install a private well and pump water from the Avila Valley Sub-basin. It is unknown the number of users with private wells, but it is likely minimal.
12. SWRCB water diversions database lists "Avila Beach County Water District" (now Avila Beach CSD) for 80 AFY from Canyon Creek underflow. The conditions were that Avila Beach CSD cannot use Canyon Creek Underflow as a supply once they have State Water. The creek diversion is no longer a source of supply for them.
13. Diversions do not distinguish type of use. Potentially 207 AFY could be diverted for use to either agriculture or rural residential.
14. The City's current recycled water use is 130 AFY. Expansion of the City of San Luis Obispo Water Reclamation Facility could make 4,690 AFY of recycled water available for use, but the current plans are to use only 1,000 AFY in the future. City has been approached about using recycled water for agriculture irrigation. Recycled water for agricultural usage provides the added benefit of maintaining an agricultural buffer around the City.
15. 170 AFY includes 20 AFY from projected Tank Farm Development.

(35 AFY) of that allocation. In addition, CSA 12 transfers water through its piping system to Avila Beach CSD, Avila Valley MWC, and San Miguelito MWC (discussed separately).

Water supplies for CSA 12 also include 7 AFY from the State Water Project allocated to the San Luis Coastal Unified School District. Entities within CSA 12 have been noted as being interested in an additional 30 AFY of State Water if it becomes available.

4.6.7.1.7 *Rural Users*

The existing rural demand for WPA 6 is 450 AFY and projected future range is 610 to 660 AFY.

4.6.7.1.8 *Agricultural Users*

The existing annual applied water for WPA 6 is approximately 3,610 AFY. The existing crops in this area include deciduous, nursery, pasture, vegetable, citrus, and vineyards. The projected future annual applied water for WPA 6 ranges from approximately 2,810 to 4,120 AFY. The existing annual applied water falls within the range of projected future agricultural demand.

4.6.7.1.9 *Environmental*

The unimpaired mean annual discharge for WPA 6 is approximately 45,820 AFY and environmental water demand is approximately 33,030 AFY. WPA 6 was divided into four sub-watersheds and the unimpaired mean annual discharge and environmental water demand was calculated for these sub-watersheds. The largest creek in these sub-watersheds is San Luis Obispo Creek. San Luis Obispo Creek has an instream flow requirement of a minimum daily average of discharge 2.5 cubic feet per second (cfs), which is equivalent to approximately 1,810 AFY (NOAA, 2005).

4.6.7.1.10 *San Luis Obispo/Avila WPA 6 Water Demand and Supply Summary*

Table 4.30 San Luis Obispo/Avila WPA 6 Demand and Supply										
	San Luis Obispo (includes airport)	Cal Poly San Luis Obispo	Avila Beach CSD	Avila Valley MWC	San Miguelito MWC	CSA-12	Port San Luis	Agriculture	Rural	Environmental
Demand										
Existing Demand (AFY)	6,389	1,040	51	32	263	68	35	3,610	450	
Forecast Demand (AFY)	7,499-7,894(1)	1,479-1,557(1)	162-170(1)(16)	30-32(1)	373-393(1)	65-68(1)	33 - 35(1)	2,810–4,120	610–660	
Supply										
State Water Project (AFY)(2)	0	0	66(3)	20	275	7(4)	0	0	0	
Whale Rock Reservoir (AFY)	6,940(5)	1,384(6)	0	0	0	0	0	0	0	
Salinas Reservoir (AFY)	(5)	0	0	0	0	0	0	0	0	
Nacimiento Water Project (AFY)	3,380(7)	0	0	0	0	0	0	0	0	
Lopez Lake Reservoir (AFY)	0	0	68	12	0	61	100	0	0	
San Luis Valley Sub-basin (AFY)(8)	100	unmetered(9)	0	0	0	0	0	Uncertain(8)	Uncertain(8)	
Avila Valley Sub-basin (AFY)(10)	0	0	0	Uncertain	118	Uncertain(11)	0	Uncertain(10)	Uncertain(10)	
Other Groundwater Supply Sources (AFY)	0	0	0	0	0	0	0	Uncertain	Uncertain	
Recycled Water (AFY)	130(15)	0	0	0	0	0	0	0	0	
SWRCB Water Diversions (AFY)	0	45	0(12)	0	0	0	0	(13)	(13)	
Loss of Availability due to Siltation to 2060 (AFY)	-500	0	0	0	0	0	0	0	0	
Total Supply (AFY)	**9,950(14)**	**1,429**	**134**	**32**	**393**	**68**	**100**	**Uncertain**	**Uncertain**	
Environmental Water Demand										
Environmental Water Demand (AFY)(17)(19)										33,030
Unimpaired Mean Annual Discharge (AFY)(18)(19)										45,820

Table 4.30 San Luis Obispo/Avila WPA 6 Demand and Supply

	San Luis Obispo (includes airport)	Cal Poly San Luis Obispo	Avila Beach CSD	Avila Valley MWC	San Miguelito MWC	CSA-12	Port San Luis	Agriculture	Rural	Environmental

Notes:

1. The low end of the forecast demand range assumes 5% additional conservation (beyond what has already been accomplished) at build-out for all urban users.
2. State Water Project average allocation assumed 66 percent of contract water service amount.
3. Avila Beach CSD has a 100 AFY allocation, but no drought buffer. Therefore, the 66 percent assumption for State Water Project delivery is 66 AFY.
4. 7 AFY of SWP water allocated to the San Luis Coastal Unified School District.
5. The City of San Luis Obispo's withdrawals from the Salinas Reservoir are coordinated with Whale Rock Reservoir. San Luis Obispo's combined safe yield of the two reservoirs was 6,940 AFY in 2010.
6. Includes 600 AFY of treated water delivered from the City of San Luis Obispo.
7. Nacimiento Water Project is scheduled to go online in 2010.
8. Estimated safe basin yield is 2,000 AFY and all pumping is for urban, agricultural or rural users. The City of San Luis Obispo's use is approximately 100 AFY, but the City does not consider their 500 AFY share of the safe yield as part of its water resource availability. The remaining 1,500 AFY is available for other urban users, agricultural irrigation, and private domestic use.
9. Cal Poly's agricultural wells contribute to the supply but are not metered. It is likely that the groundwater supply and on-going conservation measures would eliminate the possible future deficit.
10. No basin yield numbers have been published for the Avila Valley Sub-basin.
11. Individual water users within CSA 12 boundary could request an exemption to install a private well and pump water from the Avila Valley Sub-basin. It is unknown the number of users with private wells, but it is likely minimal.
12. SWRCB water diversions database lists “Avila Beach County Water District” (now Avila Beach CSD) for 80 AFY from Canyon Creek Underflow. The conditions were that Avila Beach CSD cannot use Canyon Creek Underflow as a supply once they have State Water. The creek diversion is no longer a source of supply for them.
13. Diversions do not distinguish type of use. Potentially 207 AFY could be diverted for use to either agriculture or rural residential.
14. City of San Luis Obispo's supply portfolio includes groundwater, but due to limitations on its use, the City will not consider this supply as part of its water resource availability. Siltation is expected to reduce reservoir capacity and supply by 10 acre-feet per year, or 500 af by year 2060. The water supply surplus calculation accounts for reduction in water availability due to siltation. The City includes a reliability reserve in their water supply portfolio.
15. The City's current recycled water use is 130 AFY. Expansion of the City of San Luis Obispo Water Reclamation Facility could make 4,690 AFY of recycled water available for use, but the current plans are to use only 1,000 AFY in the future. City has been approached about using recycled water for agriculture irrigation. Recycled water for agricultural usage provides the added benefit of maintaining an agricultural buffer around the City.
16. 170 AFY includes 20 AFY from projected Tank Farm Development.
17. Environmental Water Demand is defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. The federally threatened south-central California coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species for the development of a reasonable estimation of the amount of water needed to support this species.
18. Mean daily flow values from stream gaging stations representative of long-term, unimpaired (or natural) flow conditions were used to derive unimpaired mean annual discharge (MAD) estimates. The unimpaired MAD is the cumulative flow for the creeks within the water planning area that were included in the calculation.
19. The Environmental Water Demand and Unimpaired Mean Annual Discharge are calculated for the entire water planning area and not for individual streams.

4.6.7.2 South Coast WPA 7

The water supply sources for this WPA include the State Water Project, Lopez Lake Reservoir, Edna Valley, Pismo Creek Valley, Santa Maria Valley, Arroyo Grande Valley, Pismo Formation, Paso Robles Formation, and other groundwater basin supplies, recycled water, and State Board diversions. A future water supply might include the Nipomo supplemental water project.

4.6.7.2.1 *Golden State Water Company (Edna Valley)*

Source: *Golden State Water Company files*

Golden State Water Company (GSWC) supplies its Edna Valley customers with domestic water service. The service area is an unincorporated area south of the City of San Luis Obispo, located in along Highway 227, near the County Airport. The Edna Valley area is comprised of residential and agriculture areas and dominated by the San Luis Obispo Country Club, which includes an 18-hole golf course. Table 4.31 below summarizes existing and forecast demand for the GSWC service area.

Table 4.31 Golden State Water Company (Edna Valley) Demand and Supply

	Golden State Water Company (Edna Valley)
Demand	
Existing Demand (AFY)	410
Forecast Demand (AFY)	434-482
Supply	
Edna Valley Sub-basin (AFY)(1)	410
Other Groundwater Supply Sources (AFY)	0
Recycled Water (AFY)	87(2)
Total Supply (AFY)	**482**

Notes:
1. Edna Valley Sub-basin estimated safe basin yield is 4,000 AFY and all pumping is for urban, agricultural, rural users, golf courses, and CSA 18.
2. The golf course receives all of the WWTP's recycled water effluent for irrigation use (2009 - Range: 59,000-134,000 gpd, average flow: 78,000 gpd; permitted 120,000 gpd as a monthly average).

The GSWC Edna Road service area draws water from three wells, each with 500 gpm pumping capacity. The wells tap the Edna Valley Groundwater Basin. The golf course receives all of the wastewater treatment plant's recycled water effluent for irrigation. In 2009, the average recycled water flow was approximately 78,000 gallons per day (gpd). The groundwater supply complies with all primary and secondary MCLs; however, treatment is required. Lewis Lane Wells No. 3 and No. 4 are treated for high iron and manganese by oxidation and subsequent filtration, as well as partial treatment for intermittently high selenium by ion exchange. Nitrate and arsenic are also present in all three wells, but average less than one-half the MCL, and are removed along with selenium in the ion exchange unit.

4.6.7.2.2 *Rural Users*

The existing annual rural water demand in the WPA 7 summary table (Table 4.38 below) includes the rural demand for the areas in WPA 7 that are located outside of the NMMA, NCMA, and SMVMA boundaries. The existing rural demand for outlying areas in WPA 7 is 1,480 AFY and the projected demand for outlying areas in WPA 7 is 1,990 to 2,160 AFY. The majority of existing rural parcels identified in WPA 7 are classified as developed rural residential, rural suburban, or rural lands. The majority of vacant parcels in WPA 7 that could be converted to rural residential in the future are vacant parcels with rural land use designations.

4.6.7.2.3 *Agricultural Users*

The existing annual applied water in Table 4.38 includes the demand for the areas in WPA 7 that are located outside of the NMMA, NCMA, and SMVMA boundaries. The existing annual applied water for this part of WPA 7 is approximately 19,920 AFY. The projected future demand ranges from 16,610 to 23,830 AFY.

4.6.7.2.4 *Environmental*

The unimpaired mean annual discharge for WPA 7, inclusive of the water management areas, is approximately 49,100 AFY and environmental water demand of 32,960 AFY. WPA 7 was divided into five sub-watersheds and the unimpaired mean annual discharge and environmental water demand was calculated for these sub-watersheds. Creeks in these sub-watersheds include Pismo and Arroyo Grande Creek. The Arroyo Grande Creek below Lopez Dam has instream flow requirements that vary from less than 3 cfs to 20 cfs (2,170 AFY to 14,480) based on time of year and amount of water in the reservoir (Stetson Engineers, 2004).

4.6.7.2.5 *Northern Cities Management Area (NCMA)*

- City of Pismo Beach
- City of Arroyo Grande
- City of Grover Beach

- Oceano Community Services District
- Rural Users
- Agricultural Users

Existing and forecast demand for the NCMA are summarized in Table 4.32 following the member descriptions.

City of Pismo Beach

Source: *2004 City of Pismo Beach Water Master Plan, 2010 City of Pismo Beach UWMP, 2008 and 2009 NCMA Annual Reports*

The City of Pismo Beach supplies its customers with domestic water service. The dominant economic activity in Pismo Beach is tourism, and as a result, the population of Pismo Beach can more than double during summer holidays. The 2010 population was 7,676 and the forecast build-out population is 11,854. Table 4.32 below summarizes existing and forecast demands.

The City receives water from three water sources: local groundwater, Lopez Reservoir and the State Water Project. 700 AFY local groundwater is extracted from the Arroyo Grande Plain, which is part of the Santa Maria Valley Groundwater Basin. Extraction rights are shared by agreement with the City of Arroyo Grande, the City of Grover Beach, and the Oceano Community Services District (Oceano CSD). As party to the Santa Maria Valley Groundwater Basin litigation, extraction rights may be increased or decreased at a future date.

Pismo Beach receives 896 AFY from the Zone 3 Lopez Project as a contractual supply. Environmental protection issues may call for increased or decreased releases to Lopez Creek, potentially reducing or increasing the allotment available for Pismo Beach and other cities. Pismo Beach also receives 1,240 AFY from the SWP via contract with the District and delivery through Zone 3 facilities. The City also has a 1,240 AFY Drought Buffer allocation.

Future water supply possibilities may include additional State Water supplies, tertiary treatment/reuse of wastewater, and extraction from local groundwater basins. Pismo Beach, in coordination with the NCMA, is also investigating the feasibility of increasing the safe yield of Lopez Reservoir. The City of Pismo Beach 2010 UWMP states that the City of Pismo Beach is “committed to employ recycled water as a beneficial resource to protect and reduce consumption of its potable water resources” and that “the City may begin regional planning efforts regarding recycled water within the next five years.” Pismo Beach has been noted as being interested in an additional 500 AFY of State Water and 1,500 AFY of Drought Buffer if it becomes available.

City of Arroyo Grande

Source: *2010 City of Arroyo Grande Final Draft UWMP and 2008 and 2009 NCMA Annual Reports*

The City of Arroyo Grande supplies its customers with domestic water service. Arroyo Grande is located in the southern portion of San Luis Obispo County along the banks of the Arroyo Grande Creek. Land use is primarily residential and agriculture with a small commercial sector. There are no agricultural or industrial water service connections. In 2010, the service population was 16,901 and the forecast build-out population is 20,000. Existing and forecast waster demand are summarized in Table 4.32 below.

Arroyo Grande has agreements in place to draw up to 3,794 AFY from four water sources: two groundwater basins, Lopez Reservoir and through Oceano CSD. Arroyo Grande's share of groundwater extracted from the Arroyo Grande Plain (which is part of the Santa Maria Valley Groundwater Basin) is 1,314 AFY (includes 112 AFY of agricultural land conversion credit). Extraction rights are shared by agreement with the City of Pismo Beach, the City of Grover Beach, and the Oceano CSD. As party to the Santa Maria Valley Groundwater Basin litigation, extraction rights may be decreased at a future date.

Arroyo Grande extracts 80 AFY of groundwater from the Pismo Formation, which is outside of the NCMA and not subject to management agreements. Its contractual supply of Zone 3 Lopez Project water is 2,290 AFY. Environmental protection issues may call for increased releases to Lopez Creek, potentially reducing the allotment available for Arroyo Grande and other cities.

Arroyo Grande and Oceano CSD have entered into an interim water supply agreement for delivery of up to 100 AFY of Oceano CSD water supplies to the Arroyo Grande. Arroyo Grande is currently using between 90 and 95 percent of their current supply allocation, and therefore is in need of temporary water transfer agreements to meet water supply needs. Oceano CSD will deliver up to 100 AFY of groundwater and/or State Water, at Oceano CSD's discretion. This temporary agreement ends in 2014.

Future water supply possibilities include desalination, recycled water and State Water. Arroyo Grande is committed to participating in a regional effort to utilize recycled water, and will continue to participate in a dialogue between regional agencies interested in a recycled water program (including but not necessarily limited to the NCMA agencies). Arroyo Grande has been noted as being interested in 200 to 400 AFY of State Water if it becomes available.

Lopez Lake water has seasonal quality fluctuations that must be addressed by adjusting treatment methods. Groundwater quality varies by depth and source, with some of the shallower wells drawing water with high nitrate levels. Water extracted from the Pismo Formation receives iron/manganese treatment prior to delivery. Through appropriate mixing, the City has been able to deliver water that meets drinking water standards.

City of Grover Beach

Source: *2005 City of Grover Beach UWMP, 2008 and 2009 NCMA Annual Reports, Draft 2010 Water Master Plan*

The City of Grover Beach supplies its customers with domestic water service. Grover Beach is primarily a residential community, with a small commercial/industrial sector. Approximately 80 percent of the water consumers are residents. No agricultural consumers are served by the City water system, though landscape irrigation consumes approximately 90 AFY. In 2010, the population was 13,156. The build-out population is expected to reach 15,000. Table 4.32 summarizes existing and forecast demands.

Grover Beach receives water from Lopez Lake and also uses groundwater from four municipal wells and one irrigation pump. The Zone 3 Lopez Project provides a contractual supply of up to 800 AFY to Grover Beach.

Three shallow wells draw water from the Paso Robles formation and a fourth well draws water from the deeper Careaga formation. Extraction rights are shared by agreement with the City of Arroyo Grande, the City of Pismo Beach, and the Oceano CSD. The City of Grover Beach is currently entitled to 1,407 AFY from this source per the agreement. This includes a 209 AFY allocation from an Agricultural Land Conversion Credit. As party to the Santa Maria Valley Groundwater Basin litigation, extraction rights may be decreased for both of these allocations at a future date.

Two hundred twenty-five AFY non-potable groundwater is pumped from irrigation wells used on the State Parks Department golf course and a large park within the City. Grover Beach had a temporary transfer agreement with Oceano CSD that allowed the City to purchase up to 100 AFY, but this agreement expired.

Potential future water supply sources under consideration include desalination, State Water and recycled wastewater.

Lopez Lake water has seasonal quality fluctuations that must be addressed by adjusting treatment methods. The ground water from the Paso Robles formation meets all state and federal standards except for nitrate concentration. Grover Beach completed construction of an ion exchange water treatment plant designed to remove nitrates from the shallow well water in 1989.

Oceano Community Services District

Source: *2009 Oceano Community Services District Draft Water Master Plan Update and 2008 and 2009 NCMA Annual Reports*

The Oceano CSD provides water services to the community of Oceano. The service area encompasses approximately 1,150 acres. The Oceano CSD service area is located immediately south of Grover Beach and Arroyo Grande. Oceano CSD includes residential, commercial, industrial, agricultural, and public facility land uses. Existing population (as of July 2009) within the Oceano CSD service area is estimated at 8,137 and the forecast population is estimated at 12,855. Table 4.33 summarizes existing and forecast water demand.

The Oceano CSD utilizes water from three sources, including groundwater, the State Water Project and Lopez Lake water. The groundwater allocation is limited to 900 AFY by agreement with the City of Arroyo Grande, the City of Pismo Beach, and the City of Grover Beach. As party to the Santa Maria Valley Groundwater Basin litigation, extraction rights may be decreased at a future date.

Oceano CSD receives a 303 AFY allocation from Lopez Lake, subject to possible reduction if habitat requirements dictate. It also receives 750 AFY from the State Water Project, but no drought buffer. Therefore, the assumption that contractors will receive 66 percent of their State Water Project allocation reduces this supply to 495 AFY. Participation in the District's drought buffer program for State Water would improve water supply reliability for the Oceano CSD.

As discussed above for the City of Arroyo Grande, Oceano CSD entered into an interim water supply agreement, for delivery of up to 100 AFY of Oceano CSD water to Arroyo Grande. Oceano CSD will deliver up to 100 AFY of groundwater and/or State Water, at Oceano CSD's discretion. This temporary agreement ends in 2014.

In reviewing the CCR for 2008, the Oceano CSD continues to meet all Federal and State Drinking Water Standards. Selenium levels continue to be high, from two of their existing wells (Wells 4 and 5); however, drinking water standards are met through blending with other water sources.

Seawater intrusion has been measured in two the of coastal monitoring wells in the Oceano area. The rains of 2010-2011, and reduced groundwater production, pushed back the subterranean ocean interface, but the close proximity of that interface creates supply uncertainties.

Table 4.32 Pismo Beach, Arroyo Grande, Grover Beach, and Oceano CSD Demand and Supply				
	Northern Cities Management Area			
	Pismo Beach[1]	Arroyo Grande[1]	Grover Beach[1]	Oceano CSD[1]
Demand				
Existing Demand (AFY)	1,944[2]	2,956[2]	1,787[2]	855[2]
Forecast Demand (AFY)	2,679 - 2,977[3]	3,735 - 4,150[3]	1,892 - 2,500[3]	1,277 - 1,419[3]
Supply				
State Water Project (AFY)[4]	1,240	0	0	495[5]
Lopez Lake Reservoir (AFY)	896	2,290	800	303
Arroyo Grande Plain Hydrologic Subarea (part of Santa Maria Valley Groundwater Basin) (AFY)[6]	700	1,202	1,198 + 225 [9]	900
Agricultural Land Conversion Credit (AFY)[7]	0	112	209	0
Transfers (AFY)[8]	0	100	0	-100
Pismo Formation outside the NCMA (AFY)	0	80	0	0
Other Groundwater Supply Sources (AFY)	0	0	0	0
Total Supply (AFY)	**2,836**	**3,794**	**2,432**	**1,598**

Notes:
1. Part of the Northern Cities Management Area (NCMA)
2. 2010 Annual Monitoring Report Northern Cities Management Area, Table 1. 2009 and 2008 demands listed below for reference.
   Pismo Beach reported 2,039 AFY in 2009 and 2,208 AFY in 2008
   Arroyo Grande reported 3,315 AFY in 2009 and 3,579 AFY in 2008
   Grover Beach reported 1,941 AFY in 2009 and 2,051 AFY in 2008
   Oceano CSD reported 885 AFY in 2009 and 933 AFY in 2008
   Agriculture reported 2,742 AFY in 2009 and 2008
   Rural residential reported 36 AFY in 2009 and 2008
3. Ten percent additional water conservation (beyond what has already been accomplished) assumed for the low end of the forecast build-out demand, except for Grover Beach, which assumed 20% additional reduction.
4. State Water Project average allocation assumed 66 percent of contract water service amount.
5. Oceano CSD has a 750 AFY allocation, but no drought buffer. Therefore, the 66 percent assumption for State Water Project delivery is 495 AFY.

Table 4.32 Pismo Beach, Arroyo Grande, Grover Beach, and Oceano CSD Demand and Supply

	Northern Cities Management Area			
	Pismo Beach(1)	Arroyo Grande(1)	Grover Beach(1)	Oceano CSD(1)

6. Safe yield of 9,500 AFY with subdivisions for applied irrigation (5,300 AFY), subsurface outflow to the ocean (200 AFY), and urban use (4,000 AFY). The 2002 Groundwater Management Agreement safe yield allotment for urban use is broken down per the numbers shown.
7. 2002 Settlement Agreement provides that groundwater allocations can be increased when land within the incorporated boundaries is converted from agricultural uses to urban uses.
8. Arroyo Grande has an active agreement to purchase 100 AFY of Oceano CSD supplies from groundwater or Lopez Lake water. This temporary agreement ends in 2014.
9. Non-potable groundwater pumped from irrigation wells used on the State Parks Department golf course and a City park. The portion of the 225 AFY attributed to the golf course predates the Gentlemen's Agreement. The portion for the park is a substitute for preexisting agricultural use on the park site.

Rural Users

2008, 2009, and 2010 NCMA Annual Reports

Rural water demand includes small community water systems, domestic use, recreational use and agriculture-related business. Small community water systems using the Arroyo Grande Plain Hydrologic Subarea groundwater in the NCMA were identified initially through review of a list of water purveyors compiled in the 2005 San Luis Obispo County Integrated Regional Water Management Plan. These include the Halcyon Water System, Ken Mar Gardens, and Pacific Dunes RV Resort. The Halcyon Water System serves 35 homes in the community of Halcyon, while Ken Mar Gardens provides water supply to 48 mobile homes on South Halcyon Road. The Pacific Dunes RV Resort, with 215 RV sites, provides water supply to a largely transitory population and nearby riding stable. Two mobile home communities, Grande Mobile and Halcyon Estates, are served potable water from the City of Arroyo Grande. In addition, about 25 homes and businesses have been identified through inspection of aerial photographs of rural areas within NCMA. Irrigation of schools and parks from privately operated wells is accounted for in the applied irrigation demand section of the 2009 NCMA Annual Report. It is assumed that the number of private wells is negligible within the service areas of the four Northern Cities. The estimated rural water demand is shown in Table 4.33.

Table 4.33 Northern Cities Management Area Rural Water Use Demand

Arroyo Grande Plain Hydrologic Sub-area Groundwater User	No. of Units	Estimated Water Demand (AFY)	Notes
Halcyon Water System	35	14	(1)
Ken Mar Gardens	48	8	(2)
Pacific Dunes RV Resort	215	6	(3)
Rural Users	25	10	(1)

Table recreated from Table 3 from the 2010 Annual Monitoring Report for the NCMA.
Notes:
1. Water demand/unit based on 2000 and 2005 Grover Beach water use per connection, 2005 UWMP.
2. 2010 NCMA Annual Report.
3. Water demand/unit assumes 50 percent annual occupancy and 0.06 AFY per occupied site.

Agricultural Users

2008, 2009, and 2010 NCMA Annual Reports

Applied irrigation is private water used for non-domestic purposes. In the NCMA, applied irrigation demands are defined by agriculture and irrigated turf grass at schools and a golf course. Applied irrigation demand is estimated using crop type specific gross irrigation requirements by acre and land use data.

Gross irrigation requirements for the NCMA are from the San Luis Obispo County 1998 Master Water Plan Update. The County Master Water Report Update includes low, average, and high estimates of irrigation demand by crop type for each of the Water Planning Areas (WPAs) in the County. The range in estimated irrigation demands is based upon climactic conditions and irrigation efficiency; double cropping is included for relevant crops.

The areal extent of cultivated agricultural areas in the NCMA was quantified using the 2007 land use survey prepared by the San Luis Obispo County Agriculture Department. The land use survey map provides information on acreage and type of crops in the area. Public works personnel within the NCMA identified the areas with irrigated turf grass.

There are about 1,600 acres of irrigated agriculture within the NCMA of which approximately four acres are nursery crops, and the remainder is truck crops. There is a combined total of 44 acres of irrigated turf grass at the Oceano Elementary School, Arroyo Grande High School, Harloe Elementary School, and the Le Sage Riviera Golf Course.

For 2009, the annual precipitation and evapotranspiration was compared to average conditions to determine if the year in question had a low, average, or high irrigation water demand. For the 2009 NCMA Annual Report, average irrigation efficiencies were assumed. Therefore, the annual irrigation demand for each crop type is assumed to be dependant only on that year's precipitation and evapotranspiration. The range of demand estimates for all applied irrigation uses were as follows:

- Wet years: 2,056 AFY (2005, 2006, and 2010)
- Average years: 2,397 AFY (2004)
- Dry years: 2,742 AFY (2007, 2008, and 2009)

NCMA Water Demand and Supply Summary

Table 4.34 Northern Cities Management Area Demand and Supply

	Pismo Beach[1]	Arroyo Grande[1]	Grover Beach[1]	Oceano CSD[1]	Agriculture	Rural
Demand						
Existing Demand (AFY)	1,944[2]	2,956[2]	1,787[2]	855[2]	2,056[2][3]	38
Forecast Demand (AFY)	2,679 - 2,977[11]	3,735 - 4,150[11]	1,892 - 2,500[11]	1,277 - 1,419[11]	2,742	38
Supply						
State Water Project (AFY)[4]	1,240[5]	0	0	495[6]	0	0
Lopez Lake Reservoir (AFY)	896	2,290	800	303	0	0
Arroyo Grande Plain Hydrologic Sub-area (part of Santa Maria Valley Groundwater Basin) (AFY)[7]	700	1,202	1,198 + 225 [12]	900	5,300[9]	36
Agricultural Land Conversion Credit (AFY)[8]	0	112	209	0	0	0
Transfers (AFY)[9]	0	100	0	-100	0	0
Pismo Formation outside the NCMA (AFY)	0	80	0	0	0	0
Other Groundwater Supply Sources (AFY)	0	0	0	0	0	0
SWRCB Water Diversions (AFY)	0	0	0	0	[10]	[10]
Total Supply (AFY)	**2,836**	**3,794**	**2,432**	**1,598**	**Uncertain**	**Uncertain**

Notes:
1. Part of the Northern Cities Management Area (NCMA)
2. 2010 Annual Monitoring Report Northern Cities Management Area, Table 1. 2009 and 2008 demands listed below for reference.
   Pismo Beach reported 2,039 AFY in 2009 and 2,208 AFY in 2008
   Arroyo Grande reported 3,315 AFY in 2009 and 3,579 AFY in 2008
   Grover Beach reported 1,941 AFY in 2009 and 2,051 AFY in 2008

Table 4.34 Northern Cities Management Area Demand and Supply

	Pismo Beach[1]	Arroyo Grande[1]	Grover Beach[1]	Oceano CSD[1]	Agriculture	Rural

Oceano CSD reported 885 AFY in 2009 and 933 AFY in 2008
Agriculture reported 2,742 AFY in 2009 and 2008
Rural residential reported 36 AFY in 2009 and 2008

3. Agriculture is grouped in a category referred to as "Applied Irrigation" which is private water used for non domestic purposes. In the NCMA, Applied Irrigation demands are defined by agriculture and irrigated turf grass at schools and a golf course. Of the 2,056 AFY Applied Irrigation demand, agriculture likely accounted for 1,933 AFY (or 94 percent).
4. State Water Project average allocation assumed 66 percent of contract water service amount.
5. 140 AFY of the 1,240 AFY contracted amount has been allocated for Pismo Ranch.
6. Oceano CSD has a 750 AFY allocation, but no drought buffer. Therefore, the 66 percent assumption for State Water Project delivery is 495 AFY.
7. Safe yield of 9,500 AFY with subdivisions for applied irrigation (5,300 AFY), subsurface outflow to the ocean (200 AFY), and urban use (4,000 AFY). The 2002 Groundwater Management Agreement safe yield allotment for urban use is broken down per the numbers shown.
8. 2002 Settlement Agreement provides that groundwater allocations can be increased when land within the incorporated boundaries is converted from agricultural uses to urban uses.
9. Arroyo Grande has an active agreement to purchase 100 AFY of Oceano CSD supplies from groundwater or Lopez Lake water. This temporary agreement ends in 2014.
10. Diversions do not distinguish type of use. Potentially 1,243 AFY could be diverted for use to either agriculture or rural residential in WPA 7.
11. 10% additional water conservation (beyond what has already been accomplished) assumed for the low end of the forecast build-out demand, except for Grover Beach, which assumed 20% additional reduction.
12. Non-potable groundwater pumped from irrigation wells used on the State Parks Department golf course and a City park. The portion of the 225 afy attributed to the golf course predates the Gentlemen's Agreement. The portion for the park is a substitute for preexisting agricultural use on the park site.

4.6.7.2.6 *Nipomo Mesa Management Area (NMMA)*

- Golden State Water Company (Nipomo Area)
- Nipomo Community Services District
- Rural Water Company
- Woodlands Mutual Water Company
- ConocoPhillips
- Rural Users
- Agricultural Users

Existing and forecast demand for the NMMA are summarized in Table 4.35 following the member descriptions.

Golden State Water Company

Source: *GSWC files, 2005 Santa Maria Groundwater Litigation Stipulation and 2008, 2009, and 2010 NMMA Annual Report*

The Golden State Water Company (GSWC) provides water service to approximately 1,475 households on the south side of Nipomo. GSWC serves a rural population that is undergoing development and is expected to grow at a projected rate of 1.42 percent over the next two decades until build-out. Existing and future water demands are summarized in Table 4.35.

GSWC currently uses groundwater for 100 percent of its supply. Groundwater is pumped from the Nipomo Mesa Hydrologic Sub-area that is part of the Santa Maria Valley Groundwater Basin using five active wells. Litigation involving use of this groundwater basin, which began in 1997, has resulted in stipulations and judgments in 2005 and 2008. As party to the Santa Maria Groundwater Basin litigation, extraction rights may be affected at a future date. In addition, the stipulated judgment required GSWC to join with Nipomo CSD to develop alternative sources to import a minimum of 2,500 AFY. Once the supplemental water system is in place, GSWC will be required to purchase 8.33 percent (208.25 AFY) of that supply.

Water quality is formally monitored as part of the requirements of the NMMA stipulation. Wells are monitored regularly and reported publicly. The 2009 NMMA report has concluded that there is no evidence of seawater intrusion into the NMMA portion of the groundwater basin. Localized areas of the NMMA have reported nitrate concentrations as high as 90 percent of the MCL. Three of the GSWC wells are currently being treated for iron and manganese.

Nipomo Community Services District

Source: 2007 Nipomo CSD Water and Sewer Master Plan Update, 2008, 2009, and 2010 NMMA Annual Reports, and 2009 Nipomo CSD Waterline Intertie Project Narrative Report, 2010 Public Review Draft Urban Water Management Plan (UWMP)

The town of Nipomo is an unincorporated area located in southern San Luis Obispo County. The Nipomo Community Services District (Nipomo CSD) provides water service to approximately 12,000 residents. Development is expected to continue to expand in the future, more than doubling water demands at build-out, as shown in Table 4.35.

Nipomo CSD currently uses groundwater for 100 percent of supply requirements. Groundwater is pumped from the Nipomo Mesa Hydrologic Sub-area that is part of the Santa Maria Valley Groundwater Basin, using eight active wells and one standby. Litigation involving use of this groundwater basin, which began in 1997, resulted in stipulations and judgments in 2005 and 2008. As party to the Santa Maria Groundwater Basin litigation, extraction rights may be affected at a future date. The stipulation also requires the Nipomo CSD to develop alternative sources to import a minimum of 2,500 AFY.

The Nipomo CSD has investigated multiple sources of supplemental water and, as a result, signed an agreement with the City of Santa Maria to pursue an intertie project. The January 5, 2010 Wholesale Water Supply Agreement established the basis for purchase and delivery of water from the City to the Nipomo CSD. The project EIR has been certified, and the project is going through its final design stages. If constructed, it will be capable of delivering up to 3,000 AFY and could be completed in two and a half years. Once the supplemental water system is in place, Nipomo CSD will be required to purchase 2,167 AFY of that supply. Three other water purveyors, Woodlands MWC, Golden State Water Company, and Rural Water Company will share in the project costs and will together receive one-third of the mandated minimum water delivery (833 of 2,500 AFY). The additional 500 AFY capacity has been reserved for use by the Nipomo CSD for infill but no annexations or General Plan Amendments. Additional water via the City of Santa Maria (if possible), desalination and recycled water are also being considered as a long-term alternative source for the Nipomo CSD and others in the region.

Water quality discussion is similar to that described for GSWC. Also, there is a concern that nitrate levels are increasing in wells near the Southland WWTF. Though studies have not tied this increase to current effluent disposal practices, the WWTF is investigating alternative effluent disposal methods that will enhance groundwater recharge without increasing nitrate levels.

Rural Water Company

Source: *2008, 2009, and 2010 NMMA Annual Reports and 2005 Santa Maria Groundwater Litigation Stipulation*

Rural Water Company (RWC) provides water to consumers on the northwest side of the Nipomo Mesa, including Cypress Ridge, a planned development consisting of approximately 380 homes and a golf course. RWC serves a residential community that includes both densely spaced homes and numerous large lot rural residences. It also provides non-potable water to the Cypress Ridge Golf Course to supplement irrigation from recycled wastewater. The golf course is irrigated partially by effluent from the Cypress Ridge Wastewater Treatment Facility (Cypress Ridge WWTF), which in turn uses some of the golf course water features as finishing ponds in the waste treatment process. Existing and future water are summarized in Table 4.35.

RWC currently uses groundwater for 100 percent of supply requirements. Groundwater is pumped from the larger Nipomo Mesa Hydrologic Sub-area that is part of the Santa Maria Valley Groundwater Basin, using several active wells. Litigation involving use of this groundwater basin, which began in 1997, resulted in stipulations and judgments in 2005 and 2008. As party to the Santa Maria Groundwater Basin litigation, extraction rights may be affected at a future date. The stipulation requires RWC to join with Nipomo CSD to develop alternative sources to import a minimum of 2,500 AFY. Once the supplemental water system is in place, RWC will be required to purchase 8.33 percent (208.25 AFY) of that supply. The Cypress Ridge WWTF currently produces about 50 AFY of irrigation quality effluent, which is used on the golf course.

Water quality discussion is similar to that described for GSWC.

Woodlands Mutual Water Company

Source: 2004 *Water Master Plan, 2005 Santa Maria Groundwater Litigation Stipulation and 2008, 2009, and 2010 NMMA Annual Reports*

The Woodlands is a relatively new housing and commercial development located on the Nipomo Mesa in southern San Luis Obispo County. The Woodlands Mutual Water Company (Woodlands MWC) was organized to provide water to customers within the Woodlands development. The Woodlands MWC currently supplies its customers with domestic water service and wastewater reclamation.

The Woodlands has a tentative map allowing for 1,320 residential units, plus additional commercial facilities. Currently, there are 685 residential lots that have been recorded in final maps. Commercial facilities for the golf course are also constructed at this time. Other facilities that may be constructed in the future include commercial facilities at the business park, a hotel, and a possible school. The planned development also currently has an 18-hole golf course and a smaller 12-hole executive course. The on-site wastewater treatment plant provides the golf courses with recycled water for irrigation; however, the golf courses are also supplemented with groundwater. Another 18-hole golf course is planned for the future, which will be irrigated with groundwater. Existing and future water demands are summarized in Table 4.35.

Currently, the Woodlands MWC relies on groundwater as the sole source of water. The Woodlands MWC owns and operates four wells, three of which produce potable water and the fourth serves irrigation needs. Groundwater is pumped from the larger Nipomo Mesa Hydrologic Sub-area that is part of the Santa Maria Valley Groundwater Basin. Litigation involving use of this groundwater basin, which began in 1997, resulted in stipulations and judgments in 2005 and 2008. As party to the Santa Maria Groundwater Basin litigation, extraction rights may be affected at a future date. The stipulation requires Woodlands MWC to join with Nipomo CSD to develop alternative sources to import a minimum of 2,500 AFY.

Woodlands MWC has agreed to purchase a portion of the NMMA supplemental water (determined according to the percentage of completion of the project and rising to a total of 417 AFY at such time as its service area is fully developed). Woodlands MWC has also agreed to pay a portion of the operating costs, capital costs and replacement costs of the project based on the amount of water purchased by Woodlands MWC relative to the total amount purchased from the City of Santa Maria. Woodlands MWC also has the right to exercise an option for an additional 300 AFY from the Nipomo supplemental water project at a future date.

Twenty-four AFY of recycled water was used in 2008 to partially irrigate the golf course. As more residential units are completed, increased quantities of wastewater will be available for recycling. The build-out flow of the WWTP is 774 AFY. Well water will continue to be required during periods in which the recycled water available is less than the golf course demand.

Water quality discussion is similar to that described for GSWC. The most recent Consumer Confidence Report indicated that Woodlands MWC supplied water that met both primary and secondary drinking water standards. One of the wells exceeds the standards for iron, but mixing with water from other wells produces water that meets the iron standard.

ConocoPhillips

Source: *2008, 2009, and 2010 NMMA Annual Reports and 2005 Santa Maria Groundwater Litigation Stipulation*

ConocoPhillips uses water for industrial operations at its refinery on the Nipomo Mesa. Water demand has decreased in recent years due to infrastructure changes resulting in more water-efficient operations. Planned expansion will increase water demand, but demand will remain less than historical peak pumping rates. Existing and forecast demands are summarized in Table 4.35.

ConocoPhillips uses groundwater for 100 percent of supply requirements. Though it is a party to the Santa Maria Groundwater stipulation, it is not required to participate in the development of supplemental water. It has rights to reasonable and beneficial use of

Table 4.35 Golden State Water Company, Nipomo CSD, Rural Water Company, and Conoco-Phillips Demand and Supply

	Nipomo Mesa Management Area				
	Golden State Water Company [3]	**Nipomo CSD**[3]	**Rural Water Company**[4]	**Woodlands Mutual Water Company**[3]	**Conoco-Phillips**[3]
Demand					
Existing Demand (AFY)	1,060[4]	2,698[6]	720[4]	850[4]	1,200[4]
Forecast Demand (AFY)	1,750-1,944[5]	2,984	Not available	1,440-1,600[5]	1,260-1,400[5]
Supply					
Nipomo supplemental water project (AFY)[1]	208	2,167	208	417	0
Nipomo Mesa Hydrologic Sub-area (part of Santa Maria Valley Groundwater Basin) (AFY)[2]	852	457	462	405	1,400
Other Groundwater Supply Sources (AFY)	0	0	0	0	0
Recycled Water (AFY)	0	60-74	49-50	24-28	0
SWRCB Water Diversions (AFY)	0	0	0	0	0
Total Supply (AFY)	**1,060**	**2,698**	**720**	**850**	**1,200**

Notes:

1. Nipomo supplemental water project includes Nipomo CSD, Woodlands MWC, Golden State Water Company, and Rural Water Company. Nipomo CSD will receive approximately 1,667 AFY and has reserved an additional 500 AFY. The other three will receive 833 AFY.
2. For the NMMA purveyors, the groundwater supply was calculated as the difference between the current demand and the other sources of supply (e.g. recycled water, the Nipomo supplemental water project).
3. Part of the Nipomo Mesa Management Area (NMMA)
4. 2010 Annual Monitoring Report Nipomo Mesa Management Area. 2008 and 2009 demands listed below for reference.
   Golden State Water Company reported 1,380 AFY in 2008 and 1,290 AFY in 2009
   Nipomo CSD reported 2,700 AFY in 2008 and 2,370 AFY in 2010 (NCSD existing demand based on 2010 UWMP)
   Rural Water Company reported 900 AFY in 2008 and 880 AFY in 2009
   Woodlands Mutual Water Company reported 540 AFY in 2008 and 810 AFY in 2009
   ConocoPhillips reported 1,100 AFY in 2008 and 1,200 AFY in 2009

Table 4.35 Golden State Water Company, Nipomo CSD, Rural Water Company, and Conoco-Phillips Demand and Supply

	Nipomo Mesa Management Area				
	Golden State Water Company (3)	Nipomo CSD(3)	Rural Water Company(4)	Woodlands Mutual Water Company(3)	Conoco-Phillips(3)

Agriculture reported 4,300 AFY in 2008 and 3,800 AFY in 2009
Rural residential reported 1,700 AFY in 2008 and 1,700 AFY in 2009

5. Ten percent additional water conservation (beyond what has already been accomplished) assumed for the low end of the forecast build-out demand.
6. Nipomo CSD 2010 Urban Water Management Plan

groundwater without limitation, except in the event of a severe water shortage, as defined in the stipulation.

Water quality discussion is similar to that described for GSWC. One of the ConocoPhillips wells reported a high (1,000 mg/L) TDS value. The well is used for industrial processing.

Rural Users

2008, 2009, and 2010 NMMA Annual Reports

Rural land uses within the NMMA are made up primarily of residential land uses (single family, suburban, and rural). Groundwater production was estimated for rural landowners not served by a purveyor. The total estimated production for the rural landowners is 1,950 AF for 2010.

Agricultural Users

2008, 2009, and 2010 NMMA Annual Reports

The estimated groundwater production for agricultural crops in the NMMA is 2,800 AF for 2009, computed by multiplying the crop area and the crop specific unit production (Table 3-4). A detailed explanation of the methodology used for this estimate is provided in Appendix E of the 2010 NMMA Annual Report.

Table 4.36 Agricultural Demand

Crop Type	2010 Area (acres)	2010 Unit Production (ac-ft/acre)	2010 Production (ac-ft/year)
Deciduous	2	2.5	5
Pasture	2	2.8	6
Vegetable rotational	225	2.0	450
Avocado and Lemon	277	1.6	440
Strawberries	1,393	1.1	1,540
Nursery	332	1.1	360
Un-irrigated Ag Land	356	0.0	0
Total	**2,587**		**2,800**[1]

Notes:
1. This number has been rounded to reflect accuracy in estimation.

NMMA Water Demand and Supply Summary

Table 4.37 NMMA Demand and Supply

	Nipomo Mesa Management Area						
	Golden State Water Company (4)	**Nipomo CSD(4)**	**Rural Water Company(4)**	**Woodlands Mutual Water Company(4)**	**Conoco-Phillips(4)**	**Agriculture (4)**	**Rural(4)**
Demand							
Existing Demand (AFY)	1,060(5)	2,698(7)	720(5)	850(5)	1,200(5)	2,800(5)	1,950(5)
Forecast Demand (AFY)	1,750 - 1,944(6)	2,984	Not available	1,440 - 1,600(6)	1,260 - 1,400(6)	2,800 - 4,300	1,700 – 1,950
Supply							
Nipomo supplemental water project (AFY)(1)	208	2,167	208	417	0	0	0
Nipomo Mesa Hydrologic Sub-area (part of Santa Maria Valley Groundwater Basin) (AFY)(2)	852	457	462	405	1,400	4,300	1,950
Other Groundwater Supply Sources (AFY)	0	0	0	0	0	0	0
Recycled Water (AFY)	0	60-74	49-50	24-28	0	0	0
SWRCB Water Diversions (AFY)	0	0	0	0	0	(3)	(3)
Total Supply (AFY)	**1,060**	**2,698**	**720**	**850**	**1,400**	**Uncertain**	**Uncertain**

Notes:

1. Nipomo supplemental water project includes Nipomo CSD, Woodlands MWC, Golden State Water Company, and Rural Water Company. Nipomo CSD will receive approximately 1,667 AFY and has reserved an additional 500 AFY. The other three will receive 833 AFY.
2. For the NMMA purveyors, the groundwater supply was calculated as the difference between the current demand and the other sources of supply (e.g. recycled water, the Nipomo supplemental water project).
3. Diversions do not distinguish type of use. Potentially 1,243 AFY could be diverted for use to either agriculture or rural residential in WPA 7.
4. Part of the Nipomo Mesa Management Area (NMMA)
5. Demand based on 2010 Annual Monitoring Report Nipomo Mesa Management Area. 2008 and 2009 demands listed below for reference.

Table 4.37 NMMA Demand and Supply

	Nipomo Mesa Management Area						
	Golden State Water Company (4)	Nipomo CSD(4)	Rural Water Company(4)	Woodlands Mutual Water Company(4)	Conoco-Phillips(4)	Agriculture (4)	Rural(4)

Golden State Water Company reported 1,380 AFY in 2008 and 1,290 AFY in 2009
Nipomo CSD reported 2,700 AFY in 2008 and 2,370 AFY in 2010 (NCSD existing demand based on 2010 UWMP)
Rural Water Company reported 900 AFY in 2008 and 880 AFY in 2009
Woodlands Mutual Water Company reported 540 AFY in 2008 and 810 AFY in 2009
ConocoPhillips reported 1,100 AFY in 2008 and 1,200 AFY in 2009
Agriculture reported 4,300 AFY in 2008 and 3,800 AFY in 2009
Rural residential reported 1,700 AFY in 2008 and 1,700 AFY in 2009

6. Ten percent additional water conservation (beyond what has already been accomplished) assumed for the low end of the forecast build-out demand.
7. Nipomo CSD 2010 Urban Water Management Plan

4.6.7.2.7 *Santa Maria Valley Management Area (SMVMA)*

Rural Users

The water demand in the San Luis Obispo section of SMVMA is primarily classified as agricultural demand (Luhdorff and Scalmanini, 2009). Based on the County Land Use GIS, the existing rural water demand in SMVMA is approximately 37 AFY and future demand is approximately 110 AFY. Both existing and future rural demand is less than 0.5 percent of the total demand for the SMVMA within San Luis Obispo County.

Agricultural Users

In 2008, the crops within the San Luis Obispo portion of SMVMA consisted of approximately 9,649 acres of vegetables, 798 acres of strawberries, and 63 acres of nurseries. The 2008 SMVMA Annual Report established annual applied crop water duties for these crop groups of 2.50, 1.55, and 2.1 AF/Ac/Yr, respectively (Luhdorff and Scalmanini, 2009). Based on the applied water duties established in the SMVMA 2008 Annual Report and the crop acreage, the existing agricultural water demand would be approximately 25,540 AFY. The future agricultural water demand in SMVMA is not expected to change significantly from existing water usage. These users pump groundwater from unconsolidated alluvial deposits (Quaternary Alluvium, Paso Robles Formation, and Careaga Sand), which are part of Santa Maria Valley Groundwater Basin.

4.6.7.2.8 *South Coast WPA 7 Water Demand and Supply Summary*

Table 4.38	South Coast WPA 7 Demand and Supply																	
	Golden State Water Co. (Edna Valley)	Northern Cities Management Area						Nipomo Mesa Management Area							Santa Maria Valley Management Area	Outside Management Areas		Environmental
		Pismo Beach [1]	Arroyo Grande [1]	Grover Beach [1]	Oceano CSD[1]	Agriculture	Rural	Golden State Water Company[16]	Nipomo CSD[16]	Rural Water Company[16]	Woodlands Mutual Water Company[16]	Conoco Phillips[16]	Agriculture[16]	Rural[16]	Agriculture /Rural	Agriculture	Rural	
Demand																		
Existing Demand (AFY)	410	1,944[2]	2,956[2]	1,787[2]	855[2]	2,056[2][3]	38	1,060[17]	2,698[23]	720[17]	850[17]	1,200[17]	2,800[17]	1,950[17]	25,540/37	19,920	1,480	
Forecast Demand (AFY)	434-482	2,679-2,977[19]	3,735-4,150[19]	1,892-2,500[19]	1,277-1,419[19]	2,742	36	1,750-1,944[19]	2,984	Not Available	1,440-1,600[19]	1,260-1,400[19]	2,800-4,300	1,950	25,540/110	16,610-23,830	1,990-2,160	
Supply																		
State Water Project (AFY)[4]	0	1,240[5]	0	0	495[6]	0	0	0	0	0	0	0	0	0	0	0	0	
Lopez Lake Reservoir (AFY)	0	896	2,290	800	303	0	0	0	0	0	0	0	0	0	0	0	0	
Edna Valley Sub-basin (AFY)[7]	410	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Pismo Creek Valley Sub-basin (AFY)[8]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Arroyo Grande Plain Hydrologic Sub-area (part of Santa Maria Valley Groundwater Basin (AFY)[9]	0	700	1,202	1,198+225[14]	900	5,300[9]	36	0	0	0	0	0	0	0	0	Uncertain	Uncertain	
Arroyo Grande Valley Sub-basin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Uncertain	Uncertain	

Table 4.38 South Coast WPA 7 Demand and Supply

	Golden State Water Co. (Edna Valley)	Northern Cities Management Area						Nipomo Mesa Management Area							Santa Maria Valley Management Area	Outside Management Areas		
		Pismo Beach [(1)]	Arroyo Grande [(1)]	Grover Beach [(1)]	Oceano CSD[(1)]	Agriculture	Rural	Golden State Water Company[(16)]	Nipomo CSD[(16)]	Rural Water Company[(16)]	Woodlands Mutual Water Company[(16)]	Conoco Phillips[(16)]	Agriculture[(16)]	Rural[(16)]	Agriculture /Rural	Agriculture	Rural	Environmental
Agricultural Land Conversion Credit (AFY)[(10)]	0	0	112	209	0	0	0	0	0	0	0	0	0	0	0	0	0	
Transfers (AFY)[(11)]	0	0	100	0	-100	0	0	0	0	0	0	0	0	0	0	0	0	
Pismo Formation outside the NCMA (AFY)	0	0	80	0	0	0	0	0	0	0	0	0	0	0	0	Uncertain	Uncertain	
Nipomo supplemental water project (AFY)[(12)]	0	0	0	0	0	0	0	208	2,167	208	417	0	0	0	0	0	0	
Nipomo Mesa Hydrologic Sub-area (part of Santa Maria Valley Groundwater Basin) (AFY)[(13)]	0	0	0	0	0	0	0	852	457	462	405	1,400	4,300	1,950	0	Uncertain	Uncertain	
Other Groundwater Supply Sources (AFY)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25,540/37	Uncertain	Uncertain	
Recycled Water (AFY)	87[(18)]	0	0	0	0	0	0	0	60-74	49-50	24-28	0	0	0	0	0	0	
SWRCB Water Diversions (AFY)	0	0	0	0	0	[(15)]	[(15)]	0	0	0	0	0	[(15)]	[(15)]	[(15)]	0	0	
Total Supply (AFY)	**482**	**2,836**	**3,794**	**2,432**	**1,598**	**Uncertain**	**Uncertain**	**1,060**	**2,698**	**720**	**850**	**1,400**	**Uncertain**	**Uncertain**	**Uncertain**	**Uncertain**	**Uncertain**	
Environmental Water Demand																		

Table 4.38 South Coast WPA 7 Demand and Supply

	Golden State Water Co. (Edna Valley)	Northern Cities Management Area						Nipomo Mesa Management Area							Santa Maria Valley Management Area	Outside Management Areas		
		Pismo Beach (1)	Arroyo Grande (1)	Grover Beach (1)	Oceano CSD(1)	Agriculture	Rural	Golden State Water Company(16)	Nipomo CSD(16)	Rural Water Company(16)	Woodlands Mutual Water Company(16)	Conoco Phillips(16)	Agriculture(16)	Rural(16)	Agriculture /Rural	Agriculture	Rural	Environmental
Environmental Water Demand (AFY)(20)(22)																		32,960
Unimpaired Mean Annual Discharge (AFY)(21)(22)																		49,100

Notes:

1. Part of the Northern Cities Management Area (NCMA)
2. 2010 Annual Monitoring Report Northern Cities Management Area, Table 1. 2009 and 2008 demands listed below for reference.
   Pismo Beach reported 2,039 AFY in 2009 and 2,208 AFY in 2008
   Arroyo Grande reported 3,315 AFY in 2009 and 3,579 AFY in 2008
   Grover Beach reported 1,941 AFY in 2009 and 2,051 AFY in 2008
   Oceano CSD reported 885 AFY in 2009 and 933 AFY in 2008
   Agriculture reported 2,742 AFY in 2009 and 2008
3. Rural residential reported 36 AFY in 2009 and 2008. Agriculture is grouped in a category referred to as "Applied Irrigation" which is private water used for non domestic purposes. In the NCMA, Applied Irrigation demands are defined by agriculture and irrigated turf grass at schools and a golf course. Of the 2,056 AFY Applied Irrigation demand, agriculture likely accounted for 1,933 AFY (or 94 percent).
4. State Water Project average allocation assumed 66 percent of contract water service amount.
5. 140 AFY of the 1,240 AFY contracted amount has been allocated for Pismo Ranch.
6. Oceano CSD has a 750 AFY allocation, but no drought buffer. Therefore, the 66 percent assumption for State Water Project delivery is 495 AFY.
7. Edna Valley Sub-basin estimated safe basin yield is 4,000 AFY and all pumping is for urban, agricultural, rural users, golf courses, and CSA 18.
8. There is no estimate of the Pismo Creek Valley Sub-basin (basin-wide yield). The yield of the alluvial basin in the Spanish Spring ranch area has been estimated at 200 AFY.
9. Safe yield of 9,500 AFY with subdivisions for applied irrigation (5,300 AFY), subsurface outflow to the ocean (200 AFY), and urban use (4,000 AFY). The 2002 Groundwater Management Agreement safe yield allotment for urban use is broken down per the numbers shown.
10. 2002 Settlement Agreement provides that groundwater allocations can be increased when land within the incorporated boundaries is converted from agricultural uses to urban uses.
11. Arroyo Grande has an active agreement to purchase 100 AFY of Oceano CSD supplies from groundwater or Lopez Lake water. This temporary agreement ends in 2014.
12. Nipomo supplemental water project includes Nipomo CSD, Woodlands MWC, Golden State Water Company, and Rural Water Company. Nipomo CSD will receive approximately 1,667 AFY and has reserved an additional 500 AFY. The other three will receive 833 AFY.
13. For the NMMA purveyors, the groundwater supply was calculated as the difference between the current demand and the other sources of supply (e.g. recycled water, Nipomo supplemental water project).
14. Non-potable groundwater pumped from irrigation wells used on the State Parks Department golf course and a City park. The portion of the 225 AFY attributed to the golf course predates the Gentlemen's Agreement. The portion for the park is a substitute for preexisting agricultural use on the park site.
15. Diversions do not distinguish type of use. Potentially 1,243 AFY could be diverted for use to either agriculture or rural residential in WPA 7.
16. Part of the Nipomo Mesa Management Area (NMMA)
17. 2010 Annual Monitoring Report Nipomo Mesa Management Area. 2008 and 2009 demands listed below for reference.
    Golden State Water Company reported 1,380 AFY in 2008 and 1,290 AFY in 2009
    Nipomo CSD reported 2,700 AFY in 2008 and 2,370 AFY in 2010 (NCSD existing demand based on 2010 UWMP)
    Rural Water Company reported 900 AFY in 2008 and 880 AFY in 2009
    Woodlands Mutual Water Company reported 540 AFY in 2008 and 810 AFY in 2009
    ConocoPhillips reported 1,100 AFY in 2008 and 1,200 AFY in 2009
    Agriculture reported 4,300 AFY in 2008 and 3,800 AFY in 2009
    Rural residential reported 1,700 AFY in 2008 and 1,700 AFY in 2009
18. The golf course receives all of the WWTP's recycled water effluent for irrigation use (2009 - Range: 59,000-134,000 gpd, average flow: 78,000 gpd; permitted 120,000 gpd as a monthly average)
19. Ten percent additional water conservation (beyond what has already been accomplished) assumed for the low end of the forecast build-out demand, except for Grover Beach, which assumed 20% additional reduction.

Table 4.38 South Coast WPA 7 Demand and Supply																		
	Golden State Water Co. (Edna Valley)	Northern Cities Management Area						Nipomo Mesa Management Area							Santa Maria Valley Management Area	Outside Management Areas		
		Pismo Beach (1)	Arroyo Grande (1)	Grover Beach (1)	Oceano CSD(1)	Agriculture	Rural	Golden State Water Company(16)	Nipomo CSD(16)	Rural Water Company(16)	Woodlands Mutual Water Company(16)	Conoco Phillips(16)	Agriculture(16)	Rural(16)	Agriculture /Rural	Agriculture	Rural	Environmental

20. Environmental Water Demand is defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. The federally threatened south-central California coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species for the development of a reasonable estimation of the amount of water needed to support this species.
21. Mean daily flow values from stream gauging stations representative of long-term, unimpaired (or natural) flow conditions were used to derive unimpaired mean annual discharge (MAD) estimates. The unimpaired MAD is the cumulative flow for the creeks within the water planning area that were included in the calculation.
22. The Environmental Water Demand and Unimpaired Mean Annual Discharge are calculated for the entire water planning area and not for individual streams.
23. Nipomo CSD 2010 Urban Water Management Plan.

4.6.7.3 Huasna Valley WPA 8

The water supply sources for this WPA include the Huasna Valley Groundwater Basin, other groundwater supply sources, and State Board water diversions.

4.6.7.4 Urban Users

WPAs 8, 9, 10, 11, and 15 do not have urban demand because there are no large population centers in these WPAs.

4.6.7.4.1 *Rural Users*

For WPA 8, the existing annual rural water demand is 90 AFY and the range of projected future demand is 360 to 450 AFY. The majority of existing rural parcels identified in WPA 8 are classified as developed rural lands. The majority of vacant parcels in WPA 8 that could be converted to rural residential in the future are vacant parcels with rural land use designations.

4.6.7.4.2 *Agricultural Users*

The existing annual applied water for WPA 8 is approximately 1,550 AFY. The existing crops in this area include citrus, deciduous, vegetables, and vineyards. The projected future annual applied water for WPA 8 ranges from approximately 2,060 to 2,820 AFY. The projected future agricultural demand is higher than existing due to increases in acreage of nursery, pasture, and vineyards.

4.6.7.4.3 *Environmental*

The unimpaired mean annual discharge for WPA 8 inclusive of the water management areas is approximately 34,220 AFY and environmental water demand of 25,020 AFY. WPA 8 was divided into three sub-watersheds and the unimpaired mean annual discharge and environmental water demand was calculated for these sub-watersheds. Some of the creeks in these sub-watersheds included Huasna River and Alamo Creek.

4.6.7.4.4 *Huasna Valley WPA 8 Water Demand and Supply Summary*

Table 4.39 Huasna Valley WPA 8 Demand and Supply

	Urban	Agriculture	Rural	Environmental
Demand				
Existing Demand (AFY)	0	1,550	90	
Forecast Demand (AFY)	0	2,060-2,820	360-450	
Supply				
Huasna Valley Basin (AFY)[(1)]	0	Uncertain	Uncertain	
Other Groundwater Supply Sources (AFY)	0	Uncertain	Uncertain	
SWRCB Water Diversions (AFY)	0	[(2)]	[(2)]	
Total Supply (AFY)	**0**	**Uncertain**	**Uncertain**	
Environmental Water Demand				
Environmental Water Demand (AFY)[(3)(5)]				25,020
Unimpaired Mean Annual Discharge(AFY)[(4)(5)]				34,220

Notes:
1. There is no existing estimate of basin safe yield or hydrologic budget items.
2. Diversions do not distinguish type of use. Potentially 48 AFY could be diverted for use to either agriculture or rural residential.
3. Environmental Water Demand is defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. The federally threatened south-central California coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species for the development of a reasonable estimation of the amount of water needed to support this species.
4. Mean daily flow values from stream gaging stations representative of long-term, unimpaired (or natural) flow conditions were used to derive unimpaired mean annual discharge (MAD) estimates. The unimpaired MAD is the cumulative flow for the creeks within the water planning area that were included in the calculation.
5. The Environmental Water Demand and Unimpaired Mean Annual Discharge are calculated for the entire water planning area and not for individual streams.

4.6.7.5 <u>Cuyama Valley WPA 9</u>

The water supply sources for this WPA include the Cuyama Valley Groundwater Basin, other groundwater supply sources, and State Board water diversions.

4.6.7.5.1 *Urban Users*

WPAs 8, 9, 10, 11, and 15 do not have urban demand because there are no large population centers in these WPAs.

4.6.7.5.2 *Rural Users*

For WPA 9, the existing annual rural water demand is 10 AFY and the range of projected future demand is 80 to 100 AFY. The majority of existing rural parcels identified in WPA 9 are classified as developed rural lands. The majority of vacant parcels in WPA 9 that could be converted to rural residential in the future are vacant parcels with rural land use designations.

4.6.7.5.3 *Agricultural Users*

The existing annual applied water for WPA 9 is approximately 28,870 AFY. The existing crops in this area include deciduous, vegetables, and vineyards. The projected future annual applied water for WPA 9 ranges from approximately 25,320 to 32,410 AFY. The existing annual applied water falls within the range of projected future agricultural demand.

4.6.7.5.4 *Environmental*

The eastern portion of the County (i.e., WPAs 9, 10, 11, 14, and 15) was ultimately excluded from the environmental water demand analysis due to the lack of data and regional physiographic differences.

4.6.7.5.5 *Cuyama Valley WPA 9 Water Demand and Supply Summary*

Table 4.40 Cuyama Valley WPA 9 Demand and Supply

	Urban	Agriculture	Rural	Environmental[2]
Demand				
Existing Demand (AFY)	0	28,870	10	
Forecast Demand (AFY)	0	25,320-32,410	80-100	
Supply				
Cuyama Valley Basin (AFY)[1]	0	10,000[1]	10,000[1]	
Other Groundwater Supply Sources (AFY)	0	Uncertain	Uncertain	
SWRCB Water Diversions (AFY)	0	0	0	
Total Supply (AFY)	**0**	**Uncertain**	**Uncertain**	
Environmental Water Demand				
Environmental Water Demand (AFY)				Uncertain
Unimpaired Mean Annual Discharge(AFY)				Uncertain

Notes:
1. Demands include demands in the San Luis Obispo County portion of the basin and the remaining water planning area. Perennial yield for the entire basin has been estimated between 9,000 and 13,000 AFY. Recent work reported a perennial yield on the order of 10,000 AFY. 22 percent of basin is in San Luis Obispo County. Remainder of the basin resides in Santa Barbara, Kern, and Ventura County. There is no separate yield estimate for the San Luis Obispo County portion.
2. The eastern portion of the County (i.e., WPAs 9, 10, 11, 14, and 15) was ultimately excluded from the environmental water demand analysis due to the lack of data and regional physiographic differences.

4.6.8 Inland Sub-Region

This section describes water supply, water demand, and water quality for WPAs 10 through 16:

- Carrizo Plain WPA 10: Overlying users
- Rafael/Big Spring WPA 11: Overlying users
- Santa Margarita WPA 12: County Service Area 23 and Santa Margarita Ranch
- Atascadero/Templeton WPA 13: Templeton CSD, Atascadero MWC, Garden Farms Community Water District
- Salinas/Estrella WPA 14: San Miguel CSD, Camp Roberts, and County Service Area 16 (Shandon)
- Cholame WPA 15: Overlying Users
- Nacimiento WPA 16: Oak Shores and Heritage Ranch CSD

The majority of existing rural parcels identified in the Inland Sub-Region are classified as developed rural lands. The majority of vacant parcels in these WPAs that could be converted to rural residential in the future are vacant parcels with rural land use designations.

4.6.8.1 <u>Carrizo Plain WPA 10</u>

The primary source of water supply for this WPA is the Carrizo Plain Groundwater Basin, and to a limited extent, other groundwater basins and State Board water diversions.

4.6.8.1.1 *Urban Users*

WPAs 8, 9, 10, 11, and 15 do not have urban demand because there are no large population centers in these WPAs.

4.6.8.1.2 *Potential Overlying Users*

Source*: John Kessler, California Energy Commission (excerpts from Carrizo Energy Solar Farm); John Larson, URS Corporation (SunPower Project); Tim Cleath, Cleath-Harris Geologist, Inc. (SunPower Project); SunPower - California Valley Solar Ranch Environmental Impact Report (EIR), Topaz Solar Farm (First Solar) Draft Environmental Impact Report.*

The Carrizo Plain WPA has no large water purveyors. Water usage in this WPA is analyzed as overlying use. Due to the age of previous water studies for this area, potential demands and groundwater characterization from water studies completed for two proposed solar power projects are included in this discussion. The modeling completed for these two projects analyzes a significant portion of the Carrizo Plain Groundwater Basin.

These two large solar farms are referred to as the Topaz Solar Farm, and the SunPower-California Valley Solar Ranch. These proposed projects are 550 and 250 megawatt solar power plants, respectively. Both projects propose to use photovoltaic technology, which will consume less water than steam-producing plants. During operation of the facilities, (long-term) water demand would be required for washing solar panels if needed, potable water for employees, service water for general site uses including irrigation, and fire protection.

Table 4.41 Solar Farm Demand Estimates

Project	Demand During Construction	Operations
Topaz Solar Farm	48-273	4.5
Sun Power	41	9.3
	Total	**13.8**

The reported safe yield of the Carrizo Plain Groundwater Basin reported by was 600 AFY (based on water demand in 1954). The Kemnitzer safe yield was estimated at 59,000 AFY (based on 1967 inflow/outflow analysis). Taking into consideration the methodologies used in previous studies, current and historical groundwater levels, and water quality, the solar project EIRs' water analyses conclude that a more reasonable safe yield on which to base planning decisions is between 8,000 – 11,000 AFY.

Groundwater quality has a wide range of qualities, as noted in the groundwater resources discussion for the Carrizo Plain. Additionally, according to the Sun Power EIR, the results of groundwater quality testing conducted on samples for the proposed Sun Power solar project well indicate TDS content of 4,940 mg/L at the proposed project site. The EIR concludes that the groundwater quality, with treatment (reverse osmosis is proposed), is useable for the proposed project, particularly considering historic land uses of the area and understanding of aquifer characteristics. Similarly, according to the Topaz Farm EIR, the results of groundwater quality testing conducted on samples for the proposed Topaz Farm solar project well indicate water from the lower aquifer is not suitable for drinking water without treatment and primarily exceed the drinking water standard for nitrate.

4.6.8.1.3 *Rural Users*

The estimated rural demand for the Carrizo Plain, WPA 10, is 210 AFY and future demand ranges from 9,610 to 12,740. The majority of existing rural parcels identified in WPA 10 are classified as developed rural lands. According to existing zoning, it is possible that Carrizo Plain could have extensive residential development. However, it is unlikely that the number of residential units that are zoned as potential residential will be developed due to limited water availability and other factors.

4.6.8.1.4 *Agricultural Users*

The existing annual applied water for WPA 10 is approximately 800 AFY. The existing crops in this area are primarily citrus crops. The projected future annual applied water for WPA 10 ranges from approximately 680 to 890 AFY. The existing annual applied water falls within the range of projected future agricultural demand.

4.6.8.1.5 *Environmental*

The eastern portion of the County (i.e., WPAs 9, 10, 11, 14, and 15) was ultimately excluded from the environmental water demand analysis due to the lack of data and regional physiographic differences.

4.6.8.1.6 *Carrizo Plain WPA 10 Water Demand and Supply Summary*

Table 4.42 Carrizo Plain WPA 10 Demand and Supply

	Urban	Solar Power[1]	Agriculture	Rural	Environmental[5]
Demand					
Existing Demand (AFY)	0	0	800	210	
Forecast Demand (AFY)	0	13.8	680-890	9,610-12,740[2]	
Supply					
Carrizo Plain Basin (AFY)[3]	0	0	800	210	
Other Groundwater Supply Sources (AFY)	0	0	Uncertain	Uncertain	
SWRCB Water Diversions (AFY)	0	0	[4]	[4]	
Total Supply (AFY)	**0**	**Uncertain[1]**	**800**	**210**	
Environmental Water Demand					
Environmental Water Demand (AFY)					Uncertain
Unimpaired Mean Annual Discharge(AFY)					Uncertain

Notes:
1. Potential demands from two identified future solar power projects (Topaz Solar Farm and Sun Power-California Valley Solar Ranch), which have yet to be approved.
2. Carrizo Plain rural demand projections are based on existing zoning, which includes the potential for extensive California Valley development. The actual development may be much lower than the range shown due to water quality and other considerations.
3. The safe seasonal yield was estimated at 8,000 - 11,000 AFY.
4. Diversions do not distinguish type of use. Potentially 81 AFY could be diverted for use to either agriculture or rural residential.
5. The eastern portion of the County (i.e., WPAs 9, 10, 11, 14, and 15) was ultimately excluded from the environmental water demand analysis due to the lack of data and regional physiographic differences.

4.6.8.2 Rafael/Big Spring WPA 11

The primary source of water supply for this WPA is the Rafael Valley and Big Spring Valley Groundwater Basins, and to a limited extent, State Board water diversions.

4.6.8.2.1 *Urban Users*

WPAs 8, 9, 10, 11, and 15 do not have urban demand because there are no large population centers in these WPAs.

4.6.8.2.2 *Rural Users*

There is minimal or no existing rural demand for WPA 11, but in the future, if water is available and development occurs, there could be from approximately 470 to 620 AFY.

4.6.8.2.3 *Agricultural Users*

There are minimal or no agricultural demands in this WPA.

4.6.8.2.4 *Environmental*

The eastern portion of the County (i.e., WPAs 9, 10, 11, 14, and 15) was ultimately excluded from the environmental water demand analysis due to the lack of data and regional physiographic differences.

4.6.8.2.5 *Rafael/Big Spring WPA 11 Water Demand and Supply Summary*

Table 4.43 Rafael/Big Spring WPA 11 Demand and Supply

	Urban	Agriculture	Rural	Environmental[4]
Demand				
Existing Demand (AFY)	0	Minimal	Minimal	
Forecast Demand (AFY)	0	0	470-620	
Supply				
Rafael Valley Basin (AFY)[1]	0	Uncertain[2]	Uncertain[2]	
Big Spring Area Basin[1]	0	Uncertain[2]	Uncertain[2]	
Other Groundwater Supply Sources (AFY)	0	Uncertain	Uncertain	
SWRCB Water Diversions (AFY)	0	[3]	[3]	
Total Supply (AFY)	**0**	**Uncertain**	**Uncertain**	
Environmental Water Demand				
Environmental Water Demand (AFY)				Uncertain
Unimpaired Mean Annual Discharge(AFY)				Uncertain

Notes:
1. There is no information describing the basin yield.
2. It is uncertain which basins are used and the quantity of water pumped from each basin. Future studies should invest the resources to quantify the location and use of each basin.
3. Diversions do not distinguish type of use. Potentially 59 AFY could be diverted for use to either agriculture or rural residential.
4. The eastern portion of the County (i.e., WPAs 9, 10, 11, 14, and 15) was ultimately excluded from the environmental water demand analysis due to the lack of data and regional physiographic differences.

4.6.8.3 Santa Margarita WPA 12

The primary source of water supply for this WPA is the Santa Margarita, Rinconada, and Pozo Valley Groundwater Basins, Santa Margarita Creek Alluvial Aquifer, and to a limited extent other groundwater supplies and State Board water diversions.

4.6.8.3.1 *Santa Margarita Ranch*

Source: *Santa Margarita Ranch Agricultural Residential Cluster Subdivision Project and Future Development Program EIR*

The Santa Margarita Ranch (Ranch) encompasses approximately 14,000 acres and is located immediately east of U.S. Highway 101, and surrounds the community of Santa Margarita. The land currently functions as ranch and vineyard with minimal residential water use. Approximately 96 percent of the water is used by vineyards and other farm operations. An Agricultural Residential Cluster Subdivision (ARCS) is proposed, including 3,778 acres near the middle of the Ranch, southeast of the community of Santa Margarita. A Future Development Program (FDP) is planned in various locations throughout the balance of the property. The proposed ARCS includes 111 large-lot residential units and agricultural reserves. The FDP covers a variety of development types, including 402 residences, a golf course, guest ranch, wineries, and other commercial and recreational facilities.

The existing Ranch water use is estimated at 1,621 AFY based on land use water factors. Planned expansion of orchards and vineyards will increase water use to 4,263 AFY. The proposed development's EIR states that the ARCS would increase water demand by 161 AFY. Implementation of the FDP would add an additional 1,466 AFY of demand. Based on these values, the total build-out demand is 5,890 AFY.

Existing Santa Margarita Ranch water demands are supplied entirely by groundwater. The Ranch property is currently served by approximately 27 wells, located primarily along the east side of the Ranch, west of West Pozo Road. Individual well yields typically range between 200 and 400 gpm with some wells capable of rates of up to 1,000 gpm. Supplemental water supply options for Santa Margarita Ranch are State Water and Nacimiento water.

Environmental water requirements may limit the use of groundwater to meet the needs of expanded agricultural production and eventual residential development. Trout and Rinconada Creeks, which are upper tributaries of the Salinas River, are important spawning habitat for steelhead, a federally declared endangered species. The National Marine Fisheries Service (NMFS) has previously received complaints that the creeks have allegedly been dewatered as a result of vineyard development on Ranch property.

TDS concentrations in wells in the area are relatively high. Nitrates have measured concentrations below the MCL of 45 mg/L. Total coliform, fecal coliform, and Escherichia coli data have been found to be suggestive, although not conclusive, of small impacts on both shallow and deep aquifer wells from local wastewater disposal systems.

4.6.8.3.2 *County Service Area 23*

Source: 2003 CSA 23 Water Master Plan, several County staff memos, County Public Works-compiled consumption data and Planning Department land use projections

County Service Area 23 (CSA 23) provides water service to the community of Santa Margarita. Santa Margarita has a population of approximately 1,400 and covers an area of approximately 265 acres. CSA 23 supplies the community with water via groundwater wells located in the center and south-eastern corner of the community. The community is completely reliant on groundwater for its supply.

In 2009, the CSA served a total of 525 connections, predominantly residential. Future build-out is estimated to be 619 connections. CSA 23 receives its water supply from two wells; Well No. 3 and No. 4. Well No. 3 is a deep, fractured-rock well and Well No. 4 is a relatively shallow well that pumps from the alluvial deposits of Santa Margarita Creek. Two other wells, No. 1 and No. 2, are near No. 4, but are not built to current health standards, and can only be used in an emergency with a boil water order.

During periods of low seasonal rainfall, water level in the shallow well typically drops, triggering various voluntary conservation methods. Although the community is better than 85 percent built out according to the current general plan, there is concern that existing groundwater supplies may not be adequate to supply additional residents and that they are inadequate during periods of less than normal rainfall. There is also the concern that the reliance on essentially a single supply source (groundwater) may be placing the community in a tenuous public health and safety position.

The 2003 Master Plan recommended securing an additional 100 AFY of reliable supply. Based on community input, concerns over cost and need, CSA 23 is currently investigating several options to secure an additional source of water to be used only during a drought or other emergency. These include State Water, Lake Nacimiento water or additional groundwater wells. Any one of these sources could potentially supply water demand at build-out given the community’s support.

CSA 23 has been able to deliver water that meets State Drinking Water Standards.

4.6.8.3.3 *Rural Users*

The existing rural demand for WPA 12 is approximately 240 AFY and future demand ranges from approximately 450 to 520 AFY.

Table 4.44 Santa Margarita Area Demand and Supply		
	CSA 23	**Santa Margarita Ranch**
Demand		
Existing Demand (AFY)	164	1,621
Forecast Demand (AFY)	173-192$^{(4)}$	5,301-5,890$^{(4)}$
Supply		
Santa Margarita Valley Basin (AFY)$^{(1)}$	164	1,621
Rinconada Valley Basin$^{(2)}$	0	0
Pozo Valley Basin$^{(3)}$	0	0
Other Groundwater Supply Sources (AFY)	0	0
SWRCB Water Diversions (AFY)	0	22
Total Supply (AFY)	**164**	**1,643**

Notes:
1. No comprehensive studies to determine the perennial yield are known to exist. However, some reports indicate an average annual yield may range between 400 to 600 AFY.
2. There is no information describing the basin yield.
3. The safe available storage has been reported to be 1,000 AFY. There is insufficient information to characterize water availability.
4. Ten percent water conservation assumed for the low end of the forecast build-out demand.

4.6.8.3.4 *Agricultural Users*

The existing annual applied water for WPA 12 is approximately 1,770 AFY. The existing crops in this area include alfalfa, deciduous, pasture, and vineyards. The projected future annual applied water for WPA 12 ranges from approximately 1,720 to 2,680 AFY. The projected future agricultural demand is higher than existing due to increases in acreage of citrus, deciduous, pasture, and vineyards.

4.6.8.3.5 *Environmental*

The unimpaired mean annual discharge for WPA 12 inclusive of the water management areas is approximately 46,630 AFY and environmental water demand of 32,850 AFY. WPA 12 was divided into three sub-watersheds and the unimpaired mean annual discharge and environmental water demand was calculated for these sub-watersheds. The Salinas River is the major river in these sub-watersheds.

4.6.8.3.6 *Santa Margarita WPA 12 Water Demand and Supply Summary*

Table 4.45 Santa Margarita WPA 12 Demand and Supply

	CSA 23	Santa Margarita Ranch	Agriculture	Rural	Environmental
Demand					
Existing Demand (AFY)	164	1,621	1,770	240	
Forecast Demand (AFY)	173-192[6]	5,301-5,890[6]	1,720-2,680	450-520	
Supply					
Santa Margarita Valley Basin (AFY)[1]	164	1,621	Uncertain[2]	Uncertain[2]	
Rinconada Valley Basin[3]	0	0	Uncertain[2]	Uncertain[2]	
Pozo Valley Basin[4]	0	0	Uncertain[2]	Uncertain[2]	
Other Groundwater Supply Sources (AFY)	0	0	Uncertain	Uncertain	
SWRCB Water Diversions (AFY)	0	22	[5]	[5]	
Total Supply (AFY)	**164**	**1,643**	**Uncertain**	**Uncertain**	
Environmental Water Demand					
Environmental Water Demand (AFY)[7][9]					32,850
Unimpaired Mean Annual Discharge(AFY)[8][9]					46,630

Notes:
1. No comprehensive studies to determine the perennial yield are known to exist. However, some reports indicate an average annual yield may range between 400 to 600 AFY.

Table 4.45 Santa Margarita WPA 12 Demand and Supply

	CSA 23	Santa Margarita Ranch	Agriculture	Rural	Environmental

2. It is uncertain which basins are used and the quantity of water pumped from each basin. Future studies should invest the resources to quantify the location and use of each basin.
3. There is no information describing the basin yield.
4. The safe available storage has been reported to be 1,000 AFY. There is insufficient information to characterize water availability.
5. Diversions do not distinguish type of use. Potentially 417 AFY could be diverted for use to either agriculture or rural residential.
6. Ten percent water conservation assumed for the low end of the forecast build-out demand.
7. Environmental Water Demand is defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. The federally threatened south-central California coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species for the development of a reasonable estimation of the amount of water needed to support this species.
8. Mean daily flow values from stream gaging stations representative of long-term, unimpaired (or natural) flow conditions were used to derive unimpaired mean annual discharge (MAD) estimates. The unimpaired MAD is the cumulative flow for the creeks within the water planning area that were included in the calculation.
9. The Environmental Water Demand and Unimpaired Mean Annual Discharge are calculated for the entire water planning area and not for individual streams.

4.6.8.4 Atascadero/Templeton WPA 13

The primary source of water supply for this WPA is the Atascadero Groundwater Sub-basin (Paso Robles Formation and Salinas River Underflow), recycled water, Nacimiento Water Project, and to a limited extent, other groundwater supplies and State Board water diversions.

4.6.8.4.1 *Templeton Community Services District*

Source: *2005 Templeton CSD Water System Master Plan Update, 2010 Paso Robles Groundwater Basin Water Balance Review and Update*

The Templeton Community Services District (Templeton CSD) supplies its customers with domestic water service. Templeton is an unincorporated community located along Highway 101 between the City of Paso Robles and City of Atascadero. Templeton consists of a mix of residential, commercial, agriculture, and recreational areas. The Templeton area has a number of homes on larger lots, and thus exhibits a relatively large per capita water demand as a result.

Population projections are based on only those areas served by, and within, the Templeton CSD service area boundary. Thus, there will likely be discrepancies between these projections and those provided by the County or census data. The existing service area population was estimated at 6,417 persons. Based on the 2005 estimated population of 6,417 persons determined by the Templeton CSD's water service connections, plus 2,180 persons from the commercial mixed-use component, and an additional 900 persons from the residential component, the Templeton CSD's estimated build-out population (within its existing service area boundary) is 9,497 persons. The existing and forecast demands are summarized in Table 4.47 following the discussion on Garden Farms.

The Templeton CSD depends on water from eleven wells that extract water from two groundwater sources: the Paso Robles Formation and the Salinas River Underflow. Nine of the eleven wells that extract water from the Paso Robles Formation are extracting from the Atascadero Groundwater Sub-basin.

The Templeton CSD currently is permitted to extract 500 AFY from the Salinas River Underflow between October 1 and April 1. Two wells tap this aquifer, though only the Smith Well is in service. The Templeton CSD may request from CDPH an extended permit to continue to pump from the river wells through May 15 if sufficient water is available and flowing during that time.

An additional source of water for Templeton CSD comes from their re-use program with disposal of treated wastewater effluent from the Meadowbrook WWTP percolation ponds. This program allows the Templeton CSD to percolate treated effluent into the groundwater basin/Salinas River Underflow and subsequently extract the same amount of water 28 months later. According to the 2005 Water Master Plan, wastewater flow to the

Meadowbrook WWTP at that time was 148,000 gpd (165 AFY) with 30 AF being used to irrigate an alfalfa field. Therefore, the Templeton CSD at that time had been withdrawing approximately an additional 135 AFY from the Salinas River allocation (above the 500 AFY permitted Salinas River underflow). Table 4.46 below (Table 4-3 from the 2005 Water Master Plan) summarizes the existing water supply and allocations for Templeton CSD.

Table 4.46 Summary of Existing Water Supplies for Templeton CSD

	Summer Allocation (AFY) (April 1 through September 30)	Winter Allocation (AFY) (October 1 through March 31)	Total Allocation (AFY)
Paso Robles Formation	Included in total	Included in total	1,700/1,550[(1)]
Salinas River			
Salinas River Underflow	0	500	500
Riparian Rights	No increase to water supply	No increase to water supply	No increase to water supply
Greer Riparian Rights	94 AF	0	94
Re-Use Program	66 AF[(2)]	66 AF[(2)]	132
		Total	**2,246**

Notes:
1. The Templeton CSD can extract water from the Paso Robles Formation any time during the year, however, the Templeton CSD extracts the majority of the water during the summer months when the main river water allocation is not available. The Paso Robles Formation is only used during the winter to help meet peak demands that the Smith Well is unable to meet.
2. Allocation based on the existing wastewater demand minus the irrigated effluent to alfalfa fields minus 2 percent water loss.

Future water supply for the Templeton CSD will likely come from the Nacimiento Water Project (NWP). The Templeton CSD is under contract to receive 250 AFY from the NWP. Templeton CSD plans to receive raw water from the NWP and percolate this water into the Salinas River Underflow, in a similar manner that they percolate effluent from the Meadowbrook WWTP percolation ponds (Selby Pond site). This 250 AFY of percolated NWP water will then be extracted from the Templeton CSD’s downstream potable water well field. In addition, the Templeton CSD might divert additional wastewater flows to the Meadowbrook WWTP (which currently flow to the City of Paso Robles WWTP), which will allow them to increase percolation into and extraction from the Salinas River Underflow by as much as 343 AFY. These future water supply provisions are referenced in the 2005 Water Master Plan, and are included as recommendations for future water supply.

Based on the 2005 Water Master Plan, and review of current consumer confidence reports (CCRs), the Templeton CSD's water supply to its customers meets all water quality standards. In general, the river wells have lower total dissolved solid levels than the Atascadero Groundwater Sub-basin; however, all of the wells are below the upper limits of the drinking water standard of 1,000 mg/L. The Templeton CSD's overall aggregate TDS quality to its customers, as reported in the 2004 CCR, was 653 mg/L. This is based on how the Templeton CSD distributes and blends the various water supplies to its customers.

4.6.8.4.2 *Atascadero Mutual Water Company*

Source: *2005 Atascadero MWC UMWP and Draft 2009 Master Water Plan*

The Atascadero Mutual Water Company (Atascadero MWC) is a corporation organized under the laws of California for providing water service to property owners, known as the shareholders, within a geographical service area. Atascadero MWC supplies its customers with domestic water service and fire protection. Atascadero MWC's service boundary includes the City of Atascadero limits and some unincorporated areas (e.g. communities such as the Eagle Ranch Property, the West San Marcos Development, and the area south of Santa Rosa Road known as the Random Oaks area). In 2008, the Atascadero MWC served a population of 30,595 with 10,505 service connections. The Atascadero MWC projects a 2030 population of 37,436.

The City of Atascadero is located along Highway 101, between the City of Paso Robles and City of San Luis Obispo. The City of Atascadero consists of a mix of residential, commercial, agriculture, and recreational areas. Eagle Ranch, a large proposed development on the southwest side of the City of Atascadero, is only partially within Atascadero MWC's service area boundary. Atascadero MWC will serve the existing portion of the development within its boundary and another small portion proposed for inclusion. Adequate water supply for all of Eagle Ranch has yet to be confirmed.

According to Atascadero MWC records and demand forecasts, average annual per capita demand has fluctuated in the range of 188 to 213 over the past decade, with lower water use possibly linked to mandatory conservation measures. It is anticipated that water conservation programs will cause lower per capita demands to become the rule rather than the exception. A per capita demand of 199 gpcd is used to estimate a future peak demand of 7,600 AFY in 2019 with a population of 34,016. Thereafter, conservation measures are predicted to more than compensate for population growth, resulting in a build-out demand of 7,511 AFY in 2030 for a population of 37,436. The existing and forecast demands are summarized in Table 4.47 following the discussion on Garden Farms.

The Atascadero MWC's water source is the Atascadero Groundwater Sub-basin (of the Paso Robles Groundwater Basin) and Salinas River Underflow. Water is pumped from 17 active wells with two additional wells on standby status. Atascadero MWC derives approximately half of its supply from the Atascadero Groundwater Sub-basin, with the remainder coming from the Salinas River Underflow. Atascadero MWC has rights to

3,372 AFY from the Salinas River Underflow. As the Salinas River Underflow is more sensitive to rainfall, during dry years the proportionate withdrawal from the deeper Atascadero Groundwater Sub-basin increases.

The current water supply system is under stress due to the ongoing drought. During the spring of 2009, the Atascadero MWC issued a stage 2 water shortage condition alert when reserve production capacity fell to less than 10 percent of the maximum day demand. Stage 2 mandatory conservation measures include a ban on daytime landscape watering, required alternate irrigation schedules, and a prohibition of irrigation runoff.

The Atascadero MWC is a major partner of the Nacimiento Water Project, having contracted for a 2,000 AFY allotment of this future supply. The water will be used to recharge the groundwater table in the vicinity of the deep wells that pump from the Atascadero Groundwater Sub-basin. The Atascadero MWC is also exploring the expansion of its current well fields.

Atascadero MWC continues to aggressively promote water conservation, as it has since 1993. Atascadero MWC's program has reduced per capita indoor water use and the use of potable water for landscape irrigation. Atascadero MWC provides educational resources on its website, in its offices, and in periodic brochures included with water bills. In 1997, Atascadero MWC signed a memorandum of understanding (MOU) with the California Urban Water Conservation Council (CUWCC) and continues to implement and meet the goals of Best Management Practices for water conservation, including:

- Conservation Rate Structure (i.e. Tier Water Rates)
- Turf conversion rebates
- Lawn aeration rebates
- Sprinkler nozzle replacement rebates
- Irrigation controller rain sensor rebates
- Weather based irrigation controller and soil moisture sensor rebates
- Rainwater harvesting system rebates
- High efficiency clothes washing machine rebates
- High efficiency toilet rebates
- School education programs
- Free seminars on water conserving landscape design and plant selection
- Free landscape/home water surveys
- Annual Water-Conserving Landscape awards

Atascadero MWC is also a member of the Groundwater Guardian Program, Alliance for Water Efficiency, Water Education Foundation, and San Luis Obispo County Partners in Water Conservation.

Atascadero MWC's water supply to its customers meets all primary and secondary water quality standards.

4.6.8.4.3 *Garden Farms Community Water District*

Source: *Garden Farms CWD Well logs and 2007 CCR*

The Garden Farms Community Water District (Garden Farms CWD) provides water to consumers in and around the unincorporated community of Garden Farms, located along the old El Camino Real between Santa Margarita and Atascadero. Garden Farms is a small residential community of 240 residents with 113 water service connections. Besides two small commercial establishments, all connections are residential.

Demand has fluctuated between 48 and 93 AFY over the past four years. The service area is fully built out. Garden Farms CWD draws all of its supply from three wells (though the third well is rarely used) which tap the Atascadero Groundwater Sub-basin. Water levels have dropped several feet in the past year, likely due to the ongoing drought in the region.

Groundwater quality is typical for the sub-basin, with no contaminants exceeding the primary drinking water standards. High levels of manganese (70 ppb reported in 2007) have been detected, but do not currently exceed the secondary drinking water standard of 50 ppb.

Table 4.47 Garden Farms CWD, Templeton CSD, Atascadero MWC, and Paso Robles Demand and Supply				
	Garden Farms CWD	**Templeton CSD**	**Atascadero MWC**	**Paso Robles[9]**
Demand				
Existing Demand (AFY)	48-93	1,682	6,565	4,063
Forecast Demand (AFY)	48-93	2,034-2,260[8]	6,840-7,600[8]	3,728
Supply				
Atascadero Groundwater Sub-basin (AFY)[7]				
Paso Robles Formation (AFY)[1]	48 - 93	1,050[2]	3,193	Included with Salinas River Underflow
Salinas River Underflow (AFY)[1]	0	500[3]	3,372[4]	4,063/3,728[9]
Recycled Water (AFY)[5]	0	132/475	0	0
Other Groundwater Supply Sources (AFY)	0	0	0	0
SWRCB Water Diversions (AFY)	0	0	0	0
Nacimiento Water Project (AFY)[6]	0	250	2,000	0
Total Supply (AFY)	**48-93**	**1,932**	**8,565**	**4,063**

Notes:

1. The perennial yield was estimated to be 16,400 AFY. Extractions from the Sub-basin occur primarily from the Salinas River Underflow and deeper formations. Depending on the estimated use for the Agricultural and Rural sectors, future hydrology and whether additional Nacimiento supplies are utilized, Sub-basin studies are indicating that the perennial yield may be exceeded in the future.
2. Nine of Templeton CSD's wells extract groundwater from the Atascadero Groundwater Sub-basin of the Paso Robles Formation.
3. Templeton CSD is permitted to extract 500 AFY from the Salinas River Underflow between October 1 and April 1.
4. Atascadero MWC rights to 3,372 AFY from Salinas River underflow.

Table 4.47 Garden Farms CWD, Templeton CSD, Atascadero MWC, and Paso Robles Demand and Supply

	Garden Farms CWD	Templeton CSD	Atascadero MWC	Paso Robles(9)

5. Percolation of treated wastewater effluent into the Salinas River underflow and extraction of the same amount 28 months later. Currently about 132 AFY is percolated and extracted. This could increase to 475 AFY in the future.
6. Nacimiento Water Project is scheduled to go online in 2010.
7. The agencies, County, District, and local land owners intend to actively and cooperatively manage the Paso Robles Groundwater Basin (which includes the Sub-basin) via the development of a Groundwater Management Plan.
8. Ten (10) percent additional water conservation (beyond what has already been accomplished) assumed for the low end of the forecast build-out demand.
9. Paso Robles discussed in Water Planning Area 14 but included here because Paso Robles wells extract water from this water planning area. For the purposes of this analysis, it was assumed that half (4,063 AFY) of the existing demand of 8,126 AFY was extracted from the Salinas River Underflow via the Thunderbird Well Field in WPA 13. Paso Robles is permitted to extract 4,600 AFY from Salinas River Underflow, but not all is pumped from the WPA 13. Part is extracted from within WPA 14. At build-out, it was assumed that Paso Robles would extract half (3,728 AFY) of its total future groundwater supply of 7,456 AFY from the Atascadero Sub-basin.

4.6.8.4.4 *Rural Users*

The existing rural demand for WPA 13 is approximately 1,480 AFY and future demand ranges from 1,810 to 1,930 AFY.

4.6.8.4.5 *Agricultural Users*

The existing annual applied water for WPA 13 is approximately 10,620 AFY. The existing crops in this area include citrus, deciduous, nursery, pasture, vegetable, and vineyards. The projected future annual applied water for WPA 13 ranges from approximately 9,740 to 14,600 AFY. The projected future agricultural demand could exceed existing annual applied water due to increases in acreage of all existing crop groups.

4.6.8.4.6 *Environmental*

The unimpaired mean annual discharge for WPA 13 inclusive of the water management areas is approximately 74,090 AFY and environmental water demand of 41,010 AFY. WPA 13 was divided into two sub-watersheds and the unimpaired mean annual discharge and environmental water demand was calculated for these sub-watersheds. The major water bodies in these sub-watersheds include the Salinas River and Paso Robles Creek.

4.6.8.4.7 *Atascadero/Templeton WPA 13 Water Demand and Supply Summary*

Table 4.48 Atascadero/Templeton WPA 13 Demand and Supply

	Garden Farms CWD	Templeton CSD	Atascadero MWC	Paso Robles [12]	Agriculture	Rural	Environmental
Demand							
Existing Demand (AFY)	48-93	1,682	6,565	4,063	10,620	1,480	
Forecast Demand (AFY)	48-93	2,034-2,260[11]	6,840-7,600[11]	3,728	9,740-14,600	1,810-1,930	
Supply							
Atascadero Groundwater Sub-basin (AFY)[10]							
Paso Robles Formation (AFY)[1]	48-93	1,050[2]	3,193	Included with Salinas River Underflow	[3]	[3]	
Salinas River Underflow (AFY)[1]	0	500[4]	3,372[5]	4,063/ 3,728[12]	745[6]	0	
Recycled Water (AFY)[7]	0	132/475	0	0	0	0	
Other Groundwater Supply Sources (AFY)	0	0	0	0	Uncertain	Uncertain	
SWRCB Water Diversions (AFY)	0	0	0	0	[8]	[8]	
Nacimiento Water Project (AFY)[9]	0	250	2,000	0	0	0	

Table 4.48 Atascadero/Templeton WPA 13 Demand and Supply							
	Garden Farms CWD	**Templeton CSD**	**Atascadero MWC**	**Paso Robles (12)**	**Agriculture**	**Rural**	**Environmental**
Total Supply (AFY)	**43-93**	**1,932/2,275**	**8,565**	**4,063**	**Uncertain**	**Uncertain**	
Environmental Water Demand							
Environmental Water Demand (AFY)(13)(15)							41,010
Unimpaired Mean Annual Discharge(AFY)(14)(15)							74,090

Notes:
1. The perennial yield was estimated to be 16,400 AFY. Extractions from the Sub-basin occur primarily from the Salinas River Underflow and deeper formations. Depending on the estimated use for the Agricultural and Rural sectors, future hydrology and whether additional Nacimiento supplies are utilized, Sub-basin studies are indicating that the perennial yield may be exceeded in the future.
2. Nine of Templeton CSD's wells extract groundwater from the Atascadero Groundwater Sub-basin.
3. It is assumed that the majority of water supply for rural users and about 13 percent of the supply for agricultural users comes from the Sub-basin.
4. Templeton CSD is permitted to extract 500 AFY from the Salinas River Underflow between October 1 and April 1.
5. Atascadero MWC rights to 3,372 AFY from Salinas River underflow.
6. SWRCB records indicate that 745 AFY could have been diverted from the Salinas River (direct diversion or underflow). It is assumed that the entire amount is used for agriculture.
7. Percolation of treated wastewater effluent into the Salinas River underflow and extraction of the same amount 28 months later. Currently about 132 AFY is percolated and extracted. This could increase to 475 AFY in the future.
8. Diversions do not distinguish type of use. Potentially 1,431 AFY could be diverted for use to either agriculture or rural residential. Diversions were not analyzed as to whether they are within or outside the Sub-basin.
9. Nacimiento Water Project is scheduled to go online in 2010.
10. The agencies, County, District, and local land owners intend to actively and cooperatively manage the Paso Robles Groundwater Basin (which includes the Sub-basin) via the development of a Groundwater Management Plan.
11. Ten (10) percent additional water conservation (beyond what has already been accomplished) assumed for the low end of the forecast build-out demand.
12. Paso Robles discussed in Water Planning Area 14 but included here because Paso Robles wells extract water from this water planning area. For the purposes of this analysis, it was assumed that half (4,063 AFY) of the existing demand of 8,126 AFY was extracted from the Salinas River Underflow via the Thunderbird Well Field in WPA 13. Paso Robles is permitted to extract 4,600 AFY from Salinas River Underflow, but not all is pumped from the WPA 13. Part is extracted from within WPA 14. At build-out, it was assumed that Paso Robles would extract half (3,728 AFY) of its total future

Table 4.48 Atascadero/Templeton WPA 13 Demand and Supply							
	Garden Farms CWD	**Templeton CSD**	**Atascadero MWC**	**Paso Robles (12)**	**Agriculture**	**Rural**	**Environmental**

groundwater supply of 7,456 AFY from the Atascadero Sub-basin.

13. Environmental Water Demand is defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. The federally threatened south-central California coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species for the development of a reasonable estimation of the amount of water needed to support this species.
14. Mean daily flow values from stream gaging stations representative of long-term, unimpaired (or natural) flow conditions were used to derive unimpaired mean annual discharge (MAD) estimates. The unimpaired MAD is the cumulative flow for the creeks within the water planning area that were included in the calculation.
15. The Environmental Water Demand and Unimpaired Mean Annual Discharge are calculated for the entire water planning area and not for individual streams.

4.6.8.5 Salinas/Estrella WPA 14

The primary source of water supply for this WPA is the Paso Robles Groundwater Basin (Paso Robles Formation (and/or alluvium) and Salinas River Underflow), Nacimiento Water Project, and to a limited extent, other groundwater supplies and State Board water diversions.

4.6.8.5.1 *San Miguel Community Services District*

Source: *2002 San Miguel CSD Water Master Plan*

The San Miguel CSD supplies its customers with domestic water service. The unincorporated community of San Miguel is located along Highway 101, north of the City of Paso Robles. According to the 2002 Water Master Plan, the current population within the San Miguel CSD boundary was approximately 1,500 and is expected to increase to 3,742 at build-out (2040) within the existing CSD boundary. The San Miguel CSD service area covers approximately 1,530 acres of land zoned residential, office, commercial, recreation, public facility, agriculture, and industrial. The existing and forecast demands are summarized in Table 4.49 presented following the discussion on County Service Area 16 (Shandon).

The water supply for the San Miguel CSD is obtained solely from groundwater pumping of the Paso Robles Formation. There are three wells within the district; the two primary wells are Well No. 3 and Well No. 4. Well No. 5, a smaller well, historically exhibited high nitrate levels and was removed from service. In 2007, the District replaced Well 5 with a new well in the same location, but installed it deeper (approximately 800 feet). This new well has experienced occasional high nitrate concentrations and possibly high arsenic concentrations. This new well is temporarily out of service while the district conducts further evaluation.

The presence of gross alpha emitters approaching the MCL in the San Miguel water supply is of growing concern. The presence of gross alpha emitters is from naturally occurring decay of Uranium-238 and Thorium-232. The two main wells have shown increasing levels of gross alpha particles through the years, although the average is currently below the proposed MCL. Several of these samples indicate gross alpha levels that exceed the proposed MCL of 15 pCi/L.

4.6.8.5.2 *Camp Roberts*

Source: *San Miguel CSD/Camp Roberts Water System Consolidation Study, 2002*

Camp Roberts is operated by the California Army National Guard, and covers approximately 42,784 acres. Camp Roberts, located north of the community of San Miguel, is situated in both San Luis Obispo and Monterey Counties. When fully mobilized, the base supports 8,500 people. In the event of a nuclear disaster at Diablo Canyon Nuclear Power

Plant, Camp Roberts is an evacuation and staging area for about 23,000 residents within San Luis Obispo County. No growth is expected for Camp Roberts, however, based on the above discussion, water demand and temporary service population can vary widely. Base population can be a combination of on-base personnel and civilian personnel that do not live on Base. The existing and forecast demands are summarized in Table 4.49 following the discussion on County Service Area 16 (Shandon).

Camp Roberts water supply is from groundwater pumping, with three active wells. TDS and arsenic levels in the groundwater are marginal. According to 2001 reports, the TDS concentration was about 900 mg/L. Also, the arsenic levels in 2001 were noted to be 9.6 µg/L, just below the MCL of 10 µg/L.

4.6.8.5.3 *City of Paso Robles*

Source: *2005 City of Paso Robles UWMP and correspondence from Christopher Alakel*

The City of Paso Robles is located along Highway 101 in northern San Luis Obispo County. Paso Robles is situated on the upper Salinas River. Paso Robles encompasses a total area of 11,985 acres on both sides of the Salinas River. The City also is situated on the western margin of the Paso Robles Groundwater Basin.

Paso Robles has a strong agricultural base, and remains the major service center for ranching and agriculture in the North County, particularly areas to the east along Highway 46. The City proper is a mix of residential, commercial and industrial land uses, with significant areas devoted to parks and open space. Paso Robles, with a 2005 population of 27,361, is a growing community that could attain a population of 44,000 at build-out. The existing and forecast demands are summarized in Table 4.49 following the discussion on County Service Area 16 (Shandon).

The City of Paso Robles has historically relied upon local water supplies from the Salinas River Underflow and from the Paso Robles Formation (which is part of the Paso Robles Groundwater Basin) for its municipal water supply. The deeper Paso Robles Formation currently contributes 2,856 AFY to City supply. The City plans to maintain this extraction rate in the future. Salinas River Underflow refers to shallow subterranean flows in direct connection with the Salinas River. This underflow is subject to appropriative water rights and permitting by the State Water Resources Control Board (State Board). An approved State Board application allows the City to extract up to 8 cfs (3,590 gpm) with a maximum extraction of 4,600 AFY (January 1 to December 31).

The City participates in the Paso Robles Groundwater Basin Agreement (Agreement) with the District, CSA 16 – Shandon, San Miguel CSD, and approximately 20 landowners that have organized as the Paso Robles Imperiled Overlying Rights (PRIOR) group. Key elements of the Agreement are a clear acknowledgement that the Paso Robles Groundwater Basin is not in overdraft now, and that the parties will not take court action to establish any priority of groundwater rights over another party as long as the Agreement is in effect. In addition, the parties agree to participate in a meaningful way in groundwater management activities, and to develop a plan for monitoring groundwater conditions in the groundwater basin.

To assure its water supply into the future, the City of Paso Robles will purchase water from the Nacimiento Water Project, which is projected to deliver 4,000 AFY of raw water. The City is progressing with its plans for a water treatment plant. In November 2011, the City Council authorized the implementation of a plant capable of treating 2,000 AFY of NWP water. This phase should be completed by 2015/16. The City will have the option of increasing its allotment of Nacimiento water to 8,000 as demand increases.

Another supply alternative being pursued by Paso Robles is the use of recycled wastewater. The City owns its own wastewater treatment plant, which currently provides secondary treatment. Several alternatives have been studied to upgrade treatment to the tertiary level, and it is assumed that one of these alternatives will eventually be pursued. 5,000 AFY of wastewater could ultimately be treated, but only 944 AFY would be needed to meet build-out demand. This margin of safety serves as a backup source in case of limitations on any of the other sources of supply.

The City has implemented a number of mandatory water conservation measures that were in force throughout the water service area. They include mandatory recycling or recirculation of water for car washes, cooling systems, and decorative fountains and several other practices designed to curb water waste. In the summer of 2011, the City lifted many of the mandatory requirements. Paso Robles is also a member in the San Luis Obispo County Partners in Water Conservation.

The City has targeted landscape irrigation as the water use practice with the highest potential for water conservation. Educational resources are available on the City website, in City offices, and in periodic brochures included with water bills. The City also sponsors a school education program that includes water conservation as a key component.

In general, City water quality is good, but has relatively high TDS and hardness. With regard to regional groundwater quality, the Estrella subarea of the Paso Robles Groundwater Basin is characterized locally by increasing TDS, chloride and nitrate concentrations. These adverse water quality trends are unlikely to affect the City's water supply in the near future, given that groundwater currently provided by the City meets all drinking water standards and the increases in TDS, chloride and nitrate are localized. Nonetheless, salt loading to the groundwater basin is an important long-term concern. Recognizing that the City's wastewater disposal is one source of salt loading, the Paso Robles has made the reduction of salt loading one of their water resource goals. Major means to reduce salt in the city wastewater include planned use of high-quality Lake Nacimiento supply, reduced use of home water softeners, strategic use of wells with lower salt concentrations, and implementation of an industrial waste discharge ordinance.

4.6.8.5.4 *County Service Area 16 (Shandon)*

Source: *2004 CSA 16 Water Master Plan, plus written updates provided by Jay Johnson, County of San Luis Obispo*.

County Service Area No. 16 (CSA 16) was formed in 1972 to furnish potable water to customers in the Shandon area. Narrative and data are based on the 2004 Water System Master Plan. CSA 16 provides water service to 284 residential customers, 11 public authorities, and one business. Shandon's urban reserve line encompasses areas outside of the existing service boundary, so the future size and composition of the customer base will likely change. Within the existing community of Shandon, build-out service is expected to reach up to 547 service connections. However, the Shandon Community Plan is being updated that could result in a total of 2,200 residential connections and over 50 commercial and public authority service connections. The projected population is approximately 8,125.

The current source of supply for the community of Shandon is groundwater from the Paso Robles Groundwater Basin. Two wells provide all the current needs of the community and the groundwater supply is deemed sufficient to meet water needs at build-out in the current service area. Additional wells and storage will be needed to meet peak demand requirements for build-out.

CSA 16 has no supplemental water source, but does have an allocation of 100 AFY from the State Water Project. Because of the high cost to develop this supply and the lack of need at the time, in 1995, the Board of Supervisors approved offering their 100 AFY allocation for sale to other entities in the County. Since that time, only 15 AF of the 100 AFY has been secured via a transfer option agreement. This agreement expired in 2009 without the transfer taken.

The water in Shandon meets all Federal and State drinking water requirements and overall can be considered very good quality water.

Table 4.49 San Miguel CSD, Camp Roberts, CSA 16, and Paso Robles Demand and Supply				
	San Miguel CSD	**Camp Roberts**	**Paso Robles**	**CSA 16 (Shandon)**
Demand				
Existing Demand (AFY)	235	190	4,063[7]	147
Forecast Demand (AFY)	466-582[6]	190	8,422-9,772[6][7]	271-1,100[8]
Supply				
Paso Robles Groundwater Basin(AFY)[1]				
Paso Robles Formation and/or alluvium (AFY)	235	190	2,856[2]	147
Salinas River Underflow (AFY)	0	0	537/872[3]	0
Other Groundwater Supply Sources (AFY)	0	0	0	0
SWRCB Water Diversions (AFY)	0	0	0	0
State Water Project (AFY)	0	0	0	66[4]
Nacimiento Water Project (AFY)[5]	0	0	4,000	0
Total Supply (AFY)	**235**	**190**	**7,728**	**213**

Notes:
1. The perennial yield was estimated to be 97,700 AFY (includes 16,400 AFY from the Atascadero Groundwater Sub-basin). Previous studies estimated that the total groundwater pumping in the basin during 2006, including Monterey County demands, was 88,154 acre-feet, which is 90 percent of the basin perennial yield.
2. The deeper formations of the Paso Robles Groundwater Basin contributes approximately 2,856 AFY to the City of Paso Robles supply. The City plans to maintain this extraction rate in the future.
3. The City of Paso Robles is permitted to extract up to 8 cfs (3,590 gpm) with a maximum extraction of 4,600 AFY (January 1 to December 31). For the purposes of this analysis, it was assumed that half (4,063 AFY) of the existing demand of 8,126 AFY was extracted from the Salinas

Table 4.49 San Miguel CSD, Camp Roberts, CSA 16, and Paso Robles Demand and Supply				
	San Miguel CSD	Camp Roberts	Paso Robles	CSA 16 (Shandon)

River Underflow via the Thunderbird Wellfied in WPA 13. The remaining permitted extraction of 537 AFY was pumped from wells within WPA 14. At build-out, it was assumed that Paso Robles would extract 3,728 AFY from the Salinas River Underflow in WPA 13 and the remaining 872 AFY would be extracted from Salinas River Underflow within WPA 14.

4. CSA 16 has an allocation of 100 AFY of State Water Project (but no drought buffer), but has not developed this supply due to high cost. State Water Project average allocation assumed 66 percent of contract water service amount, which equate to 66 AFY.
5. Nacimiento Water Project is scheduled to go online in 2010.
6. Twenty (20) percent additional water conservation (beyond what has already been accomplished) assumed for the low end of the forecast build-out demand for San Miguel and 10% for Paso Robles.
7. Existing demand was 8,126 AFY, but half (4,063 AFY) was supplied by the Thunderbird Wellfied in WPA 13. Therefore, the net demand in WPA 14 is 4,063. Of this 4,063 AFY demand, 537 AFY was supplied by Salinas River Underflow and 2,856 AFY was supplied by the deeper Paso Robles Formation aquifer. The build-out forecast demand ranged between 12,150 and 13,500 AFY. This analysis assumed that 3,728 AFY would be supplied by the Thunderbird Wellfield in WPA 13. Therefore, the net forecast demand is 8,422 to 9,772 AFY.
8. Upper end of the range reflects demand projected in accordance with the draft Shandon Community Plan should it be approved by the Board of Supervisors in the future.

4.6.8.5.5 *Rural Users*

The existing rural demand for WPA 14 is approximately 3,590 AFY and future demand ranges from 5,570 to 6,230 AFY.

4.6.8.5.6 *Agricultural Users*

The existing annual applied water for WPA 14 is approximately 67,610 AFY. The existing crops in this area include commodities from all crop groups. The projected future annual applied water for WPA 14 ranges from approximately 60,740 to 86,820 AFY. The projected future agricultural could exceed existing annual applied water due to increases in acreage of citrus, deciduous, pasture, vegetables, and vineyards.

4.6.8.5.7 *Environmental*

The eastern portion of the County (i.e., WPAs 9, 10, 11, 14, and 15) was ultimately excluded from the environmental water demand analysis due to the lack of data and regional physiographic differences.

4.6.8.5.8 *Salinas/Estrella WPA 14 Water Demand and Supply Summary*

Table 4.50 Salinas/Estrella WPA 14 Demand and Supply

	San Miguel CSD	Camp Roberts	Paso Robles	CSA 16 (Shandon)	Agriculture	Rural	Environmental [11]
Demand							
Existing Demand (AFY)	235	190	4,063[10]	147	67,610	3,590	
Forecast Demand (AFY)	466-582[9]	190	8,422-9,772[9][10]	271-1,100[12]	60,740-86,820	5,570-6,230	
Supply							
Paso Robles Groundwater Basin (AFY)[1]							
Paso Robles Formation and/or alluvium (AFY)	235	190	2,856[2]	147	[3]	[3]	
Salinas River Underflow (AFY)	0	0	537/872[4]	0	738[5]	0	
Other Groundwater Supply Sources (AFY)	0	0	0	0	Uncertain	Uncertain	
SWRCB Water Diversions (AFY)	0	0	0	0	[6]	[6]	
State Water Project (AFY)	0	0	0	66[7]	0	0	
Nacimiento Water Project (AFY)[8]	0	0	4,000	0	0	0	
Total Supply (AFY)	**235**	**190**	**7,728**	**213**	**Uncertain**	**Uncertain**	
Environmental Water Demand							

Table 4.50 Salinas/Estrella WPA 14 Demand and Supply							
	San Miguel CSD	**Camp Roberts**	**Paso Robles**	**CSA 16 (Shandon)**	**Agriculture**	**Rural**	**Environmental (11)**
Environmental Water Demand (AFY)(11)							Uncertain
Unimpaired Mean Annual Discharge(AFY)(11)							Uncertain

Notes:

1. The perennial yield was estimated to be 97,700 AFY (includes 16,400 AFY from the Atascadero Groundwater Sub-basin). Previous studies estimated that the total groundwater pumping in the basin during 2006, including Monterey County demands, was 88,154 acre-feet, which is 90 percent of the basin perennial yield.
2. The deeper formations of the Paso Robles Groundwater Basin contributes approximately 2,856 AFY to the City of Paso Robles supply. The City plans to maintain this extraction rate in the future.
3. It is assumed that the majority of water supply for agriculture and rural users comes from the Paso Robles Groundwater Basin.
4. The City of Paso Robles is permitted to extract up to 8 cfs (3,590 gpm) with a maximum extraction of 4,600 AFY (January 1 to December 31). For the purposes of this analysis, it was assumed that half (4,063 AFY) of the existing demand of 8,126 AFY was extracted from the Salinas River Underflow via the Thunderbird Wellfied in WPA 13. The remaining permitted extraction of 537 AFY was pumped from wells within WPA 14. At build-out, it was assumed that Paso Robles would extract 3,728 AFY from the Salinas River Underflow in WPA 13 and the remaining 872 AFY would be extracted from Salinas River Underflow within WPA 14.
5. SWRCB records indicate that 738 AFY could be diverted from the Salinas River (direct diversion or underflow). It is assumed that the entire amount is used for agriculture.
6. Diversions do not distinguish type of use. Potentially 4,884 AFY could be diverted for use to either agriculture or rural residential.
7. CSA 16 has an allocation of 100 AFY of State Water Project (but no drought buffer), but has not developed this supply due to high cost. State Water Project average allocation assumed 66 percent of contract water service amount, which equate to 66 AFY.
8. Nacimiento Water Project is scheduled to go online in 2010.
9. Twenty (20) percent additional water conservation (beyond what has already been accomplished) assumed for the low end of the forecast build-out demand for San Miguel and 10% for Paso Robles.
10. Existing demand was 8,126 AFY, but half (4,063 AFY) was supplied by the Thunderbird Wellfied in WPA 13. Therefore, the net demand in WPA 14 is 4,063. Of this 4,063 AFY demand, 537 AFY was supplied by Salinas River Underflow and 2,856 AFY was supplied by the deeper Paso Robles Formation aquifer. The build-out forecast demand ranged between 12,150 and 13,500 AFY. This analysis assumed that 3,728 AFY would be supplied by the Thunderbird Wellfield in WPA 13. Therefore, the net forecast demand is 8,422 to 9,772 AFY.
11. The eastern portion of the County (i.e., WPAs 9, 10, 11, 14, and 15) was ultimately excluded from the environmental water demand analysis due to the lack of data and regional physiographic differences.
12. Upper end of the range reflects demand projected in accordance with the draft Shandon Community Plan should it be approved by the Board of Supervisors in the future.

4.6.8.6 Cholame WPA 15

The primary source of water supply for this WPA is the Cholame Valley Groundwater Basin, and to a limited extent, other groundwater supplies and State Board water diversions.

4.6.8.6.1 *Urban Users*

WPAs 8, 9, 10, 11, and 15 do not have urban demand because there are no large population centers in these WPAs.

4.6.8.6.2 *Rural Users*

The existing rural demand for WPA 15 is approximately 10 AFY and future demand ranges from 150 to 190 AFY.

4.6.8.6.3 *Agricultural Users*

The existing annual applied water for WPA 15 is approximately 80 AFY. The existing crops in this area are primarily citrus (olive) crops. The projected future annual applied water for WPA 15 ranges from approximately 60 to 80 AFY. The projected future agricultural demand is approximately equal to the existing agricultural demand in this planning area. Given the current land use, the projection for WPA 15 in particular could be refined significantly by taking ranching operations water use and conservation easement provisions into account.

4.6.8.6.4 *Environmental*

The eastern portion of the County (i.e., WPAs 9, 10, 11, 14, and 15) was ultimately excluded from the environmental water demand analysis due to the lack of data and regional physiographic differences.

4.6.8.6.5 *Cholame WPA 15 Water Demand and Supply Summary*

pw://Carollo/Documents/Client/CA/SLOCFCWCD/8257A00/Deliverables/MWR 04

Table 4.51 Cholame WPA 15 Demand and Supply				
	Urban	**Agriculture**	**Rural**	**Environmental**[2]
Demand				
Existing Demand (AFY)	0	80	10	
Forecast Demand (AFY)	0	60-80	150-190	
Supply				
Cholame Valley Basin (AFY)[1]	0	80	10	
Other Groundwater Supply Sources (AFY)	0	Unlikely	Uncertain	
SWRCB Water Diversions (AFY)	0	41	0	
Total Supply (AFY)	**0**	**Uncertain**	**Uncertain**	
Environmental Water Demand				
Environmental Water Demand (AFY)				Uncertain
Unimpaired Mean Annual Discharge(AFY)				Uncertain
Water Supply Versus Demand Balance	**0**	**Uncertain**[2]	**Uncertain**[2]	**Uncertain**

Notes:
1. There is no information describing the basin yield.
2. The eastern portion of the County (i.e., WPAs 9, 10, 11, 14, and 15) was ultimately excluded from the environmental water demand analysis due to the lack of data and regional physiographic differences.

4.6.8.7 Nacimiento WPA 16

The primary source of water supply for this WPA is Lake Nacimiento, and to a limited extent, other groundwater supplies and State Board water diversions.

4.6.8.7.1 *Oak Shores*

The Nacimiento Water Company (NWC) serves the community of Oak Shores, which is on the banks of Nacimiento Lake. The NWC currently serves a population of 275 residents with water drawn from the lake, which is then treated prior to distribution. Plans to develop an additional 345 lots as part of Oak Shores Estates are currently on hold. The water supply allocation for Oak Shores is part of the 1,750 AFY reserved for County residents in the Lake Nacimiento area. The existing and forecast demands are summarized in Table 4.53.

4.6.8.7.2 *Heritage Ranch Community Services District*

Source: *2008 Heritage Ranch Water Master Plan with updates*

The Heritage Ranch Community Services District (Heritage Ranch CSD) was formed in 1990 to oversee water and sewer services for the Heritage Ranch community. It supplies its customers with domestic water service. Heritage Ranch is an unincorporated community located on the east side of Lake Nacimiento, approximately 15 miles northwest of the City of Paso Robles. Land use at Heritage Ranch consists mostly of residential, recreational, and open space areas with some commercial and public facility areas. A community that was originally started as a remote vacation destination with the vast majority of part-time residents has now become a bedroom community to neighboring cities with full-time residents.

As of September 2010, the Heritage Ranch CSD serves approximately 1,778 water customers. Based on a density of 2.0 persons per household, this equates to an existing population of approximately 3,556 persons. The Adopted Specific Plan for the Heritage Ranch CSD, prepared in 1972 and revised in 1980, limited the total number of developable units to 4,000. In 2004, the maximum number of developable units was revised a second time to its current maximum value of 2,900 units. Based on the average household size of 2.0 persons per household, it is anticipated that the Heritage Ranch CSD's total build-out population will reach 5,800 persons. The existing and forecast demands are summarized in Table 4.52.

The Heritage Ranch CSD only has one water supply source, the Gallery Well, which is fed via three horizontal wells located in the Nacimiento River bed just downstream of the Nacimiento Dam. Typically, the Nacimiento River is fed year-round by the release of water through the upper and/or lower outlet works in the dam at Lake Nacimiento. Monterey County Water Resources Agency monitors and controls the release of the water until the water level of the lake drops below 687 feet, at which time San Luis Obispo County may obtain control over the lake releases. The water is primarily released to sustain habitat in the river, provide water to farmers in the Salinas Valley, and halt sea water intrusion into the Salinas Valley, in addition to providing a water supply source to the Heritage Ranch CSD. If no water is released from the lake, which has rarely occurred in the past 50 years, the Heritage Ranch CSD will not have a water supply. Even though the water level of Lake Nacimiento has never dropped below the dam outlet, it has come close. The last time this occurred was in October of 1989, when the lake level dropped to within two feet above the lower outlet works.

The 1,100 AFY of allocation of Nacimiento Reservoir water designated for use in Heritage Ranch's service area is part of the 1,750 AFY reserved for County residents in the Lake Nacimiento area. It is sufficient to provide water for build-out demand, but the configuration of the delivery system leaves the Heritage Ranch CSD vulnerable to a termination in water supply in an extreme drought. Alternative sources are under consideration, including taking water directly from the lake and connecting to the Nacimiento Pipeline. A possible tie-in with Camp Roberts was explored, but is now considered as not being a feasible option due to the reluctance of Camp Roberts to consider any emergency water supply options.

Water demands over the last 3 years have decreased due to an increase in water rates and implementation of water conservation programs such as for toilet retrofits and turf conversion. While the Heritage Ranch CSD's water supply to its customers has historically met all primary water quality standards, it currently exceeds the limits for Disinfection Byproducts (DBP). The treatment plant has been ineffective in removing sufficient natural organic matter to prevent the formation of DBP. The District Board hired a water treatment process engineering consultant and received a report with recommendations on new treatment equipment to better control DBP in September 2010.

4.6.8.7.3 *Rural Users*

The existing rural demand for WPA 16 is approximately 280 AFY and future demand ranges from 730 to 880 AFY.

4.6.8.7.4 *Agricultural Users*

The existing annual applied water for WPA 16 is approximately 3,860 AFY. The existing crops in this area are citrus, deciduous, pasture, and vineyards. The projected future annual applied water for WPA 16 ranges from approximately 4,740 to 7,120 AFY. The projected future agricultural demand is higher than existing due to increases in acreage of citrus, deciduous, and vineyards.

4.6.8.7.5 *Environmental*

The unimpaired mean annual discharge for WPA 16 inclusive of the water management areas is approximately 251,124 AFY and environmental water demand of 108,390 AFY. WPA 16 was divided into three sub-watersheds and the unimpaired mean annual discharge and environmental water demand was calculated for these sub-watersheds. The major river in these sub-watersheds is the Nacimiento River.

4.6.8.7.6 *Nacimiento WPA 16 Water Demand and Supply Summary*

Table 4.52 Nacimiento WPA 16 Demand and Supply					
	Nacimiento Water Company(1)	**Heritage Ranch CSD**	**Agriculture**	**Rural**	**Environmental**
Demand					
Existing Demand (AFY)	(2)	619	3,860	280	
Forecast Demand (AFY)	(2)	935-1,039	4,740-7,120	730-880	
Supply					
Lake Nacimiento (AFY)	600(3)	1,100(3)	0	0	
Other Groundwater Supply Sources (AFY)	0	0	Uncertain(4)	Uncertain(4)	
SWRCB Water Diversions (AFY)	0	0	(5)	(5)	
Total Supply (AFY)	**600**	**1,100**	**Uncertain**	**Uncertain**	
Environmental Water Demand					
Environmental Water Demand (AFY)(6)(8)(9)					108,390
Unimpaired Mean Annual Discharge (AFY)(7)(8)(9)					251,120

Notes:
1. Nacimiento Water Company serves the community of Oak Shores.
2. No estimate available for the current or forecast demand.
3. The 600 AFY water supply allocation for Oak Shores is part of the 1,750 AFY reserved for San Luis Obispo County residents in the Lake Nacimiento area. Heritage Ranch CSD's allocation of Lake Nacimiento is 1,100 AFY.
4. Groundwater supply sources around Lake Nacimiento are the typical sources of supply for wells that serve agricultural and rural users. There

Table 4.52 Nacimiento WPA 16 Demand and Supply					
	Nacimiento Water Company(1)	**Heritage Ranch CSD**	**Agriculture**	**Rural**	**Environmental**

is no information describing the yield for these groundwater supplies.

5. Diversions do not distinguish type of use. Potentially 1,048 AFY could be diverted for use to either agriculture or rural residential.
6. Environmental Water Demand is defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. The federally threatened south-central California coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species for the development of a reasonable estimation of the amount of water needed to support this species.
7. Mean daily flow values from stream gaging stations representative of long-term, unimpaired (or natural) flow conditions were used to derive unimpaired mean annual discharge (MAD) estimates. The unimpaired MAD is the cumulative flow for the creeks within the water planning area that were included in the calculation.
8. Estimates for environmental water demand include the watershed area for the Nacimiento River Index-station (162 square miles); though the Index-station is within WPA 16, most of the watershed area is not.
9. The Environmental Water Demand and Unimpaired Mean Annual Discharge are calculated for the entire water planning area and not for individual streams.

4.7 ANALYSIS CRITERIA

The criteria below were used to determine whether a supply shortfall exists and to evaluate how well the proposed water management strategies address the shortfall.

4.7.1 Criteria for Declaring a Water Resource Shortfall

1. Do the existing water demands equal or exceed the dependable supply? (consistent with current criteria for RMS water supply)
2. Do the forecast build-out demands equal or exceed the available supply?

4.7.2 Criteria for Evaluating and Ranking Water Resource Management Strategies (management, projects, programs, policies)

1. The strategies should result in a sustainable and reliable water supply.
2. The strategies should optimize management of existing supply resources and infrastructure.
3. The strategies should reduce the dependency on imported supplies and promote local control.
4. The strategies should be consistent with and support existing County goals, policies, and documents, such as: the “Strategic Growth” principles adopted by the Board of Supervisors, the Conservation and Open Space Element (COSE), Integrated Regional Water Management Plan (IRWMP), Agriculture Element, and Climate Action Plan.
5. When comparing different strategies, the preferred strategy should have the least environmental impact with or without mitigation when compared to other options.
6. A strategy’s benefits and costs should be verifiable

The water management strategies were assigned scores from 0 to 5 for each criterion, depending on how well the strategy met the goals of the criteria. For example, if a strategy uses existing supply/infrastructure to a greater extent, and/or modernizes antiquated/inefficient supplies, then it received the maximum score of 5 for criteria number one. If on the other hand, a water management strategy makes minimal use of existing supplies and requires significant new infrastructure, then it received a 1 for the first criterion. The strategy received a 0 if it was not an existing supply or resource.

The process of assigning points to the water management strategies based on how well they met the goals of the criteria was conducted over two WRAC workshops. The outcome of these WRAC workshops resulted in the following ranking of the proposed strategies (from those that best addressed criteria to those that did not):

1. Conservation

2. Optimize use of the Nacimiento Water Project
3. Land Use Management
4. Recycled Water
5. Optimize use of State Water
6. Groundwater Banking/Recharge
7. Groundwater Supply Sources
8. Salinas Reservoir Expansion/Exchanges
9. Desalination
10. Lopez Lake Expansion/Exchanges
11. New Off-Stream Storage
12. Nipomo supplemental water project optimization
13. Precipitation Enhancement
14. New On-Stream Storage

4.7.3 Water Management Strategies

Presented below are conceptual water management strategies that were considered in this study to provide long-term water reliability and supply for the County. A brief description of each strategy is provided below, followed up with a more detailed discussion later in this section of the report.

4.7.3.1 Conservation Programs

Consistent with State Water Code and County Conservation Element Policies, a potential 20 percent reduction in demand could be achieved by some cities/districts and other water users in the county. Some of the potential challenges include:

- Some coastal communities and cities that have aggressively implemented conservation programs expect limited or no further reduction in demand due to conservation
- Tiered rate structures will likely be necessary to achieve conservation goals, which might meet resistance from some cities and agencies
- Cities and agencies need not to only pass policies that promote conservation, but also provide users the “tools” to conserve, such as free home water surveys and landscape audits, sustainable landscape workshops, and education campaigns
- Insufficient voluntary conservation by some rural and agricultural users and resistance to County/District implementation of mandatory conservation programs

This management strategy is consistent with and supports existing County goals, policies, and documents, such as: the “Strategic Growth” principles adopted by the Board of Supervisors, the Conservation and Open Space Element (COSE), Integrated Regional Water Management Plan (IRWMP), Agriculture Element, and Climate Action Plan. Local cities/agencies would implement conservation programs. The County would promote rural and agricultural conservation.

4.7.3.2 Optimize Use of the Nacimiento Water Project (NWP)

Six thousand, ninety-five (6,095) AFY of contractual supply and infrastructure capacity (northern reaches) is available to existing participants or other entities for direct delivery and treatment, groundwater banking/recharge, or other reliability programs. Some of the potential challenges include:

- Participation requests of other entities depend on whether or not the entity was part of the EIR. If entity was part of the EIR, then the request can proceed to the District Board of Supervisors for consideration. If not, then the entity must receive support of existing participants that represent at least 55 percent of existing subscription amounts before consideration by the District Board.
- Infrastructure capacity reduces in the southern reaches of the pipeline

This strategy optimizes management of an existing supply resource and infrastructure by using the NWP supply to its fullest before building new supplies. Additional allocations would be purchased by project participants or other entities.

4.7.3.3 Land Use Management

Integrating land use and water management consists of planning for the housing and economic development needs of a growing population while providing for the efficient use of water, water quality, energy, and other resources. The way in which we use land- the pattern and type of land use and transportation and the level of intensity- have a direct relationship to water supply. This strategy promotes reducing municipal and industrial water demand through water use efficiency, recycling, capturing and reusing storm water, recharging and protecting groundwater, protecting ground and surface water from failed septic systems, and encouraging growth in areas with sufficient reliable water supplies. Some of the potential challenges include:

- Resistance to mandatory actions and property rights issues.
- Lack of voluntary action to implement low impact development (LID) strategies

This strategy is consistent with and supports existing County goals, policies, and documents, such as: the “Strategic Growth” principles adopted by the Board of Supervisors, the COSE, IRWMP, Agriculture Element, and Climate Action Plan.

4.7.3.4 Recycled Water

Recycled water is a supply option available to all cities and agencies with a wastewater treatment plant. Some of the potential challenges include:

- Upgrade to existing wastewater treatment plant (WWTP) required. Level of treatment depends on the intended use.
- Sufficient users are needed to justify a recycled water project.
- Public perception to using recycled water for irrigation.

This strategy reduces the dependency on imported supplies and promotes local control. Local cities and agencies would implement recycled water projects.

4.7.3.5 Optimize Use of State Water Project (SWP)

Fifteen thousand, two hundred seventy-three (15,273) AFY of unsubscribed allocation could be used by SWP contractors, entities seeking to become contractors, and/or for groundwater banking/recharge or other reliability programs. Some of the potential challenges include:

- Hydraulic and treatment plant capacity constraints put limits on how this excess can be used
- Study to evaluate available capacity in SWP pipeline is on-going
- Construction of a raw water pipeline to transmit SWP water to the Paso Robles Groundwater Basin from Polonio Pass water treatment plant for groundwater recharge could be cost prohibitive
- Future reliability of SWP allocations (MWR assuming 66 percent as the average allocation)

This strategy optimizes management of an existing supply resource and infrastructure by using the SWP supply to its fullest before building new supplies. Negotiations between the State Department of Water Resources, District, Santa Barbara County Flood Control and Water Conservation District, the Central Coast Water Authority (CCWA) and existing participants regarding available capacity in the SWP Coastal Branch pipeline and contract revisions are required.

4.7.3.6 Groundwater Banking/Recharge

Groundwater management is the planned and coordinated management of a groundwater basin with a goal of long-term sustainability of the resource. Managed recharge occurs when water is placed into constructed recharge or spreading ponds or basins, or when water is injected into the subsurface by wells. Recharge basins are frequently used to recharge unconfined aquifers. Water is spread over the surface of a basin or pond in order to increase the quantity of water infiltrating into the ground and then percolating to the water table. This strategy optimizes the use of an existing supply and increases reliability. Recharge and banking could also be implemented by delivering surface water to a groundwater user in lieu of use of that groundwater. Some of the potential challenges include:

- Effects of land use changes on cost and siting of new or enlarged recharge facilities
- Water quality compatibility and regulations
- Infrastructure and operational costs
- Effect of operations on nearby overlying groundwater users
- Water accounting
- CEQA review and environmental permitting process

4.7.3.7 Groundwater Supply Sources

This water supply option is available to all entities that overlie or are near a groundwater basin. Examples include a community in need of a water supply coordinating with a landowner or other agency that overlies a basin with sufficient yield to transfer water; treating groundwater from a basin that is not typically used due to water quality; forming an organization to supply water to a group of homes or agricultural operations; an existing organization extracting more groundwater to meet demands; or individually extracting water from a groundwater basin the property owner overlies. Some of the potential challenges include:

- Ability to develop agreements for land and easements to locate utilities.
- Legality of/regulations regarding pumping groundwater from one basin for use in another basin needs to be investigated.
- For groundwater basins that are not typically used due to water quality problems, adding water treatment can be a short or long-term solution to address needs.
- Conflicts with overlying users and County policies
- Future use and safe yield

This strategy reduces the dependency on imported supplies and promotes local control.

4.7.3.8 Salinas Reservoir Expansion/Exchanges

Santa Margarita Lake/Salinas Reservoir could potentially increase its safe yield by 1,650 AFY. Some of the potential challenges include:

- Transfer of ownership from the Army Corps of Engineers to the District is under consideration.
- Major structural improvements to the dam would be necessary to install the spillway gates.

- Water rights issues and the ability to renew the expansion right.

This strategy optimizes management of existing supply resource and infrastructure by using Santa Margarita Lake/Salinas Reservoir supply to its fullest before building new supplies. At this time, it is uncertain which agency would lead the installation of spillway gates.

4.7.3.9 Desalination

Desalination is used to treat seawater as well as brackish water (water with a salinity that exceeds normally acceptable standards for municipal, domestic, and irrigation uses, but less than that of seawater). Desalination can be a reliable water supply alternative and a part of the solution for meeting current and future water needs. Some of the potential challenges include:

- Permitting and environmental issues could be complex, and implementation could take years.
- Brine disposal and energy use

This strategy reduces the dependency on imported supplies and promotes local control. Local cities and agencies would implement desalination projects.

4.7.3.10 Lopez Lake Expansion/Exchanges

There is a potential to increase the safe yield for existing project participants. Some of the potential challenges include:

- Arroyo Grande Habitat Conservation Plan may require additional downstream releases and affect available supply.
- Current study to evaluate the feasibility of modifying the dam to increase reservoir capacity ongoing.
- Increase in safe yield depends on the results of the feasibility study and the habitat conservation plan.

This strategy optimizes management of existing supply resources and infrastructure by using Lopez Lake supply to its fullest before building new supplies. The District would likely lead implementation of dam modifications to increase yield for existing participants.

4.7.3.11 New Off-stream Storage

This water supply option would capture surface water runoff for use during high demand periods. There a numerous challenges including, but not limited to:

- Substantial funding required
- Significant environmental and regulatory issues
- Lack of suitable sites

This strategy reduces the dependency on imported supplies and promotes local control.

4.7.3.12 Nipomo Supplemental Water Project Optimization

The Nipomo supplemental water project will consist of waterlines, a pump station and reservoir, flow meter facilities and an interconnect between the City of Santa Maria and Nipomo Community Services District water systems that is designed to deliver 3,000 acre-feet per year (AFY). The project will utilize regional water supplies to slow the depletion of groundwater, reduce the potential for sea water intrusion, be consistent with the settlement agreement and the judgment related to the groundwater adjudication, and increase the reliability of water supply by providing a diversity of water sources. The portion of the waterline that crosses under the Santa Maria River has a capacity of 6,200 AFY, providing a potential for increased deliveries in the future to further benefit the groundwater basin in the Nipomo area.

Some of the potential challenges with utilizing the additional capacity include:

- Negotiations between Nipomo area participants, the City of Santa Maria, Central Coast Water Authority, the District and DWR to determine a source of supply, which would likely include a portion of the District's excess State Water.
- Cost of additional infrastructure and the cost of the water.

This strategy optimizes management of existing supply resources and infrastructure by using the intertie to the fullest extent before building new supplies, but would likely use additional State Water.

4.7.3.13 Precipitation Enhancement

This supply option, commonly called "cloud seeding", artificially stimulates clouds to produce more rainfall than they would naturally. Some of the potential challenges:

- Proof of actual results from such a program
- Fear of environmental impacts associated with use of chemicals

This management strategy reduces the dependency on imported supplies and promotes local control.

4.7.3.14 New On-stream Storage

This water supply option would require the construction of a dam across an active river or stream to capture water for use during high demand periods. There a numerous challenges including, but not limited to:

- Substantial funding required
- Significant environmental and regulatory issues
- Lack of suitable sites

This strategy reduces the dependency on imported supplies and promotes local control.

4.7.4 Conservation Programs

4.7.4.1 Agriculture Conservation

The strategy to achieve agricultural water savings and benefits primarily includes improvements in on-farm technology and management. The strategy may be dependent on an array of factors such as labor, demographics, changes in government policies, funding availability, environmental stresses, desire to increase yield, education, energy costs, water supply development, water delivery systems, legal issues, economics, and land use issues. Improvements in agricultural water use efficiency primarily occur from three activities:

1. Hardware. Improving on-farm irrigation systems and water supplier delivery systems.
2. Water Management. Improving management of on-farm irrigation.
3. Crop Water Consumption. Reducing non-beneficial evapotranspiration.

Hardware Upgrades. Due to water delivery systems limitations, growers are often unable to apply the optimal amount of irrigation water. Water delivery system improvements such as integrated supervisory control and data acquisition systems (SCADA), and other hardware and operational upgrades, can provide flexibility to deliver water at the time, quantity, and duration required by the grower. At the on-farm level, many old and most new orchards and vineyards, as well as some annual fruits and vegetables, are irrigated using pressurized irrigation systems. Almost all trees and vines established since 1990 are irrigated using micro-irrigation. Between 1990 and 2000, the crop area under micro-irrigation in California grew from 0.8 million to 1.9 million acres, a 138 percent increase.

Many growers use advanced systems for irrigation, fertilizer application, and pest management. Advanced technologies include geographic information system (GIS), global positioning system (GPS), and satellite crop and soil moisture sensing systems. These technologies allow growers to improve overall farm management.

Water Management. On-farm delivery systems must be managed to take advantage of new technologies, science and hardware. Personal computers connected to real time communication networks and local area networks allow transmission of data to a centralized location. These features enable irrigation staff to monitor and manage water flow and to log data. With such systems, the irrigation staff spends less time manually monitoring and controlling individual sites, allowing them to plan and coordinate system operation, and potentially reduce costs. Such systems improve communications and provide for flexible irrigation, distribution, measurement and accounting.

Some of today's growers use satellite weather information and forecasting systems to schedule irrigation. Many growers employ evapotranspiration and soil moisture data for irrigation. Users generate more than 70,000 inquires per year to the California Irrigation Management Information System (CIMIS), DWR's weather station program provides evapotranspiration (ET) data. Universities, water suppliers, and consultants also make this information available to a much wider audience via newspapers, Web sites, and other media.

Reducing Evapotranspiration (ET). ET is the amount of water that evaporates from the soil and transpires from the plant. Growers can reduce ET by reducing unproductive evaporation from the soil surface, eliminating weed ET, and shifting crops to plants that need less water, or reducing transpiration through deficit irrigation. In addition, some growers deficit irrigate their crops during water short periods and for agronomic purposes. Management practices such as mulching, use of cover crops, no till and minimum tillage, dust mulching associated with dry farming reduce unnecessary evaporation from the soil surfaces. Some of these management/ cultural practices have energy conservation components as well.

4.7.4.1.1 *Potential Benefits of Agricultural Water Use Efficiency*

Growers may reduce pumping costs and preserve groundwater resources.

4.7.4.1.2 *Potential Cost of Agricultural Water Use Efficiency*

The CALFED (The CALFED Bay-Delta Program is a collaboration among 25 State and Federal agencies that came together with a mission to improve California's water supply and the ecological health of the San Francisco Bay/Sacramento-San Joaquin River Delta) Programmatic Record of Decision (ROD) estimates of 2000 estimated that efficiency improvements could result in statewide water savings ranging from 120,000 to 563,000 AFY by 2030 at a cost ranging from $35 to $900 per acre feet (CALFED 2000a). The analysis was based on improving on-farm efficiency up to 85 percent. It was assumed that the achieved 85 percent efficiency would be maintained afterward. Technical management and hardware limitations to achieve high performance levels for irrigation systems restrict irrigation distribution uniformities and on-farm efficiencies up to 85 percent, beyond which a sustainable and healthy soil environment cannot be maintained. It is possible that higher than 85 percent irrigation efficiencies could result in soil salinity, soil degradation, and loss of productivity.

4.7.4.1.3 *Major Issues Facing Agricultural Water Use Efficiency*

Funding and Implementation. Implementation of agricultural water use efficiency depends on many interrelated factors. Farmers strive to optimize agricultural profits per unit land and water without compromising agricultural economic viability, water quality, or the environment. Success depends not only on availability of funds but also on technical feasibility and cost-effectiveness, availability of technical assistance, and ability and willingness of growers. Other factors such as soils and topography, micro-climate, markets, etc., play important roles as well. Implementation of efficiency measures requires consideration for crops grown, groundwater and/or surface water availability, and water quality, flow and timing, energy efficiency, and other benefits to the growers to provide regional benefits. Comprehensive implementation of efficiency measures must, to the extent of possible, include multi-purpose and multi-benefit projects.

Reducing ET requires precise application of water. Stressing crops through regulated deficit irrigation (RDI) is one approach that requires careful scheduling and application of water and may have additional costs and adverse impacts on crop quality or soil salinity.

Many growers are concerned about existing and potential water use efficiency legislation and believe that implementing efficiency measures could affect their water rights. They believe that conserved water may be used by others, causing loss of rights to the conserved water. This belief may impede implementation of water use efficiency strategies. It is believed that the water rights of agencies implementing efficiency measures will be protected, however, there are claims that the State Board has not recognized and protected conserved water.

Measurement and Evaluation. Lack of data is an obstacle for assessing irrigation efficiencies and planning for further improvement. The County lacks comprehensive County-wide data on cropped area under various methods of irrigation, applied water, crop water use, irrigation efficiency, water savings, and the cost of irrigation improvements per unit of saved water. Collection, management and dissemination of data to growers, and water resource planners are necessary for promoting increased water use efficiency.

Dry-Year Considerations. In dry years, growers that rely on state water deliveries are compelled to reduce irrigated acreage to cope with the lack of water and implement extraordinary water use efficiency or even land fallowing. While agricultural water suppliers deal in a variety of ways with water shortages and droughts, there is a need for an agricultural drought book.

4.7.4.1.4 *Recommendations to Achieve More Agricultural Water Use Efficiency*

1. Coordinate with appropriate local entities to disseminate information on conservation best management practices and identify and establish priorities for grant programs and other incentives. Priority funding may be for technical, planning and financial assistance to improve water use efficiency including implementation, monitoring and reporting of certain programs.
2. Coordinate with appropriate local entities to improve online data collection and dissemination networks to provide growers with immediate meteorological and hydrological information on climate, soil conditions, and crop water needs.
3. Coordinate with the appropriate local entities to develop methods to quantify water savings and costs associated with hardware upgrades, water management, and ET reduction projects identified in this strategy.

4.7.4.2 Urban and Rural Water Use Efficiency

Urban and rural water use efficiency results in benefits to water supply and water quality through technological and behavioral improvements that decrease indoor and outdoor residential, commercial, industrial, and institutional water use. Water use efficiency has multiple benefits. Excessive urban and rural water use result in increased runoff, groundwater overdraft, groundwater contamination, excessive flows to wastewater treatment plants, and increased green waste in the landfills. The volume and timing of surface water diversions to meet excessive use of water can produce environmental impacts. The impacts have substantial economic and financial consequences for water suppliers and consumers.

The recent challenges to California's water supply include:

4. Environmental Degradation
5. Legal and Regulatory Actions
6. Climate Change
7. Drought
8. Water Quality

In response to these challenges, California's government has responded in different ways over the past decade and has made substantial progress in developing mechanisms for further water conservation by 2020 that affect County water users. The major actions taken are the Governor's 2009 plan for 20 percent water use reduction target by 2020 which led to major water conservation legislation in 2009. Also of significance is the updating of the best management plans (BMPs) and the development of and requirements specified in the updated Model Water Efficient Landscape Ordinance, which is expected to result in significant water conservation in landscape irrigation.

The draft 20X2020 Water Conservation Plan recommendations include:

1. Establish a foundation for a statewide conservation strategy
2. Reduce landscape irrigation demand
3. Reduce water waste
4. Reinforce efficiency codes and related BMPs
5. Provide financial incentives
6. Implement statewide conservation public information and outreach campaigns
7. Provide new or exercise exhibiting enforcement mechanisms to facilitate water conservation
8. Investigate potential flexible implantation measures

9. Increase the use of recycled water and non-traditional sources of water

4.7.4.2.1 *Potential Benefits of Urban and Rural Water Use Efficiency*

Drought Preparedness. The primary benefit of improving water use efficiency is the lowering of demand and the ability to cost-effectively stretch existing water supplies. Once viewed and invoked primarily as a temporary source of water supply in response to drought or emergency water shortage situations, water use efficiency and conservation approaches have become viable long-term “supply options”, saving considerable capital and operating costs for utilities and consumers, avoiding environmental degradation, and creating multiple benefits. Reduced water demand will free up water in normal and wet years. Saved water can be carried over to another time if a supplier has surface or groundwater bank and returns it for use during drought years.

Sustainability. Water use efficiency is a foundational action for water use sustainability. In order to ensure that water uses are sustainable, water management at all levels-State, federal, regional, and local- must be based on three foundational actions: use water efficiently, protect water quality, and support environmental stewardship.

Environmental Benefits. Conservation of applied water may result in increased stream flows and water quality benefits. Conservation has the added benefit of increasing the amount of developed water available for human uses at no added cost to other users or the environment. The timing of such additional flows is often critical to maintaining endangered habitats. Water use efficiency can also reduce peak demand, curb runoff from landscape irrigation, and reduce green waste caused by inefficient watering of landscape.

Economic and Financial Benefits. One way to assess the benefits of a conservation measure is to compare the cost of producing an acre-foot of water supply savings implemented under the measure to the cost of acquiring and using one more acre-foot of supply. The avoided costs of developing a new supply, including the cost of distribution systems, water supply treatment facilities, and wastewater treatment facilities are benefits at the water agency level. These avoided costs include energy costs, which can be substantial component of water development, delivery, treatment, and use cost.

4.7.4.2.2 *Potential Costs of Urban and Rural Water Use Efficiency*

According to the CALFED report, costs can range from \$223 per acre-foot to \$522 per acre foot (CALFED 2006). Conservation’s role in water management depends on a variety of regional and local considerations.

4.7.4.2.3 *Major Issues Facing Urban and Rural Water Use Efficiency*

Funding. Even in less challenging times it has been difficult to secure funding on the scale required to reap the full water supply and the economic and environmental benefits of water use efficiency. Also, as water use efficiency increases, revenue through rates decreases.

Increases in rates could be needed to offset the reduction in water sales and to fund various conservation programs.

Program Implementation. There are a number of challenges faced by agencies when implementing water conservation programs. A study sponsored by the California Urban Water Agencies (CUWA) identified a number of these implementation challenges for urban water conservation programs. The CUWA-sponsored study recommends collaborative action by agencies, further research, and continued State or federal support to address the implementation challenges. The CUWA study concludes that the program should be as easy as possible for customers; its design should be simple; it should provide customers with guidance on water efficient fixtures; it should be coordinated with other agencies regarding permitting or potential funding; and it should emphasize a high level of customer service.

Implementation of urban and rural water conservation measures requires local and state investment in not only changing the traditional water use fixtures and technologies to more water and advanced technologies, but changing water use behavior by customers. These actions require substantial investments, but sufficient funding has not been available and the recent State budget deficits and delays in grant program implementation. Changing water use habits requires public education, outreach, incentives and disincentives.

Data Collection. Easily retrievable, standardized, and comprehensive baseline data can be challenging to implement and maintain. Documentation and evaluation of the achievements attributed to water use facility projects and programs- vital elements of successful; water use efficiency efforts- need to be improved. Tracking water use in order to document savings is necessary to gain an accurate understanding of the full cost, value, impact, and direction of urban and rural water use efficiency strategies. The measurement of water use and providing it to the water user are essential to efficient water management. The quantification of benefits for many projects lacks the necessary level of scientific rigor.

At the State level, DWR has organized a statewide network of people to improve California's analytical capabilities in support of water management decisions and investments. Improving these analytical capabilities will require significant participation by local, state, and federal agencies, organizations and governments. DWR will collaborate with interested stakeholder to improve analytical tools and share data through a Statewide Water Analysis Network (SWAN). Due to lack of data integration among various planning efforts, in cooperation with the SWAN, DWR agreed to begin the effort improving information exchange. DWR has also developed the Digital Online Submittal Tool (DOST), Water Plan Information Exchange (WaterPIE), and Integrated Water Resources Information System (IRWIS). All of these databases will serve as important data collection and dissemination tools for water resources agencies throughout the State.

At a regional level, the County collects information for the Resource Management System.

Landscape uses significant amount of water. Without a water meter or a landscape dedicated water meter, it is difficult to accurately assess landscape water use and implement appropriate programs to prevent water waste. AB 1881 (2006) requires that retail water suppliers require a dedicated water meter for landscapes with area greater than 5000 square feet for all but single family residential new connections. This requirement will allow monitoring and collection of water use data for local agencies' implementation and enforcement of the agency's landscape ordinance.

4.7.4.2.4 *Recommendations to Achieve Urban and Rural Water Use Efficiency*

1. Agencies should continue to support the California Urban Water Conservation Council and participation of other stakeholders, to improve upon the best management practices reporting and standardize utility billing and reporting systems by customer type and units of measure and identify industrial water use customers by North American Industry Classification System (NAICS).
2. Continue with public outreach efforts by being a part of such agencies as Partners in Water Conservation (PIWC), a County group that takes part in activities such as distributing brochures and hosting workshops to promote smarter landscaping to conserve water.

4.7.4.3 Economic Incentives

Economic incentives include financial assistance, water pricing, and water market policies intended to influence water management. Economic incentives can influence the amount of use, time of use, wastewater volume, and source supply.

Examples of economic incentives include low interest loans, grants, and water rates and rate structures. Free services, rebates, and the use of tax revenues to partially fund water services also have a direct effect on the price paid by water users. Government financial assistance can provide incentives for integrated resource plans by regional and local agencies. Also, government financial assistance can help water suppliers make incentives available to their water users for a specific purpose. Assistance programs can also help align the economic and financial drivers (e.g. marginal costs) affecting local, regional, and statewide water management decisions to minimize working at cross-purposes and maximize the benefits of working cooperatively with consistent goals and objectives. As opposed to incentives, promote economic disincentive that can be used to discourage undesirable water use behavior.

Marginal cost pricing is one strategy to help promote more efficient water use. With marginal cost pricing, instead of being based on average unit costs, the volumetric rates to all customers would be based on the unit cost to the water purveyor of the last, and probably most expensive, source of supply. In a much milder form, marginal cost pricing for "new" customers (e.g. residents of a new subdivision) might reflect the average cost after factoring in the cost of the additional water supply needed for those customers. This price would be higher than that for existing customers.

DWR and the State Water Resource Control Board (State Board), and the California Department of Public Health (CDHP) have run multimillion dollar bond-funded programs which have provided grant and low interest rate loan money to many local agencies for integrated regional management, water conservation, water recycling, distribution system rehabilitation, groundwater storage, water quality improvement, conjunctive use projects, and drinking water treatment. These programs are intended to encourage local agencies to adopt water management practices which have a statewide as well as local benefit.

4.7.4.3.1 *Potential Benefits of Economic Incentives*

A major purpose of economic incentives is to promote water management practices that meet federal, State, regional, and local policy goals. Incentives may produce environmental or social benefits, or avoid or delay construction of new water supply projects by promoting water use efficiency. When water costs increase, for example, customers have a choice to either pay the higher water bill or find ways to use less water, such as using a broom and a blower to clean sidewalks instead of a hose. Residential customers might install smart irrigation controllers or change to drought resistant landscaping. Industrial users may adopt process technologies that use less water or move to on-site recycling. Agricultural users may shift crop types, change their irrigation technology or reduce acreage they irrigate.

It is difficult to quantify benefits provided by economic incentives since the incentives influence decisions on other management strategies that produce their own benefits. Economic incentives can be used to influence development of water supply augmentation or demand reduction programs that promote regional self sufficiency. For example, grant funds from a State agency can help promote recycling by reducing its cost to local suppliers. Similarly, a wholesale water agency might make financial assistance available to retail water purveyors to encourage implementation of projects or programs that would benefit the region. Financial assistance can also be used to achieve beneficial changes in water system storage, conveyance, and treatment operations. The willingness of a water agency to participate in water marketing can also influenced by economic incentives.

4.7.4.3.2 *Potential Costs of Economic Incentives*

One financial cost of an incentive program to a water purveyor or government agency is the cost of its creation and administration, including the costs of arranging bond funding or low interest rate financing. Grant programs include the cost to the taxpayers of obtaining and repaying grant funds. Other costs would be associated with the adoption of water management strategies or water use behaviors- including forgoing some after use- that may result. The costs of the economic incentives will depend on how the incentives are integrated with other management strategies. As with other management strategies, economic incentives must be specific to the circumstances and water management goals of each individual water supplier.

Another type of cost can arise from the possibility that an incentive will result in actions not aligned with policy goals or that incentives will operate at cross purposes (i.e. have unintended consequences). To the extent that resources are misallocated, a loss in economic, social and/ or environmental well-being will be incurred compared with fewer losses, if any, from a better allocation of resources.

4.7.4.3.3 *Major Issues Facing Additional Economic Incentives*

Selecting Appropriate Water Rates. A major consideration is determining what rates to charge customers while ensuring that costs of providing the water (including conveyance, treatment, and distribution) and treating and disposing of the wastewater are recovered. Also, managing water rate changes during water shortages can be challenging since incremental costs of supply can both increase dramatically and change rapidly, making it more difficult to recover costs.

Incidence of Costs of Incentives. Economic incentives can affect social equity when those incurring the costs of providing incentives through higher taxes or fees do not receive a fair share of the benefits that the incentives are expected to generate. As an example, increasing the costs for agricultural water supplies increase the efficiency of on-farm water use, but can also induce changes in crop patterns that result in lower farm employment. Communities dependent on farm production may by disproportionately affected. In the urban sector, if water rate changes reduce the use of ornamental landscaping, jobs that depend on establishing and maintaining landscaping could be lost.

Incentives for water transfers can result in more water moving out of agricultural production and into other uses on a temporary or permanent basis. Communities supplying inputs to farm production through farm labor, farm equipment sales and repair, crop harvesting, hauling, and storage services; and banking, legal, and farm management services may be adversely affected. This is a bigger issue in communities more heavily dependent on supplying these inputs.

Environmental Justice. Pricing policies that are designed to promote efficiency may affect the ability of disadvantaged populations to purchase sufficient water to maintain a minimal lifestyle. Some type of lifeline rate may be desirable in these cases. Also, obligations placed on the general fund through bond measures adopted to provide financial incentives creates repayment burdens that jeopardize funding capacity available for social programs that benefit the disadvantageous.

4.7.4.3.4 *Recommendations to Help Promote Economic Incentives.*

1. Institute water rates that support better water management based on the unique conditions in each water service area.
    a. Use volumetric pricing wherever practicable and economically efficient
    b. Use tiered pricing to the extent that it improves water management, including consideration of higher prices for water in excess of agricultural and urban vegetation management requirements.
    c. Recover more costs from variable charges and fewer costs from taxes and fixed water charges as is financially prudent

2. The County should consider coordinating with local agencies in using planning methods and adopting policies that promote long-run water use efficiency on a regional basis while accounting for policies on environmental and social well-being.

4.7.5 Optimize Use of the Nacimiento Water Project

The Nacimiento Water Project (NWP) is described in Section 3.2.4. Currently, 9,655 AFY of water available from the project is subscribed for and 6,095 AFY is unsubscribed for. The following are examples of how the use of the NWP could be optimized.

Unsubscribed Urban Use: This would entail direct delivery of the unsubscribed water to existing or new urban participants.

Unsubscribed Non-Urban Use: This would entail delivery to new rural and/or agricultural participants directly or via wheeling through existing participants' infrastructure.

Groundwater Banking or Recharge: This would entail direct or in-lieu delivery of subscribed and/or unsubscribed water to a recharge location for later extraction and/or to benefit the groundwater basin. In-lieu delivery refers to delivering additional NWP water to existing participants in-lieu of those existing participants pumping groundwater.

Exchanges: This would entail using the unsubscribed water in exchange of a currently used water resource. Examples include connecting CMC or Cal Poly to the NWP and freeing up State Water and/or Whale Rock Reservoir water for use by others; the City of San Luis Obispo utilizing additional water from the NWP and freeing up Salinas Reservoir water for use by others; or delivering unsubscribed water to urban areas to free up groundwater for rural and/or agricultural users.

4.7.5.1 Potential Benefits of Optimizing the use of the Nacimiento Water Project

Unsubscribed Urban/Non-Urban Use: Direct delivery of the unsubscribed water may offset demand on another water resource, such as groundwater, and/or eliminate the need to implement additional water supply projects, depending on the projected water supply deficiency.

Groundwater Banking or Recharge: Since unused NWP water, per contract provisions, cannot be "stored" in the reservoir and accumulated for later use, taking delivery of the unused water for recharge into the Paso Robles Groundwater Basin could improve basin conditions and improve supply reliability for participants in the banking and/or recharge program. Such a program could also make NWP water available annually for beneficial use.

Exchanges: Exchanges would allow those entities with water supply needs that would not feasibly be able to connect directly to the NWP to receive a supply from a source that they are already connected to, or that would be more feasible to connect to. Such an exchange promotes use of existing water supply systems ahead of developing new supplies.

4.7.5.2 Potential Cost of Optimizing the use of the Nacimiento Water Project

Unsubscribed Urban/Non-Urban Use: Costs include those for NWP operations and maintenance and the costs of any improvements to local treatment and/or delivery systems needed to convey the additional water. New participants in the NWP, or existing participants seeking to use more than their proportionate share of the unsubscribed water available, would also need to consider the cost to “buy-in” to the NWP, essentially reimbursing the original participants for the cost of the existing infrastructure. Costs would also be incurred if the water is wheeled through the existing infrastructure of an entity to the new participant.

Groundwater Banking or Recharge: Costs include those for NWP operations and maintenance and the costs of developing (or improving in the case of an in-lieu banking/recharge program) a local treatment and/or delivery system to and into (if direct) the recharge locations. A cost to “buy-in” to the NWP may also be incurred depending on the program participants. Costs may also be incurred if the water is wheeled through the existing infrastructure of an entity. Additional costs for groundwater banking or recharge projects are described in Section 3.8.9, which include the legal and institutional issues involved with groundwater banking while preserving the water rights of the overlying users.

Exchanges: Costs to consider include those associated with the difference in cost between an existing NWP participant to take additional NWP water versus the supply to be exchanged, and any other costs that participant may require. The exchange beneficiary may also incur costs for modifying their local treatment and/or delivery systems to take the water from the exchanged source of supply.

4.7.5.3 Major Issues Facing Optimization of the use of the Nacimiento Water Project

The affordability, potential participants/beneficiaries, and mechanism for funding the options for optimizing the NWP would need to be considered and determined.

Unsubscribed Urban Use: Existing participants have evaluated their future water needs and have subscribed for a quantity of water to meet their needs. Additional use of NWP water by existing participants would more likely occur via mechanisms discussed below.

Challenges for new urban participants include the affordability of buying in to the NWP and developing adequate infrastructure to take delivery of the water since it is a raw water supply, determining a fair buy-in cost, and the process by which new participants are considered (i.e. in the EIR versus not in the EIR) as described in Section 3.2.4. The quantity of water available depends on where along the NWP infrastructure the new participant is located.

Unsubscribed Non-Urban Use: In addition to the challenges for new urban participants, non-urban participants may face challenges due to local agency and/or County policies regarding wheeling water, annexations and use of surface water in rural and agricultural areas. Rural and agricultural water users are largely individualized, which adds to the institutional and financial challenges of implementing a project to deliver NWP to rural and agricultural areas.

Groundwater Banking or Recharge: Challenges to implementing a groundwater banking or recharge project include defining the project participants and beneficiaries, institutional considerations regarding those that would be affected by the project but are unwilling to participate, determining fair costs for all beneficiaries, and, mainly for direct delivery, the ability of the groundwater basin to accept recharge, the environmental impacts of developing recharge facilities, accountability of the recharged water and water quality compatibility. For a banking project, appropriate design, operation and monitoring would be necessary to ensure extractions of banked water would not have a negative impact on the groundwater basin with respect to without project conditions.

While there are some losses to the basin that result in an overall benefit to its safe yield if done in perpetuity, banking projects are generally a reliability improvement option versus an option to provide additional supply since the amount of NWP water available annually would likely be taken directly to meet demands over time. The same may be true for a recharge project, unless there was agreement to utilize unsubscribed water for recharging the basin on a permanent basis.

Additional issues for groundwater banking or recharge projects are described in Section 3.8.9.

Exchanges: In addition to those listed in Unsubscribed Urban/Non-Urban Use above, challenges to implementing an exchange program include the feasibility of connecting to an exchanged supply source if not connected already, water rights issues regarding the place of use of the exchanged supply source, determining the institutional arrangements needed and associated costs, affordability, and stakeholder impacts.

4.7.5.4 Recommendations to Optimize the use of the Nacimiento Water Project

The NWP is a reliable source of water due to the nature of contract provisions and the quantity of the District's allocation as compared to the capacity of the reservoir. It is less likely that any of the District's allocation would be permanently set aside for reliability purposes. Given the affordability and institutional challenges associated with new urban or non-urban participants, and associated with a banking/recharge program that would likely only have a short-term benefit, and that potential direct urban participants would conduct their own evaluation regarding the NWP as a water supply option, the District should coordinate with interested entities to evaluate the potential for optimizing the use of the NWP by implementing exchange programs utilizing existing water supply systems that the District operates. Steps for evaluating exchange opportunities may include:

- Developing exchange scenarios and evaluating each scenario regarding the needs, willingness of participants, capacity availability, stakeholder review and/or approval, exchange valuation assessments, and water rights issues
- Conducting flow tests or reservoir releases to evaluate the benefit of exchange scenarios

4.7.6 Land Use Management

More efficient and effective land use patterns promote integrated regional water management (IRWM). Integrating land use and water management consists of planning for the housing and economic development needs of a growing population while providing for the efficient use of water, water quality, energy, and other resources. The way in which we use land- the pattern and type of land use and transportation and the level of intensity- have a direct relationship to water supply and quality, flood management, and other water issues.

The County's projected growth, urban, and rural development increases the pressure on natural resource conservation and amplifies the need for a comprehensive land use decision-making process. Managing rural development and promoting strategic growth to govern the conversion of agricultural land to rural development should reduce the stress on limited groundwater resources. This advisory resource management strategy describes how sustainable land use decision can improve water supply and quality, increase flood protection, conserve vital natural habitat, and lead to more efficient energy use.

Pollution Prevention. Proper land use management practices are important for pollution prevention, preventing sediment and pollutants from entering the source water. These pollutants are generated from land use activities associated with development, animal grazing, uncontrolled urban and rural runoff from development activities, and discharges from marinas and recreational boating activities. The Regional Water Quality Control Board has several point and non-point source pollution control programs to manage pollution.

Salt Management. Salts have been managed and mismanaged over the centuries in all parts of the globe. Mismanagement has often been attributable to a poor understanding of the dynamics of salt movement (how displaced salt can accumulate over time to salinize soils and aquifers; in much the same way as sweeping a room displaces dust). Unless sufficient dust is picked up and taken out of the room at some point, it will continue to accumulate and re-disperse, ultimately making the room unfit for use. Traditional irrigation practices, residential users (e.g. water softeners), and some industries can lead to salt accumulation and degradation of groundwater quality.

Developed Area Runoff Management. Developed area runoff management is a broad series of activities to manage both storm water and dry weather runoff for urban and rural areas. Dry weather runoff occurs when, for example, excess landscape irrigation flows to the storm drain. Traditionally, urban or rural runoff management was viewed as a response to flood control concerns resulting from the effects of development or urbanization. Concerns about water quality impacts of runoff led water agencies to look at watershed approaches to control runoff and provide other benefits.

Urbanization and rural development alter flow pathways, water storage, pollutant levels, rates of evaporation, groundwater recharge, surface runoff, the timing and extent of flooding, the sediment yield of rivers, and the suitability and viability of aquatic habitats. Development creates impervious surfaces resulting in the loss of infiltration of storm water into subsurface aquifers. These impervious surfaces collect pollutants that are washed off to surface waters during rain events. The impervious surfaces also increase runoff volumes and velocities, resulting in stream bank erosion, and potential flooding problems downstream. Because of the emphasis on removing the water quickly, the opportunity to use storm-generated runoff for multiple benefits is reduced.

Agricultural Lands Stewardship. Agricultural lands stewardship broadly means the conservation and protection of the environment. Land managers practice stewardship by conserving and improving land for food, fiber and biofuels production, watershed functions, soil, air, energy, plant and animal and other conservation purposes. Agricultural lands stewardship also protects open space and the traditional characteristics of rural communities. Moreover, it helps landowners maintain their farms and ranches rather than being forced to sell their land because of pressure from urban development.

There are many ways that agricultural lands can be managed to conserve and/or protect water resources. Croplands can be managed to reduce or avoid stream bank erosion or storm water runoff. Stream bank stabilization may include a buffer strip of riparian vegetation which slows bank erosion and filters drainage water from the fields. Measures such as these can minimize or reduce the effects of agricultural practices on the environment and help meet governmental regulatory requirements while also reducing long-term maintenance problems for the landowner.

While good agricultural land management can successfully prevent many problems discussed above, implementing such measures are costly in terms of time, money or productive lands for crop production. Such costs are often immediate while the potential problems associated with soil erosion or other issues are long-term costs.

Recharge Areas Protection. Recharge areas are those areas that provide the primary means of replenishing groundwater. Good natural recharge areas are those where good quality surface water is able to percolate through the sediments and rocks to the saturated zone, which contains groundwater. If recharge areas cease functioning properly, there may not be sufficient groundwater for storage or use. Protection of recharge areas requires a number of actions based on two primary goals:

1. Ensuring that areas suitable for recharge continue to be capable of adequate recharge rather than covered by urban infrastructure, such as buildings and roads

2. Preventing pollutants from entering the groundwater to avoid expensive treatment that may be needed prior to potable, agricultural, or industrial beneficial uses.

Water Dependent Recreation Planning. By incorporating planning for water-dependent recreation activities in water projects, water managers play a critical role in ensuring that people today and into the future are able to enjoy such activities. For example, acquiring land for picnic tables and accessible trails near a planned reservoir can provide visitors a relaxing day by the water. If these were not included, a valuable water dependent recreation opportunity is missed.

Demand for water dependent recreation opportunities can become so great that it exceeds the capacity of the current infrastructure. As a result, many of these facilities could be overused, jeopardizing natural and cultural resources and degrading the recreational experience.

Watershed Management. Watershed management is the process of creating and implementing plans, programs, projects, and activities to restore, sustain, and enhance watershed functions. These functions provide the goods, services and values desired by the community affected by the conditions within a watershed boundary. In California, the practice of community-based watershed has evolved as an effective approach to natural resource management practiced in hundreds of watersheds throughout the state. These community-based efforts are carried out with the active support, assistance, and participation of numerous state agencies and programs.

4.7.6.1 Potential Benefits from Land Use Management

Land use management has many topics that can have benefits to local and regional water supply. While the benefits from these topics are different they all lead to these four main benefits:

1. Water Supply. Reducing municipal and industrial water demand through water use efficiency, recycling, capturing and reusing storm water, recharging and protecting groundwater, protecting ground and surface water from failed septic systems, and encouraging growth in areas with sufficient reliable water supplies.
2. Flood Management. Keeping people and structures out of flood hazard zones, reducing runoff volumes and intensity, and preserving ecological resources.
3. Water Quality. Reducing runoff volumes and improving runoff water quality.
4. Climate Change. Reducing green house gas emissions.

Some additional benefits from land use management are included below.

Environmental Benefits. Environmental benefits from land use management include improved efficiency, reduced energy consumption while maintaining working landscapes, habitats, and open spaces. In addition to these direct environmental benefits of land stewardship, farmlands proximate to urban populations can benefit the environment by providing local sources of food requiring less transportation and storage, thereby conserving energy and land. While environmental benefits can successfully prevent many problems discussed above, implementing such measures are costly. Such costs are often immediate while the potential problems are long-term costs.

Recreational Opportunities. Preserving open spaces provides a source of public recreational activities.

4.7.6.2 Potential Cost of Land Use Management

Costs to local individuals for pollution prevention can be cost prohibitive and exceed the financial resources available to local agricultural operations.

Cost Associated with Pollution Prevention. According to the 2008 USEPA Clean Water Needs Survey, California has more than $21 billion of needs to prevent both point source and non-point source (NPS) pollution. This survey though, emphasized the point source discharges, which represents $20 billion of the needs, and likely underestimated the cost of measure to adequately prevent NPS pollution. An assessment of water quality conditions in California shows that NPS pollution has the greatest effect on water quality. It affects some of the largest economic segments of the state’s economy, from agricultural development to the tourist industry.

Salt Management. A 2007 study illustrates the wide range of costs that a single industry might face in dealing with salt management. Rubin, Sundig, and Berkman (2007) investigated the cost of managing TDS at food processing plants and found that costs for removing total dissolved solids (TDS) by various means ranged from $258 per ton (deep well injection of collected untreated effluent) to over $8,000 per ton (end of pipe effluent treatment). While cost variability is high, multiple salt management options are necessary because the least-cost salt management option appropriate for a given area may be inconsistent with sustainability when considered in a broader context of local, regional or statewide salt management, energy consumption, water availability or other resource issues.

Recharge Areas Protection. Some of the costs that may be associated with protecting recharge areas are:

- Purchase or lease price of the land that is to be used for a recharge area
- Design and construction of facilities
- Land that is reserved for recharge areas cannot be used for other purposes that might provide a significant income for the land owner and tax revenues for the government
- If a local government agency owns the land, there is no tax income for the county

By not protecting recharge areas, water supply can be lost. The growth of urban areas, with roads, freeways, parking lots, and large warehouse type buildings, means that many more areas no longer allow runoff to infiltrate into the ground. Instead, the runoff flows rapidly into streams which peak more quickly and at higher flow rates than before the urban facilities were built. This runoff may create flood flows and is lost to groundwater recharge and may require the expense of other facilities to provide a substitute for that lost recharge. In a few urban areas, injection wells have been built to take the place of recharge areas that were lost to urban development. Injection wells are expensive, require careful technical control, and are not always successful, but they may be cost effective in the face of the high costs of urban land in many cities.

Water Dependent Recreation. Information is not readily available on the statewide costs of water-dependent recreation. Yet there is a need to increase the available recreation facilities and services to accommodate population growth. However, it is difficult to translate this increased need into specific recreation costs. Since the population is estimated to nearly double, costs will likely escalate accordingly. But population growth is not the only concern. California's climate continues to change, causing varied impacts, the public's demand for water will increase, and new facilities will also be necessary to meet that demand. The potentially large costs due to climate change have also yet to be calculated.

Watershed Management. Costs associated with watershed management depend on many factors, such as the size of the watershed; the land and water use activities occurring in the watershed; the condition and trends of the watershed; and the values, goods, and services demanded from the watershed.

Much of the cost of watershed management is associated with the specific land or water use activities occurring within the watershed on a recurring basis and is coincidental with these uses. Additional or external costs of watershed management tend to be associated with interventions designed to influence management or improve the results of management, to offer specific protection for certain functions and values, or to restore the functional conditions and associated uses of a watershed.

Agricultural Land Management. While good agricultural land management can successfully prevent many problems, implementing such measures are costly in terms of time, money or productive lands for crop production. Such costs are often immediate while the potential problems associated with soil erosion or other issues are long-term costs.

4.7.6.3 <u>Major Issues Facing Land Use Management</u>

Disincentives for Change. Local governments may not promote or implement resource-efficient development patterns for many legitimate reasons. Their decisions are guided by one or more of the following reasons:

- Landownership
- Marketing of perceived consumer preferences for single family homes with yards

- Community resistance to infill projects and/or higher density development
- Traditional and antiquated local and zoning ordinances that segregate retail uses from residential uses
- The added cost to conduct coordinated regional planning efforts
- The cost and potential liability associated with pursuing infill projects
- Environmental mitigation strategies that encourage lower density development

Given all of these factors in the equation of local land use planning and development, changing standards could be a significant and expensive public policy undertaking .

Funding. Funding to support salt management planning, project development, project operation and maintenance and salinity monitoring has been absent or insufficient. With very few exceptions, public funding dispersed through grants or loans to agencies and organizations has excluded or severely limited funding for planning efforts. Salt management on the scale needed for sustainability in the County may require a great deal of coordination planning at the local and regional level.

The two main aspects of implementing urban or rural runoff management measures are source control, including education, and structural controls. In highly urbanized areas, major costs for structural control include purchasing land for facilities and constructing, operating and maintaining treatment facilities. Local municipalities have limited ability to pay for retrofitting existing developed areas within existing budgets. Some are concerned about the economic impacts of raising taxes and requiring residents and businesses to pay for retrofitting existing development.

Financing can transcend all other issues affecting outdoor recreation, including water-dependent recreation. Funding issues fall into two categories:

1. Planning and development of new recreational sites financed through water and other development projects
2. The operation and maintenance of recreation sites once they are in place.

When water resources projects are being built or upgraded, there may not be enough funding to fully incorporate recreation. One reason for this is that the beneficiaries of recreation may be different from the other beneficiaries of the water project, requiring complex funding mechanisms to fully support recreation planning.

Maintenance of recreation facilities may be more susceptible to funding cuts in a bad economy than for other resources thought to be more essential. Without reliable funding, it is difficult for recreation provides to deliver quality, consistent and relevant facilities and services to meet growing demand.

Lack of Integration of Developable Area Runoff Management. Land use planning is not conducted on a watershed basis. Many agencies spend millions of dollars annually addressing urban or rural runoff problems with very little interagency coordination (both within the municipality and with other neighboring municipalities) even though downstream communities can be impacted by the activities upstream. Internal communications within local government can be improved to ensure that program goals and direction of one branch do not conflict with those of another; and local governments need to communicate with one another to ensure that land use planning on a regional level is complimentary across jurisdictional boundaries. Retrofitting existing development may not be feasible and may be only implementable on a voluntary basis.

Water Quality. The movement of pollutants in urban or rural runoff is a concern. Runoff contains chemical constituents and pathogenic indicator organisms that could impair water quality. Studies by EPA and the U.S. Geological Survey indicate that all monitored pollutants stayed within the top 16 centimeters of the soil in the recharge basins. The actual threat to groundwater quality from recharging urban or rural runoff is dependent on several factors, including soil type, source control, pretreatment, and solubility of pollutants, maintenance of recharge basins, current and past land use, depth to groundwater, and the method of infiltration used.

Water quality can both affect and be affected by water-dependent recreation. Untreated sewage released into the ocean has led to highly publicized closures of public beaches. Fertilizers and chemicals from agricultural runoff also contribute to poor water quality in recreation areas. Contaminated lakes, rivers, and streams not only present health risks to those participating in water-contact recreation, but can affect water quality. Human source contamination, such as body contact, untreated sewage, and petroleum products discharged from houseboats and other pleasure craft can be significant problem to reservoirs storing drinking water.

Land Use Alter Hydrologic Cycles. The hydrologic cycle includes snow or rain, the flow of water into the atmosphere. How the land is managed can reduce rainwater infiltration and the timing and, in some cases, the volume of runoff. Storms, especially in urban areas but also in some rural areas, are now marked by high intensity runoff over short periods. This creates greater flood risk and reduces the ability to capture water for needs during dry times. From an ecological perspective, this compression of runoffs robs the streams and landscape of groundwater. This leads to dry land, a shift in vegetation types, lower and warmer streams, and deterioration of stream channels, all of which lead to shifts in the plants and animals that can be supported. In some areas, the diversion of water from streams in the watershed to other regions outside the watershed, or the application of water imported from outside the watershed, has changed ecological functions or altered the flow of water through the watershed.

4.7.6.4 Recommendations for Implementation of Land Use Management

Pollution Prevention

1. Pollution prevention and management of water quality impairments should be based on a watershed approach. A watershed-based approach adds value, reduces cost, promotes cross-media, and integrates programmatic and regional strategies.
2. Agencies should establish drinking water source and wellhead protection programs to shield drinking water sources and groundwater recharge areas from contamination. These source protection programs should then be incorporated into local land use plans and policies.
3. All entities that make decisions with a bearing on salt management should be participating in regional salt management planning, monitoring and implementation projects. Effective and sustainable salt management decisions rest in the hands of a wide range of water managers, regulators, facility operators, policy makers, landowners and other stakeholders in any given watershed. These entities should strive to coordinate their efforts where possible in order to utilize resources efficiently, develop regional solutions to regional problems, optimize funding opportunities and achieve a salt balance in the basin as quickly as possible.

Developable Area Runoff Management

1. Design recharge basins to minimize physical, chemical, or biological clogging. Periodically excavate recharge basins when needed to maintain infiltration capacity, develop groundwater management plan for protecting both the available quantity and quality of groundwater, and cooperate with vector control agencies to ensure the proper mosquito control mechanisms and maintenance practices are being followed.
2. Work with the development community to identify opportunities to address urban and rural runoff management, including low impact development, in development and redevelopment projects.
3. Communicate with citizens about pollution of runoff and what can be done about it by creating lists of locally accepted practices that could be used at the homeowner level to address urban runoff.

Agricultural Land Stewardship

1. Continue to implement County policies that enhance agricultural lands stewardship on high priority, productive agricultural lands. Focus on local agricultural infrastructure investment, marketing assistance, and the development of agricultural lands stewardship practices and strategies in cooperation with local, State and federal agricultural conservation entities.
2. Continue to include agricultural lands stewardship as an objective of the region's Integrated Regional Water Management Plan (IRWMP).

Recharge Protection

1. Develop a program to identify and map recharge areas

2. Consider developing a uniform method for analyzing the economic benefits and costs of recharge areas protection and provide guidance and assistance for economic feasibility analyses that could be used by project planners and funding agencies to assess recharge areas as compared with long-term reduction of water supplies, wellhead treatment, injection wells, or conversion to other land uses.

Water-Dependent Recreation

1. Participate in efforts to collect data on visitation rates versus reservoir water levels and downstream flow rates, and use this data to help optimize the timing of water that is released or held for recreation, to the degree possible consistent with other water needs.

2. Participate in efforts to inventory water facilities and measure their vulnerability to specific invasive species, prioritizing and developing preventive measures and response strategies for the most at risk facilities.

3. Participate in efforts to develop a strategy to reduce water quality impacts and recommend improvements in water recreation vehicles- such as stricter regulation outputs on gasoline engines on waterways.

Watershed Management

1. More effectively align agency goals and methods to reflect coordinated approaches to management using watersheds as the context for implementation and effectiveness measurement.

2. Provide a means of easy access to technical information such as geographic information system (GIS) layers, monitoring data, planning models and templates, assessment techniques, from multiple sources that are useful at multiple levels of decision-making.

3. Use a watershed approach to coordinate forest management; land use; agricultural land stewardship; integrated resources planning and other appropriate resource strategies and actions.

4. Increase the ability for precipitation to infiltrate into the ground; reduce surface runoff to a point where it better reflects a natural pattern of runoff retention. This practice is often described as reducing impervious surfaces within a watershed. Retain floodplain and other wetlands intact to the extent possible, in order to maintain or increase residence time of water in the watershed.

4.7.7 Recycled Water

One way to meet the current and future water demands of the County is to recycle water, that is, treat and reuse wastewater. Wastewater which is treated to a specified quality in order to be able to use it again is called recycled water. Although there are varied sources of wastewater, the discussion only addresses recycling of municipal wastewater from treatment plants.

Municipal wastewater originates primarily from domestic sources, but also includes wastewater from commercial, industrial, and institutional sources that discharge to a common collection system where it mixes with domestic water before treatment. The California Water Code provides the following definition for recycled water: “water which, as a result of treatment of wastewater, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource.”

Recycled water use can serve many purposes:

1. An additional water source, which may also offset the need for additional freshwater supplies.
2. A drought resistant water supply.
3. A green alternative for treatment and disposal of wastewater.
4. A natural treatment through land application and a reduction in discharge of excess nutrients into surface waters.
5. A source of nutrients for crops or landscape plants.
6. A means to enhance environmental features, such as wetlands.

State regulations mandate that producers and users of recycled water comply with treatment and use restrictions to protect public health and water quality. The California Department of Public Health (CDPH) adopt water recycling criteria which are based on water source and quality, and specify sufficient treatment based on intended use and human exposure. The treatment objective is to remove pathogens and excess nutrients, making the water clean and safe for the intended uses. The criteria are regulated by the Regional Water Quality Control Boards through permits which specify wastewater treatment methods, approved uses of recycled water, and performance standards.

As the treatment level is increased from primary, secondary, tertiary to advanced, the permitted uses of recycling water are also increased. For example, municipal wastewater that has been treated to a specified quality (disinfected tertiary recycled water) can be used to irrigate school yards, parks and residential landscape, and may be suitable for industrial applications or use in office and industrial buildings for toilet flushing. Wastewater that has been treated to secondary levels is generally suitable for uses that do not include contact with food or people.

Unlike treated wastewater discharged to streams, water that is discharged to the ocean or other saline water bodies is considered no longer practically available for use and is termed “irrecoverable water.” Where water recycling can capture municipal wastewater that would otherwise become irrecoverable water, water recycling represents a strategy that increases water supply. The State recognizes this distinction by classifying water recycling projects in coastal areas as new water supply. Because discharges to the ocean or brackish water bodies support few, if any, downstream beneficial uses, such discharges are excellent sources of wastewater for future recycling efforts.

As communities increase their levels of recycling, the volume of water that is discharged into a stream will be reduced, potentially adversely affecting downstream water rights or in stream beneficial uses. Recognizing this, California Water Code requires that prior to making any change in the point of discharge, place of use, or purpose of use of treated wastewater, that changes shall be reviewed by the State Water Resources Control Board (State Board) to ensure potential impacts to beneficial uses are considered before authorizing a change in the permitted discharge of municipal wastewater.

4.7.7.1 Potential Benefits of Water Recycling

Water recycling has the potential to provide a variety of benefits including reduced costs, increased reliability of supply, and increased availability of potable water. All of these benefits are derived from the primary benefit of using recycled water to increase local water supplies.

Water recycling plays a role in California’s climate change mitigation efforts. Combustion of fossil fuels at power plants is a major source of greenhouse gas (GHG) emissions. A significant amount of the energy produced by those power plants is used by the water sector. Water recycling can provide a comparatively low energy source of local water using less energy than the importation of water from other regions or desalination of ocean and brackish water. The benefit is greatest where recycled water is available for applications, such as agricultural irrigation of nonfood crops, which do not demand the advanced levels of treatment or to lands that do not have a sustainable groundwater supply. The provision of recycled water for most urban applications requires tertiary treatment, which requires a greater amount of energy reducing the GHG savings.

Climate change is predicted to impact water supply, most notably altering the seasonal availability of water. Municipal water recycling is one of several water resource management tools that may be utilized by regions working cooperatively to help develop sustainable local water resources and meet water management goals and objectives. Recycled water cannot be directly used for potable applications, but recycled water can increase the availability of local potable water. Potable water is often used for applications, like irrigation, which do not require potable quality. Using recycled water for such applications provides potable water for more appropriate uses.

4.7.7.2 Potential Cost of Recycled Water

Given the variability of local conditions and their effect on treatment and distribution costs, the estimated range of capital and operational costs of water recycling range from $300 to $1,300 per acre foot of recycled water, but in some instances costs above this range are encountered (source: California Water Plan). The actual cost will depend on the quality of the wastewater, the level of treatment required, and the proximity of potential users to the source of the recycled water. Uses that require higher quality and/or have greater public health concerns will incur higher costs.

The cost to install new distribution systems is a major obstacle to the expansion of water recycling. Because recycled water is not classified as potable, regulatory constraints prohibit conveying recycled water and potable water in the same pipelines. Recycled water must be conveyed in a separate purple pipe distribution system that is labeled and readily distinguished from traditional water lines. The cost to install new purple pipe distribution mains from the treatment plants to users can be prohibitively expensive. As a consequence, it is more cost-effective to transport water to areas near treatment plants. However the users that could use large volumes of recycled water, such as agricultural users, are often the most distant from urban wastewater treatment plants. Establishment of local ordinances requiring upgrades to dual water distribution system (purple pipe) could bolster the acceptance and implementation of recycled water projects.

The potential for cross-connections is one of the challenges of separate pipeline systems for potable and non-potable water. As the name implies, a cross connection refers to the accidental connection of potable and non-potable systems, essentially contaminating the potable water systems. The potential for such errors will likely increase as a greater number of offices, commercial centers, and residences incorporate dual plumbing to provide non-potable water for irrigation, toilet flushing, and other permitted uses.

4.7.7.3 Major Issues Facing Water Recycling

Data Availability. Comprehensive studies on water recycling facilities to quantify water recycling efforts, characterize success and/or failures, or make informed decisions as to future endeavors and funding priorities are somewhat limited.

Affordability. The cost to provide recycled water can exceed the current consumer price of fresh water, but may be less than other new water sources such as importing water from other regions or desalination. Because a significant portion of the cost to implement water recycling is associated with the installation of core infrastructure such as treatment equipment and distribution mains, recycled water can be prohibitively expensive at the local level, and may be more cost effective on a regional scale.

The shortage of local funding to plan recycled water projects can slow the construction of new projects. Public funding and incentive measures should be provided to advance water recycling projects that provide local and regional benefits. The primary source of state funding has been the Water Recycling Funding Program administered by the State Board, providing low interest loans and grants to local agencies. The DWR administers the Integrated Regional Water Management Plan (IRWM) Grant Program, which favors water recycling projects.

Water Quality. Public acceptance of recycled water depends on the confidence in the safety of the water. The following four water quality characteristics have been identified as being of particular concern:

1. Microbiological quality
2. Salinity
3. Heavy metals
4. Organic and Inorganic substances (pharmaceuticals, household chemicals, fertilizers, etc.)

Applying appropriate levels of treatment for specific uses assures the safe use of recycled water.

Conventional wastewater treatment plants are not designed to remove all organic wastes. The fate of organic waste constituents is variable and in some cases unknown. Further study is necessary to assess the health effects of these constituents. Organic chemicals are often present in extremely low concentrations that are difficult to measure.

Concentrations of heavy metals have been a concern and are closely monitored in recycled water. However, modern wastewater treatment processes are able to routinely remove more than 90 percent of heavy metals from wastewater before discharge. As technology continues to advance, concerns about the presence of heavy metals are expected to diminish.

The salinity of recycled water can limit its usefulness in salt sensitive applications such as landscaping, and agriculture. Salt is not removed by traditional wastewater treatment processes but through desalination (See section 3.8.12). Because each cycle of recycling concentrates additional salt, there are a limited number of times that water can be recycled unless advanced treatment, such as reverse osmosis, is used to remove the salts.

Water quality criteria for recycled water, established by the California Department of Public Health (CDPH), define water quality and treatment requirements are incorporated into the waste discharge or water reclamation permits which are issued by the Regional Boards to producers and users of recycled water. Extensive monitoring assures compliance with the requirements.

Potential Impacts. Communities that discharge wastewater to rivers, streams, or percolate to groundwater, contribute to the ambient water that is available downstream users. The implementation of water recycling in upstream communities would reduce the volume of such discharges, potentially reducing the volume of ambient water available for downstream reuse and/or fulfillment of environmental needs. In some cases, downstream users may have rights to the use of discharged wastewater, potentially preventing upstream communities from implementing recycling.

Whether for storage or planned indirect use, the discharge of recycled water to wells, infiltration sires, or other locations underlain by permeable soil and geologic materials has the potential to introduce contaminants, including salts, into potable groundwater sources and aquifers. Presently California does not approve direct potable reuse projects, that is, where recycled water is used directly from a treatment plant into a drinking water supply.

4.7.7.4 Central Coast RWQCB Conditional Waiver

A concern was raised that the Central Coasts RWQCB's Agricultural Order No. R3-2011-0006, Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands (Order), would affect the use of recycled water in the County. This Order regulates discharges of waste from irrigated lands by requiring dischargers to comply with the terms and conditions of the Order to ensure that such discharges do not cause or contribute to the exceedance of any regional, State, or Federal numeric or narrative water quality standard.

Dischargers may have to implement best management practices, treatment or control measures, or change farming practices to meet water quality standards and achieve compliance with the Order. Discharges from irrigated lands regulated by this Order include discharges of waste to surface water and groundwater, such as irrigation return flows, tailwater, drainage water, subsurface drainage generated by irrigating crop land or by installing and operating drainage systems to lower the water table below irrigated lands (tile drains), stormwater runoff flowing from irrigated lands, stormwater runoff conveyed in channels or canals resulting from the discharge from irrigated lands, runoff resulting from frost control, and/or operational spills. These discharges can contain wastes that could affect the quality of waters of the State and impair beneficial uses.

Personal communication with Angela Schroeter with the Central Coast RWQCB indicated that there have been very few comments received regarding the Order's impact on the use of recycled water. The Order does not specifically mention nor preclude the use of recycled water. The Central Coast RWQCB does not intend to prevent the use of recycled water for irrigation or for groundwater recharge. The individual monitoring and control measures mentioned in the Order are not dependent on the type of water that runs off a property. It depends more on the agricultural operation and whether runoff that contains chemicals is reaching a receiving water that could be impacted. This Order should have no impact on the use of recycled water in the County.

4.7.7.5 Recommendations to Increase Recycled Water Use

1. Although it is increasingly evident that water recycling projects have been and continue to be, implemented throughout the state, a comprehensive, current inventory

of recycling facilities and programs does not exist. The County should encourage the State Board to establish a centralized data repository of recycling facilities and programs that contains basic information such as type of treatment, volume of water recycled, uses of recycled water, and cost of operation.

2. The County should work with state agencies including the State Board, Regional Boards, CDPH, and DWR should develop a uniform interpretation of state standards for inclusion in regulatory programs and IRWMPs, and clarify regulations pertaining to water recycling including permitting procedures, health regulations and the impact on water quality.

3. The County should encourage the State to expedite the availability of funding for the preparation of regional salt management plans in order to increase the potential of recycled water.

4.7.8 Optimize Use of State Water Project

The State Water Project (SWP) is described in Section 3.4.1. Currently, 9,727 AFY of water available from the project is subscribed and 15,273 AFY is unsubscribed. After establishing the priorities for existing participants in consideration of contracts and prior financial contributions, the affordability of, potential participants/beneficiaries among, and mechanism for funding the options for optimizing the State Water Project system would need to be considered and determined for the unsubscribed amount. The following are examples of how the use of the SWP could be optimized.

Unsubscribed Urban Use: This would entail direct delivery, or delivery via wheeling through existing participants' infrastructure, of the unsubscribed water to existing or new urban participants.

Unsubscribed Non-Urban Use: This would entail delivery to new rural and/or agricultural participants directly or via wheeling through existing participants' infrastructure.

Groundwater Banking or Recharge: This would entail direct or in-lieu delivery of subscribed and/or unsubscribed water to a recharge location for later extraction and/or to benefit a groundwater basin. In-lieu delivery refers to delivering additional SWP water to existing participants in-lieu of those existing participants pumping groundwater.

Drought Buffer: This would entail permanently reserving any unsubscribed water for use when SWP deliveries are less than 100 percent. Drought buffer could also entail storing SWP locally or using SWP water "in-lieu" of local supplies. This would allow local supplies like groundwater or Lopez Reservoir water to remain in storage for use during droughts or when demands exceed SWP deliveries.

Exchanges: This would entail using the unsubscribed water in exchange of a currently used water resource. Examples include increasing SWP deliveries to CMC and freeing up Whale Rock Reservoir water for use by others; Lopez Turn-out participants utilizing additional water from the SWP and freeing up Lopez Reservoir water for use by others; or delivering unsubscribed water to urban areas to free up groundwater for rural and/or agricultural users.

4.7.8.1 Potential Benefits of Optimizing the Use of the State Water Project

Unsubscribed Urban/Non-Urban Use: Direct delivery of the unsubscribed water may offset demand on another water resource, such as groundwater, and/or eliminate the need to implement additional water supply projects, depending on the projected water supply deficiency.

Groundwater Banking or Recharge: Since the SWP water available can vary year to year based on hydrology and environmental regulations, taking delivery of the available unused water for recharge into a groundwater basin would improve basin conditions and improve supply reliability for participants in the banking and/or recharge program and put the SWP water available annually to beneficial use.

Drought Buffer: The SWP cannot always deliver 100 percent of allocations. To receive a greater portion of State Water during these shortages (up to their full allocation), participants can enter into “Drought Buffer Water Agreements” with the District for use of an additional portion of the District’s SWP allocation. For example, when the SWP can only deliver 50 percent of contracted allocations, an agency with 100 AFY allocation and 100 AFY drought buffer allocation can still receive 100 AFY WSA – 50 percent of their 100 AFY allocation plus 50 percent of their 100 AFY drought buffer allocation equals 100 AFY.

Using SWP water in-lieu of local supplies will preserve local groundwater and surface water supplies for use during droughts or when demands exceed SWP deliveries.

Exchanges: Exchanges would allow those entities with water supply needs that would not feasibly be able to connect directly to the SWP to receive a supply from a source they are already connected to, or that would be more feasible to connect to. This puts existing water supply systems to use ahead of developing new supplies.

4.7.8.2 Potential Cost of Optimizing the use of the State Water Project

Unsubscribed Urban/Non-Urban Use: Costs include those for SWP operations and maintenance and the costs of any improvements to local treatment and/or delivery systems needed to convey the additional water. New participants in the SWP, or existing participants seeking to use more than their proportionate share of the unsubscribed water available, would also need to consider the cost to “buy-in” to the SWP, essentially reimbursing the original participants for the cost of the existing infrastructure. Costs would also be incurred if the water is wheeled through the existing infrastructure of an entity to the new participant.

Groundwater Banking or Recharge: Costs include those for SWP operations and maintenance and the costs of developing (or improving in the case of an in-lieu banking/recharge program) a local treatment and/or delivery system to and into (if direct) the recharge locations. A cost to “buy-in” to the SWP may also be incurred depending on the program participants. Costs may also be incurred if the water is wheeled through the existing infrastructure of an entity.

Drought Buffer: The cost of the drought buffer program is equal to the District’s cost for carrying the excess allocation annually and relates to the past cost of the SWP infrastructure from Northern California to Devil’s Den - currently approximately $70 – 75 per acre foot.

Exchanges: Costs to consider include those associated with the difference in cost between an existing SWP participant to take additional SWP water versus the supply to be exchanged, and any other costs that participants may require. The exchange beneficiary may also incur costs for modifying their local treatment and/or delivery systems to take the water from the exchanged source of supply.

4.7.8.3 Major Issues Facing Optimization of the use of the State Water Project

The affordability, potential participants/beneficiaries, and mechanism for funding the options for optimizing the State Water System would need to be considered and determined.

Unsubscribed Urban Use: Additional use of SWP water by existing and new urban participants is limited by the capacity of the Coastal Branch of the State Water Project, District policies and contracts between the District, CCWA and/or DWR as described in Section 3.4.1. If there is excess capacity in the Coastal Branch, use of that excess capacity, related changes in treatment plant operations, and associated costs would need to be negotiated between the District, CCWA and DWR in order to modify existing contracts.

Challenges for new urban participants include determining a fair buy-in cost, the affordability of buying in to the SWP and developing adequate infrastructure to take delivery of the water, the process by which new participants are considered under District policies, and the reliability of the SWP. The quantity of water available depends on where along the SWP infrastructure the new participant is located.

Unsubscribed Non-Urban Use: In addition to the challenges for existing and new urban participants, non-urban participants may face challenges due to local agency and/or County policies regarding wheeling water, annexations and use of surface water in rural and agricultural areas. Rural and agricultural water users are largely individualized, which adds to the institutional and financial challenges of implementing a project to deliver SWP to rural and agricultural areas.

Groundwater Banking or Recharge: Challenges to implementing a groundwater banking or recharge project include defining the project participants and beneficiaries, institutional considerations regarding those that would be affected by the project but are unwilling to participate, determining fair costs for all beneficiaries, and, mainly for direct delivery, the ability of the groundwater basin to accept recharge, the environmental impacts of developing recharge facilities, accountability of the recharged water and water quality compatibility. For a banking project, appropriate design, operation and monitoring would be necessary to ensure extractions of banked water would not have a negative impact on the groundwater basin with respect to without project conditions.

Drought Buffer: In years when the SWP can deliver 100 percent of allocations, the water available as drought buffer may not be put to beneficial use locally, and options for sale of the water on a temporary basis are limited. The water could be “turned back” to the State with only a small percentage of the annual cost of that water reimbursed to the SWP participant. Depending on the percent of allocations the State can provide and the amount of drought buffer SWP participants have, sale of any available drought buffer water at a higher rate, if not sold locally, would likely only be possible under an emergency drought declaration by the State.

Exchanges: In addition to those listed in Unsubscribed Urban/Non-Urban Use above, challenges to implementing an exchange program include the feasibility of connecting to an exchanged supply source if not connected already, water rights issues regarding the place of use of the exchanged supply source, determining the institutional arrangements needed and associated costs, affordability, and stakeholder impacts.

4.7.8.4 Recommendations to Optimize the use of the State Water Project

Since the SWP is a less reliable source of water, looking at a combination of these optimization options to both improve its reliability and increase direct use would be most beneficial. Steps for evaluating and implementing optimization opportunities may include:

- Understanding which entities may be interested in receiving additional State Water (the District has been compiling a list of interested parties)
- Understanding how much additional capacity may be available in the existing infrastructure that conveys State Water (an analysis of the Lopez Pipeline has been completed; an analysis of the Coastal Branch and Chorro Valley Pipeline will be completed in Summer 2011)
- Understanding exchange opportunities with other resources within the District that may free up a portion of the existing State Water allocation
- Developing and/or updating District policies regarding which entities have priority to receive State Water
- Creating a priority list of those who have requested additional State Water based on District policies, infrastructure capabilities and potential exchange opportunities with other resources
- Providing a final opportunity to existing SWP participants to execute Drought Buffer Agreements

- Negotiating use of excess capacity and District allocation with CCWA and DWR guided by District needs and priorities. If District needs are greater than the proportionate share of excess capacity, negotiations with CCWA would likely involve exchanging use of CCWA's proportionate share of capacity for a portion of the District's excess allocation.
- Coordinating with State Water users to further consider the Paso Robles Groundwater Basin (or other Basin in the County) for a banking and/or recharge operation for storage or sale of any unused State Water on an annual basis

4.7.9 Groundwater Banking/Recharge

Groundwater management is the planned and coordinated management of a groundwater basin with a goal of long-term sustainability of the resource. In particular, groundwater management is directed toward improving specific aspects of the management of groundwater resources in individual basins or portions of basins, across the County. The improvements pertain to many aspects of groundwater management, including characterizing and increasing knowledge of individual groundwater basins, identifying basin management strategies or objectives, planning and conducting groundwater studies, and designing and constructing conjunctive management projects.

Groundwater storage can be defined in three different ways depending on the context of its use:

1. The quantity of water that occurs beneath the land surface and fills the pore spaces of alluvium, soil, of rock formations beneath the land surface
2. The volume of usable physical space available to store water in the pore spaces of the alluvium, soil, or rock formation beneath the land surface
3. The act of storing water in the pore spaces of the alluvium, soil, or rock formation beneath the land surface.

These water-filled geologic materials, or aquifers, may receive the water, or be "recharged," from natural hydrologic processes, or the water may be introduced to the aquifers by active groundwater management. The water in these aquifers may be withdrawn through wells, or the water may discharge naturally, contributing to stream flow or to the supply of water for springs, seeps, and wetlands. Maximum attainable groundwater storage capacity is defined as the maximum volume of usable void space that can be occupied by water in a given volume of a formation, aquifer, or groundwater basin.

Groundwater remains an important water source for municipal drinking water, agriculture, and individual water users throughout the County. Groundwater storage is less susceptible to adverse impacts from natural hazards and requires less maintenance compared to surface storage.

Groundwater recharge is the mechanism by which surface water moves from the land surface, through the topsoil subsurface, and into de-watered aquifer space, or through injection of water directly into the aquifers by wells. Groundwater recharge can be either natural or managed. Natural recharge occurs from precipitation falling on the land surface, from water stored in lakes, and from streams carrying storm runoff. Managed recharge occurs when water is placed into constructed recharge or spreading ponds or basins, or when water is injected into the subsurface by wells. Managed recharge is also known as artificial, intentional, or induced recharge. Two widely used methods for managed groundwater recharge are recharge basins and injection wells.

In-lieu recharge is the practice of using alternate source of supply (e.g. imported water) in place of groundwater, thereby leaving groundwater in storage for later use. When supplies are available, groundwater producers would be encouraged to turn off their pumping facilities and use imported water to meet their demands.

Recharge Basins. Recharge basins are frequently used to recharge unconfined aquifers. Water is spread over the surface of a basin or pond in order to increase the quantity of water infiltrating into the ground and then percolating to the water table. Recharge basins concentrate a large volume of infiltrating water on the surface. As a result, groundwater mounds form beneath a basin. As the recharge begins the mound grows; when recharge ceases the mound recedes as the water is spread through the aquifer. The infiltration capacity of recharge basins is initially high, and then as recharge progresses the infiltration rate decreases as a result of surface clogging by fine sediments and biological growth on the uppermost layer of the soil. Fine surface sediments may occasionally need to be removed mechanically to maintain the effectiveness of recharge basins.

Injection Wells. Injection wells are used primarily to recharge confined aquifers. The design of an injection well for artificial recharge is similar to that of a water supply well. The principal difference is that water flows from the injection well into the surrounding aquifer under either a gravity head or a head maintained by an injection pump. As a large amount of water is pushed through a small volume of aquifer near the well face, injection wells are prone to clogging, which is one of the most serious maintenance problems encountered. It is suspected that a combination of a build-up materials brought in by the recharging water are the primary and chemical changes brought about by the recharging water are the primary causes of clogging. Using dual purpose wells (injection and pumping) is one economical way to operate artificial recharge by injection. So that cleaning of the well and the aquifer may be achieved during the pumping period. However, pretreatment of the water to be injected is always necessary to eliminate the suspended matter.

4.7.9.1 <u>Potential Benefits of Groundwater Banking/ Recharge</u>

1. Improved Local Water Supply Reliability. Imported surface storage water supplies and/or flood flows are recharged to a local groundwater basin during wet years/seasons, increasing local water supply reliability.

2. Drought Relief for Urban Water Users and Potential Induced Groundwater Recharge. Groundwater substitution transfer and agricultural water transfer during drought months.

3. Protection from Salt Water Intrusion. Recharge groundwater using captured flood flows or recycled water in the vicinity of salt water interface to raise the groundwater levels and prevent migration of saline water into freshwater production portions of the aquifer.

4. Improved Flood Control and Groundwater Storage. Development of detention/ retention ponds at the proposed residential subdivisions located in the groundwater recharge protection areas can offset the increased urban runoff due to the development while maintaining natural groundwater recharge.

4.7.9.2 Potential Costs of Groundwater Banking/Recharge

Costs for implementing groundwater storage or recharge may include a wide range of facilities and depend on site-specific nature of the program; accordingly, the cost for a unit increase in water supply or delivery is highly variable.

Some projects require relatively minor changes in operations or upgrades of existing infrastructure, such as increased sizing of pumps in existing wells. Other projects may require extensive new facilities such as new pipelines, pumps, injection or extraction wells, or construction of new recharge basins. The highly variable nature of implementation costs requires that feasibility of new projects or programs be evaluated carefully on a case-by-case basis.

The wide range of costs result from many factors including project complexity, regional differences in construction and land costs, availability and quality of recharge supply, availability of infrastructure to capture, convey, recharge and extract water, intended use of water, and treatment requirements.

4.7.9.3 Major Issues Facing Groundwater Banking/ Recharge

Effects of Land Use Changes on Cost and Citing of New or Enlarged Recharge Facilities. A natural recharge area may be eliminated because of a new development or contamination from a development. The protection and the improvement of natural recharge areas are important in maintaining and improving groundwater storage. Proximity of some developments to existing groundwater recharge facilities precludes further expansion of recharge area.

With the cost of land increasing, better land use planning is required to preserve natural recharge areas by either limiting the encroaching development or purchasing the land. However, protecting an important natural recharge area sometimes may not be high priority for the County or local use authorities.

Inconsistency and Uncertainty in Regulatory Status with Respect to Recharge and Surface Commingling of Different Quality Water. Groundwater recharge involves using water from different sources to recharge a groundwater basin. The water quality of water used for recharge is usually different from the water in the receiving groundwater basin. Uncertainty in regulatory status with regard to water quality of recharging and receiving waters increases the uncertainty of the planning effort of the project.

Infrastructure and Operational Costs. Physical capacities of existing storage and conveyance facilities are often not large enough to capture surface water when it is available in wet years. Conveyance capacity for surplus imported water supplies is most available during the wetter and cooler months when water demand is low. However this wetter period also coincides with reduced ability to accomplish in-lieu recharge (due to low water demands) and with increased spreading of local runoff, which may limit the ability to recharge other sources of water.

Water Quality. Groundwater quality can be degraded by naturally occurring or human-introduced chemical constituents, low quality recharge water, or chemical reactions caused by mixing water of different qualities. Protection of human health, the environment, and groundwater quality are all concerns for programs that recharge urban runoff or reclaimed/ recycled water into groundwater.

New and changing understanding of water quality constituents, including emerging contaminants, and their risks to human and ecological health result in changing water quality standards. A water source may, at the time it is used for recharge, meet all drinking water quality standards. Over time, however, detection capabilities improve and new or change water quality standards become applicable. As a result, contaminants that were not previously identified or detected may become future water quality problems creating potential liability.

Recovery of Banked Water. Groundwater banking is generally viewed as being difficult to implement and monitor if overlying land owners are not part of the banking project. Overlying land owners could extract water and benefit from a project that was funded by other parties.

4.7.9.4 Recommendations to Improve Groundwater Banking/ Recharge

1. Basin-wide groundwater management plans should be developed with assistance from an advisory committee of stakeholders to help guide the development, educational outreach, and implementation of the plans. Advanced tools developments should be pursued as part of planning basin wide groundwater management to help quantify the benefit and assess robustness of management strategies.
2. Manage the use of available aquifer space for managed recharge and to develop multi-benefit projects that generate source water for groundwater storage by capturing water not used by other water users or the environment.

3. Identify and evaluate local opportunities to reduce runoff and increase recharge on residential, school, park, and other unpaved areas.

4.7.10 Groundwater Supply Sources

This water supply option is available to all entities that overlay or are near a groundwater basin. Examples include a community in need of a water supply coordinating with a landowner or other agency that overlies a basin with sufficient yield to transfer water; treating groundwater from a basin that is not typically used due to water quality; forming an organization to supply water to a group of homes or agricultural operations; an existing organization extracting more groundwater to meet demands; or individually extracting water from a groundwater basin the property owner overlies.

4.7.10.1 Potential Benefits of using Groundwater Supply Sources

Groundwater is a relatively inexpensive, local supply to meet demands.

4.7.10.2 Potential Cost of Groundwater Supply Sources

Costs of using groundwater supplies include the infrastructure, treatment and ongoing operation and maintenance costs for the system. There may be a fee imposed by the landowner or entity involved with a transfer from the groundwater basin to an outside party. There are institutional costs associated with appropriative rights.

4.7.10.3 Major Issues Facing the use of Groundwater Supply Sources

1. Requires agreements for land and easements to locate utilities.
2. Pumping groundwater from one basin for use in another may require the acquisition of water rights.
3. For groundwater basins that are not typically used due to water quality problems, adding water treatment can be a short or long-term solution to address needs.
4. Conflicts with overlying users and County policies
5. Future use and safe yield

4.7.10.4 Recommendations to Facilitate Management of Groundwater Supply Sources

1. Develop adequate basin monitoring programs in order to understand the safe yield of each basin and monitor its condition over time
2. Develop Groundwater Management Plans for each basin in order to understand their capacity and the effect of certain actions
3. Facilitate education and outreach programs about existing County policies, State programs and water laws regarding groundwater.

4.7.11 Salinas Reservoir Expansion/Exchanges

The Salinas Reservoir and River system could be optimized by modifying the dam to increase the reservoir's safe yield by 1,650 AFY and/or managing releases and flows in the river or its tributaries to make use of high flows that would not otherwise be used or retained in San Luis Obispo County.

4.7.11.1 <u>Potential Benefits of Salinas Reservoir Expansion/Exchanges</u>

This strategy optimizes management of existing supply resource and infrastructure by using Santa Margarita Lake/Salinas Reservoir to its fullest before building new supplies.

For expanding the Reservoir, the rights to do so, currently held by the City of San Luis Obispo, would need to be granted to a regional agency or group in order to implement the project. Examples of this project would be to use the additional safe yield for timed releases to benefit downstream users, deliver directly via wheeling or exchange, or store for emergency use.

Managing releases and flows entails detaining high flows in order to maximize recharge into the groundwater basin and/or make use of flows that would otherwise exit the County.

4.7.11.2 <u>Potential Cost of Salinas Reservoir Expansion/Exchanges</u>

Major costs are for the structural modifications to the dam to meet standards and be able to retain the additional safe yield. There are likely administrative costs associated with maintaining the expansion right and subsequent storage right, contractual coordination and reservoir operations. Infrastructure to detain and utilize flows would be needed. If the additional safe yield was delivered directly, there may be costs associated with delivery infrastructure modifications/additions and/or wheeling charges.

4.7.11.3 <u>Major Issues Facing Salinas Reservoir Expansion/Exchanges</u>

Major structural improvements to the dam would be necessary to install the spillway gates and expand the reservoir which impacts the affordability of the project for its benefit. Also, the rights for expansion, originally with the City of San Luis Obispo, would need to be granted to the regional agency or group representing the expansion project beneficiaries by the State Board. The transfer of ownership of the dam from the Army Corps of Engineers to the District is under consideration, and may also impact the consideration of an expansion project. The legal/institutional ability to detain or extract water from the river during high flows would need to be investigated. Significant environmental impacts associated with expanding the reservoir are also anticipated. Any of the optimization options would require complex negotiations and institutional and financial arrangements related to, among other things, costs and priority of water stored. The affordability, potential participants/beneficiaries, and mechanism for funding the options for the optimizing the Salinas Reservoir would need to be considered and determined.

4.7.11.4 <u>Recommendations to Facilitate Salinas Reservoir Expansion/Exchanges</u>

Due to the cost of the project as compared to the benefit (increase in safe yield) and the water rights issues associated with expanding the reservoir or managing high flows, other options should be considered first for meeting water resources needs. Some investigation into the process and feasibility of implementing the project would be beneficial for determining whether the strategy is actually an option. This may include review of the structural modification requirements, consultation with the State Board, Army Corp of Engineers and City of San Luis Obispo and polling interested participants.

4.7.12 Desalination

Desalination comprises various water treatment processes for the removal of salt from water for beneficial use. Desalination is used to treat seawater as well as brackish water (water with a salinity that exceeds normally acceptable standards for municipal, domestic, and irrigation uses, but less than that of seawater). Desalination technologies are also used to treat polluted and impaired waters and as an advanced treatment of wastewater to produce high quality recycled water. In California, the principle method for desalination is reverse osmosis (RO). This process can be used to remove salt as well as specific contaminants in water such as trihalomethane precursors, volatile organic carbons, nitrates, and pathogens.

Only desalination for municipal purposes, that is, desalination used by public and private water agencies, is considered in the following discussion. Desalination used within an industrial and commercial manufacturing process is not considered since those applications of desalting generally involve treating fresh water to a higher standard than potable water to meet a specific need. For the purposes of this discussion, desalination plant capacity is expressed in terms of the fresh or potable water production capacity of the plant. Total costs are given in dollars per acre-foot of fresh potable water produced.

4.7.12.1.1 *Potential Benefits of Desalination*

In times of water scarcity and an ever-growing demand for fresh water due to population growth, and given current climate trends, water resources will become even more unevenly distributed as water-scarce regions experience more frequent and prolonged droughts. Desalination can be a reliable water supply alternative and a part of the solution for meeting current and future water needs. Conventional water sources are often limited by overdraft, depletion, pollution, and environmental requirements. Furthermore, traditional water supply management methods such as surface water storage, groundwater extraction, and inter-basin water transfer may not be sufficient to meet increasing water demand.

Desalination, when adopted as part of a diversified water supply portfolio, can offer several benefits including:

- Increase in water supply

- Reclamation and beneficial use of impaired waters
- Increased water supply reliability during drought periods
- Decreased need for imported water by developing a local supply source
- Diversification and increased reliability and operational flexibility of water supply sources
- Improved potable water quality
- Protection of public health
- Facilitate more recycling and reuse, given the lower salinity of the source

The primary benefit of desalting is to increase local water supply. Seawater desalting creates a new water supply by tapping the significant supply of feed water from the Pacific Ocean. In addition to seawater desalting, desalination technologies can be used to produce potable water from brackish waters as well as impaired waters. Many surface and groundwater sources are brackish-having high salinity levels-which can be naturally occurring due to the soil type and aquifer lithology or induced by man-made activities such as farming and overdraft of coastal aquifers causing seawater intrusion. Desalination was also proven to treat to very high levels of purity other water that may have low salinity but is impaired by high levels of specific contaminants such as nitrate. Accordingly, desalination in water resources planning is a unique tool serving both the water supply augmentation and water quality improvement strategies.

Desalting groundwater allows groundwater of impaired quality to be adequately treated for potable use. Groundwater desalting may or may not be a new water supply depending upon the water portfolio or balance in the area or region where it occurs. It is however, providing water from a source that is not currently being used for beneficial purposes.

Desalination can serve as an emergency water supply option. Desalination water produced by mobile water desalination units can provide emergency potable water supply for towns and communities during droughts or in response to an abrupt disruption of their water supplies. Mobile water desalination units are water treatment units-generally, Reverse Osmosis mobile desalination units- that can be truck-mounted or air-lifted, enabling the provision of short-term emergency water supply as well as supplemental supply for drought-stricken or disaster areas. These units can provide a flexible solution to water shortages as they can be quickly and easily deployed. Unlike permanent desalination plants, temporary mobile units can be commissioned, installed and put into production in a short period of time. They can also be quickly and easily decommissioned or moved to other locations should emergency or drought conditions ease.

4.7.12.1.2 *Potential Costs of Desalination*

Technological advances in desalination have in the last 20+ years significantly reduced the cost of desalinating water to levels that are comparable, and in some instance competitive, with other alternatives for acquiring new water supplies. Proposition 50 grant funding cycles in 2005 and in 2006 funded a number of research and development programs directly related to desalting in California. Membrane technologies in the form of reverse osmosis (RO) have the most significant improvement. Continuing improvements in system design, membrane technology and energy efficiency and recovery have helped increase efficiency and reduce costs and energy demand. The RO process has been proven to produce high quality drinking water throughout the world for decades.

The cost of desalination depends on numerous factors that are often project-specific. Feed water characteristics are the greatest determinant of treatment cost. When planning desalination projects, it is important that cost estimates take into account the costs of concentrate management and intake systems, including environmental and permitting costs in addition to process costs (i.e., costs of pre-treatment, post-treatment, and main desalting process). The costs for the City of Morro Bay project were presented earlier in this chapter.

4.7.12.1.3 *Major Issues Facing Desalination*

Desalination has historically been prohibitively expensive. Improvements in technology and the rising cost of conventional water supplies have made desalination competitive with imported water and recycled municipal wastewater in a number of cases. As a result of the improved economics of desalination, other issues have increased in relative importance to cost, namely, environmental impacts and associated permitting (particularly for coastal plants).

Cost and Affordability. The cost will be influenced by the type of feed water, the available concentrate disposal options, the proximity to distribution systems, and the availability and cost of power. The higher costs of desalting may, in some cases, be offset by the benefits of increased water supply reliability and/or the environmental benefits from substituting desalination for a water supply with higher environmental costs. When comparing the cost and impacts of desalination as a water supply option, it is important to compare it to the development of other new water supply options.

Environmental Impact and Permitting. Brackish water desalination plants have fairly routine environmental and permitting requirements with the exception of the problematic issue of concentrate disposal in inland locations. Coastal desalination plants face much greater scrutiny. With a location within the coastal zone, and with the need for water intakes and outfalls, there are many reviewing agencies, organizations and permitting requirements.

Seawater Intakes. A primary concern associated with coastal with coastal desalination plants is the impact of feed water intake on aquatic life. Surface intakes of seawater result in impingement and entrainment of marine organisms. This impact can be avoided by adopting subterranean intakes wherever feasible. Existing seawater intakes for power plant cooling have been approved or are proposed as the source of supply for several of the currently proposed plants. Other projects are currently studying or testing alternative seawater intake designs. It is worth noting here that the State Board is in the process of developing a statewide water quality control policy based on the Federal Clean Water Act (CWA) Section 316(b) regulations related to the use of coastal and estuarine waters for power plant cooling. However, given that desalination plants co-located with power plants typically draw water off of the system after thermal exchange, the State Water Board's released scoping documents consider that the subject is outside of the scope of CWA section 316(b) and would be more appropriately addressed under existing water quality control plans and policies. A stand-alone desalination facility will be required to apply for an NPDES permit to discharge waste brine.

Carbon Footprint. Given the energy intensity of advanced water treatment processes used to separate salts from water, energy consumption represents a major portion of the direct operation and maintenance expenses of a desalination plant. Energy efficiency will therefore be a key factor in assessing the viability of using desalination as a water supply option in California. Furthermore, efforts to reduce desalination energy use will significantly contribute toward the reduction of greenhouse gas (GHG) emissions from the many proposed desalination projects in California.

The carbon footprint of a desalination plant is mainly a translation of its energy consumption. The associated GHG emissions will be measured by the indirect CO_2 emissions from the electricity used by the plant. In instances where desalinated water is displacing other water supplies currently in use with their own GHG emissions, the net carbon footprint of desalination should be counted as the incremental GHG emissions beyond the current emissions baseline.

The average energy consumption of currently operational RO desalination facilities is estimated at about 1,800 kWh/AF for brackish water and 4,000 kWh/AF for seawater desalination. Using a conservative estimate of GHG emissions of 400 grams of carbon dioxide equivalents (CO_2eq) per kWh, the GHG emissions associated with an RO desalination plant operation are estimated to be 720 kg of CO_2eq/AF of desalinated brackish water and 1,600 kg of CO_2eq/AF of desalinated seawater.

Measures to help reduce the carbon footprint of desalination plants include efficiencies through energy recovery devices, high efficiency pumps, variable frequency drives, low-energy with improved salt rejection membranes, the use of renewable energy sources, and carbon offset plans. A recent demonstration led by the non-profit Affordable Desalination Collaboration showed that by using state-of-the-art energy recovery technology and high efficiency pumps and membranes, the energy required for seawater desalination can be substantially reduced to the range of 2,000-2,500 kWh/AF.

Growth Inducing Impacts. The availability of water has been a substantial limitation on development in a number of locations, primarily coastal communities. Since seawater desalination on the coast is now a more affordable option in comparison to the past the lack of water may no longer be as strong a constraint on coastal development. However, such a concern is not restricted to desalination and would also be associated with any other new water supply option.

Concentrate Discharge. Desalination plants of any type produce a salt concentrate that must be discharged. The quantity and salinity of that discharge varies with the type of desalting plant and its operation. Brackish water plants in California discharge their concentrate to municipal wastewater treatment systems where they are treated and blended with effluent prior to discharge. For brackish water plants, this type of discharge is likely to continue. Inland desalting plants without a discharge to the ocean may be limited by the type of discharge options available. Seawater desalination produces a concentrate approximately twice as salty as seawater. In addition, residuals of other treatment chemicals may also be in the concentrate. Some plants currently being planned will use existing power plant or wastewater outfall systems to take advantage of dilution and mixing prior to discharge. The availability of power plant cooling systems to dilute the concentrate prior to discharge to the ocean will also be affected by the future of coastal power plants as discussed in the prior section. On the other hand, co-locating concentrate discharge with wastewater effluent outfall might have some environmental benefits to the extent that the concentrate from the desalination plant would increase the salinity of the wastewater effluent levels that are comparable or closer to the of seawater.

Energy Use. Desalination's primary operation cost is for power. A 50 mgd seawater plant would require approximately 33 MW of power. The reduction in unit energy use has been among the most dramatic improvements in recent years due to improvement in energy recovery systems. Additional improvements in energy use are expected.

Generally, the variance in energy requirements of RO desalination is a direct function of the salinity of the feed water source (total dissolved solids). As a result, given similar operating conditions and plant parameters, brackish water desalination is usually less energy intensive, and hence less costly, than seawater desalination.

Even though desalination is energy intensive, other conventional water supply options might in some instances be as energy intensive. At a given point of use, energy intensity of a water supply is the total amount of energy required for its extraction, treatment, and conveyance. Energy required for pumping and transporting water over long distances may be higher than that needed to desalinate local saline waters (e.g. delivering State Water Project). Due to continuing reductions in energy use, the energy needed at the end of the SWP pipe reaches levels that in some instances become comparable to the amount of energy needed to desalinate seawater.

4.7.12.1.4 *Recommendations to Facilitate Desalination*

1. Desalination should be considered, where economically and environmentally appropriate, as an element of a balanced water supply portfolio, which also includes conservation and water recycling to the maximum extent practicable.

2. Where appropriate, desalination must be considered by an integrated regional water management planning region in developing a strategy to meet resource management goals and objectives of the region.
3. Provide technical assistance, when available, to local agencies exploring desalination to help with the implementation of their desalination programs.
4. Provide guidance on permitting requirements to help local agencies pursuing desalination overcome the complex regulatory processes. There is a need for a state clearinghouse to serve as an information source and facilitator for desalination projects, particularly for seawater desalination.
5. Project sponsors should ensure adequate planning to include a collaborative process, which engages key stakeholders and the general public, as well as permitting agencies.

4.7.13 Lopez Lake Expansion/Exchanges

The Lopez Reservoir could be optimized by modifying the dam to increase the reservoir's safe yield or by using the reservoir conjunctively with other supplies for reliability/emergency storage purposes.

4.7.13.1 Potential Benefits of Lopez Reservoir Expansion/Exchanges

This strategy optimizes management of an existing supply resource and infrastructure by using Lopez Reservoir to its fullest before building new supplies.

For expanding the reservoir, examples of this project would be to use the additional safe yield for timed releases to benefit downstream users, deliver directly via wheeling or exchange, or store for emergency use.

Utilizing Lopez Reservoir for reliability/emergency storage purposes involves delivering another supply source when it is available and exceeds demand in lieu of Lopez Reservoir water. Lopez Reservoir water would be retained for use when the water is not available, when there is a drought, to address seawater intrusion or other emergency declaration per Water Code Section 350.

4.7.13.2 Potential Cost of Lopez Reservoir Expansion/Exchanges

Major costs are for the structural modifications to the dam to be able to retain the additional safe yield. There are likely administrative costs associated with obtaining the expansion right and subsequent storage right, contractual coordination and reservoir operations. If the additional safe yield was delivered directly, there may be costs associated with delivery infrastructure modifications/additions and/or wheeling charges. Costs associated with use of the reservoir for reliability/emergency storage purposes include those associated with delivery of the alternative water source and any reimbursement for use of the reservoir and any applicable infrastructure.

4.7.13.3 Major Issues Facing Lopez Reservoir Expansion/Exchanges

Structural improvements to the dam would be necessary to expand the reservoir which impacts the affordability of the project for its benefit. Also, the rights for expansion would need to be granted to the regional agency or group representing the expansion project beneficiaries by the State Board. Significant environmental impacts associated with expanding the reservoir are also anticipated. Any of the optimization options would require complex negotiations and institutional and financial arrangements related to, among other things, costs and priority of water stored. The affordability, potential participants/beneficiaries, and mechanism for funding the options for optimizing the Lopez Reservoir would need to be considered and determined.

4.7.13.4 Recommendations to Facilitate Lopez Reservoir Expansion/Exchanges

An investigation into the process and feasibility of implementing the project, and its cost and benefit, is currently being conducted by Flood Control Zone 3 agencies for determining whether the strategy is actually an option. The District should continue to coordinate with those agencies and other stakeholders on the evaluation of the expansion option with respect to other options.

Use of the reservoir for reliability/emergency storage was anticipated to occur in 2011 by delivering excess State Water in lieu of delivering Lopez Reservoir water and retaining water in the reservoir for use under an emergency declaration per Water Code Section 350 or to address seawater intrusion. Whether the program happens in 2011 or a subsequent year, this experience will would help to evaluate the option for use in the future.

4.7.14 New Off Stream Storage

Many water agencies rely on surface water surface storage as a part of their water systems, and reservoirs also play an important role in flood control and hydropower generation. Similarly, surface storage is often necessary for, or can increase the benefits from other water management strategies such as water transfers, conjunctive management, and conveyance improvement. Some reservoirs contribute to water deliveries across several regions across the state, while others only provide local water deliveries within the same watershed. There are two general categories of surface reservoirs: those formed by building a dam across an active river (on stream) and those called off-stream reservoir storage where the actual reservoir is in a separate geographic location away from the supply source, with water diverted or pumped into storage. This section will cover the second category.

Smaller reservoirs typically store water annually in the winter for use in summer, while larger reservoirs also hold stored water over several years as a reserve for drought or other emergencies.

4.7.14.1 Potential Benefits of Off Stream Surface Storage

Although the allocation of benefits for proposed off-stream surface storage can affect the occurrence and magnitude of different types of benefits, they generally can include:

- Water quality management
- System operational flexibility
- Hydroelectric power generation
- Flood management
- Ecosystem Management
- Sediment transport management
- Emergency water supply

The presence of new offstream surface storage could allow ecosystem and water managers the flexibility to take actions and make real-time decisions that would not be possible without the storage. Water transfers between regions could be easier if water can be released from storage at appropriate times and the receiving regions have reservoirs to store or use the transferred water. Surface storage can improve the effectiveness of conjunctive water management strategies by more effectively capturing supply that can ultimately be stored in or used in lieu of groundwater basins.

With regard to anticipated climate change impacts, new surface storage has the potential to provide greater flexibility for managing supplies to meet varied future water demands. By expanding surface storage capacity, water supply systems will have greater flexibility to use water that would normally go unused. Climate change projections foresee more extreme weather such as floods and droughts. Additional surface storage provides greater flexibility to capture and store floodwaters and hold water in reserve storage for dry years and droughts.

4.7.14.2 Potential Costs of New Off Stream Surface Storage

Costs for off stream storage include the infrastructure and land required for such facilities. Depending on the source of supply, appropriate location for the storage systems, time in storage and subsequent use of the water, there may be treatment requirements.

4.7.14.3 Major Issues Facing New Off Stream Storage

Funding. Construction usually requires a substantial amount of money in a short time. Included in the long-term capital outlay are planning costs such as administrative, engineering, legal, financing, permitting and mitigation, which can also require significant investments.

Impacts. New storage can affect environmental and human conditions and create economic impacts for the surrounding community. New reservoirs may result in the loss of property tax revenue to local governments in the area they are located or in an increase of local property values by firming up the water supply. Mitigation of environmental effects is normally accomplished through implementation strategies that avoid, minimize, rectify or reduce need to address impacts under the application of various laws, regulatory processes and statues.

Suitable Sites. The appropriate site for off-stream storage operations may not be a feasible location due to environmental issues or competing land use options, such as if it is prime agricultural land.

4.7.14.4 <u>Recommendation to Increase Off Stream Surface Storage Benefits</u>

1. Assess whether there are opportunities in the County for off stream storage systems.

4.7.15 Nipomo Supplemental Water Project

The Nipomo supplemental water project consists of waterlines, a pump station and reservoir, flow meter facilities and an interconnect between the City of Santa Maria and Nipomo Community Services District (Nipomo CSD) water systems that is designed to deliver 3,000 AFY. Subsequent distribution of the 3,000 AFY to various agencies in the Nipomo area, either directly or in lieu of Nipomo CSD pumping of groundwater, is shown below:

Nipomo CSD	2,169 AFY
Woodlands Mutual Water Company	415 AFY
Golden State Water Company	208 AFY
Rural Water Company	208 AFY

The project will utilize regional water supplies to slow the depletion of groundwater, reduce the potential for sea water intrusion, be consistent with the settlement agreement and the judgment related to the groundwater adjudication, and increase the reliability of water supply by providing a diversity of water sources.

This Master Water Report assumes the project will be implemented. The portion of the waterline that crosses under the Santa Maria River has a capacity of 6200 AFY, providing a potential for increased deliveries in the future to further benefit the groundwater basin in the Nipomo area.

The possible challenges with utilizing the additional capacity include:

- Negotiations between Nipomo area participants, the City of Santa Maria, Central Coast Water Authority, the District and DWR to determine a source of supply, which would likely include a portion of the District's excess State Water.

4.7.15.1 <u>Potential Benefits of the Nipomo Supplemental Water Project</u>

Putting the additional capacity of the waterline intertie to beneficial use would provide additional supplies to the San Luis Obispo County portion of the Santa Maria Groundwater Basin and offsetting demand on the groundwater basin. This strategy optimizes management of existing supply resources and infrastructure by using the intertie to the fullest extent before building new supplies.

4.7.15.2 <u>Potential Cost of the Nipomo Supplemental Water Project</u>

Costs are associated with procurement of the additional water supply and infrastructure needed to deliver the water. These would likely be a combination of new infrastructure and operation and maintenance costs, and reimbursement for use of existing capacity in the water supply systems.

4.7.15.3 <u>Major Issues Facing the Nipomo Supplemental Water Project</u>

Complex negotiations between Nipomo area participants, the City of Santa Maria, Central Coast Water Authority (CCWA), the District and DWR to determine a source of supply, which would likely include a portion of the District's excess State Water, would be required. Use of State Water as the source of supply would depend on the outcome of a capacity analysis of the Coastal Branch, opportunities for exchanges to free up existing District State Water allocations, priority of use of the State Water allocation based on District policies. The affordability, potential participants/beneficiaries, and mechanism for funding the use of the additional capacity in the intertie would need to be considered and determined.

4.7.15.4 <u>Recommendations to Facilitate the Nipomo Supplemental Water Project</u>

Include the consideration of optimizing the use of the intertie in optimizing the State Water Project as discussed above and continue to coordinate with stakeholders in the Nipomo area and CCWA.

4.7.16 Precipitation Enhancement

Precipitation enhancement, commonly called "cloud seeding," artificially stimulates clouds to produce more rainfall than they would naturally. Cloud seeding injects special substances into the clouds that enable raindrops to form more easily.

Winter orographic cloud seeding has been practiced in California since the early 1950s. Most of the projects are along the central and southern Sierra Nevada with some in the Coast Range. The projects generally use silver iodide as the active seeding agent, supplemented by dry ice if aerial seeding is done. Silver iodide can be applied from ground generators or from airplanes. Occasionally, other agents such as liquid propane are used. In recent years, some projects have been trying hygroscopic materials (substances that take up water from the air) as supplement seeding agents. Most of the projects suspend operations during the very wet years once enough snow has accumulated to meet their water needs.

In San Luis Obispo County, the District participated in a three year program of cloud seeding with the City of San Luis Obispo during the drought of the early 1990s to benefit the Lopez and Salinas Reservoirs. The contract with the cloud seeding company was for the following amounts each year:

Year	Base Cost	Consumables Cost	Estimated Precipitation Increase	Target Reservoir
1	$66,000	Up to $31,520	12 to 16%, 2 inches	Lopez and Salinas
2	$108,000	Up to $44,440	11 to 14%, 1.5 inches	Lopez and Salinas
3	$30,400	Up to $12,000	13 to 17%, 4 inches	Lopez Only

In the third year, above average rainfall fell, and Salinas Reservoir was full and not included in the program. The 1993 analysis of costs was $13 per AF. Due to limitations of the Lopez Reservoir Dam at the time to go above 60 percent full, and the City of San Luis Obispo no longer pursuing cloud seeding for Salinas Reservoir, the District held off on pursuing the cloud seeding program pending consideration of joint efforts with Santa Barbara County, which was conducting a program that included benefitting Twitchell Reservoir. The District has not participated with Santa Barbara County in this effort. More recently, Monterey County has initiated efforts to potentially implement a cloud seeding program for the Nacimiento and San Antonio Watersheds.

State requirements for sponsors of weather modification projects consist of filing a Notice of Intention (NOI) initially and every five years for continuing projects, some record keeping by operators and annual or biennial reports to the California Department of Water Resources. The items to include in the NOI can be obtained from the DWR. In addition, sponsors need to comply with the California Environmental Quality Act (CEQA). Annual letter notices should also be sent to the board of supervisors of affected counties and to DWR. Activity reports are sent to the National Oceanic and Atmospheric Administration (NOAA) giving the number of days and hours of operation and the amount of seeding material applied.

4.7.16.1 Potential Benefits from Precipitation Enhancement

In California, all precipitation enhancement projects are intended to increase water supply or hydroelectric power. The amount of water produced is difficult to determine, but estimates range from a 2 to 15 percent increase in annual precipitation or runoff. A National Research Council (NRC) 2003 report on weather modification suggested that there is considerable evidence that winter orographic weather modification does work, possibly up to a 10 percent increase. Nearly half of the projects are conducted by utilities, so there is also substantial incremental benefit to hydroelectric power generation.

Cloud seeding has advantages over many other strategies for providing water. A project can be developed and implemented relatively quickly without multiyear lead times. Precipitation enhancement should not be viewed as a remedy for drought. Cloud seeding opportunities are generally fewer in dry years. It works better in combination with surface or groundwater storage to increase average supplies. In the very wet years, when sponsors already have enough water, cloud seeding operations are usually suspended.

4.7.16.2 Potential Cost of Precipitation Enhancement

Costs for cloud seeding are generally less than $20 per AFY. State law says that water gained from cloud seeding is treated the same as natural supply in regard to water rights.

4.7.16.3 Major Issues for Precipitation Enhancement

Operational Precision. It is difficult to accurately target the location and time of cloud seeding. There is an incomplete understanding of the effectiveness of the current targeting practices. Chemical tracer experiments have provided support for some targeting practices. New atmospheric measuring tools can be used in studies of new seeding agents, transport, and diffusion to improve operational precision.

Concern over Potential Impacts. Questions about potential unintended impacts from precipitation enhancement have been raised and addressed over the years. Common concerns related to downwind effects (enhancing precipitation in one area at the expense of those downwind), long-term toxic effects of silver and added snow removal costs in mountain counties. The United States Bureau of Reclamation (USBR) did extensive studies on these issues. The finding is reported in its Project Skywater programmatic environmental statement in 1977 and its Sierra Cooperative Pilot Project environmental impact statement in 1981. The available evidence does not show that seeding clouds with silver iodide causes a decrease in downwind precipitation; in fact, at times some of the increase of target area may extend up to 100 miles downwind.

The potential for eventual toxic effects of silver has not been shown to be a problem. According to the USBR, the small amounts used in cloud seeding do not compare to industry emissions of 100 times as much into the atmosphere in many parts of the country or individual exposure from tooth fillings. Watershed concentrations would be extremely low because only small amounts of seeding agent are used. Accumulations in the soil, vegetation, and surface runoff have not been large enough to measure above the natural background. Sampling at Upper Blue Lake and Salt Springs Reservoir showed very low to nondetectable concentrations in water and sediment. Similar results were found at Lake Almanor in testing water, sediment, and fish samples during the 2000 to 2003 period. Amounts were far below any toxic levels. And there was little to suggest bioaccumulation. Therefore, continued operations should not result in any significant chronic effect on sensitive aquatic regions.

All operating projects have suspension criteria designed to stop cloud seeding any time there is a flood threat.

Inadvertent Weather Modification. There is evidence that human activities such as biomass burning, transportation and agricultural and industrial activities modify local and sometimes regional weather. The effect of aerosols on clouds and precipitation is complex. Recent studies by Ramanathan and Rosenfeld suggest suppressed precipitation formation in affected clouds due to pollution and dust. Some aerosols can enhance precipitation and some, especially the very fine aerosols in diesel smoke, can reduce precipitation processes and the amount of impact as well as possible effects on cloud seeding programs. It is possible that some of the California cloud seeding projects have offset a potential loss in precipitation from air pollution, which may have obscured a more positive signal from the weather modification projects. Research work in Israel has demonstrated such effects.

4.7.16.4 Recommendations to Increase Precipitation Enhancement

1. The County should monitor, as appropriate, research on potential new seeding agents, particularly ones that work at higher temperatures. Climate change may limit the effectiveness of silver iodide, the most commonly used agent, which requires cloud temperatures well below freezing, around -5 C, to be effective.
2. The County should encourage DWR to support the efforts by California weather modification project sponsors, such as that proposed in 2002-03 by Santa Barbara County Water Agency, to obtain federal and state research funds for local research experiments built upon their operating cloud seeding projects.
3. Reconsider cloud seeding in coordination with appropriate agencies given the results of previous efforts and the other water management strategies.

4.7.17 New On Stream Storage

On stream surface storage uses reservoirs to collect water for later release and use. Many California water agencies rely on surface water surface storage as a part of their water systems, and reservoirs also play an important role in flood control and hydropower generation. Similarly, surface storage is often necessary for, or can increase the benefits from other water management strategies such as water transfers, conjunctive management, and conveyance improvement. Some reservoirs contribute to water deliveries across several regions across the state, while others only provide local water deliveries within the same watershed. There are two general categories of surface reservoirs: those formed by building a dam across an active river (on stream) and those called off stream reservoir storage where the actual reservoir is in a separate geographic location away from the source of supply, with water diverted or pumped into storage. This section will cover the first category.

Additional surface storage capacity can also be developed by enlarging, reoperation or modifying existing reservoirs and their outlet structures. Smaller reservoirs typically store water annually in the winter for use in summer, while larger reservoirs also hold stored water over several years as a reserve for drought or other emergencies.

During the past three decades, river habitats and instream flows downstream of many existing reservoirs have gradually received improved water benefits due to changes in reservoir releases resulting from new regulations and legislation. Specifically, the management of many existing reservoirs has been improved to achieve ecosystem and river recreation benefits beyond the original water supply needs. However, as the water demands for agricultural, urban, and environmental needs have grown, the operational flexibility of the surface water system has become more limited.

4.7.17.1 <u>Potential Benefits of On Stream Surface Storage</u>

Many reservoirs were originally built for the primary purposes of hydropower, flood control, and consumptive water use. Although the allocation of benefits for proposed surface storage can affect the occurrence and magnitude of different types of benefits, they generally can include:

- Water quality management
- System operational flexibility
- Hydroelectric power generation
- Flood management
- Ecosystem Management
- Sediment transport management
- River and lake Recreation
- Emergency water supply

The presence of new on stream surface storage could allow ecosystem and water managers the flexibility to take actions and make real-time decisions that would not be possible without the storage. Water transfers between regions could be easier if water can be released from upstream storage appropriate times and the receiving regions have reservoirs to store the transferred water. Surface storage can improve the effectiveness of conjunctive water management strategies by more effectively capturing runoff that can ultimately be stored in groundwater basins.

With regard to anticipated climate change impacts, new surface storage has the potential to provide greater flexibility for capturing surface water runoff and managing supplies to meet varied future water demands. By expanding surface storage capacity, water supply systems will have greater flexibility to capture more winter runoff and control larger floods. Climate change projections foresee more extreme weather such as floods and droughts. Additional surface storage provides greater flexibility to capture and store floodwaters and hold water in reserve storage for dry years and droughts.

4.7.17.2 Potential Costs of New On Stream Surface Storage

Cost estimates for potential surface storage alternatives are not specified in this narrative because they vary extensively by region and specific project design. In most cases, the costs of multipurpose storage projects are shared by many beneficiaries, and often include State or federal cost-share component. The magnitude of individual project benefits and corresponding costs for new water supply, hydropower, water quality, and flood management can be expected to vary significantly from project to project, so that average cost information is not accurate.

4.7.17.3 Major Issues Facing New On Stream Storage

Funding. Construction usually requires a substantial amount of money in a short time. Included in the long-term capital outlay are planning costs such as administrative, engineering, legal, financing, permitting and mitigation, which can also require significant investments. Some new storage options, such as raising existing reservoirs, reoperating them, or constructing small local reservoirs, may require significantly less capital, but may require local funding through revenue or general obligation bonds. Even these less costly projects could face financial challenges.

Impacts. New storage can affect environmental and human conditions and create economic impacts for the surrounding community and flow impacts both up and downstream of diversions. New reservoirs may result in the loss of property tax revenue to local governments in the area they are located or in an increase of local property values by firming up the water supply. Regulatory and permitting requirements require surface storage investigations to consider potential impacts to the stream flow regimes, potential changes in stream geomorphology, loss of fish and wildlife habitat, and risk of failure during seismic and operational events. Existing environmental laws require that these types of effects be mitigated. Mitigation of environmental effects is normally accomplished through implementation strategies that avoid, minimize, rectify or reduce need to address impacts under the application of various laws, regulatory processes and statues such as Public Trust Doctrine, State dam safety standards, Area of Origin statues, California Environmental Quality Act, National Environmental Protection Act, the Clean Water Act, and the Endangered Species Act.

Suitable Sites. Most of the best natural reservoir sites in the County have already been developed and environmental and regulations and mitigation requirements impose significant constraints to development of new surface storage in the County. Sites that were identified but never developed include: Lower Jack Creek (gross storage of 15,000 to 28,000 acre feet), Santa Rita Creek (gross storage of 10,000 to 23,500 acre-feet). Several alternative reservoir sites were conceptually identified with an estimated gross storage of 7,000 to 12,200 acre-feet at Santa Rosa Creek, Lower San Simeon Creek, and Upper

Steiner Creek. The range of surface storage development operations is generally more limited for smaller local and regional agencies than for the state and federal government, because the limited agency funding and staff resources impact their capabilities to complete complex feasibility studies, design documents, environmental impact studies, and related project planning needs. These circumstances severely constrain the ability of local governments and agencies to finance and implement the projects necessary to sustain the local economy, preserve or restore riparian habitats and provide water supplies for regional population growth.

4.7.17.4 Recommendation to Increase On Stream Surface Storage Benefits

1. Reservoir operators and stakeholders should continue to adaptively manage operations of existing facilities in response to increased understanding of system complexities and demands as well as changes in natural and human considerations such as social values, hydrology, and climate change.

3. Water resources scientists, engineers, engineers, and planners, should recognize the potential long development time required for new surface storage in securing funding needed for continuity of planning, environmental studies, permitting, design, construction, and operation and maintenance.

4. Rehabilitation and possible enlargement of existing older dams and infrastructure should be given full consideration as an alternative to new storage.

5. As an alternative to new storage, agencies should consider the potential to develop water purchasing agreements to buy water from other agencies that own storage reservoirs with substantial water supplies.

4.8 SUMMARY ANALYSIS, CONCLUSIONS, RECOMMENDATIONS

This section presents a summary of the analysis and recommendations for improving water supply to meet existing and future demands throughout the County. The first few sub-sections below explore some of the regional recommendations that could be implemented County-wide to improve supply reliability and to improve the information contained in future master water reports. Following the regional recommendation discussion, there is a summary of the water demand and supply analysis by water planning area (WPA) for the three sub-regions. The WPA analysis presents support for implementing different water management strategies to meet existing and forecast demands, and to improve supply reliability.

4.8.1 Contingency Plan or Reliability Supply

It is suggested that each community in the County consider developing a contingency plan or reliability supply, if they have not already done so. The contingency plan or reliability supply can either be a dramatic reduction in demand to off-set the loss of a supply or an additional supply above the build-out demand. Below are two discussions of contingency or reliability supply plans that could be implemented to maintain adequate services to residents in a community. The first discussion summarizes the successful water supply portfolio and general plan policies adopted by the City of San Luis Obispo to manage its supply sources. The second discussion is a general approach to achieve a reliability supply plan through a combination of emergency conservation and new supplies. Both of these discussions are simply examples that could be followed by water purveyors, but not all purveyors will have the ability to implement such programs.

An additional benefit with implementing a contingency or reliability supply plan is the ability to address the uncertainties with climate change and the potential impacts to water supply. As climate change and the potential effects on local and imported supplies are better understood, the contingency supply plans can be adjusted to improve the water supply management strategies. Without a reliability supply plan, a community may be unable to respond to extended periods of below average water supply resulting from climate change.

4.8.1.1 City of San Luis Obispo Reliability Reserve

The City of San Luis Obispo possesses sufficient available water supply to meet its primary water supply needs, and maintains a reliability reserve and secondary water supply. The following is an excerpt from Chapter 8 of the City of San Luis Obispo's General Plan (Revised July 6, 2010).

In 1991, during an extended drought, the community was within 18 months of running out of water in Salinas and Whale Rock Reservoirs. In fact, Salinas Reservoir was below minimum pool and was not available to the City of San Luis Obispo toward the end of this drought period. In 1996, citizens voted to incorporate Section 909 into the City's Charter identifying a water reliability reserve. In an effort to reduce the impacts of drought on the community, the City Council has enacted numerous water policies to strengthen its water resources portfolio.

The City will account for water supplies necessary to meet three specific community needs: 1) primary water supply; 2) reliability reserve; and 3) secondary water supply.

1) Primary water supply is the amount needed to meet the General Plan build-out of the City. The quantity of water needed for the City's primary water supply needs is calculated using a ten-year average of actual per-capita water use and the City's build-out population.

2) Reliability reserve provides a buffer for future unforeseen or unpredictable long-term impacts to the City's available water resources such as loss of yield from an existing water supply source and impacts due to climate change.

3) Secondary water supply is the amount needed to meet peak water demand periods or short-term loss of City water supply sources. The City's secondary water supply is

identified as any water supply resources above those needed to meet the primary water supply and reliability reserve.

The City's historical per capita usage water use has ranged from a high of 182 gallons per capita per day (gpcd) in 1987 to a low of 86 gpcd in 1991 (during mandatory water rationing). To project the City's primary water supply and reliability reserve into the future, an average per capita water use rate will be used, moderated by the use of the ten-year running average to normalize weather events. In 2010, the ten-year average is 123.2 gpcd. This water use rate is used with the City's build-out population and current population to project the primary water supply and reliability reserve. The City's remaining water resources make up secondary water supply, as shown in Table 4.53. The City has successfully managed its water supply resources to provide adequate service for its citizens during times of drought, and also maintain a reliability reserve to address unforeseen loss of yield from an existing supply, and preserve a secondary supply in case of short-term loss of a supply.

Table 4.53 City of San Luis Obispo 2010 Water Supply Accounting

Total Supply Availability, (AF)(1)	Primary Water Supply, (AF)(2)	Reliability Reserve (AF)(3)	Secondary Water Supply, (AF)(4)
9,950	7,894	1,241	816

Notes:
1. The "Total" water supply for 2010 is identified in Table 1, Chapter 8 of the City's General Plan. It includes safe annual yield from Salinas and Whale Rock Reservoirs, contractual limit from Nacimiento Reservoir, annual recycled water usage for 2009, and deducts siltation losses at Salinas and Whale Rock Reservoirs to 2060.
2. *Primary Water Supply* was calculated using the City's buildout population (57,200, per Land Use Element, General Plan Table 2, Anticipated City Population Growth, 2006) and the water use rate of 123.2 gallons per capita per day (a ten-year running average of the City's actual per capita water use), per policy A 5.2.2.
3. *Reliability Reserve* was calculated using the City's 2010 population (44,948, per CA Dept. of Finance, E-4 Population Estimates for Cities, Counties and the State, 2001-2010, with 2000 Benchmark. Sacramento, CA, May 2010) and 20 percent of the water use rate of 123.2 gallons per capita per day (a ten-year running average of the City's actual per capita water use), per policy A 5.2.3.
4. Secondary Water Supply includes the remaining water resources available in 2010, identified in Table 1, per policy A 5.2.4.

Source: City of San Luis Obispo Utilities Department, 2010.

In 1988, the City contracted with the engineering firm of Leedshill-Herkenhoff, Inc., to prepare a detailed analysis of the City's water supplies and create a computer model to estimate safe annual yield, based on coordinated operation of the Salinas and Whale Rock Reservoirs. In 1991, staff updated the computer model to examine the impact of the 1986-1991 drought on safe annual yield and revise the assumptions on the amount of water used from Whale Rock Reservoir each year to more accurately reflect the way the City actually used that resource. The analysis determined that the 1986-91 drought was the critical drought of record for the two reservoirs. These revised assumptions resulted in a reduction in the safe annual yield estimate. The City's safe annual yield for 2010, from the coordinated operation of Salinas and Whale Rock Reservoirs is 6,940 acre feet. This includes reductions due to siltation at both reservoirs to the year 2010. The Nacimiento Water Project (3,380 AF), Recycled Water (130 AF), and reductions due to siltation (less 500 AF), along with the two reservoirs provide the 2010 Supply Availability of 9,950 AF presented in the table above.

4.8.1.2 Reliability Supply Goal

The City of San Luis Obispo's Reliability Reserve and Secondary Supply (combined) are equivalent to about 26 percent of the build-out demand or 20 percent of the 2010 water resource availability. It is suggested that all municipal agencies in the County consider developing an additional 15 to 20 percent supply (above the build-out demand) as a reliability reserve, similar to the City of San Luis Obispo, or develop a contingency plan that would provide the ability to manage future unforeseen or unpredictable long-term impacts to water resources. Different factors determine how much reliability is needed by an agency and each agency has the authority to implement this suggestion since it is not a requirement. This study did not evaluate or conclude how much reliability is needed for each agency.

Determining how much reliability reserve is necessary could depend on how much supply is at risk during an emergency. Since the supplies within the County vary from imported surface water, local surface water, groundwater, desalination, recycled water, and river extraction, determining how much supply is at risk varies for each agency and depends on the type of emergency. Agencies should evaluate the supply side risk (which resources could be lost in an emergency or drought) and demand side risk (which uses would be reduced or eliminated) to determine the necessary reliability reserve.

The next step is to determine how an agency would react to the emergency or drought. If agencies decide not to increase supplies similar to San Luis Obispo, then the other option could be to control demand and implement drastic emergency conservation measures to offset an unforeseen loss of a water resource. If a community could reduce its demands sufficiently to avoid the development of a reliability reserve supply, then drastic conservation becomes the emergency plan. Emergency conservation may not be sufficient by itself to make up for the loss of supply, but it would reduce the reliability reserve that an agency would need to implement. In this case, a mixture of severe conservation and the development of a reliability reserve supply would be necessary.

4.8.2 Regional Water Supply Strategies

The District, in coordination with appropriate entities, will lead the effort to optimize the use of unsubscribed State Project Water (SWP) or Nacimiento Project Water (NWP) to promote enhanced use of existing available resources that support local agency use and exchanges.

4.8.2.1 Interagency Arrangements and Exchanges

There are opportunities to move water within the County and to match demands with available sources at different times. An example of this is using the City of Morro Bay's newly installed brackish water reverse osmosis system. During certain months of the year, Morro Bay does not use any State Water. During these months, other agencies could take advantage of Morro Bay's allocation, provided the recipient of Morro Bay's State Water would be willing to return their allocation later in the year.

Other exchange opportunities (as previously described above) entail using unsubscribed water in exchange for a currently used water resource. Examples include:

- Connecting CMC or Cal Poly to the NWP and freeing up State Water and/or Whale Rock Reservoir water for use by others;
- The City of San Luis Obispo utilizing additional water from the NWP and freeing up Salinas Reservoir water for use by others;
- Delivering unsubscribed water to urban areas to free up groundwater for rural and/or agricultural users;
- Increasing SWP deliveries to CMC and freeing up Whale Rock Reservoir water for use by others; or
- Lopez Turn-out participants utilizing additional water from the SWP and freeing up Lopez Reservoir water for use by others.

Exchanges would allow those entities with water supply needs that would not feasibly be able to connect directly to the NWP or SWP to receive a supply from a source to which they are already connected, or whose connection would be more feasible. Such an exchange promotes use of existing water supply systems before developing new supplies. Below are examples of interagency arrangements and exchanges that could be implemented to optimize the County's overall water supply.

4.8.2.2 Chorro Valley Water System Connection to NWP

Connecting the Chorro Valley Water System to the Nacimiento Water Project could allow for more State Water and/or Whale Rock Reservoir delivery to North and South County areas. The majority of the infrastructure is built, but some improvements would be necessary to connect the Chorro Valley Water System to the NWP.

4.8.2.3 Santa Margarita Lake/Salinas Reservoir Release

The Santa Margarita Lake/Salinas Reservoir (Salinas Reservoir) fills quickly, and spills every two years (personal communication with City of San Luis Obispo staff). Therefore, the Salinas Reservoir presents an exchange opportunity to release water from the reservoir that could be used to recharge the Paso Robles groundwater basin. In return, the City of San Luis Obispo would receive a certain amount of Nacimiento Project Water based on the Salinas Reservoir releases.

4.8.3 Water Conservation

A detailed discussion on the benefits, costs, and issues facing agricultural and urban conservation programs was presented earlier in this chapter. Water conservation programs are being implemented throughout the County. Most purveyors established water conservation programs during a prolonged drought in the early 90s. Purveyors should continue promoting conservation measures to their customers and teach conservation as a way of life in the County. All County purveyors should be members of the Partner in Water Conservation. Currently there are only 12 members in the County.

County departments should coordinate with appropriate entities to promote the use of conservation measures by rural and agricultural users. Since most rural and agricultural users do not receive water from a regional water wholesaler, the County is the logical entity to lead in implementing new programs to assist these users with reducing water use. The County should raise awareness and gain involvement of key groups and individuals throughout the County who could assist with this challenge. One group that is leading the effort to understand agricultural irrigation within the Paso Robles Groundwater Basin is the Paso Robles Wine Country Alliance (PRWCA) and another group that is leading the effort to improve agricultural irrigation efficiencies is the Central Coast Vineyard Team (CCVT). The CCVT, working with resource conservation districts (RCDs), can improve irrigation efficiencies via on-farm audits, education programs and mobile laboratory irrigation testing. Refer to Chapter 2 “Resource Agencies” for a discussion on other groups with whom to coordinate. Working with these groups would assist the County in:

- Increasing communication with the agricultural and rural community
- Increasing knowledge of supply limitations and findings of this study
- Establishing conservation goals for different groundwater basins throughout the County

4.8.4 Groundwater Evaluations

The perennial yield or safe basin yield of groundwater basins should be determined for those basins without an adequate or current estimate. If this value is determined, then each groundwater basin within the County would have an estimate of the rate at which water could be pumped from wells year after year without decreasing the groundwater in storage. The perennial yield could also be tied to the rate of replenishment or recharge to the basin that will not result in diminished storage (Perennial yield definition excerpt from the Revised Resource Capacity Study, Water Supply in the Paso Robles Groundwater Basin, October 2010).

Groundwater models are possible tools that could assist in the management of recharge and extraction to preserve supply resources. Once developed, these tools could be used to determine the perennial yield.

These basin management efforts are best implemented by forming basin stakeholder groups and developing a Groundwater Management Plan. Ideally, a participating agency would lead this effort and submit applications for groundwater management assistance grant programs.

4.8.5 Groundwater Banking/Recharge

In general, groundwater banking/recharge is not perceived as a long-term management strategy for use of unallocated supplies. The opportunity for banking supplemental water decreases as new subscribers are added to surface water supplies, such as the Nacimiento Water Project (NWP) or the State Water Project (SWP). Current contractors of NWP or SWP should consider maximizing their allotted use, which will reduce groundwater pumping. Once unallocated supplies are allocated, those participating agencies could then consider banking/recharge programs to improve the reliability and use of those supplies.

Groundwater banking is generally viewed as being difficult to implement and monitor if overlying land owners are not part of the banking project. Overlying land owners could extract water and benefit from a project that was funded by other parties. Or the operations of the banking project, if not designed and operated properly, could negatively affect neighboring overlying users. The costs to implement a water banking project are also very high when compared to the benefit.

4.8.6 Streamline Institutional Agreements

The cities and agencies within the County desire a simplified approach to transfer water between each other. A request was made that the District lead the development of a “boiler plate” agreement, or streamlined, standard process, which could then be used by local agencies to implement a transfer agreement. A similar agreement or process could also be developed for emergency intertie agreements. An example of how the process could be streamlined is by developing a memorandum of understanding (MOU) to establish the method for determining the equitable costs for a temporary transfer or emergency intertie.

4.8.7 Improving Agriculture Demand Estimate

The agriculture demand assessment was based in large part on the County Agriculture Commissioner’s Agricultural/Crop ArcGIS layer from August 2008. This information was used to determine existing agricultural acreage by crop group. This layer is updated each year with information from the pesticide use records obtained by the San Luis Obispo Department of Agriculture. According to the Agriculture Commissioner’s staff, the pesticide use permits provide the most accurate information available regarding the location of planned commercial agricultural production during the year, but do not identify whether the specific crop was planted, whether irrigation was applied, the number of crop rotations for annual crops, and other factors critical to an accurate accounting of irrigated cropland (Isensee, 2009).

Future planning efforts need to include agricultural demands not captured in the Agriculture Commissioner's pesticide use reports GIS database. For example, irrigated pastures not intended for commercial sale but for private use are not included in the County's database, but are likely a large demand on the local groundwater supplies. An example is Water Planning Area 1 (San Simeon) where the calculated agricultural demand is fairly small, but there is a large irrigated pasture component that is not currently in the demand for WPA 1. The actual agricultural demand is likely greater than the calculated demand presented in this report. This report also does not account for livestock water use, which in some basins, could be a significant user. However, it would be difficult to accurately assess livestock water demand.

Future planning efforts should either develop more accurate agricultural demand estimates or complete a separate study that focuses solely on agricultural demands, and then incorporate the findings into future master water reports. Ideally, stakeholder groups established in each Water Planning Area would coordinate to refine these (and other) estimates on a watershed and groundwater basin basis for their area to better reflect whether there is enough supply to meet demand, as discussed in the next section. One example of a group that is leading the effort to understand agricultural irrigation within the Paso Robles Groundwater Basin is the UC Davis Cooperative Extension, with the support of the Paso Robles Wine Country Alliance and participating growers. Refer to Chapter 2 "Resource Agencies" for a discussion on other groups with whom to coordinate.

4.8.8 Improving Rural Demand Estimate

Similar to the agricultural demand estimate, the method for calculating the rural demand estimate should be improved. More accuracy in the rural demand estimate is achievable, provided water use information from rural customers is available. As part of the recommendations in the Resource Management System 2009 Annual Summary Report provided by the WRAC, the County Board of Supervisors adopted a set of actions that should result in more rural water use information being made available for future master water reports.

The adopted actions include, but are not limited to the installation of flow meters on non-agricultural wells, monthly water use recording and semi-annual reporting for water purveyors with as few as five connections, and the inclusion of some wells into the District's water well level monitoring program. The implementation of these requirements will result in actual water use data being used to develop better rural water demand projections.

4.8.9 Agricultural and Rural Users Water Management Strategies

County-wide, rural water demands represent less than five percent of the total urban, agriculture and rural demands. The range varies from a low of less than one percent (Los Osos WPA 5) to a high of 21 percent (Carrizo Plain WPA 10). Agricultural water demand represents about 80 percent of the total County demand (excluding environmental). The range varies from a low of 30 percent (San Luis Obispo/Avila WPA 6) to a high of nearly 100 percent (Huasna Valley WPA 8).

One challenge with developing water management strategies for rural and agricultural users is the lack of understanding between the demand location and the supply source. For example, for the Paso Robles Groundwater Basin, the District has a good understanding of where rural and agriculture demands are compared to the groundwater basin supply. Therefore, the Paso Robles Groundwater Basin study was able to develop a water demand and supply balance for the users within the basin. This is not the case for all basins within the County. A water balance evaluation should be conducted on a watershed and groundwater basin basis within the County to better understand the relationship between supply and demand within a water planning area's boundary. This Master Water Report evaluated demands on a water planning area level, but was not able to conclude whether or not rural or agricultural supplies are adequate to meet demands (i.e. "uncertain", as discussed below). Future studies should be focused on the watershed and basin level to arrive at the water balance. An alternative would be the preparation of a "stakeholder driven" watershed/groundwater basin management plan, such as the Groundwater Management Plan and Steering Committee formed for the Paso Robles Groundwater Basin Management, that could be used in future master water reports.

Another challenge with developing water management strategies for rural and agricultural users is the uncertainty of whether and how much groundwater is being extracted from defined basins (discussed in Section 3.3), versus how much groundwater is being supplied by wells that tap fractured rock aquifers or other non-basin sources. For example, the agricultural areas located west of the cities of Paso Robles and Templeton along Highway 46 West are outside the Paso Robles Groundwater Basin and Atascadero Groundwater Sub-basin. However, sufficient groundwater appears to exist to supply commercial agricultural operations currently, but it is unknown whether the groundwater can sustain operations into the future. Groundwater resources in some areas outside defined basins have been studied on a multiple-parcel basis for specific planning issues or for small public water systems, but in most cases hydrogeologic data is only generated when a new well is drilled or a property is sold. Generally, available information is limited to specific wells; formation-wide data related to aquifer yield, water quality, or water availability is not available.

Although the agricultural and rural water demands were quantified on a water planning area basis, there is too much uncertainty in the demand and the exact source of supply to arrive at a reasonable conclusion on whether an existing and/or future water supply exists for most water planning areas. In general, if there is a need for additional supply to meet rural and agricultural demands, the following water management strategies should be considered.

- Conservation
- Land use management (including low impact development and rainwater harvesting)
- Groundwater supply sources, including undefined fractured rock aquifers
- Off stream storage, including stock ponds
- Recycled water estimate. Recycled water presents a viable opportunity for direct delivery of irrigation water or for groundwater recharge/banking. Potential wastewater treatment plants being upgraded or constructed to provide tertiary treatment for recycled water include the City of Morro Bay and the community of Los Osos. The City of San Luis Obispo's existing water reclamation facility could be expanded to increase recycled water delivery. Other treatment plants that could be upgraded to produce recycled water and are located near large agricultural operations include the City of Paso Robles and the South San Luis Obispo County Sanitation District.
- Groundwater banking/recharge using recycled water, NWP or SWP supplies
- Desalination of brackish groundwater for areas like the Carrizo Plain

4.8.10 Environmental Water Management Strategy

Environmental water demand refers to the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. For this study, Environmental Water Demand is most commonly described and quantified in terms of instream flow requirements, i.e., the amount of water that must remain in the creek or river to support the various life stages of the target or indicator species. For the purposes of this analysis, the federally threatened south-central California coast steelhead (*Oncorhynchus mykiss*) was used as the primary indicator species.

Planning-level assessments such as this one do not take the complexity of natural systems into consideration. While the results provide a reasonable and scientifically supported estimate of the Environmental Water Demand for the purposes of water planning, site- and project-specific instream flow requirements need to be completed to be able to determine a water balance that accounted for environmental water demand on a water planning area basis in future master water reports. This would allow the environmental water demand to be quantified and represented on a sub-watershed or creek basis. The first steps in this effort are establishing appropriate data collection sites, identifying opportunities for coordination with appropriate entities on the effort, and prioritize these locations.

4.8.11 Unsubscribed State Water Project

The District is currently studying the hydraulic capacity of the State Water Project Coastal Branch to determine if sufficient capacity exists to transmit additional State Water to coastal communities. This effort is to identify the potential for the delivery of additional unsubscribed State Water. Use of unsubscribed SWP in the above exchange scenarios will also be considered in evaluating and negotiating the use of any extra capacity in the Coastal Branch.

4.8.12 North Coast Sub-Region

The discussion and analysis below presents the existing and forecast water demands and supplies, an evaluation of the water supply versus demand balance, identification of water management strategies and the potential for implementing a management strategy for each WPA. Note that the suggested water management strategies are not requirements, and most are consistent with existing water planning studies and options being considered by cities, communities and agencies.

As shown in the tables below, the water management strategies were assigned a Greater or Moderate designation to express their potential for implementation. These designations were presented to the WRAC and individual agencies for input on their validity. If a water management strategy had minimal potential for implementation or was not applicable, then a designation was not assigned. Below are the designation definitions used to evaluate the water management strategies and their ability to address the water supply need.

- Greater: Likely feasible and will address all or a major portion of the deficiency
- Moderate: Project may be feasible and may provide some level of supply to address the deficiency

4.8.12.1 San Simeon WPA 1

Groundwater is the primary water supply source for this WPA. The primary constraints on water availability in the basins in this WPA include physical limitations and potential water quality issues. Currently the Pico Creek Valley Groundwater Basin water supply of San Simeon CSD is at a certified Level III severity rating (resource capacity has been met or exceeded) due to the unreliability of the groundwater supply to meet existing demands (SLO County, 2008). As a result, a moratorium on development in San Simeon has been in place since 1991.

Groundwater levels for the groundwater basins in this WPA are likely highest during the wet season. They steadily decline from these levels during the dry season, and recover again to higher levels during the next wet season. During drought periods, creek flows are likely insufficient to adequately recharge the basins and groundwater levels could subsequently be lowered significantly due to pumping. Significant lowering of basin groundwater levels at or below sea level near the coast could lead to seawater intrusion and degradation of water quality.

4.8.12.1.1 *Water Management Strategies*

San Simeon CSD serves the primary population center and is the largest urban water user in this WPA. Seventy percent of water used by the San Simeon CSD is for commercial use (tourist/hotels). Due to the supply limitations of the Pico Creek Valley Groundwater Basin, an alternative supply is necessary to meet future demands. Water conservation measures have been fully implemented and there is minimal or no opportunity to further reduce water demands. As discussed above, further mandatory or emergency conservation would be used to off-set an emergency or reliability supply, not to support growth. Three water management strategies are likely the most feasible options to consider for San Simeon CSD's future water supply:

- Recycled water
- Groundwater supply sources (other than Pico Creek Valley Groundwater Basin)
- Desalination

San Simeon CSD plans to move forward with upgrading its wastewater treatment facility to use the treated effluent as recycled water for landscape irrigation and possibly commercial uses (not for seawater intrusion barrier). By July 2012, the facility will be producing Title 22 recycled water, but it will only be available to commercial trucks that connect to an on-site tank. The long-term plan is to construct a recycled water distribution system.

The Arroyo De La Cruz Groundwater Basin is a possible option for a future water supply. Unfortunately, published hydrogeologic information for this basin is compiled from older reports and may not be representative of current conditions. The safe basin yield should be determined as part of any investigation of this basin as a future water supply. This supply would likely serve as the best option for the future Hearst Ranch Hotel and Old Town San Simeon. Coordination with Hearst Ranch for delivering groundwater from this basin to San Simeon CSD would be required.

San Simeon CSD could also implement a desalination project (similar to one being considered by Cambria CSD). The implementation challenges would be similar to those experienced by Cambria CSD, which is the reason for this water management strategy receiving a moderate designation for implementation potential.

On stream storage has been proposed and evaluated in the past, and is not a likely option.

Other water management strategies that received a moderate designation for implementation potential include land use management (includes low impact development and rainwater harvesting) and groundwater banking/recharge (using recycled water).

Although the urban water demand is greater than the combined calculated agricultural and rural demands, the calculations do not account for livestock operations, and likely underestimates the actual agricultural demand. For example, Hearst Holdings Inc. makes up the majority of agriculture/rural land ownership in this WPA and has submitted surface water diversion reporting forms to the State Board estimating 1,829 AFY has been used for irrigation, for livestock and domestic purposes on their property. As discussed above in the Agricultural and Rural Water Management Strategies section, due to the uncertainty in determining the exact source of supply compared to the demand, it is difficult to determine whether a supply deficiency exists. Future master water reports should more accurately calculate agricultural demand and complete a water balance to gain a better understanding of potential supply deficiencies for non-urban water users.

If it is determined that a supply deficit exists, then rural and agricultural users are encouraged to implement conservation measures to reduce demands and/or extract water from other groundwater supplies. Other water management strategies that received a moderate designation for implementation potential include land use management (includes low impact development and rainwater harvesting) and off stream storage.

Table 4.54 San Simeon WPA 1 Water Management Strategies				
	San Simeon CSD	**Agriculture**	**Rural**	**Environmental**
Demand				
Existing Demand (AFY)	108[1]	70[2]	20[2]	
Forecast Demand (AFY)	250[3][4]	10 - 60[2]	50[2]	
Supply				
Pico Creek Valley Basin (AFY)[5]	140	[6]	[6]	
San Carpoforo Valley Basin (AFY)[7]	0	Uncertain	Uncertain	
Arroyo De La Cruz Valley Basin (AFY)	0	[8][9]	[9]	
Other Groundwater Supply Sources (AFY)	Uncertain	Uncertain	Uncertain	
SWRCB Water Diversions (AFY)	0	[10]	[10]	
Total Supply (AFY)	**140**	**Uncertain**	**Uncertain**	
Environmental Water Demand				
Environmental Water Demand (AFY)[16]				72,980
Unimpaired Mean Annual Discharge(AFY)[17]				104,490
Water Supply Versus Demand Balance	**Future Deficit**	**Uncertain[11]**	**Uncertain[11]**	**Uncertain[18]**
Water Management Strategies and Potential for Implementation				
Further Conservation	Fully Implemented[12]	**Greater**	**Greater**	

Table 4.54 San Simeon WPA 1 Water Management Strategies

	San Simeon CSD	Agriculture	Rural	Environmental
Unsubscribed Nacimiento Water Project[13]				
Land Use Management[19]	Moderate	Moderate	Moderate	
Recycled Water	**Greater**			
Optimize Use of State Water Project				
Groundwater Banking/Recharge	Moderate[14]			
Groundwater Supply Sources	**Greater**	**Greater**	**Greater**	
Salinas Reservoir Expansion/Exchange				
Desalination	Moderate			
Lopez Lake Expansion/Exchange				
New Off Stream Storage		Moderate		
Nipomo Supplemental Water Project				
Precipitation Enhancement				
New On Stream Storage[15]				

Notes:
1. Demands fluctuate between 70 and 140 AFY due to changes in tourism.
2. Agricultural and rural demand calculations do not account for livestock operations, and likely underestimates actual water demands. For example, Hearst Holdings Inc. makes up the majority of agriculture/rural land ownership in this WPA and has submitted surface water diversion reporting forms to the SWRCB estimating 1,829 AFY of irrigation, livestock and domestic usage for their property from surface sources.
3. Extensive conservation program in place. No further conservation expected at build-out by San Simeon CSD.

Table 4.54 San Simeon WPA 1 Water Management Strategies

	San Simeon CSD	Agriculture	Rural	Environmental

4. Most recent master plan forecast a build-out demand of 224 AFY, but San Simeon CSD's current build-out demand estimate is 250 AFY.
5. Estimated safe basin yield of Pico Creek underflow is 120 AFY
6. Seventy (70) AFY of Pico Creek livestock and domestic usage was reported by Hearst Holdings Inc. to the SWRCB in June 2010.
7. No estimates of basin yield exist
8. One thousand, six hundred seven (1,607) AFY of Arroyo De La Cruz Underflow is reported in the SWRCB diversion database as a permitted appropriative water right for Hearst Holdings Inc.
9. Estimated safe basin yield is 1,244 AFY and all pumping is for agricultural or rural users
10. Diversions from sources other than the three basins noted above total 238 AFY according to diversion reporting forms to the SWRCB from Hearst Holdings Inc. (June 2010) and the SWRCB diversion database.
11. It is uncertain whether an agricultural or rural supply deficit exists. If the users are drawing water from the San Carpoforo groundwater basin, then it is unlikely that a deficit exists. Future studies should invest the resources to determine which groundwater basins are used by the agricultural and rural water users.
12. See Note 3.
13. By exchange via Whale Rock and by building a pipeline from the reservoir.
14. Potential strategy using recycled water.
15. On stream storage was proposed for San Simeon Creek in previous studies.
16. Environmental Water Demand is defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. The federally threatened south-central California coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species for the development of a reasonable estimation of the amount of water needed to support this species.
17. Mean daily flow values from stream gaging stations representative of long-term, unimpaired (or natural) flow conditions were used to derive unimpaired mean annual discharge (MAD) estimates. The unimpaired MAD is the cumulative flow for the creeks within the water planning area that were included in the calculation.
18. The Environmental Water Demand and Unimpaired Mean Annual Discharge are calculated for the entire water planning area and not for individual streams.
19. Includes Low Impact Development/Rainwater Harvesting.

4.8.12.2 Cambria WPA 2

Groundwater is the primary water supply source for this WPA. The primary constraints on the groundwater availability in this WPA include physical limitations and potential water quality issues. Currently the San Simeon Valley Groundwater Basin, which supplies water to the Cambria CSD, has a maximum extraction limit of 1,230 AFY set by the State Board. The Santa Rosa Valley Groundwater Basin, which also supplies Cambria CSD, has a maximum extraction limit of 518 AFY set by the State Board. Currently the water supply of Cambria CSD is at a Level III severity rating (resource capacity has been met or exceeded) due to unreliability of the groundwater supply to meet existing demands (Cambria CSD WMP, 2008).

Levels for the groundwater basins in this WPA are likely highest during the wet season. They steadily decline from these levels during the dry season, and recover again to higher levels during the next wet season. During drought periods, creek flows are likely insufficient to adequately recharge the basins and groundwater levels could subsequently be lowered significantly due to pumping. Significant lowering of basin groundwater levels at or below sea level near the coast could lead to seawater intrusion and degradation of water quality.

4.8.12.2.1 *Water Management Strategies*

Cambria CSD serves the primary population center and is the largest urban water user in this WPA. Due to the supply limitations of the San Simeon and Santa Rosa Valley Groundwater Basins, an alternative supply is necessary to meet existing seasonal deficits and future demands. Water conservation measures have been implemented and there is minimal opportunity to further reduce water demands. Further mandatory or emergency conservation would be used to off-set an emergency or reliability supply, not to support growth. Two water management strategies are likely the most feasible options to consider for Cambria CSD's future water supply:

- Desalination
- Recycled water

To meet the additional water supply needs and to increase water supply reliability, the Cambria CSD plans to construct a seawater desalination plent to produce up to 602 AFY. This plant would operate during the dry season to augment supply during that period of high demand. A decentralized recycled water program is also planned, with an estimated 180 AFY made available for unrestricted irrigation use.

Other water management strategies that received a moderate designation for implementation potential include further conservation and land use management (includes low impact development and rainwater harvesting).

Table 4.55 Cambria WPA 2 Water Management Strategies				
	Cambria CSD	**Agriculture**	**Rural**	**Environmental**
Demand				
Existing Demand (AFY)	706	640	100	
Forecast Demand (AFY)	1,009-1,514[(1)]	740-1,490	190-220	
Supply				
San Simeon Valley Basin (AFY)[(2)]	1,230[(4)(6)]	Uncertain	Uncertain	
Santa Rosa Valley Basin (AFY)[(3)]	518[(5)(6)]	Uncertain	Uncertain	
Villa Valley Basin (AFY)	0	[(7)]	[(7)]	
Other Groundwater Supply Sources (AFY)	0	Uncertain	Uncertain	
SWRCB Water Diversions (AFY)	0	[(8)]	[(8)]	
Total Supply (AFY)	**1,748**	**Uncertain**	**Uncertain**	
Environmental Water Demand				
Environmental Water Demand (AFY)[(13)]				51,460
Unimpaired Mean Annual Discharge(AFY)[(14)]				87,050
Water Supply Versus Demand Balance	**Existing Seasonal and Future Deficit[(9)]**	**Possible Deficit[(10)]**	**Possible Deficit[(10)]**	**Uncertain[(15)]**
Water Management Strategies and Potential for Implementation				
Further Conservation	Moderate	**Greater**	**Greater**	
Unsubscribed Nacimiento Water Project[(11)]				
Land Use Management[(16)]	Moderate	Moderate	Moderate	

Table 4.55 Cambria WPA 2 Water Management Strategies				
	Cambria CSD	**Agriculture**	**Rural**	**Environmental**
Recycled Water	**180 AFY**			
Optimize Use of State Water Project				
Groundwater Banking/Recharge				
Groundwater Supply Sources		**Greater**	**Greater**	
Salinas Reservoir Expansion/Exchange				
Desalination	**602 AFY**			
Lopez Lake Expansion/Exchange				
New Off Stream Storage		Moderate		
Nipomo Supplemental Water Project				
Precipitation Enhancement				
New On Stream Storage(12)				

Notes:

1. The low end of the demand range for Cambria CSD represents maintaining current conservation practices and is the lowest demand scenario from the district's water master plan.
2. Estimated safe basin yield is 1,040 AFY
3. Estimated safe basin yield is 2,260 AFY
4. SWRCB allows Cambria CSD 1,230 AFY maximum extraction and 370 AF dry season extraction
5. SWRCB allows Cambria CSD 518 AFY maximum extraction and 260 AF dry season extraction
6. California Coastal Commission limits Cambria CSD total diversion from both San Simeon and Santa Rosa Creeks to 1,230 AFY
7. Estimated safe basin yield is 1,000 AFY and all pumping is for agricultural or rural users
8. Diversions do not distinguish type of use. Potentially 158 AFY could be diverted for use to either agriculture or rural residential.
9. Although the existing annual supply and demand indicates a surplus, the dry season extraction limit creates a seasonal supply deficit.
10. It is uncertain whether an agricultural or rural supply deficit exists. If the users are drawing water from the Villa Valley groundwater basin, then the demands are approaching the basin yield. Future studies should invest the resources to determine which groundwater basins are used by the agricultural and rural water users.
11. By exchange and building a pipeline from Whale Rock Reservoir.

Table 4.55 Cambria WPA 2 Water Management Strategies				
	Cambria CSD	**Agriculture**	**Rural**	**Environmental**

12. On stream storage was proposed for San Simeon Creek in previous studies.
13. Environmental Water Demand is defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. The federally threatened south-central California coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species for the development of a reasonable estimation of the amount of water needed to support this species.
14. Mean daily flow values from stream gaging stations representative of long-term, unimpaired (or natural) flow conditions were used to derive unimpaired mean annual discharge (MAD) estimates. The unimpaired MAD is the cumulative flow for the creeks within the water planning area that were included in the calculation.
15. The Environmental Water Demand and Unimpaired Mean Annual Discharge are calculated for the entire water planning area and not for individual streams.
16. Includes Low Impact Development/Rainwater Harvesting.

4.8.12.3 Cayucos WPA 3

Whale Rock Reservoir is the primary source of supply for urban users and groundwater is the primary water supply source for agriculture and rural users in this WPA. The primary constraints on the groundwater availability in this WPA include physical limitations and potential water quality issues. The shallow alluvial deposits that characterize these groundwater basins are typically more susceptible to drought impacts than deeper formation aquifers. They have less groundwater storage and consequently have less capacity for resource utilization and banking. Water level and well capacity declines during drought periods limit water availability, and sea water intrusion is the primary constraint in the lower portions of the basins.

Whale Rock Reservoir is part of the Old Valley Groundwater Basin. Basin groundwater users downstream of the reservoir include members of the Cayucos Area Water Organization (CAWO). The combined groundwater and Whale Rock Reservoir surface water allocation for CAWO in Old Valley is 600 AFY.

4.8.12.3.1 *Water Management Strategies*

CAWO members, which include Morro Rock Mutual Water Company (Morro Rock MWC), Paso Robles Beach Water Association (PRBWA), County Service Area 10A (CSA 10A), the Cayucos Cemetery District (CCD), are the primary urban users within this WPA. Whale Rock Reservoir allocations to CAWO members are sufficient to provide existing demands and meet forecast build-out demands. CSA 10A has procured an additional entitlement of 25 AFY through the Nacimiento Water Project. This water will be taken from the Whale Rock Reservoir in an exchange agreement with the City of San Luis Obispo. The agreement allows up to 90 AFY to be exchanged, which may be a way to address any future needs of the CAWO. Nacimiento Water Project water could be delivered to Morro Rock MWC or Paso Robles Beach Water Association as part of this arrangement.

Table 4.56 Cayucos WPA 3 Water Management Strategies							
	Morro Rock MWC[(1)]	Paso Robles Beach Water Association[(1)]	CSA 10A[(1)]	Cayucos Cemetery District[(1)]	Agriculture	Rural	Environmental
Demand							
Existing Demand (AFY)	121	163	132	16	520	80	
Forecast Demand (AFY)	164-173	207-218	220-232	17-18	430-800	130-140	
Supply							
Whale Rock (Supplies Urban Demands) (AFY)	170	222	190	18	0	0	
Whale Rock (Supplies Mainini Ranch and Ogle) (AFY)	-	-	-	-	64	0	
Nacimiento Water Project (2010) (AFY)[(2)]	0	0	25 - 90	0	0	0	
Cayucos Valley Basin (AFY)	0	0	0	0	[(3)]	[(3)]	
Old Valley Basin (AFY)[(4)]	-	-	-	-	-	-	
Toro Valley Basin (AFY)	0	0	0	0	[(5)]	[(5)]	
Other Groundwater Supply Sources (AFY)	0	0	0	0	Uncertain	Uncertain	
SWRCB Water Diversions (AFY)	3[(6)]	0	0	0	[(7)]	[(7)]	
Total Supply (AFY)	**173**	**222**	**215 - 280**	**18**	**Uncertain**	**Uncertain**	
Environmental Water Demand							
Environmental Water Demand (AFY)[(10)]							26,160
Unimpaired Mean Annual Discharge (AFY)[(11)]							33,340
Water Supply Versus Demand Balance	**At Supply Limit**	**At Supply Limit**	**At Supply Limit**	**At Supply Limit**	**Uncertain[(8)]**	**Uncertain[(8)]**	**Uncertain[(12)]**
Water Management Strategies and Potential for Implementation							
Further Conservation	Moderate	Moderate	Moderate	Moderate	**Greater**	**Greater**	
Unsubscribed Nacimiento Water Project	**Greater[(2)]**	**Greater[(2)]**	**Greater[(2)]**				
Land Use Management[(9)]	Moderate	Moderate	Moderate		Moderate	Moderate	
Recycled Water							
Optimize Use of State Water Project							
Groundwater Banking/Recharge							

Table 4.56 Cayucos WPA 3 Water Management Strategies							
	Morro Rock MWC(1)	**Paso Robles Beach Water Association(1)**	**CSA 10A(1)**	**Cayucos Cemetery District(1)**	**Agriculture**	**Rural**	**Environmental**
Groundwater Supply Sources	Moderate(6)				**Greater**	**Greater**	
Salinas Reservoir Expansion/Exchange							
Desalination							
Lopez Lake Expansion/Exchange							
New Off Stream Storage					Moderate		
Nipomo Supplemental Water Project							
Precipitation Enhancement							
New On Stream Storage							

Notes:

1. The Cayucos Area Water Organization includes the Morro Rock MWC, the Paso Robles Beach Water Association, CSA 10A, and the Cayucos Cemetery District. The low end of the forecast demand range assumes 5% additional conservation (beyond what has already been accomplished) at build-out.
2. CSA 10A has procured 25 - 90 AFY of Nacimiento Water Project via exchange with City of San Luis Obispo for Whale Rock Reservoir water. Agreement provisions allow for up to 90 AFY of NWP if necessary. Nacimiento water could be delivered to Morro Rock MWC or Paso Robles Beach Water Association, as part of this arrangement.
3. Estimated safe basin yield is 600 AFY and the majority of pumping is for agricultural or rural users, but a small public water system does serve a mobile home park.
4. Includes Whale Rock Reservoir. Most of the wells extract water that is replenished by recharge from Whale Rock Reservoir. Water drawn from these wells is also limited by the 664 AFY entitlement from Whale Rock Reservoir. Note that CAWO agencies receive water directly from the reservoir via pipeline and the treatment plant.
5. Estimated safe basin yield is 500 AFY and the majority of pumping is for agricultural or rural users
6. Only 3 AFY is diverted for a school and park irrigation, but up to 56 AFY is the permitted diversion from Little Cayucos Creek underflow. 56 AFY is part of the 600 AFY safe basin yield for the Cayucos Valley Basin. Due to water quality, the remaining 53 AFY could be used for domestic supply following treatment.
7. Diversions do not distinguish type of use. Potentially 65 AFY could be diverted for use to either agriculture or rural residential.
8. It is uncertain but unlikely that an existing agricultural or rural supply deficit exists. The yield from the Cayucos Valley and Toro Valley basins exceed existing demand. It is possible that future demands could exceed supply. Future studies should invest the resources to determine which groundwater basins are used by the agricultural and rural water users.
9. Includes Low Impact Development/Rainwater Harvesting.
10. Environmental Water Demand is defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. The federally threatened south-central California coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species for the development of a reasonable estimation of the amount of water needed to support this species.
11. Mean daily flow values from stream gaging stations representative of long-term, unimpaired (or natural) flow conditions were used to derive unimpaired mean annual discharge (MAD) estimates. The unimpaired MAD is the cumulative flow for the creeks within the water planning area that were included in the calculation.
12. The Environmental Water Demand and Unimpaired Mean Annual Discharge are calculated for the entire water planning area and not for individual streams.

Since the forecast build-out demands will push the CAWO members to their supply limit, an alternative supply should be developed as a reliability reserve. Water conservation measures provide minimal opportunity to further reduce water demands. Further mandatory or emergency conservation would be used to off-set an emergency or reliability supply, not to support growth. The most viable option for a reliability reserve supply is the NWP, since the existing agreement with CSA 10A allows up to 90 AFY to be exchanged.

Other water management strategies that received a moderate designation for implementation potential include further conservation and land use management (includes low impact development and rainwater harvesting).

The combination of full 90 AFY NWP exchange and emergency conservation measures would provide the CAWO members with reliability reserve.

4.8.12.4 Morro Bay WPA 4

This WPA uses a diverse blend of surface water (local and imported), groundwater, desalination, and State Board permitted water diversions. The City of Morro Bay and the agencies that make up the Chorro Valley Water System (CMC, Cuesta College, Camp San Luis Obispo, and County Operations Center/Office of Education) represent the urban users in this WPA.

The primary constraints on groundwater availability in this WPA include physical limitations, water quality issues, and water rights. Shallow alluvial deposits are typically more susceptible to drought impacts. For the upper Morro Valley and Chorro Valley Groundwater Basins, water level and well capacity declines during drought periods limit the availability of the resource, while in the lower valley area, sea water intrusion would be the primary constraint. Elevated nitrates are a constraint for drinking water availability at the City of Morro Bay well field, where appropriative water right permits from the State Board also limit production. The State Board permitted allocation allows withdrawals from the Chorro Basin only when creek flows exceed 1.4 cubic feet per second (cfs). Nevertheless, strategic management of these sources should allow the City of Morro Bay to reliably extract 581 AFY from the Morro Basin and 566 AFY from the wells that penetrate the Chorro Basin, for a total of 1,147 AFY, even in dry years.

The State Water Project provides water to the City of Morro Bay, CMC, County Operations Center/Office of Education, and Cuesta College. The SWP shuts down for annual maintenance activities each fall/winter during which the City of Morro Bay has used its alternative supplies. In 2008, the SWP shutdown took place when groundwater quality issues were limiting the City of Morro Bay’s use of well water. The shortfall was made up for through an agreement with CMC to provide the Morro Bay with water during that period. In addition, The SWP is considered a supplementary source of water supply since hydrologic variability, maintenance schedules, and repair requirements can cause reduced deliveries or complete shut down of the delivery system. Since delivery to the Central Coast began, the SWP has provided between 50 and 100 percent of the contracted allocations, but recently, the drought coupled with pumping restrictions in consideration of endangered species habitat lowered that amount to 35 percent in 2008 and 40 percent in 2009. This Master Water Report assumed an average allocation of 66 percent of the contract water service amount for determining supply.

CMC, Camp San Luis Obispo, and County Operations Center/Office of Education also receive water from Whale Rock and Chorro Reservoirs. Raw lake water is pumped from Whale Rock to CMC for treatment. The net storage capacity of both of these reservoirs has decreased due to siltation. Flow must also be maintained in Chorro Creek downstream of the reservoir for riparian habitat enhancement.

Although not a surface water supply counted in the demand/supply balance for this WPA, the Salinas Reservoir waterline was extended from the Cuesta Water Tunnel to the Chorro Reservoir as part of the original improvements in World War II. The pipeline has only been used to convey water from the Salinas Reservoir to Camp San Luis Obispo twice since construction, but is available for emergency conditions.

More detailed discussion on the water rights and related agreements between the various agencies in this WPA is provided in section 3.7.6.

4.8.12.4.1 *Water Management Strategies*

The City of Morro Bay and the Chorro Valley Water System are the primary population centers and urban water users in this WPA. As shown in Table 4.57 below, these users have adequate supply to meet existing and forecast demands. However, during a SWP shut down for annual maintenance, the City of Morro Bay experienced a supply shortfall that was made up through an agreement with CMC to provide the Morro Bay with water during that period.

The purveyors in this WPA should consider enhancing their contingency or reliability supply. Due to the diversity in water supply sources, Morro Bay and the Chorro Valley Water System have several likely feasible options to consider (listed below). Water conservation measures have been fully implemented in Morro Bay and there is minimal or no opportunity to further reduce water demands. However, conservation is an option for the Chorro Valley Water System. As discussed above, further mandatory or emergency conservation would be used to off-set an emergency or reliability supply, not to support growth.

- Further conservation (Chorro Valley Water System)
- Unsubscribed Nacimiento Water Project
- Recycled water
- Optimized use of State Water Project
- Desalination

Morro Bay modernized its desalination plant to restore its full capacity, and it could double the capacity if necessary for future reliability needs. It is also interested in an additional 750 AFY of State Water Project and 1,500 AFY of Drought Buffer, if it became available. Other potential future supplies include the jointly operated Morro Bay - Cayucos Sanitary District Wastewater Treatment Plant. The plant is slated for a major upgrade in 2014. Production of tertiary effluent will be provided, and thus could be a source of future water recycling to augment water supplies.

The Chorro Valley Water System could implement conservation measures to reduce its water demand. CMC is considering participation in the Nacimiento Water Project. CMC has contacted the District requesting from 200 AFY to 400 AFY of Nacimiento Water for future supply reliability and minor demand increases. CMC and Cuesta College have also expressed interest in any State Water that may become available.

These additional supplies are not required to satisfy an existing or anticipated future demand, but to develop a reliability reserve, or to develop a contingency plan that would provide the ability to manage future unforeseen or unpredictable long-term impacts to water resources. Other water management strategies that received a moderate designation for implementation potential include land use management (includes low impact development and rainwater harvesting), groundwater banking/recharge, and Salinas Reservoir Expansion/Exchange.

Table 4.57 Morro Bay WPA 4 Water Management Strategies								
	Morro Bay	**CMC**[(2)]	**Camp San Luis Obispo (National Guard)**[(2)]	**County Operations Center/Office of Education**[(2)]	**Cuesta College**[(2)]	**Agriculture**	**Rural**	**Environmental**
Demand								
Existing Demand (AFY)	1,620[(1)]	1,135	138	94	125	2,060	120	
Forecast Demand (AFY)	2,040[(1)]	1,135	138	94	125	1,690 - 2,440	190 - 220	
Supply								
State Water Project (AFY)[(3)]	1,313	735[(4)]	0	150[(4)]	140[(4)]	0	0	
Desalination Plant (AFY)	645	0	0	0	0	0	0	
Whale Rock Reservoir (AFY)	0[(5)]	420	0	25[(6)]	0	0	0	
Chorro Reservoir (AFY)	0	25[(7)]	140	0	0	25[(8)]	0	
Morro Valley Basin (AFY)[(9)]	581	0	0	0	0	Uncertain[(9)]	Uncertain[(9)]	
Chorro Valley Basin (AFY)[(10)]	566	0	200[(11)]	0	0	Uncertain[(10)]	Uncertain[(10)]	
Other Groundwater Supply Sources (AFY)	0	0	0	0	0	Uncertain	Uncertain	
Recycled Water (AFY)	0	0	0	0	0	0	275[(12)]	
SWRCB Water Diversions (AFY)	0	0	0	3	0	[(13)]	[(13)]	
Total Supply (AFY)	**3,105**	**1,180**	**340**	**178**	**140**	**Uncertain**	**Uncertain**	
Environmental Water Demand								
Environmental Water Demand (AFY)[(21)]								27,880
Unimpaired Mean Annual Discharge (AFY)[(22)]								43,430
Water Supply Versus Demand Balance	**Adequate Supply, but Possible Deficit**[(14)]	**Adequate Supply**	**At Supply Limit**[(15)]	**Adequate Supply**[(16)]	**Adequate Supply**	**Uncertain**[(17)]	**Uncertain**[(17)]	**Uncertain**[(23)]
Water Management Strategies and Potential for Implementation								
Further Conservation		**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	
Unsubscribed Nacimiento Water Project	Moderate[(18)]	**200 - 400 AFY**	Moderate[(18)]		Moderate[(18)]			

Table 4.57 Morro Bay WPA 4 Water Management Strategies

	Morro Bay	CMC[2]	Camp San Luis Obispo (National Guard)[2]	County Operations Center/Office of Education[2]	Cuesta College[2]	Agriculture	Rural	Environmental
Land Use Management[19]	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	
Recycled Water	**Greater**[20]	Existing		Existing		Moderate[20]	Moderate[20]	
Optimize Use of State Water Project	**750 AFY**	**Greater**			**Greater**			
Groundwater Banking/Recharge	Moderate[20]					Moderate[20]	Moderate[20]	
Groundwater Supply Sources						**Greater**	**Greater**	
Salinas Reservoir Expansion/Exchange		Moderate	Moderate					
Desalination	**645 AFY**							
Lopez Lake Expansion/Exchange								
New Off Stream Storage						Moderate		
Nipomo Supplemental Water Project								
Precipitation Enhancement								
New On Stream Storage								

Notes:
1. Water demands based on the 2005 Urban Water Management Plan (UWMP), which will be updated for the 2010 UWMP. Year 2009 demands were less than 1,620 AFY.
2. Part of Chorro Valley Water System.
3. State Water Project average allocation assumed 66 percent of contract water service amount.
4. CMC receives 60 AFY of Cuesta College 200 AFY allocation. County Operations Center provides up to 275 AFY from their 425 AFY State Water Project allocation to CMC. Totals in table reflect these agreements.
5. Mutual aid agreements with CMC and Whale Rock Commission for emergency supply only.
6. 25 AFY of Whale Rock water provided by CMC as part of the County Well No. 1 development agreement.
7. Rights to any Chorro Reservoir excess from Camp San Luis Obispo.
8. Mainini Ranch has agreement with Camp San Luis Obispo for a delivery of up to 25 AFY.
9. Estimated safe basin yield is 1,500 AFY and the groundwater is used by urban, agriculture and rural users.
10. Perennial yield estimated at 2,210 AFY and the groundwater is used by urban, agriculture and rural users.
11. County Well No. 1.
12. Dairy Creek Golf Course owned and operated by the County of San Luis Obispo.
13. Diversions do not distinguish type of use. Potentially 475 AFY could be diverted for use to either agriculture or rural residential.
14. State Water Project annual maintenance and summer peak demands could create water supply deficits that requires Morro Bay to use lower quality groundwater and more expensive treatment measures.
15. Additional 200 AFY when County Well No. 1 is operating.
16. Surplus increases from 56 to 81 AFY when County Well No. 1 is operating.
17. It is uncertain but unlikely that an existing agricultural or rural supply deficit exists. The yield from the Morro Valley and Chorro Valley basins exceed existing demand. It is possible that future demands could exceed supply. Future studies should invest the resources to determine which groundwater basins are used by the agricultural and rural water users. Also, since SWRCB diversions account for a large supply, quantifying the locations of these sources would be beneficial.
18. By exchange for Whale Rock Reservoir water.

Table 4.57 Morro Bay WPA 4 Water Management Strategies								
	Morro Bay	CMC(2)	Camp San Luis Obispo (National Guard)(2)	County Operations Center/Office of Education(2)	Cuesta College(2)	Agriculture	Rural	Environmental

19. Includes Low Impact Development/Rainwater Harvesting.
20. The effluent from the upgrade to the Morro Bay/Cayucos Sanitation District Wastewater Treatment plant may benefit Morro Bay and/or surrounding agricultural and rural lands.
21. Environmental Water Demand is defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. The federally threatened south-central California coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species for the development of a reasonable estimation of the amount of water needed to support this species.
22. Mean daily flow values from stream gaging stations representative of long-term, unimpaired (or natural) flow conditions were used to derive unimpaired mean annual discharge (MAD) estimates. The unimpaired MAD is the cumulative flow for the creeks within the water planning area that were included in the calculation.
23. The Environmental Water Demand and Unimpaired Mean Annual Discharge are calculated for the entire water planning area and not for individual streams.

4.8.12.5 <u>Los Osos WPA 5</u>

The Los Osos Valley Groundwater Basin is the primary water supply source for this WPA. The primary constraint on water availability in this groundwater basin is deteriorating water quality due to sea water intrusion and nitrate contamination. The County of San Luis Obispo Planning Department has determined that the basin is currently at a certified Level III severity rating (resource capacity has been met or exceeded) due to sea water intrusion.

4.8.12.5.1 *Water Management Strategies*

Basin groundwater users in the Los Osos Valley Groundwater Basin include Golden State Water Company, S&T Mutual, the Los Osos Community Services District, and overlying users. The three local water purveyors, along with the County of San Luis Obispo, are currently preparing a Basin Management Plan under a court-approved Interlocutory Stipulated Judgment (ISJ).

One of the proposed strategies for mitigating sea water intrusion involves shifting production from lower aquifer wells near the coast to wells closer to or within the Los Osos Creek Valley. This approach will balance the distribution of pumping between the upper and lower aquifers to mitigate sea water intrusion. Other strategies involve future wastewater disposal/reuse options and increased conservation. The Los Osos wastewater project, one of the primary tools in future groundwater basin management, is being planned by the County to reduce nitrate loading in the basin, to provide wastewater reuse opportunities within the basin, and to help resolve the Level III water availability shortage. The community of Los Osos has been subject to a building moratorium since 1988, which has resulted in only limited development.

The County Planning Department has implemented an indoor retrofit-upon-sale program as a result of the Level of Severity III certification. A mandatory fixture replacement program, which is part of the wastewater treatment facility project, will replace all toilets and urinals in the wastewater service area with low-flow devices. This action could reduce overall water consumption by 20 to 25 percent, with similar reductions expected in wastewater flows. The objective of fixture replacement program is to reduce indoor water use to 50 gallons per capita per day within the wastewater service area.

The strategies discussed above are likely the most feasible options to consider for Los Osos. Other water management strategies include:

- Land use management
- Groundwater banking/recharge
- Groundwater supply resources

Table 4.58 Los Osos WPA 5 Water Management Strategies						
	Los Osos CSD	**S&T MWC**	**Golden State Water Company**	**Agriculture**	**Rural**	**Environmental**
Demand						
Existing Demand (AFY)	951	94	998	3,290	20	
Forecast Demand (AFY)	835-1,044(1)	77-96(1)	1,384-1,730(1)	2,750-3,770	20	
Supply						
Los Osos Valley Basin (AFY)	(2)	(2)	(2)	(2)	(2)	
Other Groundwater Supply Sources (AFY)	0	0	0	Uncertain	Uncertain	
SWRCB Water Diversions (AFY)	0	0	0	(3)	(3)	
Total Supply (AFY)	(2)	(2)	(2)	(2)	(2)	
Environmental Water Demand						
Environmental Water Demand (AFY)(7)						7,040
Unimpaired Mean Annual Discharge (AFY)(8)						8,200
Water Supply Versus Demand Balance	**(4)**	**(4)**	**(4)**	**(4)**	**(4)**	**Uncertain(9)**
Water Management Strategies and Potential for Implementation						
Further Conservation	**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	
Unsubscribed Nacimiento Water Project						

Table 4.58 Los Osos WPA 5 Water Management Strategies						
	Los Osos CSD	**S&T MWC**	**Golden State Water Company**	**Agriculture**	**Rural**	**Environmental**
Land Use Management(5)	**Greater**	**Greater**	**Greater**	Moderate	Moderate	
Recycled Water	**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	
Optimize Use of State Water Project						
Groundwater Banking/Recharge	**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	
Groundwater Supply Sources	**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	
Salinas Reservoir Expansion/ Exchange						
Desalination(6)						
Lopez Lake Expansion/Exchange						
New Off Stream Storage				Moderate		
Nipomo Supplemental Water Project						
Precipitation Enhancement						
New On Stream Storage						

Notes:
1. The low end of the forecast demand range assumes 20 percent additional conservation (beyond what has already been accomplished) at build-out of current general plan.
2. Estimated safe basin yield is 3,200 AFY and all pumping is for urban, agricultural or rural users. Purveyors have 2,100 AFY available for their use. The remaining 1,100 AFY is used for agricultural irrigation, private domestic use, and golf course irrigation (Los Osos Groundwater Basin Update, ISJ

Table 4.58 Los Osos WPA 5 Water Management Strategies

	Los Osos CSD	S&T MWC	Golden State Water Company	Agriculture	Rural	Environmental

Working Group, May 4, 2010).

3. Diversions do not distinguish type of use. Potentially 46 AFY could be diverted for use to either agriculture or rural residential.
4. The Los Osos water purveyors and the County of San Luis Obispo have released an update on the Los Osos Groundwater Basin. The work was prepared under the Interlocutory Stipulated Judgment (ISJ) agreement, which is a Court directed process to resolve the lawsuit filed as a result of seawater intrusion in the Los Osos Groundwater Basin. The parties to the ISJ agreement are preparing a Basin Management Plan (BMP) to address the seawater intrusion problem and provide for sustainable use of the water supply for Los Osos. One of the goals of the Basin Management Plan is to quantify each party's rights to rely on the basin's water resources.
5. Includes Low Impact Development/Rainwater Harvesting.
6. Brackish water treatment
7. Environmental Water Demand is defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. The federally threatened south-central California coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species for the development of a reasonable estimation of the amount of water needed to support this species.
8. Mean daily flow values from stream gaging stations representative of long-term, unimpaired (or natural) flow conditions were used to derive unimpaired mean annual discharge (MAD) estimates. The unimpaired MAD is the cumulative flow for the creeks within the water planning area that were included in the calculation.
9. The Environmental Water Demand and Unimpaired Mean Annual Discharge are calculated for the entire water planning area and not for individual streams.

4.8.13 South Coast Sub-Region

4.8.13.1 San Luis Obispo/Avila WPA 6

This WPA uses a diverse blend of surface water (local and imported), groundwater, and recycled water. The City of San Luis Obispo, Cal Poly, Avila Beach CSD, Avila Valley MWC, San Miguelito MWC, CSA 12, and Port San Luis represent the urban users in this WPA.

The San Luis Valley and Avila Valley Sub-basins do not provide a significant supply to the urban users when compared to the surface water supplies. The primary constraints on water availability in the San Luis Valley Sub-basin include physical limitations, water quality issues, and environmental demand. The shallow alluvial deposits are typically more susceptible to drought impacts. Elevated nitrates are a constraint for drinking water availability at some of the City of San Luis Obispo wells. Similar constraints on water availability are experienced in the Avila Valley Sub-basin.

The State Water Project provides water to the Avila Beach CSD, Avila Valley MWC, San Miguelito MWC, and CSA 12. The SWP is considered a supplementary source of water supply since hydrologic variability, maintenance schedules, and repair requirements can cause reduced deliveries or complete shut down of the delivery system. Since delivery to the Central Coast began, the SWP has provided between 50 and 100 percent of the contracted allocations, but recently, the drought coupled with pumping restrictions in consideration of endangered species habitat lowered that amount to 35 percent in 2008 and 40 percent in 2009. This Master Water Report assumed an average allocation of 66 percent of contract water service amount for determining supply.

Whale Rock Reservoir supplies water to San Luis Obispo and Cal Poly. Raw lake water is pumped from Whale Rock to the City of San Luis Obispo for treatment. The City of San Luis Obispo operates the Salinas Reservoir and Whale Rock Reservoir in a coordinated manner to maximize the available water from these sources. The combined yield from the two reservoirs can be maximized by utilizing water from Salinas as the City of San Luis Obispo's primary source, and using Whale Rock as a backup source. This approach increases the long-term water supply from these two sources (excerpt from City's General Plan, revised July 2010).

Lopez Lake Reservoir supplies water to Avila Beach CSD, Avila Valley MWC, and CSA 12.

Future water sources include the Nacimiento Water Project, which is scheduled to go online in 2010/11, will supply up to 3,380 AFY to the City of San Luis Obispo.

The City of San Luis Obispo's Water Reclamation Facility currently delivers 130 AFY, but will deliver up to 1,000 AFY of recycled water for irrigation and other approved uses in the future.

4.8.13.1.1 *Water Management Strategies*

The City of San Luis Obispo maintains sufficient supply to meet existing and anticipated future demands, and provide a reliability supply. The other urban users are either at their supply limit or could experience a future deficit, except for Port San Luis. Port San Luis possesses sufficient supply for existing and anticipated future demands.

Cal Poly, Avila Beach CSD, Avila Valley MWC, San Miguelito MWC, and CSA 12 should consider enhancing their water supply to meet build-out demands or to provide contingency or reliability supply. Water conservation measures could be increased at Cal Poly to reduce the amount of additional supply needed. Otherwise, Cal Poly will continue to rely on Whale Rock Reservoir. Further conservation measures are an option for the other water purveyors, but additional conservation is not expected to result in a large demand reduction. Further mandatory or emergency conservation would be used to off-set an emergency or reliability supply, not to support growth.

Optimizing the use of State Water Project water is the management strategy that is likely the most feasible option to consider for Avila Beach CSD, Avila Valley MWC, San Miguelito MWC, and CSA 12. Further consideration should be given to the Interagency Arrangements and Exchanges discussed in Section 3.9.2 to move water within the County and to match demands with available sources at different times during the year.

Other water management strategies that received a moderate designation for implementation potential include:

- Unsubscribed Nacimiento Water Project
- Land use management
- Recycled water
- Salinas Reservoir Expansion/Recharge
- Desalination
- Lopez Lake Expansion/Exchange

Table 4.59 San Luis Obispo/Avila WPA 6 Water Management Strategies										
	San Luis Obispo (includes airport)	**Cal Poly San Luis Obispo**	**Avila Beach CSD**	**Avila Valley MWC**	**San Miguelito MWC**	**CSA-12**	**Port San Luis**	**Agriculture**	**Rural**	**Environmental**
Demand										
Existing Demand (AFY)	6,389	1,040	51	32	263	68	35	3,610	450	
Forecast Demand (AFY)	7,499-7,894(1)	1,479-1,557(1)	162-170(1)(17)	30-32(1)	373-393(1)	65-68(1)	33 - 35(1)	2,810–4,120	610–660	
Supply										
State Water Project (AFY)(2)	0	0	66(3)	20	275	7(4)	0	0	0	
Whale Rock Reservoir (AFY)	6,940(5)	1,384(6)	0	0	0	0	0	0	0	
Salinas Reservoir (AFY)	(5)	0	0	0	0	0	0	0	0	
Nacimiento Water Project (AFY)	3,380(7)	0	0	0	0	0	0	0	0	
Lopez Lake Reservoir (AFY)	0	0	68	12	0	61	100	0	0	
San Luis Valley Sub-basin (AFY)(8)	100	unmetered(9)	0	0	0	0	0	Uncertain(8)	Uncertain(8)	
Avila Valley Sub-basin (AFY)(10)	0	0	0	Uncertain	118	Uncertain(11)	0	Uncertain(10)	Uncertain(10)	
Other Groundwater Supply Sources (AFY)	0	0	0	0	0	0	0	Uncertain	Uncertain	
Recycled Water (AFY)	130(16)	0	0	0	0	0	0	0	0	
SWRCB Water Diversions (AFY)	0	45	0(12)	0	0	0	0	(13)	(13)	
Loss of Availability due to Siltation to 2060 (AFY)	-500	0	0	0	0	0	0	0	0	
Total Supply (AFY)	**9,950(15)**	**1,429**	**134**	**32**	**393**	**68**	**100**	**Uncertain**	**Uncertain**	
Environmental Water Demand										
Environmental Water Demand (AFY)(19)										33,030
Unimpaired Mean Annual Discharge (AFY)(20)										45,820

Table 4.59 San Luis Obispo/Avila WPA 6 Water Management Strategies										
	San Luis Obispo (includes airport)	**Cal Poly San Luis Obispo**	**Avila Beach CSD**	**Avila Valley MWC**	**San Miguelito MWC**	**CSA-12**	**Port San Luis**	**Agriculture**	**Rural**	**Environmental**
Water Supply Versus Demand Balance	**Adequate Supply(15)**	**At Supply Limit(9)**	**Future Deficit**	**At Supply Limit**	**At Supply Limit**	**At Supply Limit**	**Adequate Supply**	**Uncertain(14)**	**Uncertain(14)**	**Uncertain(21)**
Water Management Strategies and Potential for Implementation										
Further Conservation	Moderate (0 - 5% more)	**Greater**	Moderate	Moderate	Moderate	Moderate	Moderate	**Greater**	**Greater**	
Unsubscribed Nacimiento Water Project	Moderate(22)	Moderate								
Land Use Management(18)	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	
Recycled Water	**870 AFY(16)**	Moderate	Moderate		Moderate			**Greater(16)**		
Optimize Use of State Water Project			**Greater**	**20-40 AFY interest**	**10 AFY interest**	**30 AFY interest**				
Groundwater Banking/Recharge										
Groundwater Supply Sources										
Salinas Reservoir Expansion/ Exchange	Moderate(22)									
Desalination			Moderate							
Lopez Lake Expansion/Exchange			Moderate	Moderate	Moderate	Moderate	Moderate(22)			
New Off Stream Storage								Moderate		
Nipomo Supplemental Water Project										
Precipitation Enhancement										
New On Stream Storage										

Notes:
1. The low end of the forecast demand range assumes 5% additional conservation (beyond what has already been accomplished) at build-out for all urban users.
2. State Water Project average allocation assumed 66 percent of contract water service amount.
3. Avila Beach CSD has a 100 AFY allocation, but no drought buffer. Therefore, the 66 percent assumption for State Water Project delivery is 66 AFY.
4. Seven (7) AFY of SWP water allocated to the San Luis Coastal Unified School District.
5. The City of San Luis Obispo's withdrawals from the Salinas Reservoir are coordinated with Whale Rock Reservoir. San Luis Obispo's combined safe yield of the two reservoirs was 6,940 AFY in 2010.
6. Includes 600 AFY of treated water delivered from the City of San Luis Obispo.
7. Nacimiento Water Project is scheduled to go online in 2010/11.
8. Estimated safe basin yield is 2,000 AFY and all pumping is for urban, agricultural or rural users. The City of San Luis Obispo's use is approximately 100 AFY, but the City does not consider their 500 AFY share of the safe yield as part of its water resource availability. The remaining 1,500 AFY is available for other urban users, agricultural irrigation, and private domestic use.
9. Cal Poly's agricultural wells contribute to the supply but are not metered. It is likely that the groundwater supply and on-going conservation measures would eliminate the possible future deficit.
10. No basin yield numbers have been published for the Avila Valley Sub-basin.
11. Individual water users within CSA 12 boundary could request an exemption to install a private well and pump water from the Avila Valley Sub-basin. It is unknown the number of users with private wells, but it is likely minimal.
12. SWRCB water diversions database lists “Avila Beach County Water District” (now Avila Beach CSD) for 80 AFY from Canyon Creek underflow. The conditions were that Avila Beach CSD cannot use Canyon Creek Underflow as a supply once they have State Water. The creek diversion is no longer a source of supply for them.

Table 4.59 San Luis Obispo/Avila WPA 6 Water Management Strategies										
	San Luis Obispo (includes airport)	Cal Poly San Luis Obispo	Avila Beach CSD	Avila Valley MWC	San Miguelito MWC	CSA-12	Port San Luis	Agriculture	Rural	Environmental

13. Diversions do not distinguish type of use. Potentially 207 AFY could be diverted for use to either agriculture or rural residential.
14. It is uncertain whether an existing agricultural or rural supply deficit exists. Not enough information exists to determine whether the yield from the San Luis Valley and Avila Valley basins exceed existing demand. It is possible that future demands could exceed supply. Future studies should invest the resources to determine which groundwater basins are used by the agricultural and rural water users.
15. City of San Luis Obispo's supply portfolio includes groundwater, but due to limitations on its use, the City will not consider this supply as part of its water resource availability. Siltation is expected to reduce reservoir capacity and supply by 10 acre-feet per year, or 500 af by year 2060. The water supply surplus calculation accounts for reduction in water availability due to siltation. The City includes a reliability reserve in their water supply portfolio.
16. The City's current recycled water use is 130 AFY. Expansion of the City of San Luis Obispo Water Reclamation Facility could make 4,690 AFY of recycled water available for use, but the current plans are to use only 1,000 AFY in the future. City has been approached about using recycled water for agriculture irrigation. Recycled water for agricultural usage provides the added benefit of maintaining an agricultural buffer around the City.
17. One hundred seventy (170) AFY includes 20 AFY from projected Tank Farm Development.
18. Includes Low Impact Development/Rainwater Harvesting.
19. Environmental Water Demand is defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. The federally threatened south-central California coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species for the development of a reasonable estimation of the amount of water needed to support this species.
20. Mean daily flow values from stream gaging stations representative of long-term, unimpaired (or natural) flow conditions were used to derive unimpaired mean annual discharge (MAD) estimates. The unimpaired MAD is the cumulative flow for the creeks within the water planning area that were included in the calculation.
21. The Environmental Water Demand and Unimpaired Mean Annual Discharge are calculated for the entire water planning area and not for individual streams.
22. Exchange programs with these resources may be an option if needed in the future

4.8.13.2 South Coast WPA 7

The discussion for this WPA is broken down into:

- Edna Valley (Golden State Water Company)
- Northern Cities Management Area
- Nipomo Mesa Management Area
- Santa Maria Valley Management Area

4.8.13.2.1 *Edna Valley*

The Edna Valley Sub-basin groundwater users include Golden State Water Company, San Luis Country Club (golf course), a few small public water systems, agricultural growers, and private residences. The primary constraints on water availability in the Edna Valley portion of the basin are physical limitations and environmental demand. Lowering groundwater levels due to production in the basin may impact base flows to Pismo Creek, which support steelhead habitat. Another supply source is the wastewater treatment plant's recycled water effluent for irrigation, which is delivered to the golf course.

Additional water conservation measures should be implemented to reduce water demands. Other water management strategies include land use management.

4.8.13.2.2 *Northern Cities Management Area*

This WPA uses a diverse blend of surface water (local and imported) and groundwater. Pismo Beach, Arroyo Grande, Grover Beach and Oceano CSD, small public water systems (including Halcyon Water System), Lucia Mar Unified School District, and residential and agricultural overlying users represent the groundwater users in this WPA.

The Arroyo Grande Plain Hydrologic Sub-area (part of the Santa Maria Valley Groundwater Basin) provides from 30 to 100 percent of the water supply for the urban users. The groundwater extraction rights are shared by agreement with Pismo Beach, the City of Arroyo Grande, the City of Grover Beach, and the Oceano CSD. As party to the Santa Maria Valley Groundwater Basin litigation, extraction rights may be increased or decreased at a future date. Groundwater availability in the NCMA is primarily constrained by water quality issues and water rights. Basin sediments in the management area extend offshore along several miles of coastline, where sea water intrusion is the greatest potential threat to the supply. The major purveyors have agreed to share the water resources through a cooperative agreement that also sets aside water for agricultural use and for basin outflow, although the amount allocated for basin outflow has been deemed unreasonably low (Todd, 2007). Following the detection of evidence of seawater intrusion in 2009, the NCMA water purveyors worked cooperatively with each other and the District to reduce groundwater pumping. This approach included the following management strategies:

- Increased surface water use through delivery of surplus supplies from Lopez reservoir
- Expanded conservation programs and customer education
- Negotiations to secure an emergency allocation of additional State Water Project supplies, if needed
- Hydraulic evaluation and maintenance of the Lopez pipeline
- Increased groundwater monitoring
- Expanded regional cooperation

Going forward, the NCMA water purveyors plan to implement several initiatives to improve the long-term sustainability of their water supplies. These initiatives could include:

- Development of a groundwater model for the Santa Maria Valley Groundwater Basin
- Pursuit of additional permanent and emergency allocations of State Water Project supplies
- Enhanced conjunctive use of the groundwater basin
- Regional recycled water projects

All four cities receive Zone 3 Lopez Lake water as a contractual supply. Environmental protection issues may call for increased or decreased releases to Lopez Creek, potentially reducing or increasing the allotment available for the cities. Pismo Beach and Oceano CSD also receive SWP via contract with the District and delivery through Zone 3 facilities.

The City of Arroyo Grande also extracts groundwater from the Pismo Formation, which is outside the NCMA and receives water by a transfer agreement to purchase 100 AFY of Oceano CSD supplies from groundwater or Lopez Lake water. This temporary agreement ends in 2014.

Water conservation measures should be implemented to the fullest extent possible. Mandatory or emergency conservation measures would be used to off-set the need for additional or reliability supply, not to support growth.

Oceano CSD maintains adequate supply to meet existing and forecast build-out demands. With sufficient conservation, Oceano CSD should have adequate supply to not only meet its customer's needs, but also maintain a reliability supply. Oceano CSD's participation in the District's drought buffer program for State Water would improve water supply reliability in the event of drastic cut backs in SWP supplies.

The cities of Pismo Beach, Arroyo Grande, and Grover Beach have sufficient supply to meet existing demands, but would need to implement permanent conservation measures to meet forecast demands. The cities could experience a possible future supply deficit. To address this need, optimization of State Water supplies, recycled water, and groundwater banking/recharge are considered the most feasible water management strategy options to consider implementing.

Pismo Beach, in coordination with the NCMA, is also investigating the feasibility of increasing the safe yield of Lopez Reservoir. Other water management strategies that received a moderate designation for implementation potential include land use management (includes low impact development and rainwater harvesting), groundwater supply sources and desalination.

If recycled water is not feasible for urban customers only, then a multi-use project could include urban and agriculture delivery from the South San Luis Obispo County or City of Pismo Beach WWTP.

4.8.13.2.3 *Nipomo Mesa Management Area*

This WPA uses groundwater for its primary supply and recycled water to a lesser extent. When the Nipomo supplemental water project comes on-line, it will provide imported water to this WPA. Groundwater users in the Nipomo Mesa Management Area include Golden State Water Company, Rural Water Company, Woodlands Mutual Water Company (MWC), ConocoPhillips, Nipomo Community Services District (Nipomo CSD), Lucia Mar Unified School District, small public water systems (serving residential, industrial and nursery/greenhouse operations), and commercial, agricultural and residential overlying users represent the groundwater users in this WPA.

Groundwater is pumped from the Nipomo Mesa Hydrologic Sub-area that is part of the Santa Maria Valley Groundwater Basin. Litigation involving use of this groundwater basin, which began in 1997, has resulted in stipulations and judgments in 2005 and 2008. As party to the Santa Maria Groundwater Basin litigation, extraction rights for Golden State Water Company, Rural Water Company, Woodlands MWC, ConocoPhillips and Nipomo CSD may be affected at a future date. In addition, the stipulated judgment required these users (except for ConocoPhillips) to develop alternative sources to import a minimum of 2,500 AFY. More detail on the agreement and mandated minimum delivery is presented in Section 3.7.7 above.

The primary constraints on water availability in the NMMA are physical limitations to the east, water quality on the west, and water rights. The base of permeable sediments rises toward the eastern boundary of the area, reducing groundwater in storage and increasing the susceptibility of wells to drought impacts and associated water level declines. To the west, where deeper sediments allow for greater storage fluctuations, sea water intrusion would limit the available fresh water. The Nipomo Mesa area is currently in a certified Level of Severity III for water supply (resource capacity has been met or exceeded), as defined by San Luis Obispo County.

Rural Water Company and Woodland MWC use recycled water for golf course irrigation.

Water conservation measures should be implemented to the fullest extent possible. Mandatory or emergency conservation measures would be used to off-set the need for additional or reliability supply, not to support growth.

Even with additional conservation measures in place, Golden State Water Company, Rural Water Company, Woodlands MWC, and Nipomo CSD could experience supply deficits if groundwater is insufficient to meet increases in demands. To address this need, recycled water, investigating other groundwater supply sources, and increasing delivery from the Nipomo supplemental water project are considered the most feasible water management strategy options to consider implementing.

Other water management strategies that received a moderate designation for implementation potential include:

- Land use management
- Optimize use of State Water Project
- Groundwater banking/recharge
- Desalination

4.8.13.2.4 *Santa Maria Valley Management Area*

The Santa Maria Valley Management Area (SMVMA) is part of the Santa Maria Valley groundwater basin adjudicated area and spans both San Luis Obispo and Santa Barbara Counties. Basin groundwater users in the San Luis Obispo County portion of the SMVMA consist primarily of agricultural overlying users, with some residential overlying users and a small public water system. The primary constraints on water availability in the San Luis Obispo County portion of the SMVMA are water quality and water rights. A natural outflow of fresh water must be maintained, both in the deeper aquifer zones where sea water pressures are greatest, and in the shallow alluvial zones where irrigation returns are concentrated. The operation of Twitchell Reservoir and the Superior Court Stipulated Judgment and Judgment after Trial affect groundwater availability.

Although there are no urban users in this WPA, the rural and agricultural users are encouraged to implement conservation measures to reduce demands. A water management strategy that could serve agricultural users is a recycled water project with one of the water purveyors in the NMMA. Land use management (includes low impact development and rainwater harvesting) received a moderate designation for implementation potential.

Table 4.60	South Coast WPA 7 Water Management Strategies																	
	Golden State Water Co. (Edna Valley)	**Northern Cities Management Area**						**Nipomo Mesa Management Area**							**Santa Maria Valley Management Area**	**Outside Management Areas**		
		Pismo Beach [1]	**Arroyo Grande [1]**	**Grover Beach [1]**	**Oceano CSD[1]**	**Agriculture**	**Rural**	**Golden State Water Company[17]**	**Nipomo CSD[17]**	**Rural Water Company[17]**	**Woodlands Mutual Water Company[17]**	**Conoco Phillips[17]**	**Agriculture[17]**	**Rural[17]**	**Agriculture /Rural**	**Agriculture**	**Rural**	**Environmental**
Demand																		
Existing Demand (AFY)	410	1,944 [2]	2,956[2]	1,787[2]	855[2]	2,056[2][3]	38	1,290[18]	2,698[27]	880[18]	810[18]	1,200[18]	3,800[18]	1,700[18]	25,540/37	19,920	1,480	
Forecast Demand (AFY)	434-482	2,679-2,977 [20]	3,735-4,150[20]	1,892-2,500[20]	1,277-1,419[20]	2,742	38	1,750-1,944[20]	2,984	Not Available	1,440-1,600[20]	1,260-1,400[20]	3,800-4,300	1,700	25,540/110	16,610-23,830	1,990-2,160	
Supply																		
State Water Project (AFY)[4]	0	1,240	0	0	495[6]	0	0	0	0	0	0	0	0	0	0	0	0	
Lopez Lake Reservoir (AFY)	0	896	2,290	800	303	0	0	0	0	0	0	0	0	0	0	0	0	
Edna Valley Sub-basin (AFY)[7]	410	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Pismo Creek Valley Sub-basin (AFY)[8]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Arroyo Grande Plain Hydrologic Sub-area (part of Santa Maria Valley Groundwater Basin (AFY)[9]	0	700	1,202	1,198+225[14]	900	5,300[9]	36	0	0	0	0	0	0	0	0	Uncertain	Uncertain	
Arroyo Grande Valley Sub-basin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Uncertain	Uncertain	
Agricultural Land Conversion Credit (AFY)[10]	0	0	112	209	0	0	0	0	0	0	0	0	0	0	0	0	0	

Table 4.60	**South Coast WPA 7 Water Management Strategies**																	
	Golden State Water Co. (Edna Valley)	**Northern Cities Management Area**						**Nipomo Mesa Management Area**							**Santa Maria Valley Management Area**	**Outside Management Areas**		
		Pismo Beach [1]	**Arroyo Grande [1]**	**Grover Beach [1]**	**Oceano CSD[1]**	**Agriculture**	**Rural**	**Golden State Water Company[17]**	**Nipomo CSD[17]**	**Rural Water Company[17]**	**Woodlands Mutual Water Company[17]**	**Conoco Phillips[17]**	**Agriculture[17]**	**Rural[17]**	**Agriculture /Rural**	**Agriculture**	**Rural**	**Environmental**
Transfers (AFY)[11]	0	0	100	0	-100	0	0	0	0	0	0	0	0	0	0	0	0	
Pismo Formation outside the NCMA (AFY)	0	0	80	0	0	0	0	0	0	0	0	0	0	0	0	Uncertain	Uncertain	
Nipomo Supplemental Water Project (AFY)[12]	0	0	0	0	0	0	0	208	2,167	208	417	0	0	0	0	0	0	
Nipomo Mesa Hydrologic Sub-area (part of Santa Maria Valley Groundwater Basin) (AFY)[13]	0	0	0	0	0	0	0	1,082	457	622	365	1,400	4,300	1,700	0	Uncertain	Uncertain	
Other Groundwater Supply Sources (AFY)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25,540/37	Uncertain	Uncertain	
Recycled Water (AFY)	87[19]	0	0	0	0	0	0	0	60-74	49-50	24-28	0	0	0	0	0	0	
SWRCB Water Diversions (AFY)	0	0	0	0	0	[15]	[15]	0	0	0	0	0	[15]	[15]	[15]	0	0	
Total Supply (AFY)	**482**	**2,836**	**3,794**	**2,432**	**1,598**	**Uncertain**	**Uncertain**	**1,290**	**2,698**	**880**	**810**	**1,400**	**Uncertain**	**Uncertain**	**Uncertain**	**Uncertain**	**Uncertain**	
Environmental Water Demand																		
Environmental Water Demand (AFY)[23]																		32,960

Table 4.60	**South Coast WPA 7 Water Management Strategies**																	
	Golden State Water Co. (Edna Valley)	**Northern Cities Management Area**						**Nipomo Mesa Management Area**							**Santa Maria Valley Management Area**	**Outside Management Areas**		
		Pismo Beach [1]	**Arroyo Grande** [1]	**Grover Beach** [1]	**Oceano CSD**[1]	**Agriculture**	**Rural**	**Golden State Water Company**[17]	**Nipomo CSD**[17]	**Rural Water Company**[17]	**Woodlands Mutual Water Company**[17]	**Conoco Phillips**[17]	**Agriculture**[17]	**Rural**[17]	**Agriculture /Rural**	**Agriculture**	**Rural**	**Environmental**
Unimpaired Mean Annual Discharge (AFY)[24]																		49,100
Water Supply Versus Demand Balance	**At Supply Limit**	**Possible Future Deficit**[16]	**Possible Future Deficit**[16]	**Possible Future Deficit**[16]	**Adequate Supply**[16]	[16]	[16]	**Possible Future Deficit**[16]	**Possible Future Deficit**[16]	**Possible Future Deficit**[16]	**Possible Future Deficit**[16]	[16]	[16]	[16]	[16]	**Uncertain**	**Uncertain**	**Uncertain**[25]
Water Management Strategies and Potential for Implementation																		
Further Conservation	**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	
Unsubscribed Nacimiento Water Project																		
Land Use Management[22]	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate		Moderate	Moderate	Moderate	Moderate	Moderate	
Recycled Water	Existing	**Greater**	**Greater**	**Greater**		**Greater**		**Greater**	**Greater**	**Greater**	**774 AFY**	Moderate	**Greater**		**Greater**			
Optimize Use of State Water Project		**500 AFY**	**200-400 AFY**	**400 AFY**				Moderate	Moderate	Moderate	Moderate							
Groundwater Banking/ Recharge[26]		**Greater**	**Greater**	**Greater**		**Greater**		Moderate	Moderate	Moderate	Moderate		Moderate					
Groundwater Supply Sources		Moderate[21]						**Greater**	**Greater**	**Greater**	**Greater**							
Salinas Reservoir Expansion/ Exchange																		
Desalination			Moderate	Moderate				Moderate	Moderate	Moderate	Moderate							

Table 4.60 South Coast WPA 7 Water Management Strategies

	Golden State Water Co. (Edna Valley)	Northern Cities Management Area						Nipomo Mesa Management Area							Santa Maria Valley Management Area	Outside Management Areas		
		Pismo Beach (1)	Arroyo Grande (1)	Grover Beach (1)	Oceano CSD(1)	Agriculture	Rural	Golden State Water Company(17)	Nipomo CSD(17)	Rural Water Company(17)	Woodlands Mutual Water Company(17)	Conoco Phillips(17)	Agriculture(17)	Rural(17)	Agriculture /Rural	Agriculture	Rural	Environmental
Lopez Lake Expansion/ Exchange		Moderate	Moderate	Moderate														
New Off Stream Storage																Moderate		
Nipomo Supplemental Water Project								Greater	Greater	Greater	300 AFY							
Precipitation Enhancement																		
New On Stream Storage																		

Notes:

1. Part of the Northern Cities Management Area (NCMA)
2. 2010 Annual Monitoring Report Northern Cities Management Area, Table 1. 2009 and 2008 demands listed below for reference.
   Pismo Beach reported 2,039 AFY in 2009 and 2,208 AFY in 2008
   Arroyo Grande reported 3,315 AFY in 2009 and 3,579 AFY in 2008
   Grover Beach reported 1,941 AFY in 2009 and 2,051 AFY in 2008
   Oceano CSD reported 885 AFY in 2009 and 933 AFY in 2008
   Agriculture reported 2,742 AFY in 2009 and 2008
3. Rural residential reported 36 AFY in 2009 and 2008. Agriculture is grouped in a category referred to as "Applied Irrigation" which is private water used for non-domestic purposes. In the NCMA, Applied Irrigation demands are defined by agriculture and irrigated turf grass at schools and a golf course. Of the 2,056 AFY Applied Irrigation demand, agriculture likely accounted for 1,933 AFY (or 94 percent).
4. State Water Project average allocation assumed 66 percent of contract water service amount.
5. Intentionally left blank.
6. Oceano CSD has a 750 AFY allocation, but no drought buffer. Therefore, the 66 percent assumption for State Water Project delivery is 495 AFY.
7. Edna Valley Sub-basin estimated safe basin yield is 4,000 AFY and all pumping is for urban, agricultural, rural users, golf courses, and CSA 18.
8. There is no estimate of the Pismo Creek Valley Sub-basin (basin-wide yield). The yield of the alluvial basin in the Spanish Spring ranch area has been estimated at 200 AFY.
9. Safe yield of 9,500 AFY with subdivisions for applied irrigation (5,300 AFY), subsurface outflow to the ocean (200 AFY), and urban use (4,000 AFY). The 2002 Groundwater Management Agreement safe yield allotment for urban use is broken down per the numbers shown.
10. 2002 Settlement Agreement provides that groundwater allocations can be increased when land within the incorporated boundaries is converted from agricultural uses to urban uses.
11. Arroyo Grande has an active agreement to purchase 100 AFY of Oceano CSD supplies from groundwater or Lopez Lake water. This temporary agreement ends in 2014.
12. Nipomo supplemental water project includes Nipomo CSD, Woodlands MWC, Golden State Water Company, and Rural Water Company. Nipomo CSD will receive approximately 1,667 AFY and has reserved an additional 500 AFY. The other three will receive 833 AFY.
13. For the NMMA purveyors, the groundwater supply was calculated as the difference between the current demand and the other sources of supply (e.g. recycled water, Nipomo supplemental water project).
14. Non-potable groundwater pumped from irrigation wells used on the State Parks Department golf course and a City park. The portion of the 225 AFY attributed to the golf course predates the Gentlemen's Agreement. The portion for the park is a substitute for preexisting agricultural use on the park site.
15. Diversions do not distinguish type of use. Potentially 1,243 AFY could be diverted for use to either agriculture or rural residential in WPA 7.
16. The NCMA cities, NMMA cities, County, District, and local land owners actively and cooperatively manage surface and groundwater with the goal of preserving the long-term integrity of water supplies in the NCMA and NMMA.
17. Part of the Nipomo Mesa Management Area (NMMA)
18. 2009 Annual Monitoring Report Nipomo Mesa Management Area. 2008 demands listed below for reference.
    Golden State Water Company reported 1,380 AFY in 2008 and 1,290 AFY in 2009

Table 4.60 South Coast WPA 7 Water Management Strategies

	Golden State Water Co. (Edna Valley)	Northern Cities Management Area						Nipomo Mesa Management Area							Santa Maria Valley Management Area	Outside Management Areas		
		Pismo Beach [1]	Arroyo Grande [1]	Grover Beach [1]	Oceano CSD[1]	Agriculture	Rural	Golden State Water Company[17]	Nipomo CSD[17]	Rural Water Company[17]	Woodlands Mutual Water Company[17]	Conoco Phillips[17]	Agriculture[17]	Rural[17]	Agriculture /Rural	Agriculture	Rural	Environmental

Nipomo CSD reported 2,700 AFY in 2008 and 2,370 AFY in 2010 (NCSD existing demand based on 2010 UWMP)
Rural Water Company reported 900 AFY in 2008 and 880 AFY in 2009
Woodlands Mutual Water Company reported 540 AFY in 2008 and 810 AFY in 2009
ConocoPhillips reported 1,100 AFY in 2008 and 1,200 AFY in 2009
Agriculture reported 4,300 AFY in 2008 and 3,800 AFY in 2009
Rural residential reported 1,700 AFY in 2008 and 1,700 AFY in 2009

19. The golf course receives all of the WWTP's recycled water effluent for irrigation use (2009 - Range: 59,000-134,000 gpd, average flow: 78,000 gpd; permitted 120,000 gpd as a monthly average)
20. Ten percent additional water conservation (beyond what has already been accomplished) assumed for the low end of the forecast build-out demand, except for Grover Beach, which assumed 20% additional reduction.
21. Groundwater basins outside the NCMA.
22. Includes Low Impact Development/Rainwater Harvesting.
23. Environmental Water Demand is defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. The federally threatened south-central California coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species for the development of a reasonable estimation of the amount of water needed to support this species.
24. Mean daily flow values from stream gauging stations representative of long-term, unimpaired (or natural) flow conditions were used to derive unimpaired mean annual discharge (MAD) estimates. The unimpaired MAD is the cumulative flow for the creeks within the water planning area that were included in the calculation.
25. The Environmental Water Demand and Unimpaired Mean Annual Discharge are calculated for the entire water planning area and not for individual streams.
26. Potential use of recycled water.
27. Nipomo CSD 2010 Urban Water Management Plan.

4.8.13.3 Huasna Valley WPA 8

The Huasna Valley Groundwater Basin is the only defined groundwater basin in this WPA. There are no urban water users or large population centers in this WPA. All pumping is for rural residential and agricultural purposes by overlying users. There is no existing estimate of safe basin yield or hydrologic budget items. Therefore, it is uncertain whether a water supply deficit exists or not in this WPA.

Constraints on water availability in the Huasna Valley Groundwater Basin include physical limitations. Shallow alluvial deposits are typically more susceptible to drought impacts than deeper formation aquifers. Water availability in the sandstone and fractured rock can be highly variable, depending on the local structure, available storage capacity, and access to source of recharge.

4.8.13.3.1 *Water Management Strategies*

Although there are no urban users in this WPA, and it is uncertain whether a supply deficit exists, the rural and agricultural users are encouraged to implement conservation measures to reduce demands. Other water management strategies that received a moderate designation for implementation potential include land use management (includes low impact development and rainwater harvesting) and off stream storage.

Table 4.61 Huasna Valley WPA 8 Water Management Strategies				
	Urban	**Agriculture**	**Rural**	**Environmental**
Demand				
Existing Demand (AFY)	0	1,550	90	
Forecast Demand (AFY)	0	2,060-2,820	360-450	
Supply				
Huasna Valley Basin (AFY)[1]	0	Uncertain	Uncertain	
Other Groundwater Supply Sources (AFY)	0	Uncertain	Uncertain	
SWRCB Water Diversions (AFY)	0	[2]	[2]	
Total Supply (AFY)	**0**	**Uncertain**	**Uncertain**	
Environmental Water Demand				
Environmental Water Demand (AFY)[5]				25,020
Unimpaired Mean Annual Discharge(AFY)[6]				34,220
Water Supply Versus Demand Balance	**0**	**Uncertain[3]**	**Uncertain[3]**	**Uncertain[7]**
Water Management Strategies and Potential for Implementation				
Further Conservation		**Greater**	**Greater**	
Unsubscribed Nacimiento Water Project				
Land Use Management[4]		Moderate	Moderate	
Recycled Water				

Table 4.61 Huasna Valley WPA 8 Water Management Strategies

	Urban	Agriculture	Rural	Environmental
Optimize Use of State Water Project				
Groundwater Banking/Recharge				
Groundwater Supply Sources				
Salinas Reservoir Expansion/Exchange				
Desalination				
Lopez Lake Expansion/Exchange				
New Off Stream Storage		Moderate		
Nipomo Supplemental Water Project				
Precipitation Enhancement				
New On Stream Storage				

Notes:
1. There is no existing estimate of basin safe yield or hydrologic budget items.
2. Diversions do not distinguish type of use. Potentially 48 AFY could be diverted for use to either agriculture or rural residential.
3. It is uncertain whether an agricultural or rural supply deficit exists. There is no estimate for the basin yield. Future studies should invest the resources to quantify the safe basin yield and to determine which groundwater basins are used by the agricultural and rural water users.
4. Includes Low Impact Development/Rainwater Harvesting.
5. Environmental Water Demand is defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. The federally threatened south-central California coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species for the development of a reasonable estimation of the amount of water needed to support this species.
6. Mean daily flow values from stream gaging stations representative of long-term, unimpaired (or natural) flow conditions were used to derive unimpaired mean annual discharge (MAD) estimates. The unimpaired MAD is the cumulative flow for the creeks within the water planning area that were included in the calculation.
7. The Environmental Water Demand and Unimpaired Mean Annual Discharge are calculated for the entire water planning area and not for individual streams.

4.8.13.4 Cuyama Valley WPA 9

The Cuyama Valley Groundwater Basin is the only defined groundwater basin in this WPA. There are no urban water users or large population centers in this WPA. All pumping is for rural residential, agricultural purposes, and oil field operators. This basin includes portions within unincorporated San Luis Obispo County, Santa Barbara County, Kern County, and Ventura County. Perennial yield for the entire basin has been estimated at 10,000 AFY. There is no separate yield estimate for the San Luis Obispo County portion of the basin, but the agricultural demands in San Luis Obispo County exceed the perennial yield.

Constraints on water availability in the Cuyama Valley Groundwater Basin are primarily physical limitations. The County of San Luis Obispo Planning Department has determined that the basin is currently at a Level III severity rating (resource capacity has been met or exceeded) due to historical groundwater level declines and resulting groundwater storage losses.

In 1980, the Cuyama Valley Groundwater Basin was identified by the California Department of Water Resources as one of the eleven basins in “critical condition of overdraft”. Although the groundwater basin is experiencing serious hydrologic impacts due to unsustainable groundwater pumping practices, a groundwater management plan for the basin does not yet exist. However, Santa Barbara County has been leading efforts recently to better understand the condition of this basin, and the District recently coordinated with that agency on jointly funding a new stream gauge.

4.8.13.4.1 *Water Management Strategies*

Although there are no urban users in this WPA, it is certain that a supply deficit exists. Rural users represent an insignificant demand compared to agriculture. Agricultural users are encouraged to implement conservation measures to reduce demands. Other water management strategies that received a moderate designation for implementation potential include land use management (includes low impact development and rainwater harvesting) and off stream storage.

The four counties that overlie the basin are coordinating on a groundwater management plan.

Table 4.62 Cuyama Valley WPA 9 Water Management Strategies				
	Urban	**Agriculture**	**Rural**	**Environmental**(4)
Demand				
Existing Demand (AFY)	0	28,870(5)	10	
Forecast Demand (AFY)	0	25,320-32,410	80-100	
Supply				
Cuyama Valley Basin (AFY)(1)	0	10,000(1)	10,000(1)	
Other Groundwater Supply Sources (AFY)	0	Uncertain	Uncertain	
SWRCB Water Diversions (AFY)	0	0	0	
Total Supply (AFY)	**0**	**Uncertain**	**Uncertain**	
Environmental Water Demand				
Environmental Water Demand (AFY)				Uncertain
Unimpaired Mean Annual Discharge(AFY)				Uncertain
Water Supply Versus Demand Balance	**0**	**Deficit**(2)	**Deficit**(2)	**Uncertain**
Water Management Strategies and Potential for Implementation				
Further Conservation		**Greater**	**Greater**	
Unsubscribed Nacimiento Water Project				
Land Use Management(3)		Moderate	Moderate	
Recycled Water				

Table 4.62 Cuyama Valley WPA 9 Water Management Strategies

	Urban	Agriculture	Rural	Environmental[4]
Optimize Use of State Water Project				
Groundwater Banking/Recharge				
Groundwater Supply Sources				
Salinas Reservoir Expansion/ Exchange				
Desalination				
Lopez Lake Expansion/Exchange				
New Off Stream Storage		Moderate		
Nipomo Supplemental Water Project				
Precipitation Enhancement				
New On Stream Storage				

Notes:

1. Demands include demands in the San Luis Obispo County portion of the basin and the remaining water planning area. Perennial yield for the entire basin has been estimated between 9,000 and 13,000 AFY. Recent work reported a perennial yield on the order of 10,000 AFY. 22 percent of basin is in San Luis Obispo County. Remainder of the basin resides in Santa Barbara, Kern, and Ventura County. There is no separate yield estimate for the San Luis Obispo County portion.
2. The County Planning Department has determined that the Cuyama Valley Basin is currently at a Level III severity rating. In 1980, the basin was identified by the California Department of Water Resources as being in "critical condition of overdraft." Although the groundwater basin is experiencing serious hydrologic impacts due to unsustainable groundwater pumping practices, a groundwater management plan for the basin does not exist.
3. Includes Low Impact Development/Rainwater Harvesting.
4. The eastern portion of the County (i.e., WPAs 9, 10, 11, 14, and 15) was ultimately excluded from the environmental water demand analysis due to the lack of data and regional physiographic differences.
5. Agricultural demands estimated for San Luis Obispo County only, not the other three counties.

4.8.14 Inland Sub-Region

4.8.14.1 Carrizo Plain WPA 10

The Carrizo Plain Groundwater Basin is the only defined groundwater basin in this WPA. There are no urban water users or large population centers in this WPA. There is one small public water system serving the local school. All other pumping in the basin is for agricultural and residential purposes by overlying users. There are two proposed solar farms that will located within this WPA (Topaz Farms 550-MW; SunPower 250-MW).

The estimated rural demand for the Carrizo Plain, WPA 10, is 210 AFY and future demand estimate range from 9,610 to 12,740. The majority of existing rural parcels identified in WPA 10 are classified as developed rural lands. According to existing zoning, it is possible that Carrizo Plain could have extensive residential development. However, it is unlikely that the number of residential units that are zoned as potential residential will be developed due to limited water availability and other factors.

Constraints on water availability in the basin include physical limitations and water quality issues. The low safe yield estimate of this basin relative to its large size and the high TDS concentrations in areas (e.g., Soda Lake) suggest that water availability in the region is limited.

4.8.14.1.1 *Water Management Strategies*

All pumping is for rural residential and agricultural purposes by overlying users (there are no urban users in this WPA). Based on recent estimates of safe basin yield, it is unlikely that a supply deficit exists. Rural and agricultural users are encouraged to implement conservation measures to reduce demands. Water quality issues may force overlying users to explore other groundwater supplies. Other water management strategies that received a moderate designation for implementation potential include land use management (includes low impact development, rainwater harvesting), off stream storage, and desalination to reduce TDS concentrations.

Table 4.63 Carrizo Plain WPA 10 Water Management Strategies					
	Urban	**Solar Power**(1)	**Agriculture**	**Rural**	**Environmental**(8)
Demand					
Existing Demand (AFY)	0	0	800	210	
Forecast Demand (AFY)	0	13.8	680-890	9,610-12,740(2)	
Supply					
Carrizo Plain Basin (AFY)(3)	0	0	800	210	
Other Groundwater Supply Sources (AFY)	0	0	Uncertain	Uncertain	
SWRCB Water Diversions (AFY)	0	0	(4)	(4)	
Total Supply (AFY)	**0**	**Uncertain**(1)	**800**	**210**	
Environmental Water Demand					
Environmental Water Demand (AFY)					Uncertain
Unimpaired Mean Annual Discharge(AFY)					Uncertain
Water Supply Versus Demand Balance	**0**	**Uncertain**(1)(5)	**Uncertain**(5)	**Uncertain**(5)	**Uncertain**
Water Management Strategies and Potential for Implementation					
Further Conservation		Moderate	**Greater**	**Greater**	

Table 4.63 Carrizo Plain WPA 10 Water Management Strategies

	Urban	**Solar Power**[1]	**Agriculture**	**Rural**	**Environmental**[8]
Unsubscribed Nacimiento Water Project					
Land Use Management[7]		Moderate	Moderate	Moderate	
Recycled Water					
Optimize Use of State Water Project					
Groundwater Banking/Recharge					
Groundwater Supply Sources		**Greater**	**Greater**	**Greater**	
Salinas Reservoir Expansion/ Exchange					
Desalination		**Greater**[6]	Moderate[6]	Moderate[6]	
Lopez Lake Expansion/Exchange					
New Off Stream Storage			Moderate		
Nipomo Supplemental Water Project					
Precipitation Enhancement					
New On Stream Storage					

Notes:
1. Potential demands from two identified future solar power projects (Topaz Solar Farm and Sun Power-California Valley Solar Ranch), which have yet to be approved.
2. Carrizo Plain rural demand projections are based on existing zoning, which includes the potential for extensive California Valley development.

Table 4.63 Carrizo Plain WPA 10 Water Management Strategies

	Urban	Solar Power[1]	Agriculture	Rural	Environmental[8]

The actual development may be much lower than the range shown due to water quality and other considerations.

3. The safe yield was estimated at 8,000 - 11,000 AFY.
4. Diversions do not distinguish type of use. Potentially 81 AFY could be diverted for use by either agriculture or rural residential.
5. A safe yield of 8,000 - 11,000 AFY has been identified via the Solar Project EIRs. However, future efforts should seek to refine the safe yield analysis and rural demand estimate in order to make a supported determination.
6. Treatment to reduce TDS concentrations in groundwater, reverse osmosis is proposed.
7. Includes Low Impact Development/Rainwater Harvesting.
8. The eastern portion of the County (i.e., WPAs 9, 10, 11, 14, and 15) was ultimately excluded from the environmental water demand analysis due to the lack of data and regional physiographic differences.

4.8.14.2 Rafael/Big Spring WPA 11

The Rafael Valley and Big Spring Valley Groundwater Basins are the only defined groundwater basin in this WPA. There are no urban water users or large population centers in this WPA. All pumping is for minimal rural residential and agricultural purposes by overlying users. There are no existing estimates of safe basin yield or hydrologic budget items. Therefore, it is uncertain but unlikely that an existing agricultural or rural supply deficit exists since the existing demands are minor. It is possible that future demands could exceed the basins' safe yield, but without adequate information, this cannot be determined.

Constraints on water availability in these basins are primarily physical limitations. Shallow alluvial deposits are typically limited by available storage capacity and are therefore susceptible to drought impacts. The alluvial aquifers also overlie and recharge the underlying consolidated rock formations. Water availability in the consolidated rock fractures is highly variable, depending on the local structure, available storage capacity, and access to a source of recharge.

4.8.14.2.1 *Water Management Strategies*

Although there are no urban users in this WPA, and it is uncertain but unlikely that a supply deficit exists, the rural and agricultural users are encouraged to implement conservation measures to reduce demands. If future supply deficits occur, then the overlying water users could tap into fractured rock aquifers or other non-basin sources. Other water management strategies that received a moderate designation for implementation potential include land use management (includes low impact development and rainwater harvesting) and off stream storage.

Table 4.64 Rafael/Big Spring WPA 11 Water Management Strategies				
	Urban	**Agriculture**	**Rural**	**Environmental(6)**
Demand				
Existing Demand (AFY)	0	Minimal	Minimal	
Forecast Demand (AFY)	0	0	470-620	
Supply				
Rafael Valley Basin (AFY)(1)	0	Uncertain(2)	Uncertain(2)	
Big Spring Area Basin(1)	0	Uncertain(2)	Uncertain(2)	
Other Groundwater Supply Sources (AFY)	0	Uncertain	Uncertain	
SWRCB Water Diversions (AFY)	0	(3)	(3)	
Total Supply (AFY)	**0**	**Uncertain**	**Uncertain**	
Environmental Water Demand				
Environmental Water Demand (AFY)				Uncertain
Unimpaired Mean Annual Discharge(AFY)				Uncertain
Water Supply Versus Demand Balance	**0**	**Uncertain (4)**	**Uncertain (4)**	**Uncertain**
Water Management Strategies and Potential for Implementation				
Further Conservation		**Greater**	**Greater**	
Unsubscribed Nacimiento Water Project				
Land Use Management(5)		Moderate	Moderate	

Table 4.64 Rafael/Big Spring WPA 11 Water Management Strategies

	Urban	Agriculture	Rural	Environmental(6)
Recycled Water				
Optimize Use of State Water Project				
Groundwater Banking/Recharge				
Groundwater Supply Sources		**Greater**	**Greater**	
Salinas Reservoir Expansion/ Exchange				
Desalination				
Lopez Lake Expansion/Exchange				
New Off Stream Storage		Moderate		
Nipomo Supplemental Water Project				
Precipitation Enhancement				
New On Stream Storage				

Notes:
1. There is no information describing the basin yield.
2. It is uncertain which basins are used and the quantity of water pumped from each basin. Future studies should invest the resources to quantify the location and use of each basin.
3. Diversions do not distinguish type of use. Potentially 59 AFY could be diverted for use to either agriculture or rural residential.
4. It is uncertain but unlikely that an existing agricultural or rural supply deficit exists. The yield from the two basins serving this water planning area is unknown, but the existing demands are minor. It is possible that future demands could exceed the basins safe yield, but without adequate information, this cannot be confirmed. Future studies should invest the resources to quantify the safe basin yield and to determine which groundwater basins are used by the agricultural and rural water users.
5. Includes Low Impact Development/Rainwater Harvesting.
6. The eastern portion of the County (i.e., WPAs 9, 10, 11, 14, and 15) was ultimately excluded from the environmental water demand analysis due to the lack of data and regional physiographic differences.

4.8.14.3 <u>Santa Margarita WPA 12</u>

Groundwater is the primary water supply source for this WPA. The primary constraint on water availability in the Santa Margarita Valley Groundwater Basin, which supplies CSA 23 and Santa Margarita Ranch, are physical limitations. Although the alluvial aquifer is considered to be highly productive, it is shallow in vertical extent (i.e., 50 feet thick) and therefore highly susceptible to seasonal fluctuations in groundwater levels of about 15 to 20 feet. During dry water years or extended droughts, well yields may be significantly reduced due to low groundwater levels (Todd, 2004). Recharge in the shallow alluvial deposits for a particular year is dependent on rainfall, creek stream flows, and precipitation runoff generated in the four watersheds. Wells developed in the Santa Margarita Formation generally do not have sufficient yields to reliably replace the wells in the alluvial aquifer. Hydrographs of deep wells in the area indicate that groundwater levels have been trending downward at least over the last decade (Hopkins, 2006).

The Rinconada Valley and Pozo Valley Groundwater Basins constraints on water availability are physical limitations. Shallow alluvial deposits are typically limited by available storage capacity and are therefore susceptible to drought impacts. The alluvial aquifers overlie and recharge the underlying rock formations. Water availability in the consolidated rock fractures is generally limited and highly variable, depending on the local structure, available storage capacity, and access to a source of recharge.

4.8.14.3.1 *Water Management Strategies*

The community of Santa Margarita, which is served by CSA 23, is the primary population center and urban water user in this WPA. Santa Margarita Ranch is primarily an agricultural operation, but residential subdivisions are proposed on the Ranch. Due to the supply limitations of the Santa Margarita Valley Groundwater Basin, an alternative supply is necessary to meet anticipated future demands and to provide a reliability supply. Water conservation measures should be implemented to the fullest extent possible. Mandatory or emergency conservation would be used to off-set the need for additional or reliability supply in CSA 23, but not to support growth. In addition to conservation, three water management strategies are likely the most feasible options to consider for CSA 23 and/or Santa Margarita Ranch's future water supply:

- Unsubscribed Nacimiento Water Project
- Recycled water
- Optimized use of State Project Water

Other water management strategies that received a moderate designation for implementation potential include land use management (includes low impact development and rainwater harvesting) and groundwater supply sources.

Table 4.65 Santa Margarita WPA 12 Water Management Strategies					
	CSA 23	**Santa Margarita Ranch**	**Agriculture**	**Rural**	**Environmental**
Demand					
Existing Demand (AFY)	164	1,621	1,770	240	
Forecast Demand (AFY)	173-192(7)	5,301-5,890(7)	1,720-2,680	450-520	
Supply					
Santa Margarita Valley Basin (AFY)(1)	164	1,621	Uncertain(2)	Uncertain(2)	
Rinconada Valley Basin(3)	0	0	Uncertain(2)	Uncertain(2)	
Pozo Valley Basin(4)	0	0	Uncertain(2)	Uncertain(2)	
Other Groundwater Supply Sources (AFY)	0	0	Uncertain	Uncertain	
SWRCB Water Diversions (AFY)	0	22	(5)	(5)	
Total Supply (AFY)	**164**	**1,643**	**Uncertain**	**Uncertain**	
Environmental Water Demand					
Environmental Water Demand (AFY)(9)					32,850
Unimpaired Mean Annual Discharge(AFY)(10)					46,630
Water Supply Versus Demand Balance	**Supply Deficit(1)(6)**	**Supply Deficit(1)(6)**	**Uncertain (2)(6)**	**Uncertain (2)(6)**	**Uncertain(11)**

Table 4.65 Santa Margarita WPA 12 Water Management Strategies					
	CSA 23	**Santa Margarita Ranch**	**Agriculture**	**Rural**	**Environmental**
Water Management Strategies and Potential for Implementation					
Further Conservation	**Greater**	**Greater**	**Greater**	**Greater**	
Unsubscribed Nacimiento Water Project	Moderate	**Greater**			
Land Use Management(8)	Moderate	Moderate	Moderate	Moderate	
Recycled Water		**Greater**			
Optimize Use of State Water Project	**Greater**				
Groundwater Banking/Recharge					
Groundwater Supply Sources	Moderate	Moderate			
Salinas Reservoir Expansion/ Exchange					
Desalination					
Lopez Lake Expansion/Exchange					
New Off Stream Storage			Moderate		
Nipomo Supplemental Water Project					
Precipitation Enhancement					

Table 4.65 Santa Margarita WPA 12 Water Management Strategies					
	CSA 23	**Santa Margarita Ranch**	**Agriculture**	**Rural**	**Environmental**
New On Stream Storage					

Notes:

1. No comprehensive studies to determine the perennial yield are known to exist. However, some reports indicate an average annual yield may range between 400 to 600 AFY.
2. It is uncertain which basins are used and the quantity of water pumped from each basin. Future studies should invest the resources to quantify the location of and use within each basin.
3. There is no information describing the basin yield.
4. The safe available storage has been reported to be 1,000 AFY. There is insufficient information to characterize water availability.
5. Diversions do not distinguish type of use. Potentially 417 AFY could be diverted for use to either agriculture or rural residential.
6. It is likely that a deficit exists because the combined existing urban, agricultural, and rural demands exceed the Santa Margarita Valley and Pozo Valley basin yield/storage.
7. Ten percent water conservation assumed for the low end of the forecast build-out demand.
8. Includes Low Impact Development/Rainwater Harvesting
9. Environmental Water Demand is defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. The federally threatened south-central California coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species for the development of a reasonable estimation of the amount of water needed to support this species.
10. Mean daily flow values from stream gaging stations representative of long-term, unimpaired (or natural) flow conditions were used to derive unimpaired mean annual discharge (MAD) estimates. The unimpaired MAD is the cumulative flow for the creeks within the water planning area that were included in the calculation.
11. The Environmental Water Demand and Unimpaired Mean Annual Discharge are calculated for the entire water planning area and not for individual streams.

4.8.14.4 Atascadero/Templeton WPA 13

Groundwater from the Atascadero Groundwater Sub-basin is the primary water supply source for this WPA, but recycled water and recently the Nacimiento Water Project (NWP) are also sources of supply. The Atascadero Groundwater Sub-basin includes the City of Atascadero and the communities of Templeton and Garden Farms. Although the City of Paso Robles is not located within WPA 13, its Thunderbird wellfield is located within WPA 13 and extracts water from the Salinas River Underflow. The sub-basin contains three aquifer groups with distinctly different hydraulic characteristics: 1) Alluvium along the floodplain of the Salinas River, 2) Paso Robles Formation deposits directly underlying the Salinas River alluvium, and 3) Paso Robles Formation deposits along the east side of the sub-basin that are not directly connected to the younger alluvium.

Primary constraints on water availability in the sub-basin include water rights and physical limitations. The rights to surface water flows in the Salinas River and associated pumping from the alluvium (Salinas River Underflow) have been fully appropriated by the State Water Resources Control Board (State Board) and no plans exist to increase these rights beyond the current allocations. Full appropriation implies that no additional rights to the Salinas River flows are being issued by the State Board at this time nor is any additional pumping for existing rights being granted. Therefore, the Salinas River does not represent a future source of water supply that can be developed beyond its present appropriation.

In terms of physical limitations, Todd (2009) estimated the gross groundwater pumping in the sub-basin during 2006 to be 15,545 AF, which is 95 percent of the sub-basin perennial yield of 16,400 AFY. Ongoing studies may revise the estimated pumping from the sub-basin. According to Fugro (2010), whereas total groundwater in storage in the main part of the Paso Robles Groundwater Basin is predominantly in the Paso Robles Formation, the Salinas River alluvium in the Atascadero Groundwater Sub-basin accounts for a significant percentage of the total groundwater storage in the sub-basin. Pumping from the alluvium should be accounted for separately from pumping from the Paso Robles Formation. Furthermore, Fugro opined that pumping in excess of the perennial yield in the sub-basin may not necessarily be reflected by decreasing groundwater levels in the Paso Robles Formation since significant pumping occurs in the alluvium.

An additional source of water for Templeton CSD comes from their re-use program with disposal of treated wastewater effluent from the Meadowbrook WWTP percolation ponds. This program allows the Templeton CSD to percolate treated effluent into the groundwater basin/Salinas River Underflow and subsequently extract the same amount of water 28 months later.

The Templeton CSD is also under contract to receive 250 AFY from the NWP. The Atascadero MWC is a major partner of the Nacimiento Water Project, having contracted for a 2,000 AFY allotment of this future supply. For Atascadero MWC, the water will be used to recharge the groundwater basin in the vicinity of the deep wells that pump from the Atascadero Groundwater Sub-basin.

4.8.14.4.1 *Water Management Strategies*

The Atascadero MWC maintains sufficient supply to meet existing and anticipated future demands, and to provide a reliability supply. The other urban users are either at their supply limit or could experience a future deficit.

As mentioned above, the Salinas River does not represent a future source of water supply that can be developed beyond its present appropriation.

The estimated gross groundwater pumping from urban, rural and agricultural users in the Atascadero Groundwater Sub-basin is approaching the perennial yield. Therefore, the sub-basin is not considered a significant source of additional future supply.

Due to the supply limitations of the Atascadero Groundwater Sub-basin, an alternative supply is necessary to meet future demands and to provide a reliability supply. Water conservation measures should be implemented to the fullest extent possible. Atascadero MWC has successfully implemented a number of conservation measures and continues to aggressively promote water conservation. Mandatory or emergency conservation would be used to off-set the need for additional or reliability supply, not to support growth.

Future water supply for the Templeton CSD will likely come from the Nacimiento Water Project (NWP). Templeton CSD could increase its NWP allotment. Templeton CSD would percolate raw water from the NWP into the Salinas River Underflow, in a similar manner that they percolate effluent from the Meadowbrook WWTP percolation ponds (Selby Pond site). In addition, the Templeton CSD might divert additional wastewater flows to the Meadowbrook WWTP (which currently flow to the City of Paso Robles WWTP), which will allow them to increase percolation into and extraction from the Salinas River Underflow by as much as 343 AFY.

Other water management strategies that received a moderate designation for implementation potential include land use management (includes low impact development and rainwater harvesting) and groundwater banking/recharge.

Table 4.66 Atascadero/Templeton WPA 13 Water Management Strategies							
	Garden Farms CWD	**Templeton CSD**	**Atascadero MWC**	**Paso Robles(16)**	**Agriculture**	**Rural**	**Environmental**
Demand							
Existing Demand (AFY)	48-93	1,682	6,565	4,063	10,620	1,480	
Forecast Demand (AFY)	48-93	2,034-2,260(15)	6,840-7,600(15)	3,728	9,740-14,600	1,810-1,930	
Supply							
Atascadero Groundwater Sub-basin (AFY)(13)							
Paso Robles Formation (AFY)(1)	48-93	1,050(2)	3,193	Included with Salinas River Underflow	(3)	(3)	
Salinas River Underflow (AFY)(1)	0	500(4)	3,372(5)	4,063/ 3,728(16)	745(6)	0	
Recycled Water (AFY)(7)	0	132/475	0	0	0	0	
Other Groundwater Supply Sources (AFY)	0	0	0	0	Uncertain	Uncertain	
SWRCB Water Diversions (AFY)	0	0	0	0	(8)	(8)	
Nacimiento Water Project (AFY)(9)	0	250	2,000	0	0	0	
Total Supply (AFY)	**43-93**	**1,932**	**8,565**	**4,063**	**Uncertain**	**Uncertain**	

Table 4.66 Atascadero/Templeton WPA 13 Water Management Strategies

	Garden Farms CWD	Templeton CSD	Atascadero MWC	Paso Robles[16]	Agriculture	Rural	Environmental
Environmental Water Demand							
Environmental Water Demand (AFY)[18]							41,010
Unimpaired Mean Annual Discharge(AFY)[19]							74,090
Water Supply Versus Demand Balance	**At Supply Limit**	**Possible Future Deficit[1][10]**	**Adequate Supply[1][14]**	**At Supply Limit[1]**	**Uncertain [11]**	**Uncertain [11]**	**Uncertain[20]**
Water Management Strategies and Potential for Implementation							
Further Conservation	**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	
Unsubscribed Nacimiento Water Project		**Greater**	**Greater**	**Greater**	Moderate[12]		
Land Use Management[17]	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	
Recycled Water		**343 AFY**	Moderate	**Greater**	**Greater**		
Optimize Use of State Water Project							
Groundwater Banking/Recharge		Moderate	Moderate	Moderate	Moderate	Moderate	
Groundwater Supply Sources		**500 AFY**	Moderate		**Greater**	**Greater**	

Table 4.66 Atascadero/Templeton WPA 13 Water Management Strategies

	Garden Farms CWD	Templeton CSD	Atascadero MWC	Paso Robles[16]	Agriculture	Rural	Environmental
Salinas Reservoir Expansion/ Exchange							
Desalination							
Lopez Lake Expansion/Exchange							
New Off Stream Storage					Moderate		
Nipomo Supplemental Water Project							
Precipitation Enhancement							
New On Stream Storage							

Notes:

1. The perennial yield was estimated to be 16,400 AFY. Extractions from the Sub-basin occur primarily from the Salinas River Underflow and deeper formations. Depending on the estimated use for the Agricultural and Rural sectors, future hydrology and whether additional Nacimiento supplies are utilized, Sub-basin studies are indicating that the perennial yield may be exceeded in the future.
2. Nine of Templeton CSD's wells extract groundwater from the Atascadero Groundwater Sub-basin.
3. It is assumed that the majority of water supply for rural users and about 13 percent of the supply for agricultural users comes from the Sub-basin.
4. Templeton CSD is permitted to extract 500 AFY from the Salinas River Underflow between October 1 and April 1.
5. Atascadero MWC rights to 3,372 AFY from Salinas River underflow.
6. SWRCB records indicate that 745 AFY could be diverted from the Salinas River (direct diversion or underflow). It is assumed that the entire amount is used for agriculture.
7. Percolation of treated wastewater effluent into the Salinas River underflow and extraction of the same amount 28 months later. Currently about 132 AFY is percolated and extracted. This could increase to 475 AFY in the future.
8. Diversions do not distinguish type of use. Potentially 1,431 AFY could be diverted for use to either agriculture or rural residential. Diversions were not analyzed as to whether they are within or outside the Sub-basin.
9. Nacimiento Water Project is scheduled to go online in 2010.
10. If the Templeton Sub-Unit can not supply at least 1,000 AFY, then a water supply deficit could occur. A combination of conservation and an increase in treated wastewater effluent percolation could supply the projected increase in demands.

Table 4.66 Atascadero/Templeton WPA 13 Water Management Strategies

	Garden Farms CWD	Templeton CSD	Atascadero MWC	Paso Robles(16)	Agriculture	Rural	Environmental

11. It is uncertain whether the sources of supply outside the Sub-basin in addition to the Sub-basin itself are sufficient to sustain the level of demand (also see note 1).
12. Via an institutional/physical mechanism for direct deliveries or groundwater banking.
13. The agencies, County, District, and local land owners intend to actively and cooperatively manage the Paso Robles Groundwater Basin (which includes the Sub-basin) via the development of a Groundwater Management Plan.
14. Although the demand and supply balance indicates a surplus for Atascadero MWC, if the Sub-basin is not managed appropriately, Atascadero MWC could be impacted.
15. Ten (10) percent additional water conservation (beyond what has already been accomplished) assumed for the low end of the forecast build-out demand.
16. Paso Robles discussed in Water Planning Area 14 but included here because Paso Robles wells extract water from this water planning area. For the purposes of this analysis, it was assumed that half (4,063 AFY) of the existing demand of 8,126 AFY was extracted from the Salinas River Underflow via the Thunderbird Well Field in WPA 13. Paso Robles is permitted to extract 4,600 AFY from Salinas River Underflow, but not all is pumped from the WPA 13. Part is extracted from within WPA 14. At build-out, it was assumed that Paso Robles would extract half (3,728 AFY) of its total future groundwater supply of 7,456 AFY from the Atascadero Sub-basin.
17. Includes Low Impact Development/Rainwater Harvesting.
18. Environmental Water Demand is defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. The federally threatened south-central California coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species for the development of a reasonable estimation of the amount of water needed to support this species.
19. Mean daily flow values from stream gaging stations representative of long-term, unimpaired (or natural) flow conditions were used to derive unimpaired mean annual discharge (MAD) estimates. The unimpaired MAD is the cumulative flow for the creeks within the water planning area that were included in the calculation.
20. The Environmental Water Demand and Unimpaired Mean Annual Discharge are calculated for the entire water planning area and not for individual streams.

4.8.14.5 <u>Salinas/Estrella WPA 14</u>

Groundwater from the Paso Robles Groundwater Basin is the primary water supply source for this WPA. The Nacimiento Water Project (NWP) is also a source of supply, and the community of Shandon maintains a State Water Project allocation. This WPA and the Paso Robles Basin include the City of Paso Robles and the communities of San Miguel, Camp Roberts and Shandon, rural and agricultural users, and a number of small commercial and community water systems. Groundwater in the basin is found in alluvium (Salinas River Underflow) and in the Paso Robles Formation.

Primary constraints on water availability in the basin include water rights, water quality, and physical limitations. The rights to surface water flows in the Salinas River and associated pumping from the alluvium have been fully appropriated by the State Board and no future plans exist to increase these rights beyond the current allocations. Therefore, the Salinas River does not represent a future source of water supply that can be developed beyond its present appropriation. In terms of physical limitations, Todd (2009) estimated the total groundwater pumping in the basin during 2006 to be 88,154 AF, which is 90 percent of the basin perennial yield of 97,700 AFY.

Portions of the Paso Robles Groundwater Basin have experienced significant water level declines over the past 15 to 20 years (Fugro 2002, Fugro 2005, Todd 2007, Todd 2009). The area of particular concern is the Estrella subarea, primarily from the eastern part of the City of Paso Robles, eastward along the Highway 46 corridor to Whitley Gardens. The “area of concern” has been the subject of additional investigation by the San Luis Obispo County Planning Department and the focus of a Resource Capacity Study that was completed 2011.

The City of Paso Robles is under contract to receive 4,000 AFY from the NWP. The City is progressing with its plans for a water treatment plant to treat NWP deliveries. Current projections indicate that the first phase of the plant will treat approximately 2,000 AFY by year 2015/16, during the peak water demand season. Future phases of the treatment plant are projected to be completed in 2021/22.

4.8.14.5.1 *Water Management Strategies*

The District, City of Paso Robles, CSA 16 – Shandon, San Miguel CSD, and approximately 20 landowners have organized as the Paso Robles Imperiled Overlying Rights (PRIOR) group to participate in the Paso Robles Groundwater Basin Agreement (Agreement). Key elements of the Agreement are a clear acknowledgement that the Paso Robles Groundwater Basin is not in overdraft now, and that the parties will not take court action to establish any priority of groundwater rights over another party as long as the Agreement is in effect. In addition, the parties agree to participate in a meaningful way in groundwater management activities, and to develop a plan for monitoring groundwater conditions in the groundwater basin.

As mentioned above, the Salinas River does not represent a future source of water supply that can be developed beyond its present appropriation. Also, the estimated gross groundwater pumping from urban, rural and agricultural users in the groundwater basin is approaching its perennial yield. Therefore, the groundwater basin is not considered a significant source of additional future supply.

The City of Paso Robles has an option of increasing its allotment of the Nacimiento Water Project from 4,000 AFY to 8,000 AFY as demand increases. The NWP is also an option for San Miguel CSD, but they do not currently subscribe to this supply.

Another supply alternative being pursued by Paso Robles is the use of recycled wastewater. The City owns its own wastewater treatment plant, which currently provides secondary treatment. Several alternatives have been studied to upgrade treatment to the tertiary level, and it is assumed that one of these alternatives will eventually be pursued. The City is considering the use of up to 1,000 AFY of recycled water to serve future demands. The primary issue with recycled water is that there is little urban demand (e.g. landscape irrigation or industrial users) within the city limits. Another option is to deliver recycled water to wineries or other agricultural users.

Water conservation measures should be implemented to the fullest extent possible. The City of Paso Robles has implemented a number of permanent mandatory water conservation measures that are in force throughout the water service area. These measures have reduced demand from 13 mgd to 10 mgd. Mandatory or emergency conservation by the city would be used to off-set the need for additional or reliability supply, not to support growth.

CSA 16-Shandon has an allocation of 100 AFY of State Water Project water (but no drought buffer), but has not developed this supply due to high cost.

Other water management strategies that received a moderate designation for implementation potential include land use management (includes low impact development and rainwater harvesting), recycled water, groundwater banking/recharge, and groundwater supply.

Table 4.67 Salinas/Estrella WPA 14 Water Management Strategies

	San Miguel CSD	Camp Roberts	Paso Robles	CSA 16 (Shandon)	Agriculture	Rural	Environmental [14]
Demand							
Existing Demand (AFY)	235	190	4,063[11]	147	67,610	3,590	
Forecast Demand (AFY)	466-582[10]	190	8,422-9,772[10(11)]	271-1,100[15]	60,740-86,820	5,570-6,230	
Supply							
Paso Robles Groundwater Basin (AFY)[1]							
Paso Robles Formation and/or alluvium (AFY)	235	190	2,856[2]	147	[3]	[3]	
Salinas River Underflow (AFY)	0	0	537/872[4]	0	738[5]	0	
Other Groundwater Supply Sources (AFY)	0	0	0	0	Uncertain	Uncertain	
SWRCB Water Diversions (AFY)	0	0	0	0	[6]	[6]	
State Water Project (AFY)	0	0	0	66[7]	0	0	
Nacimiento Water Project (AFY)[8]	0	0	4,000	0	0	0	
Total Supply (AFY)	**235**	**190**	**7,728**	**213**	**Uncertain**	**Uncertain**	
Environmental Water Demand							

Table 4.67 Salinas/Estrella WPA 14 Water Management Strategies							
	San Miguel CSD	**Camp Roberts**	**Paso Robles**	**CSA 16 (Shandon)**	**Agriculture**	**Rural**	**Environmental** (14)
Environmental Water Demand (AFY)							Uncertain
Unimpaired Mean Annual Discharge(AFY)							Uncertain
Water Supply Versus Demand Balance	**Future Deficit**(12)	**At Supply Limit**(12)	**Future Deficit**(12)	**Future Deficit**(12)	**Future Deficit**(9)(12)	**Future Deficit**(9)(12)	Uncertain
Water Management Strategies and Potential for Implementation							
Further Conservation	**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	**Greater**	
Unsubscribed Nacimiento Water Project	Moderate		**4,000 AFY**		Moderate(16)	Moderate(16)	
Land Use Management(13)	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	
Recycled Water	Moderate		**944-1,000 AFY**	Moderate	Moderate(16)		
Optimize Use of State Water Project				**Greater**	Moderate(16)	Moderate(16)	
Groundwater Banking/Recharge	Moderate		Moderate	Moderate	Moderate	Moderate	
Groundwater Supply Sources	**Greater**			Moderate	**Greater**	**Greater**	
Salinas Reservoir Expansion/ Exchange							

Table 4.67 Salinas/Estrella WPA 14 Water Management Strategies

	San Miguel CSD	Camp Roberts	Paso Robles	CSA 16 (Shandon)	Agriculture	Rural	Environmental (14)
Desalination							
Lopez Lake Expansion/Exchange							
New Off Stream Storage					Moderate		
Nipomo Supplemental Water Project							
Precipitation Enhancement							
New On Stream Storage							

Notes:
1. The perennial yield was estimated to be 97,700 AFY (includes 16,400 AFY from the Atascadero Groundwater Sub-basin). Previous studies estimated that the total groundwater pumping in the basin during 2006, including Monterey County demands, was 88,154 acre-feet, which is 90 percent of the basin perennial yield.
2. The deeper formations of the Paso Robles Groundwater Basin contributes approximately 2,856 AFY to the City of Paso Robles supply. The City plans to maintain this extraction rate in the future.
3. It is assumed that the majority of water supply for agriculture and rural users comes from the Paso Robles Groundwater Basin.
4. The City of Paso Robles is permitted to extract up to 8 cfs (3,590 gpm) with a maximum extraction of 4,600 AFY (January 1 to December 31). For the purposes of this analysis, it was assumed that half (4,063 AFY) of the existing demand of 8,126 AFY was extracted from the Salinas River Underflow via the Thunderbird Wellfied in WPA 13. The remaining permitted extraction of 537 AFY was pumped from wells within WPA 14. At build-out, it was assumed that Paso Robles would extract 3,728 AFY from the Salinas River Underflow in WPA 13 and the remaining 872 AFY would be extracted from Salinas River Underflow within WPA 14.
5. SWRCB records indicate that 738 AFY could be diverted from the Salinas River (direct diversion or underflow). It is assumed that the entire amount is used for agriculture.
6. Diversions do not distinguish type of use. Potentially 4,884 AFY could be diverted for use to either agriculture or rural residential.
7. CSA 16 has an allocation of 100 AFY of State Water Project (but no drought buffer), but has not developed this supply due to high cost. State Water Project average allocation assumed 66 percent of contract water service amount, which equate to 66 AFY.
8. Nacimiento Water Project is scheduled to go online in 2010.
9. It is possible that a future supply deficit will exist because the forecast agricultural and rural demands, excluding demands in the Monterey County portion of the basin, exceed the basin yield. It is uncertain how much of the rural and agricultural demand is supplied by sources outside the basin.

Table 4.67 Salinas/Estrella WPA 14 Water Management Strategies

	San Miguel CSD	Camp Roberts	Paso Robles	CSA 16 (Shandon)	Agriculture	Rural	Environmental (14)

10. Twenty (20) percent additional water conservation (beyond what has already been accomplished) assumed for the low end of the forecast build-out demand for San Miguel and 10% for Paso Robles.
11. Existing demand was 8,126 AFY, but half (4,063 AFY) was supplied by the Thunderbird Wellfied in WPA 13. Therefore, the net demand in WPA 14 is 4,063. Of this 4,063 AFY demand, 537 AFY was supplied by Salinas River Underflow and 2,856 AFY was supplied by the deeper Paso Robles Formation aquifer. The build-out forecast demand ranged between 12,150 and 13,500 AFY. This analysis assumed that 3,728 AFY would be supplied by the Thunderbird Wellfield in WPA 13. Therefore, the net forecast demand is 8,422 to 9,772 AFY.
12. Including demand in the Monterey County portion of the basin, and depending on the estimated use for the Agricultural and Rural sectors and future hydrology, basin studies are indicating that the perennial yield may be exceeded in the future. The agencies, County, District, and local land owners intend to actively and cooperatively manage the groundwater basin via the development of a Groundwater Management Plan.
13. Includes Low Impact Development/Rainwater Harvesting.
14. The eastern portion of the County (i.e., WPAs 9, 10, 11, 14, and 15) was ultimately excluded from the environmental water demand analysis due to the lack of data and regional physiographic differences.
15. Upper end of the range reflects demand projected in accordance with the draft Shandon Community Plan should it be approved by the Board of Supervisors in the future.
16. Via an institutional/physical mechanism for direct deliveries or groundwater banking.

4.8.14.6 <u>Cholame WPA 15</u>

The Cholame Valley Groundwater Basin is the only defined groundwater basin in this WPA. There are no urban water users or large population centers in this WPA, but there are some small public water systems. All other pumping is for residential and agricultural purposes by overlying users. No information is available describing basin yield. Therefore, it is uncertain whether a water supply deficit exists or not.

4.8.14.6.1 *Water Management Strategies*

Although there are no urban users in this WPA, and it is uncertain whether a supply deficit exists, the rural and agricultural users are encouraged to implement conservation measures to reduce demands. If supply deficits do exist, then other undefined groundwater basins could serve as a potential supply. Other water management strategies that received a moderate designation for implementation potential include land use management (includes low impact development and rainwater harvesting) and off stream storage.

Table 4.68 Cholame WPA 15 Water Management Strategies				
	Urban	**Agriculture**	**Rural**	**Environmental[(4)]**
Demand				
Existing Demand (AFY)	0	80	10	
Forecast Demand (AFY)	0	60-80	150-190	
Supply				
Cholame Valley Basin (AFY)[(1)]	0	80	10	
Other Groundwater Supply Sources (AFY)	0	Uncertain	Uncertain	
SWRCB Water Diversions (AFY)	0	41	0	
Total Supply (AFY)	**0**	**Uncertain**	**Uncertain**	
Environmental Water Demand				
Environmental Water Demand (AFY)				Uncertain
Unimpaired Mean Annual Discharge(AFY)				Uncertain
Water Supply Versus Demand Balance	**0**	**Uncertain[(2)]**	**Uncertain[(2)]**	**Uncertain**
Water Management Strategies and Potential for Implementation				
Further Conservation		**Greater**	**Greater**	
Unsubscribed Nacimiento Water Project				
Land Use Management[(3)]		Moderate	Moderate	

Table 4.68 Cholame WPA 15 Water Management Strategies

	Urban	**Agriculture**	**Rural**	**Environmental[4]**
Recycled Water				
Optimize Use of State Water Project				
Groundwater Banking/Recharge				
Groundwater Supply Sources		**Greater**	**Greater**	
Salinas Reservoir Expansion/Exchange				
Desalination				
Lopez Lake Expansion/Exchange				
New Off Stream Storage		Moderate		
Nipomo Supplemental Water Project				
Precipitation Enhancement				
New On Stream Storage				

Notes:
1. There is no information describing the basin yield.
2. It is uncertain but unlikely that an existing agricultural or rural supply deficit exists. The yield from the basin serving this water planning area is unknown, but the existing demands are minor. It is possible that future demands could exceed the basins safe yield, but without adequate information, this cannot be confirmed. Future studies should invest the resources to quantify the safe basin yield.
3. Includes Low Impact Development/Rainwater Harvesting.
4. The eastern portion of the County (i.e., WPAs 9, 10, 11, 14, and 15) was ultimately excluded from the environmental water demand analysis due to the lack of data and regional physiographic differences.

4.8.14.7 <u>Nacimiento WPA 16</u>

In this WPA, Lake Nacimiento is the primary source of supply for urban users and there are no significant groundwater basins. The Nacimiento Water Company serves the community of Oak Shores, which is on the banks of Nacimiento Lake. The water supply allocation for Oak Shores is part of the 1,750 AFY reserved for County residents in the Lake Nacimiento area.

The Heritage Ranch CSD has only one water supply source, the Gallery Well, which is fed via three horizontal wells located in the Nacimiento River bed just downstream of the Nacimiento Dam. Heritage Ranch CSD serves a residential community along the southern shores of Lake Nacimiento. Typically, the Nacimiento River is fed year-round by the release of water through the upper and/or lower outlet works in the dam at Lake Nacimiento. If no water is released from the lake, the Heritage Ranch CSD will not have a water supply. The 1,100 AFY of allocation of Nacimiento Reservoir water designated for use in Heritage Ranch's service area is part of the 1,750 AFY reserved for County residents in the Lake Nacimiento area.

4.8.14.7.1 *Water Management Strategies*

The 1,100 AFY Nacimiento Reservoir allocation for Heritage Ranch CSD is sufficient to provide water for anticipated build-out demand, but the configuration of the delivery system leaves the Heritage Ranch CSD vulnerable to a termination in water supply in an extreme drought. Alternative sources are under consideration, including taking water directly from the lake and connecting to the Nacimiento Water Project pipeline. A possible tie-in with Camp Roberts was explored, but was found to be infeasible due to the reluctance of Camp Roberts to consider any emergency water supply options.

Additional water conservation measures provide some opportunity to further reduce water demands. Further mandatory or emergency conservation would be used to off-set an emergency or reliability supply, but not to support growth. Conservation also does not provide the alternative supply needed during times of extreme drought.

Other water management strategies that received a moderate designation for implementation potential include land use management (includes low impact development and rainwater harvesting), groundwater supply sources (undefined groundwater basins), and new off-stream storage.

Table 4.69 Nacimiento WPA 16 Water Management Strategies					
	Nacimiento Water Company(1)	**Heritage Ranch CSD**	**Agriculture**	**Rural**	**Environmental**
Demand					
Existing Demand (AFY)	(2)	619	3,860	280	
Forecast Demand (AFY)	(2)	935-1,039	4,740-7,120	730-880	
Supply					
Lake Nacimiento (AFY)	600(3)	1,100(3)	0	0	
Other Groundwater Supply Sources (AFY)	0	0	Uncertain(4)	Uncertain(4)	
SWRCB Water Diversions (AFY)	0	0	(5)	(5)	
Total Supply (AFY)	**600**	**1,100**	**Uncertain**	**Uncertain**	
Environmental Water Demand					
Environmental Water Demand (AFY)(9)(11)					108,390
Unimpaired Mean Annual Discharge (AFY)(10)(11)					251,120
Water Supply Versus Demand Balance	**Uncertain**	**481 surplus/61 surplus (possible deficit(6))**	**Uncertain(7)**	**Uncertain(7)**	**Uncertain(12)**

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Table 4.69 Nacimiento WPA 16 Water Management Strategies					
	Nacimiento Water Company[(1)]	**Heritage Ranch CSD**	**Agriculture**	**Rural**	**Environmental**
Water Management Strategies and Potential for Implementation					
Unsubscribed Nacimiento Water Project					
Further Conservation	**Greater**	**Greater**	**Greater**	**Greater**	
Land Use Management[(8)]	Moderate	Moderate	Moderate	Moderate	
Recycled Water					
Optimize Use of State Water Project					
Groundwater Banking/Recharge					
Groundwater Supply Sources		Moderate			
Salinas Reservoir Exchange/ Expansion					
Desalination					
Lopez Lake Exchange/Expansion					
New Off Stream Storage		Moderate	Moderate		
Nipomo Supplemental Water Project					

Table 4.69 Nacimiento WPA 16 Water Management Strategies					
	Nacimiento Water Company(1)	**Heritage Ranch CSD**	**Agriculture**	**Rural**	**Environmental**
Precipitation Enhancement					
New On Stream Storage					

Notes:
1. Nacimiento Water Company serves the community of Oak Shores.
2. No estimate available for the current or forecast demand.
3. The 600 AFY water supply allocation for Oak Shores is part of the 1,750 AFY reserved for San Luis Obispo County residents in the Lake Nacimiento area. Heritage Ranch CSD's allocation of Lake Nacimiento is 1,100 AFY.
4. Groundwater supply sources around Lake Nacimiento are the typical sources of supply for wells that serve agricultural and rural users. There is no information describing the yield for these groundwater supplies.
5. Diversions do not distinguish type of use. Potentially 1,048 AFY could be diverted for use to either agriculture or rural residential.
6. The Lake Nacimiento supply allocation is sufficient to meet forecast demands. However, if the lake's water level drops below the dam outlet (has never occurred but came to within two feet of the lower outlet works in October 1989), then Heritage Ranch CSD could lose its water supply.
7. It is uncertain whether an agricultural or rural supply deficit exists. Future studies should invest the resources to determine the basin yield for these groundwater supplies and the uses for the creek/river diversions. It is possible that the combined supplies from groundwater and creek diversions are sufficient to meet the agricultural and rural demands.
8. Includes Low Impact Development/Rainwater Harvesting.
9. Environmental Water Demand is defined as the amount of water needed in an aquatic ecosystem, or released into it, to sustain aquatic habitat and ecosystem processes. The federally threatened south-central California coast steelhead (Oncorhynchus mykiss) was used as the primary indicator species for the development of a reasonable estimation of the amount of water needed to support this species.
10. Mean daily flow values from stream gaging stations representative of long-term, unimpaired (or natural) flow conditions were used to derive unimpaired mean annual discharge (MAD) estimates. The unimpaired MAD is the cumulative flow for the creeks within the water planning area that were included in the calculation.
11. Estimates for environmental water demand include the watershed area for the Nacimiento River Index-station (162 square miles); though the Index-station is within WPA 16, most of the watershed area is not.
12. The Environmental Water Demand and Unimpaired Mean Annual Discharge are calculated for the entire water planning area and not for individual streams.