Appendix L

San Luis Obispo County Groundwater Basins

Appendix L. San Luis Obispo County Groundwater Basins

The description of each groundwater basin and sub-basin contained within this appendix is a compilation of many works from prior studies and reports. In many cases, the best available information is used with a careful understanding of the approximate nature of the information and the need to update the data to a more current understanding under controlled conditions.

This Appendix is organized by WPA and Groundwater Basin and Sub-Basin. See **Figure L-1** for location of groundwater basins in the IRWM Planning Region. Each Sub-Region will have a similar map showing smaller Sub-Basins where applicable.

L.1 North Coast Groundwater Basins

See **Figure L-2** for location of North Coast Sub-Region Groundwater Basins and Sub-Basins.

1. **San Carpoforo Valley Groundwater Basin**

The San Carpoforo Valley Groundwater Basin is located in WPA 1 of the North Coast Sub-Region 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 is estimated as 1,800 acre-feet (AF). There are no current estimates of actual groundwater in terms of in-storage volumes. The volume of in-storage groundwater 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. There are neither estimates of basin yield, nor is their information available describing water quality in the basin. The primary constraints on water availability in the basin include physical limitations in storage volume and recharge and potential water quality issues, including salinity intrusion from the Pacific Ocean.

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 are recommended. 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 CDWR and other private sources.

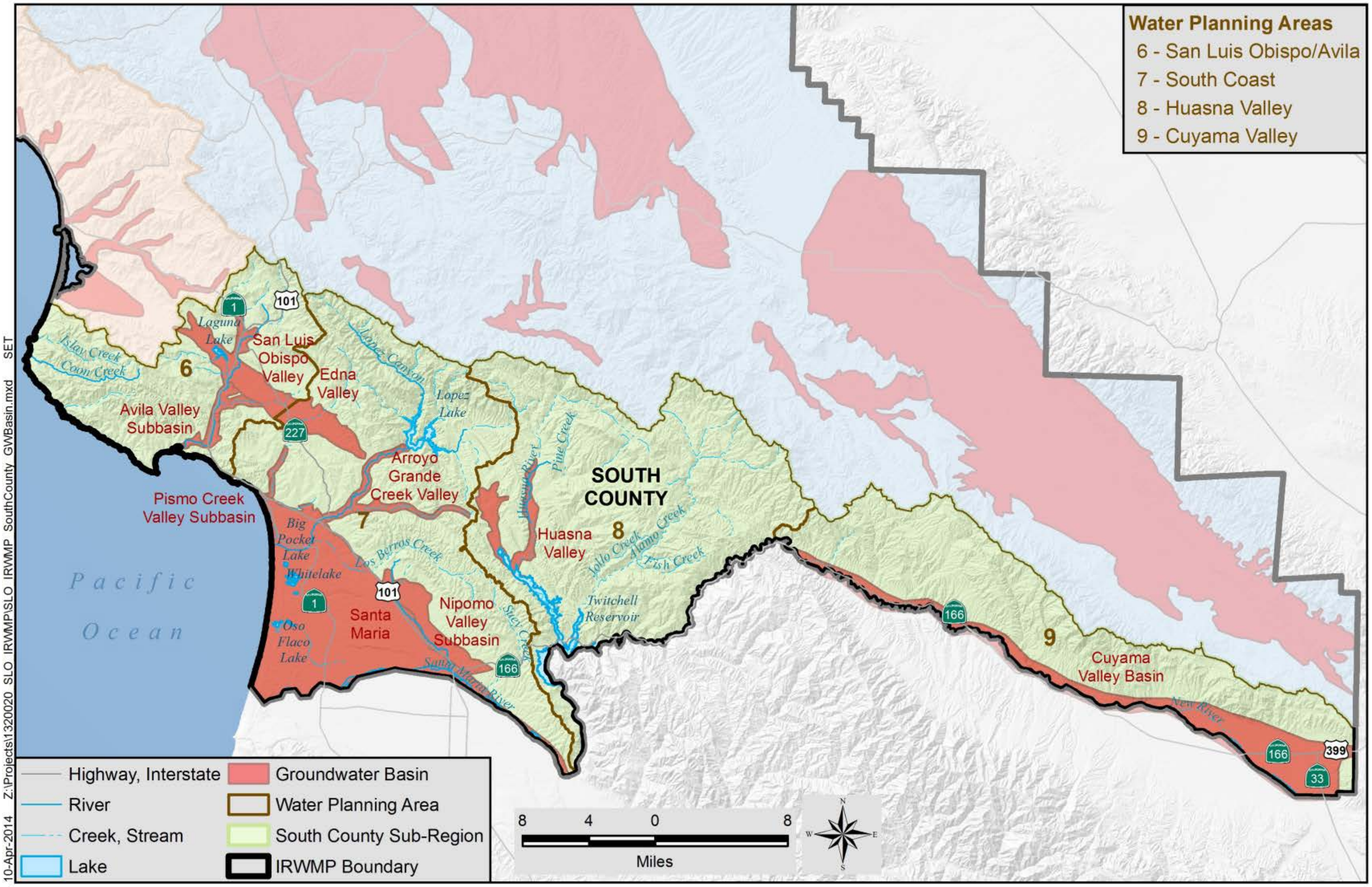

Figure L-1. Entire IRWM Planning Region Groundwater Basin Map

Figure L-2. North Coast Groundwater Basins

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 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 of useable groundwater storage is currently unknown. The volume of groundwater basin storage likely fluctuates widely in response to seasonal variations in rainfall and pumping extractions for agriculture during the irrigation season. There are no municipal or public water purveyors in the basin. All pumping in the basin is for agricultural purposes and by overlying private pumpers for rural uses. The safe yield of the basin is 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 from applied fertilizers and pesticides, small ranch properties and salinity intrusion. Groundwater levels in the basin are likely highest during the wet season, steadily declining 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 are recommended. 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 CDWR and private well sources.

3. Pico Creek Valley Groundwater Basin

The Pico Creek Valley Groundwater Basin is located in WPA 1 of the North Coast Sub-Region. 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 and tidal influences 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. San Simeon Valley Groundwater Basin

The San Simeon Valley Groundwater Basin is located in the WPA 2 of the North Coast Sub-Region 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 (approx. 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. 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). As a result, Cambria CSD is constantly challenged to meet demands through water conservation, proper well location, and groundwater treatment. New growth is constrained due to the lack of sustainability in water supplies.

5. <u>Santa Rosa Valley Groundwater Basin</u>

The Santa Rosa Valley Groundwater Basin is located in WPA 2 of the North Coast Sub-Region 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).

6. Villa Valley Groundwater Basin

The Villa Valley Groundwater Basin is located in WPA 2 in the North Coast Sub-Region and encompasses approximately 980 acres (approx. 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 (based on data extracted from 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 are recommended. 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 well user sources.

7. <u>Cayucos Valley Groundwater Basin</u>

The Cayucos Valley Groundwater Basin is located in WPA 3 in the North Coast Sub-Region and encompasses approximately 580 acres (approx. 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 limit the availability of the resource, while in the lower valley area; sea water intrusion is 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 are recommended. 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 well sources.

8. Old Valley Groundwater Basin

The Old Valley Groundwater Basin is in WPA 3 in the North Coast sub-region (see **Error! Reference source not found.** above) and encompasses approximately 750 acres (approx. 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 protect against sea water intrusion (Cleath & Associates 1993, 1995). With direct deliveries of CAWO downstream entitlements 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.

9. Toro Valley Groundwater Basin

The Toro Valley Groundwater Basin is in WPA 3 in the North Coast sub-region (see **Error! Reference source not found.** above) and encompasses approximately 510 acres (approx. 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 basin storage, the safe yield estimate 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 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 are recommended. 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 well sources.

10. Morro Valley Groundwater Basin

The Morro Valley Groundwater Basin is in WPA 4 in the North Coast Sub-Region 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 for use as recycled water, 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 and tidal influences. 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). 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.

11. Chorro Valley Groundwater Basin

The Chorro Valley Groundwater Basin is in WPA 4 in the North Coast Sub-Region and encompasses approximately 3,200 acres (5 square miles), although the effective extent of saturated basin deposits covers an estimated 1,900 acres (approx. 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) are 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 continue to 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 is the primary constraint, especially during drought conditions. 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.

12. <u>Los Osos Valley Groundwater Basin</u>

The Los Osos Valley Groundwater Basin is part of the North Coast Sub-Region and encompasses approximately 6,400 acres (10 square miles), of which 3.3 square miles underlie the Morro Bay estuary and sandspits (i.e., sandy deposits built into landforms), 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). 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.

L.2 South County Groundwater Basins

See South County Groundwater Basins and Sub-Basins in L.2

13. 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 (approx. 21.6 square miles), including the newly defined Avila Valley Sub-Basin. 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

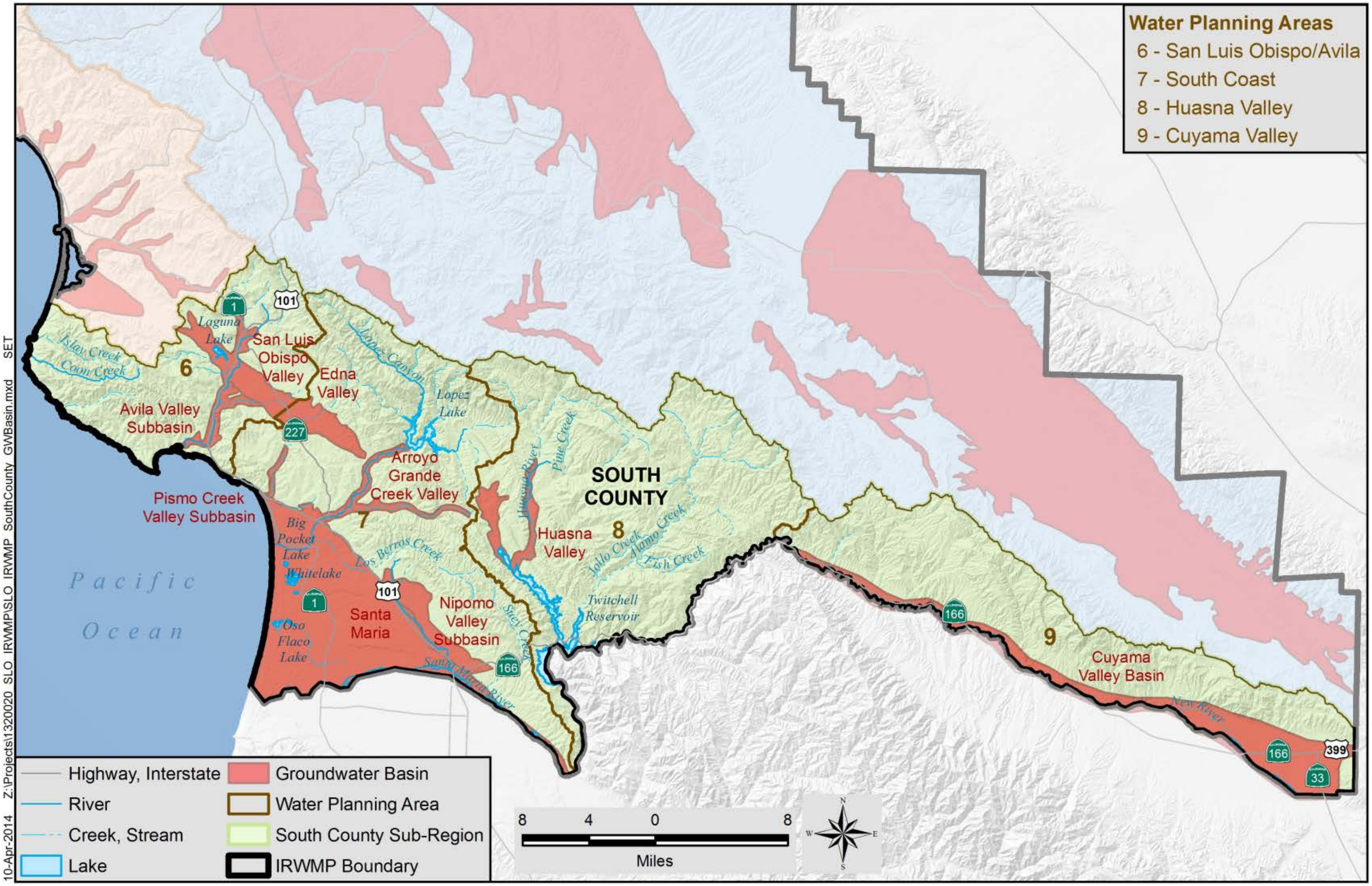

Figure L-3. South County Map of Groundwater Basins length of the drought periods and the recovery time following them, and an assessment of the behavior of the basin. The 1991 study reported a value of sustained yield of the entire basin under existing conditions at 5,900 AFY. The 1997 DWR study reported 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).

14. 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.

15. 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.

16. 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. 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.

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.

17. Santa Maria Valley Groundwater Basin

The Santa Maria Valley Groundwater Basin is part of WPA 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 (see **Error! Reference source not found.**). 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 River Valley Groundwater Basin is designated by the DWR as Basin 3-12 (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.

18. 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.

19. 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.

20. 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.

Brief Descriptions of Santa Maria River Valley Management Areas

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.

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).

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.

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).

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.

21. Huasna Valley Groundwater Basin

The Huasna Valley Groundwater Basin is part of the South Coast Sub-Region and encompasses approximately 4,700 acres (approx. 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.

22. Cuyama Valley Groundwater Basin

The Cuyama Valley Groundwater Basin is part of the South Coast Sub-Region 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). 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).

L.3 NORTH COUNTY SUB-REGION GROUNDWATER BASINS AND SUB-BASINS

23. Carrizo Plain Groundwater Basin

The Carrizo Plain Groundwater Basin is located in WPA 10 and is identified in California's Groundwater Bulletin 118 as Groundwater Basin Number 3-19 (DWR 2003). The basin is 173,000 acres (approx. 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.

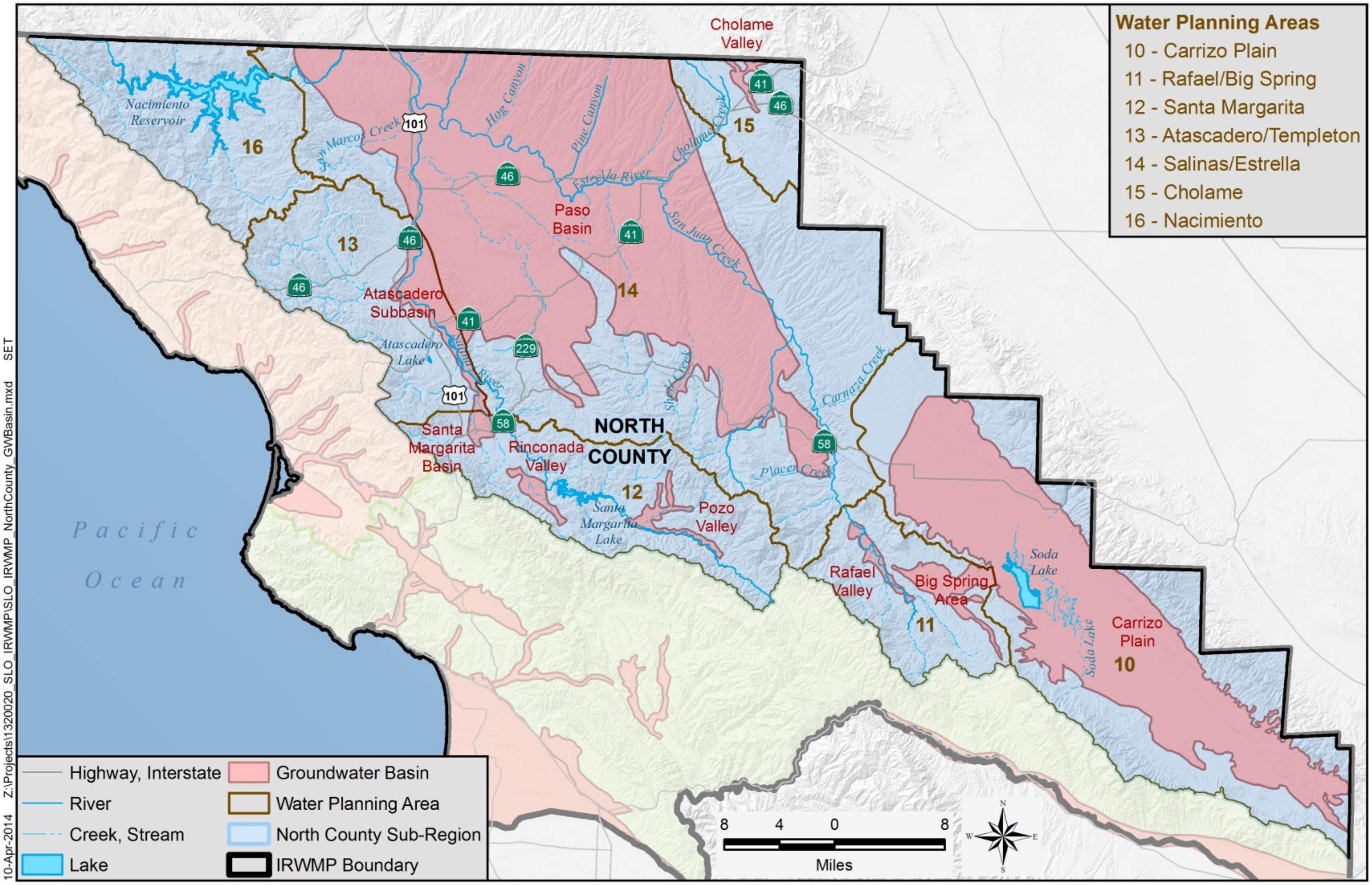

Figure L-4. North County Map of Groundwater Basins

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.

24. Rafael Valley Groundwater Basin

The Rafael Valley Groundwater Basin is located in the Inland Sub-Region 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 (approx. 3.6 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.

25. Big Spring Area Groundwater Basin

The Big Spring Area Groundwater Basin is located in the Inland Sub-Region and is identified in California's Groundwater Bulletin 118 as Groundwater Basin Number 3-47 (DWR 2003). The basin is 7,320 acres (approx. 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. 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.

26. Pozo Valley Groundwater Basin

The Pozo Valley Groundwater Basin is located in the Inland Sub-Region and is identified in California's Groundwater Bulletin 118 as Groundwater Basin Number 3-44 (DWR 2003). The basin is 6,840 acres (approx. 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.

27. Rinconada Valley Groundwater Basin

The Rinconada Valley Groundwater Basin is located in the Inland Sub-Region 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 (approx. 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.

28. Santa Margarita Valley Groundwater Basin

The Santa Margarita Valley Groundwater Basin is located in the Inland Sub-Region. 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. 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). 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).

29. Paso Robles Groundwater Basin

The Paso Robles Groundwater Basin is part of the Inland Sub-Region. 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 in both Monterey and San Luis Obispo counties and is 505,000 acres (approx. 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.

30. Atascadero Groundwater Sub-Basin

The Atascadero Groundwater Sub-basin is located in the Inland Sub-Region 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. 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.

31. Cholame Valley Groundwater Basin

The Cholame Valley Groundwater Basin is located in the Inland Sub-Region 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 (approx. 62.2 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 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.

San Luis Obispo Integrated Regional Water Management Plan