Agenda

San Miguel Groundwater Sustainability Agency

BOARD OF DIRECTORS

John Green, President | Joseph Parent, Vice President
Anthony Kalvans, Director | Gib Buckman, Director | Ashley Sangster, Director

THURSDAY, October 25, 2018
6:00 TO 6:30 P.M. OPENED SESSION
BOARD OF DIRECTORS MEETING AGENDA

SMCSD Boardroom
1150 Mission St.
San Miguel, CA 93451

Cell Phones: As a courtesy to others, please silence your cell phone or pager during the meeting and engage in conversations outside the Boardroom.

Americans with Disabilities Act: If you need special assistance to participate in this meeting, please contact the CSD Clerk at (805) 467-3388. Notification 48 hours in advance will enable the CSD to make reasonable arrangements to ensure accessibility to this meeting. Assisted listening devices are available for the hearing impaired.

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I. **Call to Order:** **6:00 PM**

II. **Pledge of Allegiance:**

III. **Roll Call:** *Green___ Parent___ Buckman___ Kalvans___ Sangster___*

IV. **Approval of GSA Meeting Agenda:**

M______________________ S_______________________ V__________

V. **ADJOURN TO CLOSED SESSION:**

A. **CLOSED SESSION AGENDA:** None

VI. **Call to Order for Regular Board Meeting/Report out of Closed Session**

VII. **Public Comment and Communications for items not on the Agenda:**

Persons wishing to speak on a matter not on the agenda may be heard at this time; however, no action will be taken until placed on a future agenda. Speakers are limited to three minutes. Please complete a "Request to Speak" form and place in basket provided.

VIII. **Special Presentations/Public Hearings/Other:** None

IX. **Staff & Committee Reports – Receive & File:** None

X. **CONSENT CALENDAR:**

1. **Review and Approve Board Meeting Minutes**
   a. 9-27-2018 GSA Regular Board Meeting

The items listed above are scheduled for consideration as a group and one vote. Any Director or a member of the public may request an item be withdrawn from the Consent Agenda to discuss or to change the recommended course of action. Unless an item is pulled for separate consideration by the Board, the following items are recommended for approval without further discussion.

XI. **BOARD ACTION ITEMS:**

Review, Discuss, Receive and File the following DRAFT Sections of the Paso Robles Sub-Basin Groundwater Sustainability Plan (GSP)

a. Chapter 4. Hydrogeologic Conceptual Model including Appendices 4A & 4B

b. Chapter 5. Groundwater Conditions including Appendix Appendix 5A

Public Comments: (Hear public comments prior to Board Action)

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XII. BOARD COMMENT:

This section is intended as an opportunity for Board members to make brief announcements, request information from
staff, request future agenda item(s) and/or report on their own activities related to District business. No action is to be taken until an item is placed on a future agenda.

XIII. ADJOURNMENT TO NEXT GSA MEETING

ATTEST:

STATE OF CALIFORNIA)
COUNTY OF SAN LUIS OBISPO) ss.
COMMUNITY OF SAN MIGUEL)

I, Tamara Parent, Board Clerk/Accounts Manager of San Miguel Community Services District, hereby certify that I caused the posting of this agenda at the SMCSD office on October 18, 2018

Date: October 18, 2018

Tamara Parent
Tamara Parent, Board Clerk/ Accounts Manager

Rob Roberson
Rob Roberson, Fire Chief/Interim General Manager

John Green,
Approved by: President Green

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III. Roll Call: *Green___ Parent___ Buckman___ Kalvans___ Sangster___*

IV. Approval of GSA Meeting Agenda:

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V. ADJOURN TO CLOSED SESSION:

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IX. Staff & Committee Reports – Receive & File: None

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Tamara Parent, Board Clerk/ Accounts Manager

Rob Roberson
Rob Roberson, Fire Chief/Interim General Manager

John Green,
Approved by: President Green

SAN MIGUEL COMMUNITY SERVICES DISTRICT
BOARD OF DIRECTORS
SEPTEMBER 27, 2018 GROUNDWATER SUSTAINABILITY AGENCY MEETING MINUTES

MEETING HELD AT DISTRICT OFFICES
1150 MISSION STREET
SAN MIGUEL, CA 93451

I. Meeting Called to Order by Vice President Parent – 6:03 P.M.

II. Pledge of Allegiance lead by Director Parent

III. **Roll Call:** Directors Present: Parent, Kalvans, and Sangster.
Director Absent: Buckman (Arrived @ 6:10 P.M.)
Green (Arrived @ 6:20 P.M.)
District Staff in attendance: Rob Roberson, Kelly Dodds, Tamara Parent
District Engineer, Blaine Reely
District General Counsel, Counsel Schweikert

IV. **Adoption of Special Meeting Agenda:**
Motion by Director Sangster to adopt Meeting Agenda as presented.
Seconded by Director Parent Motion was approved by vote of 3 AYES and 0 NOES 2 ABSENT.

V. **Adjourn to closed session:** None

VI. **Call to order out of closed session:** None

VII. **Public Comment and Communications (for items not on the agenda):**
No Public Comment

VIII. **Special Presentation/Public Hearing/Other:** None

IX. **Staff & Committee Reports-** Receive & File: None

X. **Consent Calendar**: 1.a Review and approve 8-23-2018 GSA Meeting Minutes

Motion by Director Kalvans to approve Consent calendar.

Seconded by Director Sangster. Motion was approved by Vote of 3 AYES and 0 NOES and 2 ABSENT.

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XI. BOARD ACTION ITEMS:

1. Review, Discuss, Receive and File the Invoice #4 (SM20180914) for payment for proportional share of the "Paso Robles Basin GSP" for $3,352.27

Item presented by Dr. Blaine Reely, District Engineer updating the Board of Directors about on the 4th invoice from the GSP and asked for any questions. Mr. Reely informed the Board of Directors that there are two public outreach meetings on October 4th at Kermit King Elementary at 6 P.M. and one on October 8th at Creston Elementary School at 6 P.M. with the GSP consultation team.
Board Comment: Director Kalvans asked about the expenses accrued, voiced that his concern is travel.

Director Buckman arrives at 6:10 P.M.

District Engineer explained that he did bring Director Klavans's concerned to the last GSP meeting, and everyone is voicing the same opinion, but would bring it to their attention again.
Director Buckman asked about travel expenditures, and the limits and guidelines. It was explained that it is in the cooperative agreement.
Director Sangster would like to read the RFP or agreement for the consultation team, so he could be more informed.
Director Kalvans asked if any shared project will or will not go thru agencies? District Engineer explained that after the GSP is approved, the cooperative agreement ends and a new one would have to be negotiated.

Public Comment: None

Motion by Director Buckman to *Receive and File the Invoice #4 (SM20180914) for payment for proportional share of the "Paso Robles Basin GSP" for $3,352.27*

Seconded by Director Parent. Motion was approved by Vote of 4 AYES and 0 NOES and 1 ABSENT.

XII. BOARD COMMENT: Director Buckman asked District Counsel about the Steinbeck litigation and how it pertains to the GSA or GSP
District Counsel Schweikert explained it like the new law coming down and will discuss more about the Steinbeck litigation in closed session at regular meeting.

Director Green arrives at 6:19 P.M

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XIII. ADJOURNMENT@ 6:20 P.M until next meeting on October 25.

Draft
Paso Robles Subbasin
Groundwater Sustainability Plan
Chapter 4

Prepared for the Paso Robles Subbasin Cooperative Committee and the Groundwater Sustainability Agencies

October 10, 2018

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CHAPTER 4. HYDROGEOLOGIC CONCEPTUAL MODEL

This chapter describes the hydrogeologic conceptual model of the Paso Robles Subbasin, including the Subbasin boundaries, geologic formations and structures, and principal aquifer units. The chapter also summarizes general Subbasin water quality, the conceptual interaction between groundwater and surface water, and generalized groundwater recharge and discharge areas. This chapter draws upon previously published studies, primarily hydrogeologic and geologic investigations by Fugro Consultants Inc. completed for San Luis Obispo County in 2002 and 2005. Fugro Consultants' 2002 and 2005 reports are the definitive geologic reports of the Subbasin. All subsequent investigations, such as the 2016 groundwater model update, adopted the geologic interpretations of the 2002 and 2005 Fugro Consultant reports. The Hydrogeologic Conceptual Model presented in this chapter is not intended to be exhaustive, but is a summary of the relevant and important aspects of the Subbasin hydrogeology that influence groundwater sustainability. More detailed information can be found in the original reports (Fugro, 2002 and 2005). This chapter, along with Chapter 3 – Basin Setting, sets the framework for subsequent chapters on groundwater conditions and water budgets.

4.1 SUBBASIN TOPOGRAPHY AND BOUNDARIES

The Subbasin is a structural northwest-trending trough filled with sediments that have been folded and faulted by regional tectonics. The top of the Subbasin is the ground surface. The elevation of the Subbasin ranges from approximately 2,000 feet above mean sea level (msl) at the southeastern corner to approximately 600 feet above msl in the northwest where the Salinas River exits the Subbasin. The central part of the Subbasin forms a broad plain with relatively minor relief.

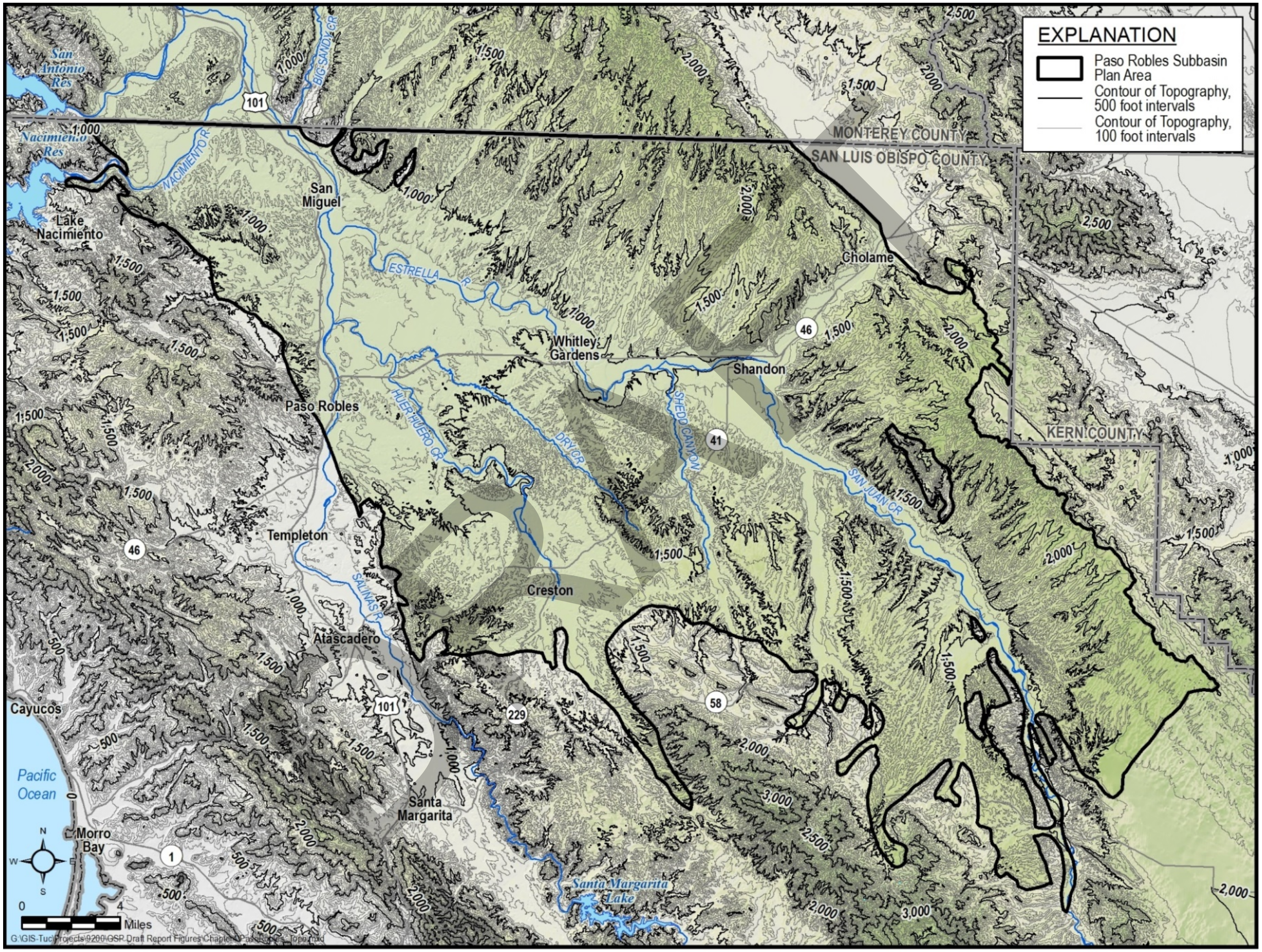

Figure 4-1. Paso Robles Subbasin Topography

Figure 4-1 shows the topography of the Subbasin using 100-foot contour intervals. The Subbasin is bounded by sediments with low permeability, sediments with poor groundwater quality, rock, and structural faults. In some areas the sediments of the Subbasin are continuous with adjacent subbasins. Specific Subbasin lateral boundaries include the following:

- The western boundary of the Subbasin is defined by the contact between the sediments in the Subbasin and the sediments of the Santa Lucia Range. An additional section of the western boundary is defined by the San Marcos-Rinconada fault system which separates the Paso Robles Subbasin from the Atascadero Subbasin.
- The northern boundary of the Subbasin is defined by the county line between San Luis Obispo County and Monterey County. This boundary is not defined by a physical barrier to groundwater flow; water-bearing sediments are continuous with the Salinas Valley Upper Valley Subbasin in Monterey County.
- The eastern boundary of the Subbasin is defined by the contact between the sediments in the Subbasin and the sediments of the Temblor Range. The San Andreas Fault forms the northeastern Subbasin boundary and is approximately parallel to the boundary further south.
- The southern boundary of the Subbasin is defined by the contact between the sediments in the Subbasin and the sediments of the La Panza Range. To the southeast, a watershed divide separates the Subbasin from the adjacent Carrizo Plain Basin; sedimentary layers are likely continuous across this divide.

The bottom of the Subbasin is generally defined as the base of the Paso Robles Formation, which is an irregular surface formed as the result of folding, faulting, and erosion (Fugro, 2002). The Subbasin boundary and bottom are not considered absolute barriers to flow because some of the geologic units underlying the Paso Robles Formation produce sufficient quantities of water, but the water is generally of poor quality and it is therefore not considered part of the Subbasin.

Figure 4-2 shows the lateral boundaries of the Subbasin and the approximate depth to the bottom of Paso Robles Formation in areas where it is saturated. The Paso Robles Formation is either not present or not saturated east of the San Juan fault system and there is very little well data in this portion of the subbasin.

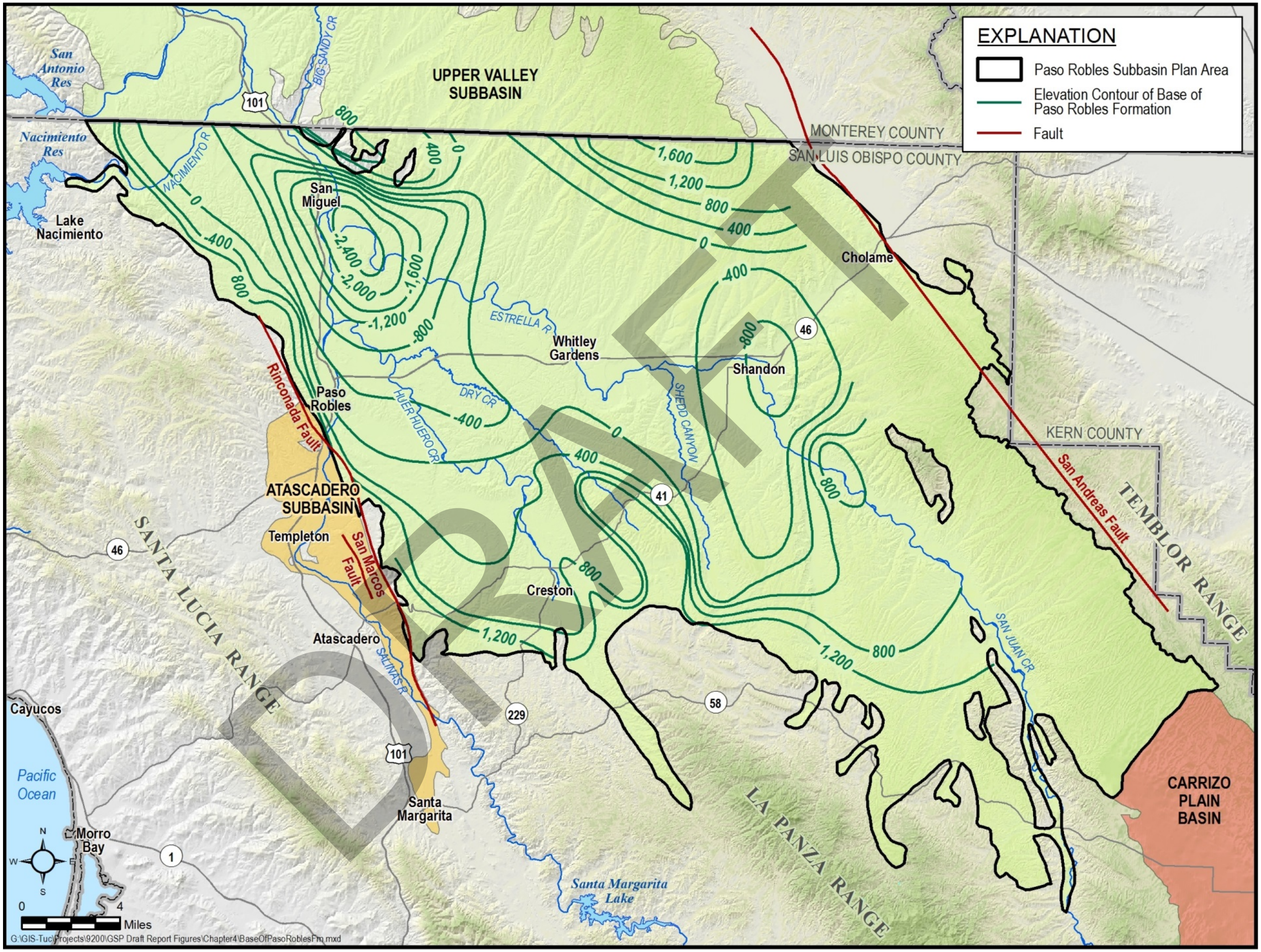

Figure 4-2. Base of Subbasin as Defined by the Base of the Paso Robles Formation

4.2 SOILS INFILTRATION POTENTIAL

Saturated hydraulic conductivity of surficial soils is a good indicator of the soil's infiltration potential. Soil data from the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Survey Geographic Database (SSURGO) (USDA NRCS, 2007) is shown by the four hydrologic groups on Figure 4-3. The soil hydrologic group is an assessment of soil infiltration rates that is determined by the water transmitting properties of the soil, which includes hydraulic conductivity and percentage of clays in the soil, relative to sands and gravels. The groups are defined as:

- Group A – High Infiltration Rate: water is transmitted freely through the soil; soils typically less than 10 percent clay and more than 90 percent sand or gravel.
- Group B – Moderate Infiltration Rate: water transmission through the soil is unimpeded; soils typically have between 10 and 20 percent clay and 50 to 90 percent sand
- Group C – Slow Infiltration Rate: water transmission through the soil is somewhat restricted; soils typically have between 20 and 40 percent clay and less than 50 percent sand
- Group D – Very Slow Infiltration Rate: water movement through the soil is restricted or very restricted; soil stypically have greater than 40 percent clay, less than 50 percent sand

The hydrologic group of the soil generally correlates with the hydraulic conductivity of underlying geologic units, with lower soil hydraulic conductivity zones correlating to areas underlain by clayey portions of the Paso Robles Formation. The higher soil hydraulic conductivity zones correspond to areas underlain by alluvium or areas of coarser sediments within the Paso Robles Formation.

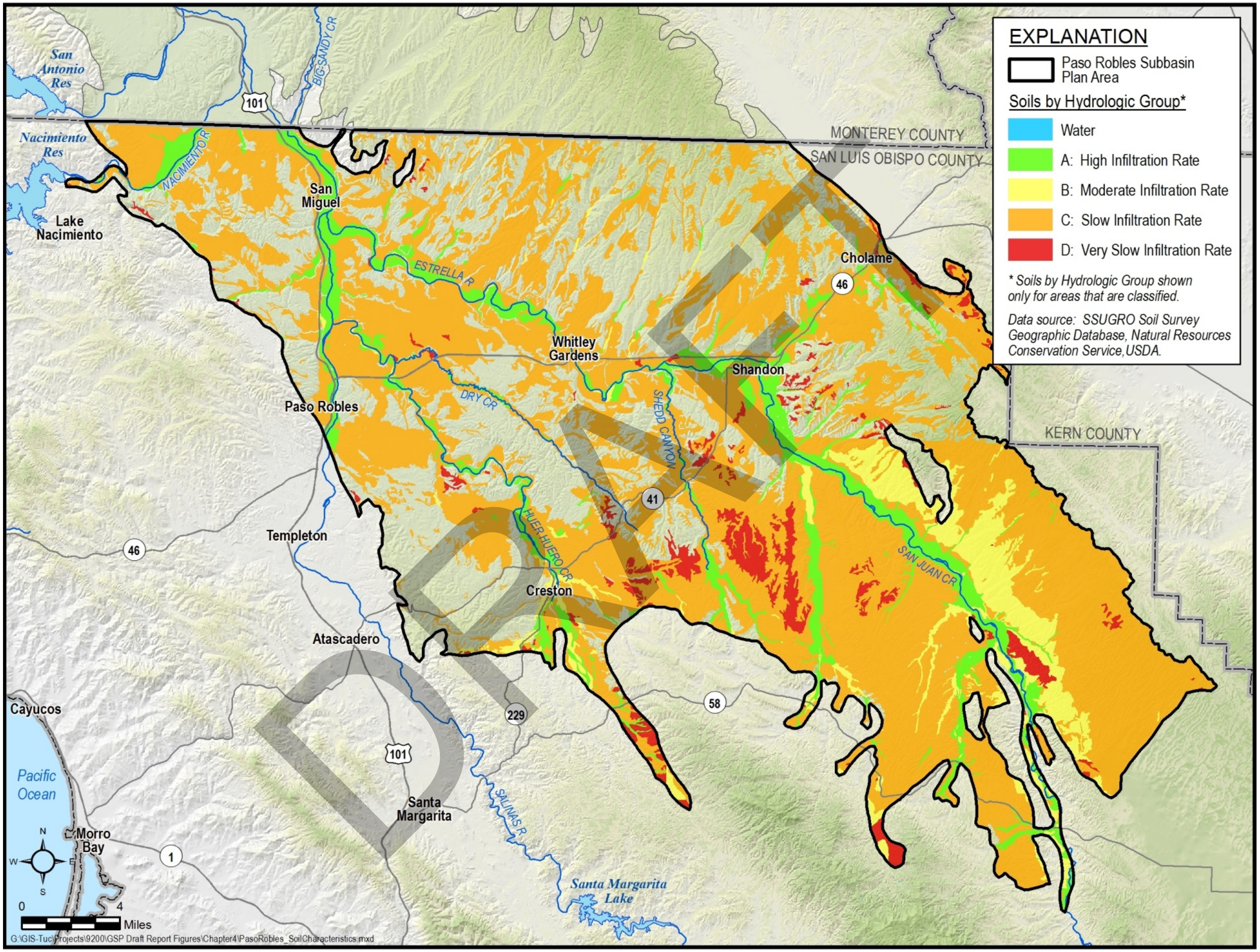

Figure 4-3. Paso Robles Subbasin Soil Characteristics

4.3 REGIONAL GEOLOGY

This section provides a description of the geologic formations in the Subbasin. These descriptions are summarized from previously published reports by Fugro (2002 and 2005). Figure 4-4 shows the surficial geology and geologic structures of the Subbasin (County of SLO, 2007). Figure 4-5 provides the location of the geologic cross-sections shown on Figure 4-6 through Figure 4-10. The selected geologic cross-sections illustrate the relationship of the geologic formations that constitute the Subbasin and the geologic formations that underlie and surround the subbasin. The cross-sections are from different reports so the format differs but the units are consistent. Figure 4-6 through Figure 4-8 are from the *Paso Robles Groundwater Basin Study* (Fugro, 2002); Figure 4-9 and Figure 4-10 are from the *Paso Robles Groundwater Basin Study, Phase II: Numerical Model Development, Calibration, and Application* (Fugro, 2005).

4.3.1 REGIONAL GEOLOGIC STRUCTURES

The base of the Subbasin is locally divided by two semi-parallel bedrock ridges: the San Miguel Dome and the Creston Anticlinorium (Figure 4-4). These two bedrock ridges are often not exposed at the ground surface, but are apparent in the subsurface cross-sections. The subsurface expression of the bedrock is illustrated on the cross-sections shown on Figure 4-6, which shows the Creston Anticlinorium, and Figure 4-8 which shows the San Miguel Dome. Between the San Miguel Dome and Creston Anticlinorium, there is no clear bedrock ridge as shown on Figure 4-7. This gap allows for sediments on the east side of the ridges near Shandon to continue and be connected with sediments on the west side of the ridges.

The deepest portion of the Subbasin is west of the San Miguel Dome and north of Paso Robles, with over 3,000 feet of sediments (Fugro, 2005). This deep trough extends through the Paso Robles area and shallows progressively to the south. As shown on Figure 4-6, the sediments are generally relatively thin on the order of a few hundred feet in the Creston area. East of the San Miguel Dome and near the community of Shandon the Paso Robles Formation is over 2,000 feet thick.

The faults within and along the borders of the Subbasin boundaries are shown on Figure 4-6. The predominant fault near the eastern side of the Subbasin is the San Andreas Fault. The predominant fault near the western side of the Subbasin is the San Marcos-Rinconada fault system. Within the Subbasin and sub-parallel to the San Andreas Fault are the Red Hill, San Juan, and White Canyon faults. It is unknown to what degree these faults are barriers to groundwater flow. In the center of the Subbasin are the King City fault and various unnamed faults. It is unknown to what degree these internal faults are barriers to groundwater flow. These faults could create compartments in the sediments and limit the ability of groundwater to move within the Subbasin.

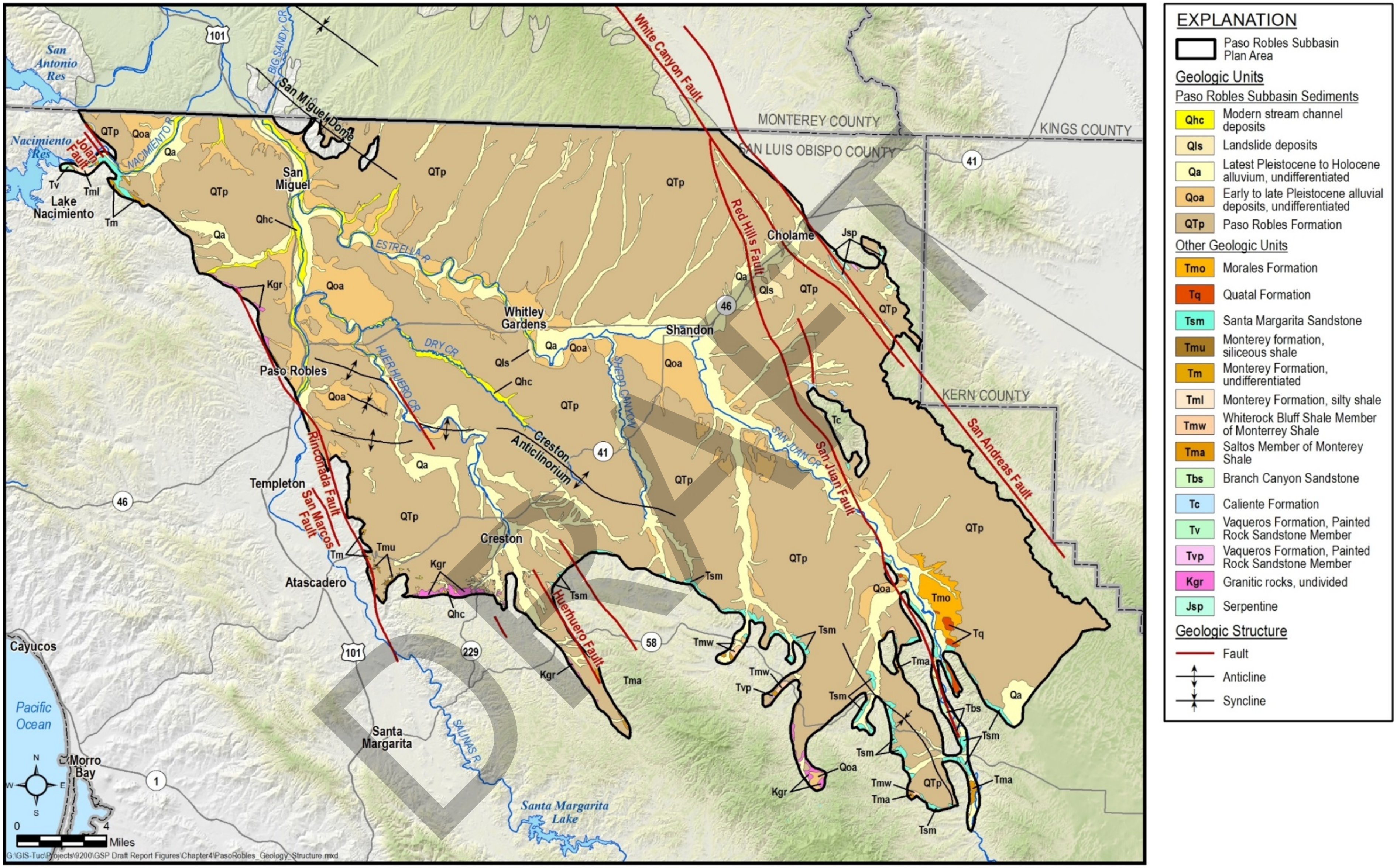

Figure 4-4. Surficial Geology and Geologic Structures

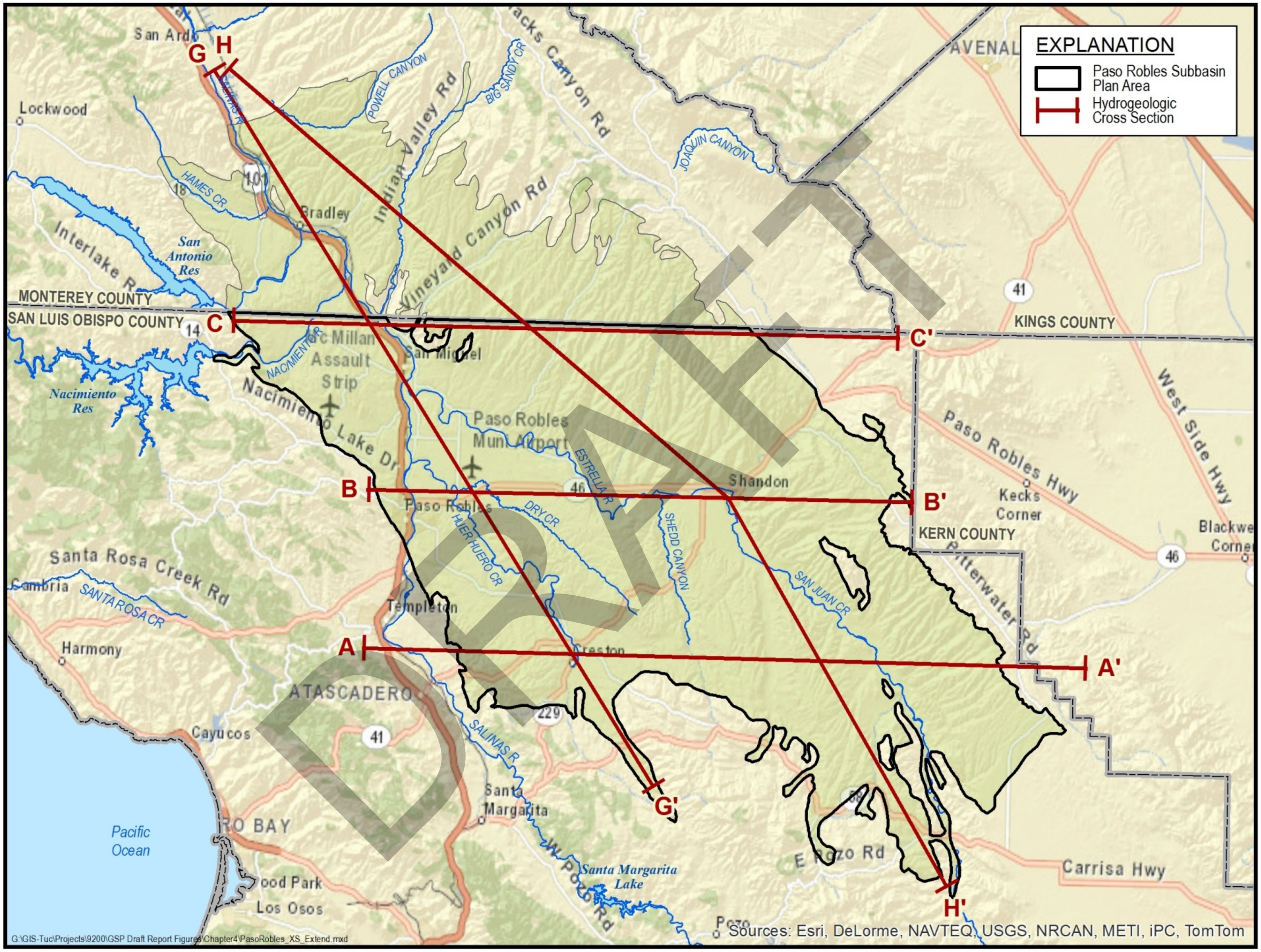

Figure 4-5. Cross Sections Locations

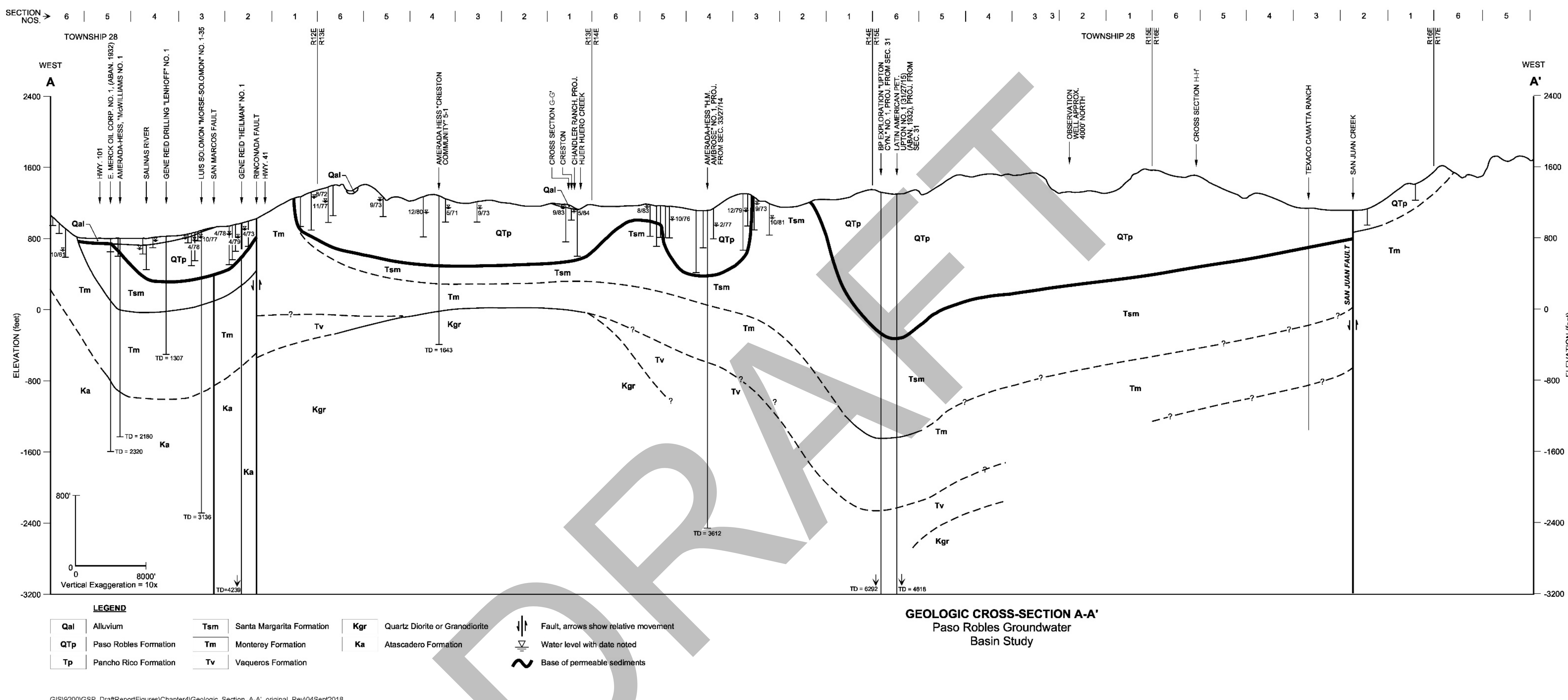

Figure 4-6. Geologic Section A-A′

Source: Modified from Fugro (2002)

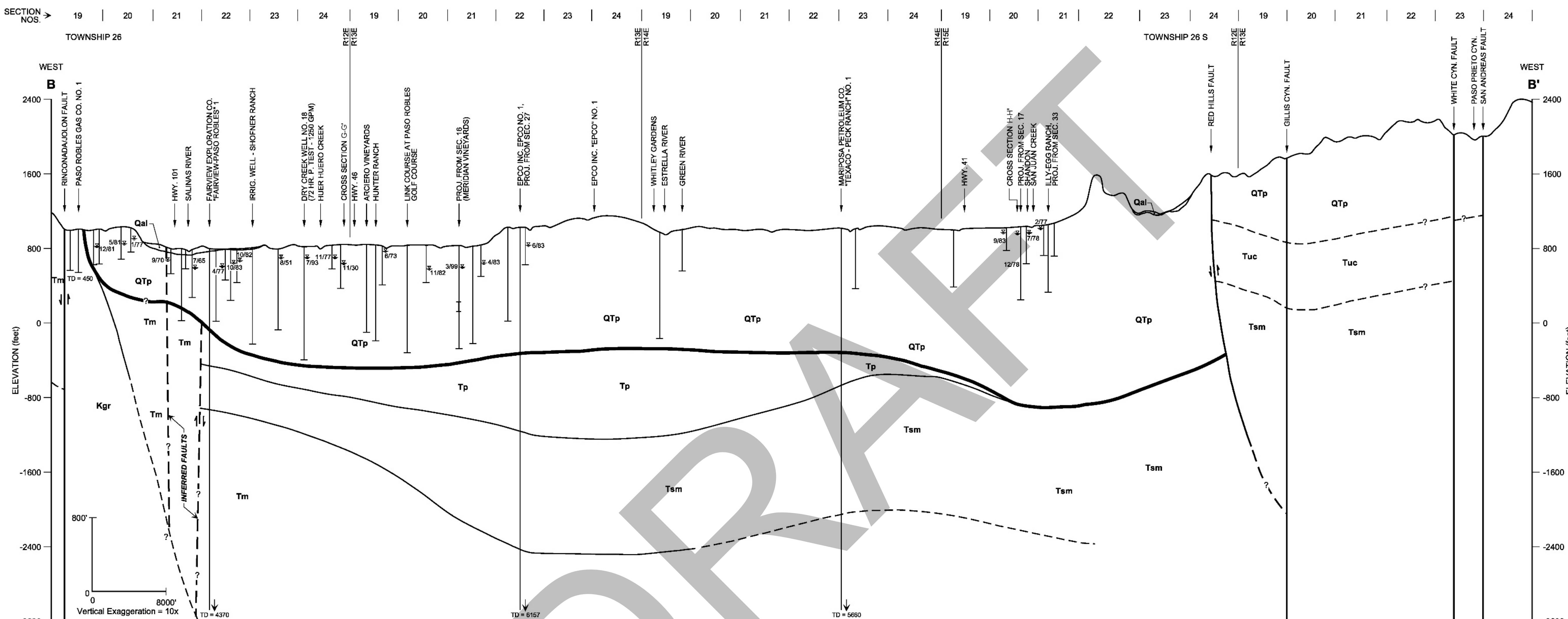

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Figure 4-7. Geologic Section B-B′

Source: Modified from Fugro (2002)

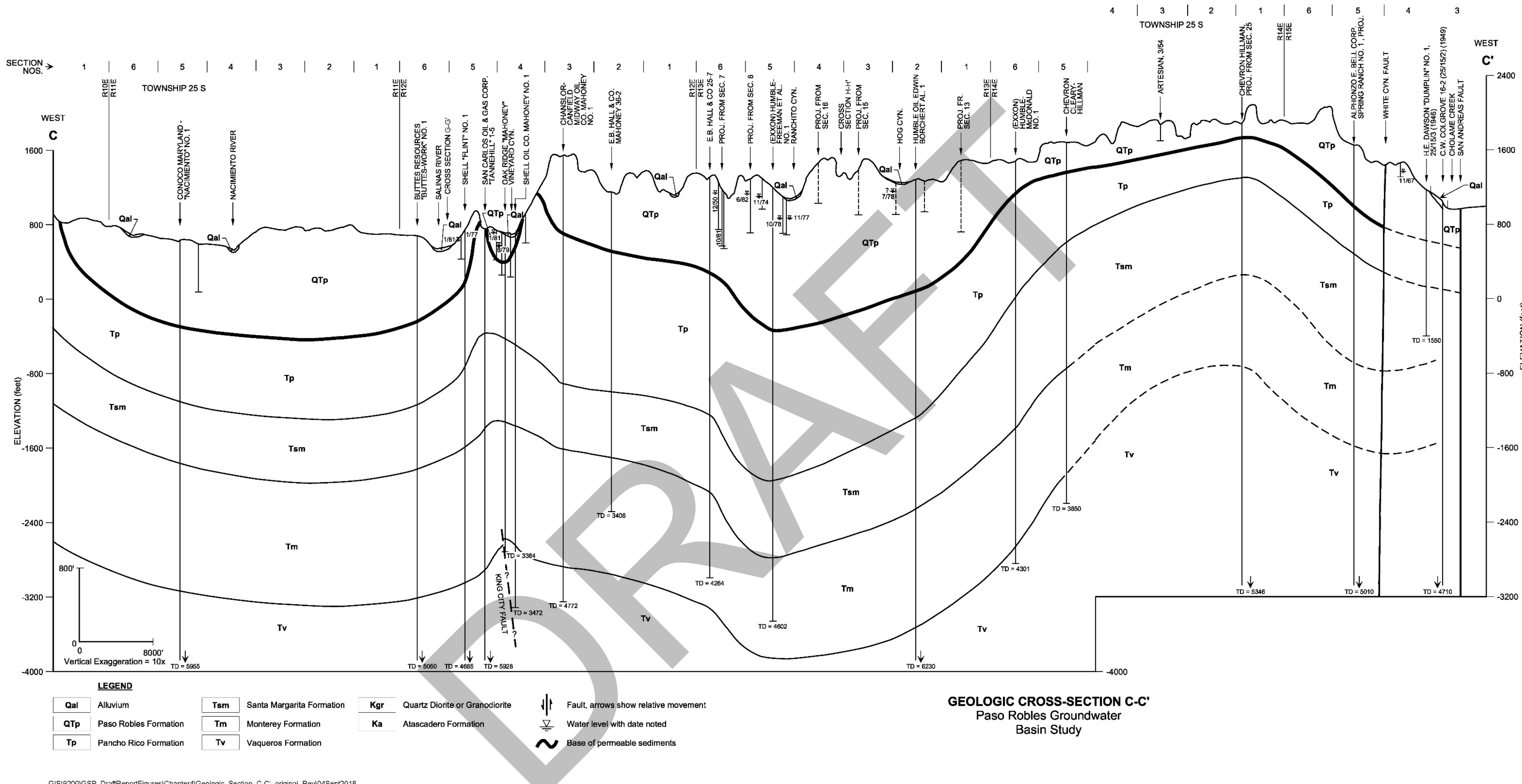

Figure 4-8. Geologic Section C-C′

Source: Modified from Fugro (2002)

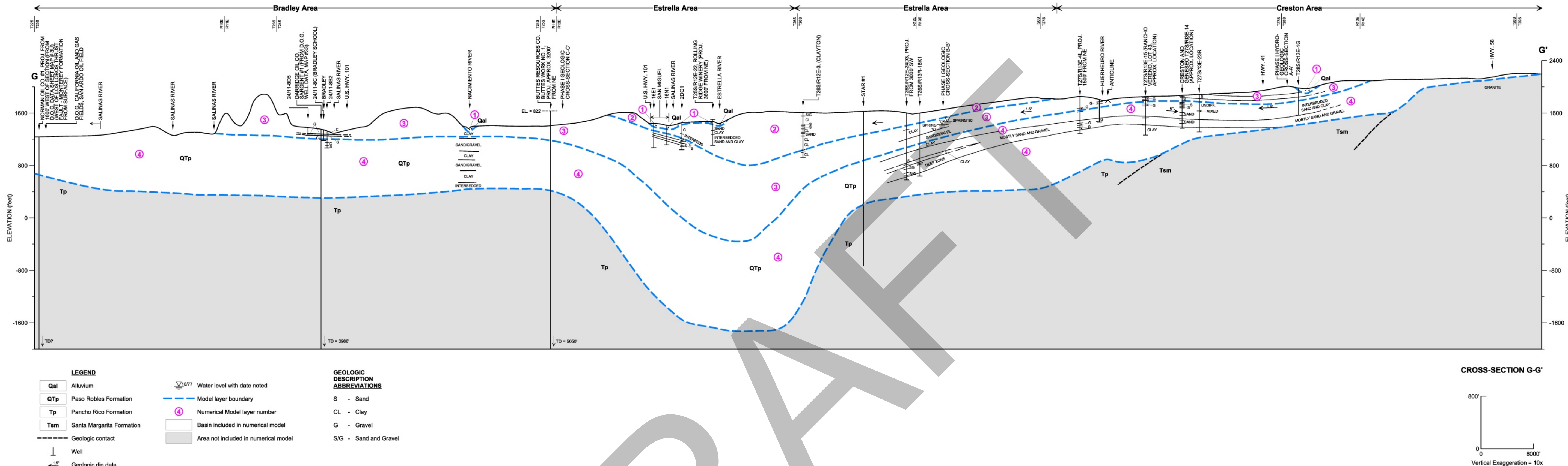

Figure 4-9. Geologic Section G-G′

Source: Modified from Fugro (2005)

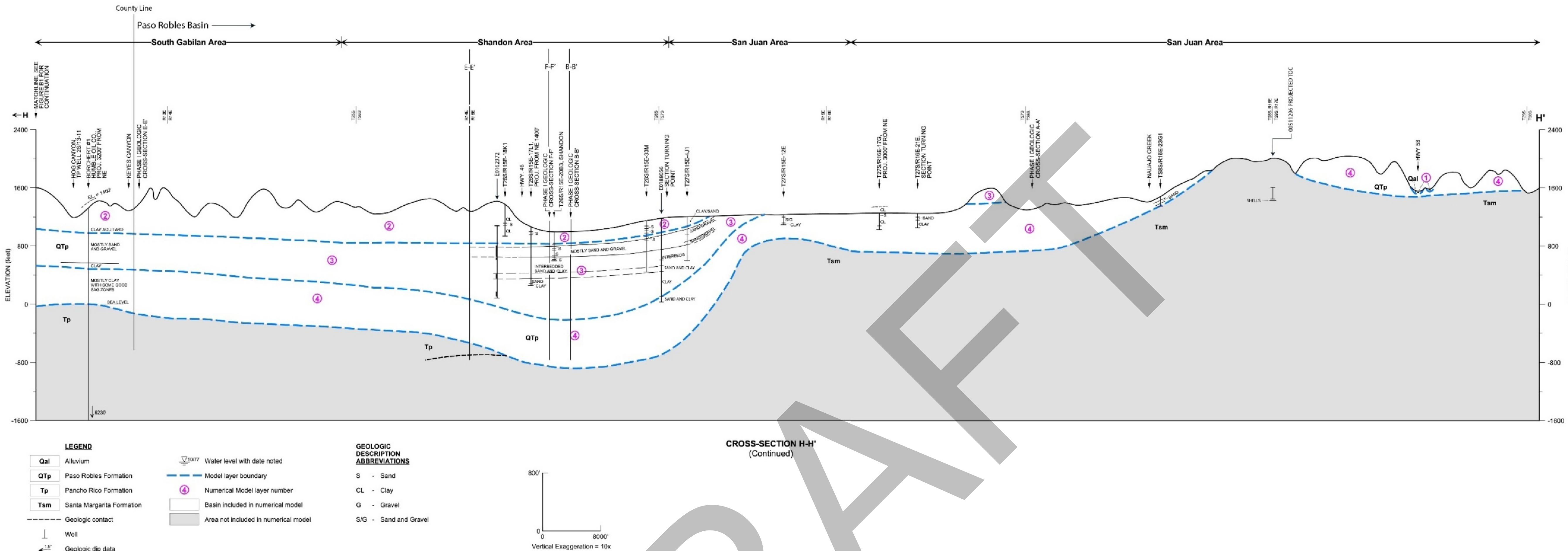

Figure 4-10. Geologic Section H-H'

Source: Modified from Fugro (2005)

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4.3.2 Geologic Formations Within the Subbasin

The main criteria used by previous authors for defining which geologic formations constitute the groundwater basin are:

1. The formation must have sufficient permeability and storage potential for the movement and storage of groundwater such that wells can reliably produce more than 50 gallons per minute (gpm) on a long-term basis, and
2. The groundwater produced from the geologic formation must be of generally acceptable quality (Fugro, 2002). DWR (1979) classifies groundwater with a conductivity of 3,000 micromhos/centimeter or less as fresh, and therefore of acceptable quality.

The only two geologic formations that reliably meet these two criteria are the Quaternary-age alluvial deposits and the Tertiary-age Paso Robles Formation. Therefore, these are the only two formations that constitute the Subbasin. A general discussion of these two formations is presented below.

Alluvium

Alluvium occurs beneath the flood plains of the rivers and streams within the Subbasin. Figure 4-4 shows the location of the alluvial deposits, labeled as Quaternary alluvium, identified as Qa. These deposits are typically no more than 100 feet thick and comprise coarse sand and gravel with some fine-grained deposits. The alluvium is generally coarser than the Paso Robles Formation, with higher permeability that results in well production capability that often exceeds 1,000 gpm.

Paso Robles Formation

The largest volume of sediments in the Subbasin are in the Paso Robles Formation. This formation has sedimentary layers up to 3,000 feet thick in the northern part of the Estrella area and up to 2,000 feet near Shandon. Figure 4-4 shows the location of the Paso Robles Formation deposits, identified as QTp. Throughout most of the Subbasin the Paso Robles Formation sediments have a thickness of 700 to 1,200 feet.

The Paso Robles Formation is derived from erosion of nearby mountain ranges. Sediment size decreases from the east and the west, becoming finer towards the center of the Subbasin, indicating sediment source areas are both to the east and west. The Paso Robles Formation is a Plio-Pleistocene, predominantly non-marine geologic unit comprising relatively thin, often discontinuous sand and gravel layers interbedded with thicker layers of silt and clay. The formation was deposited in alluvial fan, flood plain, and lake depositional environments. The formation is typically unconsolidated and generally poorly sorted. The sand and gravel beds in the Paso Robles Formation have a high percentage of eroded Monterey shale and have lower permeability compared to the overlying alluvial unit. The formation also contains minor amounts of gypsum and woody coal.

Poor quality groundwater with elevated concentrations of iron, manganese, and in some cases hydrogen sulfide odor have been observed within deeper portions of the Paso Robles Formation in some areas.

4.3.3 Geologic Formations Surrounding the Subbasin

Underlying and surrounding the Subbasin are older geologic formations that either typically have low well yields or have poor quality water. In general, the geologic units underlying the Subbasin include:

1. Tertiary-age or older consolidated sedimentary beds;
2. Cretaceous-age metamorphic rocks; and
3. Granitic rock.

Figure 4-11 shows the location of oil and gas exploration wells drilled in the Subbasin. These oil and gas wells help identify the depth and extent of the geologic formations that surround and underlie the Subbasin.

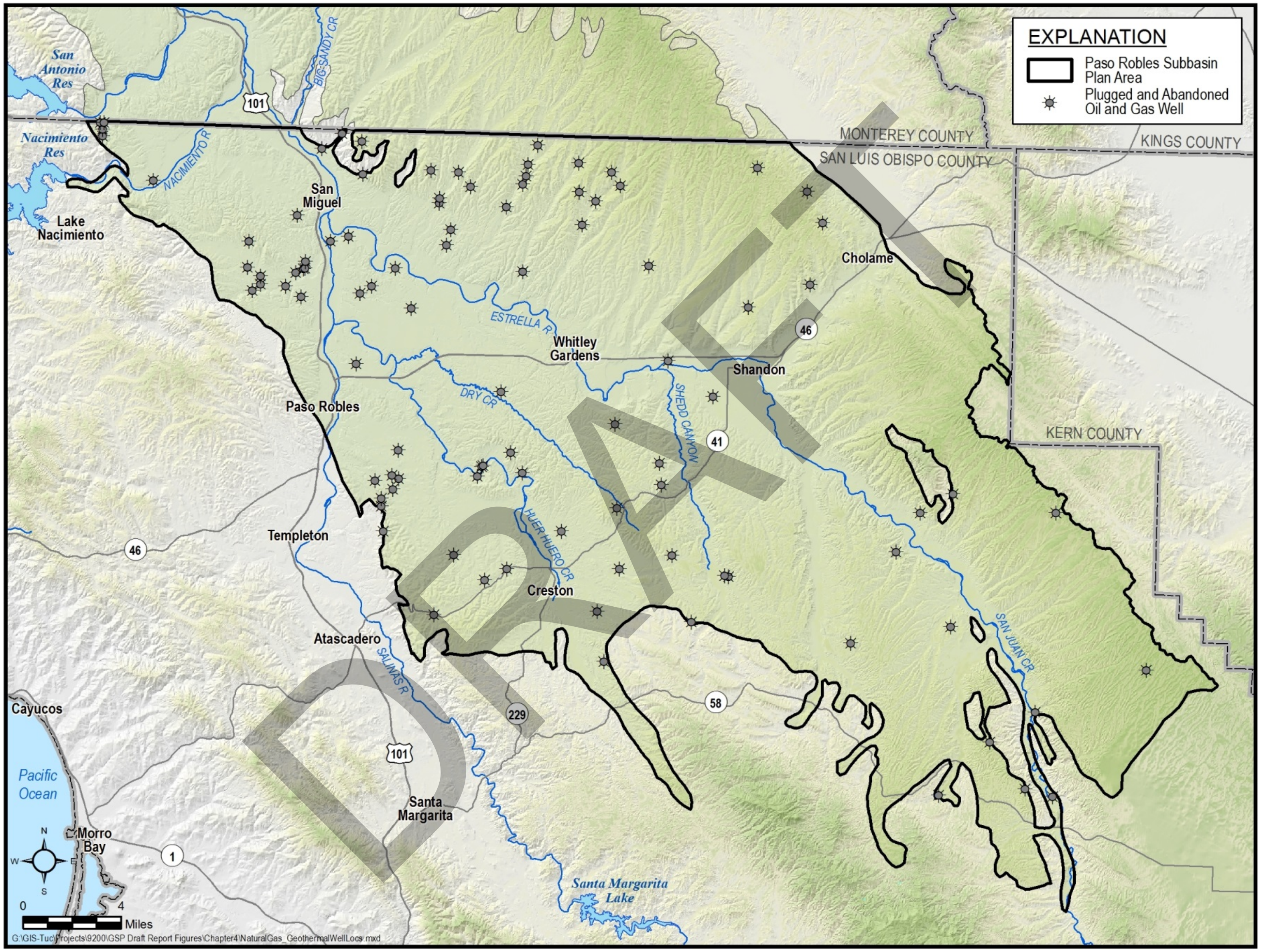

Figure 4-11. Natural Gas Exploration Well Locations and Geothermal Wells

PANCHO RICO FORMATION

The Pancho Rico Formation (Tp) is a Pliocene-age marine deposit found mostly in the northern portion of the study area. In places it appears to be time-correlative to the Paso Robles Formation, and may be in lateral contact as a facies change. The unit predominantly consists of fine-grained sediments up to 1,400 feet thick that yield low quantities of water. The Pancho Rico Formation additionally has poor water quality associated with tar sands that are present at the bottom of this formation (State Division of Mines, 1974).

SANTA MARGARITA FORMATION

The Santa Margarita Formation (Tsm) is an upper Miocene-age marine deposit, consisting of a white, fine-grained sandstone and siltstone with a thickness of up to 1,400 feet. The unit is found beneath most of the Subbasin. The Santa Margarita Formation is relatively permeable, but is not considered part of the Subbasin because the water quality is usually very poor. The geothermal waters contained in the Santa Margarita Formation in this area are often highly mineralized and characterized by elevated boron concentrations that restrict agricultural uses.

MONTEREY FORMATION

The Miocene-age Monterey Formation (Tm) consists of interbedded argillaceous and siliceous shale, sandstone, siltstone, and diatomite. The unit is as great as 2,000 feet thick in the study area, and is often highly deformed. Wells in the Monterey Formation are generally of too low yield to consider the Monterey Formation part of the Subbasin; although isolated areas in the Monterey Formation can yield more than 50 gpm. Additionally, groundwater produced from the Monterey Formation often has high concentrations of hydrogen sulfide, total organic carbon, manganese, and iron.

VAQUEROS FORMATION

The marine Oligocene-age Vaqueros Formation (Tv) is a highly cemented fossiliferous sandstone that reaches a thickness up to 200 feet. Springs in the Vaqueros Formation with flows up to 25 gpm are common in canyons on the western and southern sides of the study area. Most water wells tapping this formation produce less than 20 gpm. Generally, the quality of water in this unit is good, though hard due to the calcareous cement within the rock.

METAMORPHIC AND GRANITIC ROCKS

The southern and western edges of the Subbasin are bordered by Cretaceous-age metamorphic and granitic rock. The metamorphic rock units include the Franciscan, Toro, and Atascadero Formations. The Franciscan consists of discontinuous outcrops of shale, chert, metavolcanics, graywacke, and blue schist, with or without serpentinite. The Toro Formation (Kt) is a highly consolidated claystone and shale that does not typically yield significant water to wells. The Atascadero Formation (Ka) is highly consolidated, but does have some sandstone beds that yield limited amounts of water to wells.

The granitic rock unit (Kgr) lies east of the Rinconada fault system, south of Creston, east of Atascadero, and in the area northwest of the City of Paso Robles. The granitic rocks are often capped by a layer of granular decomposed granite that may be weathered to clay. This decomposed granite may be up to 80 feet in thick and may contain limited amounts of groundwater.

4.4 PRINCIPAL AQUIFERS AND AQUITARDS

Water-bearing sand and gravel beds that may be laterally and vertically discontinuous are generally grouped together into zones that are referred to as aquifers. The aquifers can be vertically separated by fine-grained zones that can impede movement of groundwater between aquifers. Two aquifers exist in the Subbasin:

- A relatively continuous aquifer comprising alluvial sediments that underlie streams;
- An interbedded and discontinuous aquifer comprising sand and gravel lenses in the Paso Robles Formation.

Figure 4-4 shows the location of geologic sections that were used to depict the aquifers in the subsurface. Figure 4-12 through Figure 4-15 show the aquifers and model layers in profile, which are interpreted from the geologic logs, geophysical logs, groundwater levels, and water quality (Fugro, 2002 and 2005). For the GSP several additional well logs were added to the sections to refine the extent of the aquifers. These logs have been labeled with the state well inventory number (e.g. E0188061). Appendix 4A contains the well logs used to update the sections.

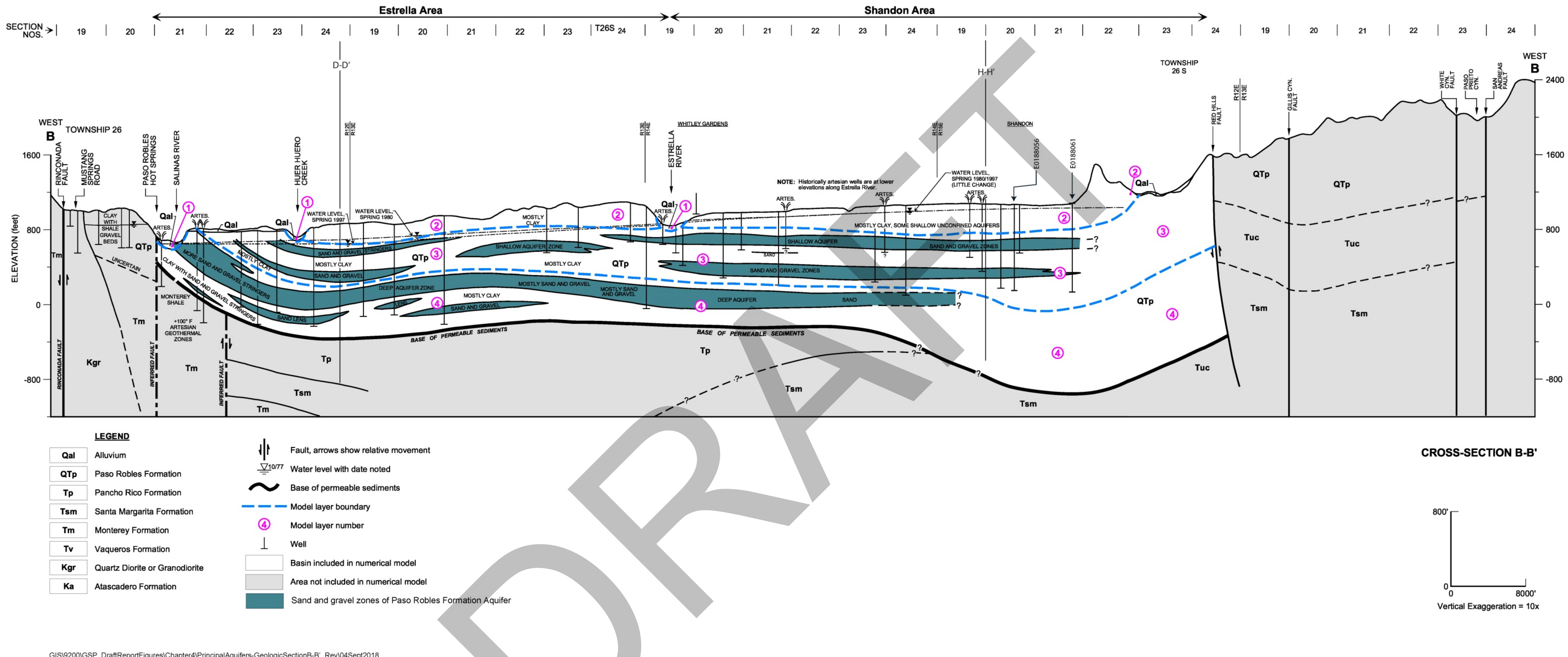

Figure 4-12. Aquifers - Geologic Section B-B'

Source: Modified from Fugro (2005)

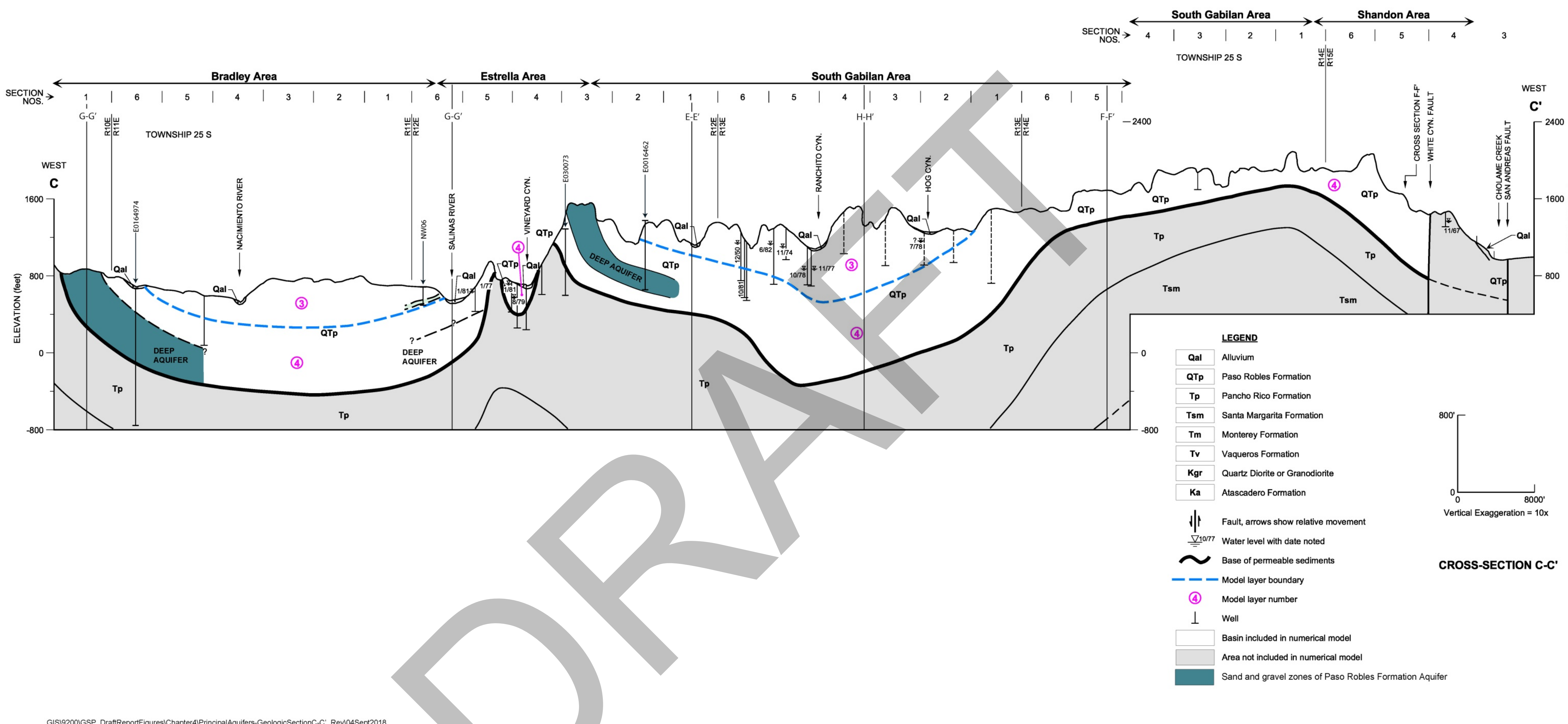

Figure 4-13. Aquifers - Geologic Section C-C′

Source: Modified from Fugro (2005)

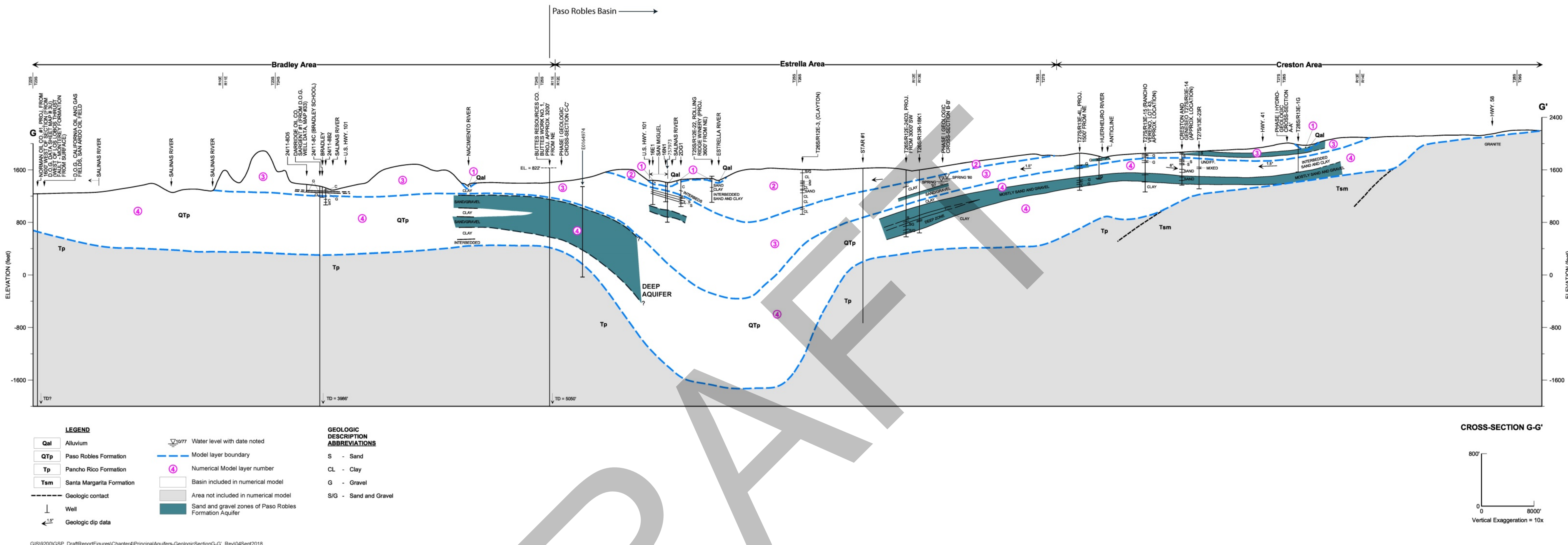

Figure 4-14. Aquifers - Geologic Section G-G′

Source: Modified from Fugro (2005)

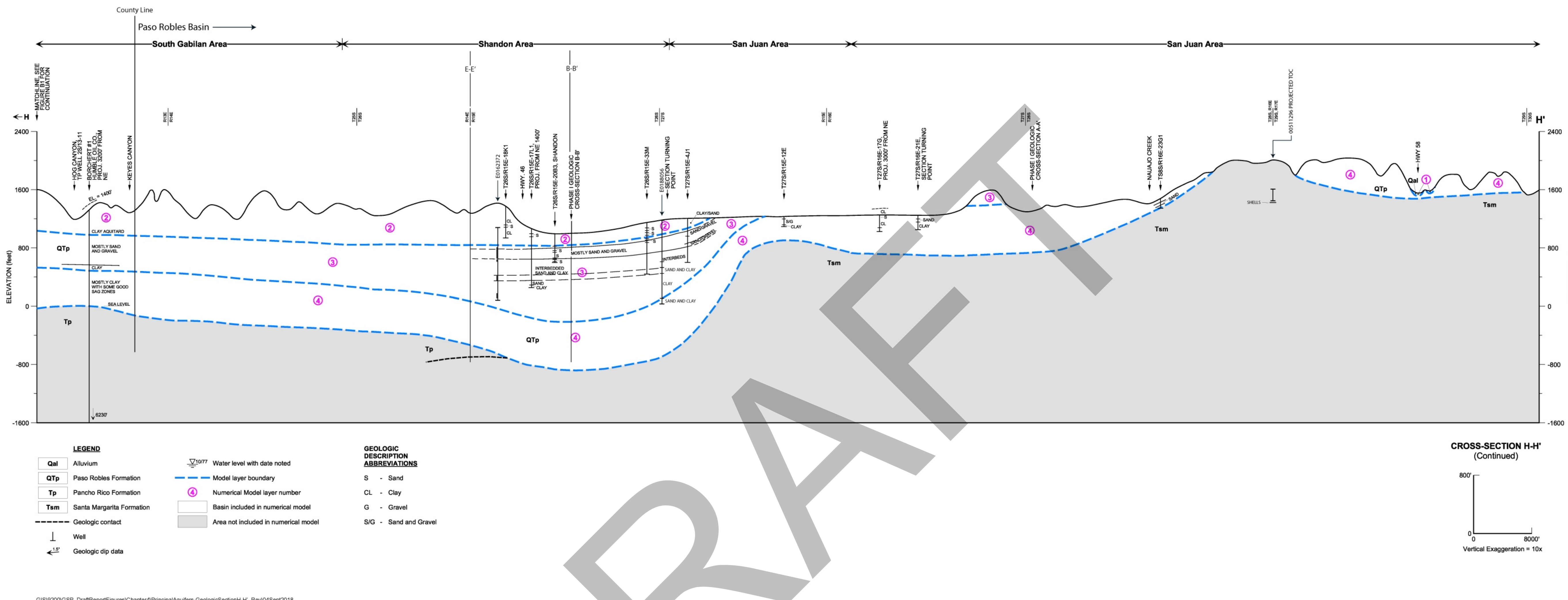

Figure 4-15. Aquifers - Geologic Section H-H'

Source: Modified from Fugro (2005)

4.4.1 ALLUVIAL AQUIFER

The unconfined Alluvial Aquifer is generally composed of saturated coarse-grained sediments and occurs along Huer Huero Creek, the Salinas River, and the Estrella River; the extent of this aquifer is shown on Figure 4-4. The alluvial aquifer varies in thickness, but is generally about 100 feet thick. The Alluvial Aquifer is highly permeable. Wells screened in the alluvial aquifer can yield up to a 1,000 gpm (Fugro, 2005).

4.4.2 PASO ROBLES FORMATION AQUIFER

Geologic information reported in Fugro (2002) suggests that the sand and gravel zones that constitute the Paso Robles Formation Aquifer are generally thin, discontinuous, and are usually separated vertically by relatively thick zones of silts and clays. Figure 4-4 shows the extent of the Paso Robles Formation in the Subbasin. In general, the sand and gravel zones occur throughout the Paso Robles Formation, although they may be locally discontinuous or absent in some areas. As shown on Figure 4-14, near Creston the shallow sand and gravel zones appear to be disconnected from other parts of the Paso Robles aquifer by faults and structural folds. The shallow aquifer zone near Creston may be an isolated aquifer area.

4.4.3 AQUIFER PROPERTIES

Data reported in Fugro (2002) were reviewed to estimate representative aquifer hydraulic properties. Most aquifer tests have been conducted in the Estrella and Creston areas. Estimated aquifer properties are summarized in Table 4-1.

Table 4-1. Paso Robles Subbasin Aquifer Hydrogeologic Properties

Well Location	Test Duration (hours)	Flow (gpm)	Well Depth (feet)	Perforated Interval	Transmissivity (gpd/ft)	Q/s (gpm/ft)	Hydraulic Conductivity (ft/day)
Alluvial Aquifer							
28S/13E-36	24	367	70	40	186,300	68	620
Paso Robles Formation Aquifer							
27S/12E-09	72	300	450	170	8,800	4.9	6.9
26S/12E-22	12	220	430	100	900	1.2	1.2
25S/11E-24	12	150	350	90	800	0.62	1.2
27S/12E-18	8	140	225	35	4,100	3	15.7
26S/12E-20	48	115	400	50	7,600	10	20
26S/12E-36	24	400	660	280	8,800	5.1	4.2
26S/12E-35	18	690	830	370	7,900	4.9	2.9
27S/14E-18	24	600	740	220	6,100	5.5	3.7
26S/13E-16	24	200	820	350	3,100	2.63	1.2
26S/12E-25	24	500	730	340	5,700	3.6	2.2
25S/13E-30	24	600	720	260	6,900	79	3.5
26S/13E-7	24	600	825	380	3,200	3	1.1
26S/13E-7	24	600	990	610	5,000	4.2	1.1
24S/11E-34	24	850	612	100	2,805	4.5	3.8

Source: Fugro, 2002

Based on limited aquifer property data available for the Alluvial Aquifer, the transmissivity may be in the range of 150,000 to 200,000 gallons per day per foot (gpd/ft); or between 20,000 and 27,000 square feet per day (ft^2/day). Hydraulic conductivity of the Alluvial Aquifer may be over 500 feet per day (ft/d).

The estimated transmissivity of the Paso Robles Formation Aquifer ranges between 800 gpd/ft and about 9,000 gpd/ft; or between 100 and 1,200 ft^2/day. The geometric mean of the tabulated transmissivity values for the shallow aquifer zone is about 3,500 gpd/ft, or 470 ft^2/day.

The estimated hydraulic conductivity of the Paso Robles Formation Aquifer ranges from about 1 ft/d to about 20 ft/d. The geometric mean of the tabulated hydraulic conductivity values for the Paso Robles Formation Aquifer is 5 ft/d.

Limited data exist to assess the confined storage properties, such as storativity, of the Paso Robles Formation aquifer (Fugro, 2002). Table 4-2 summarizes reported estimates of specific yield for unconfined portions of the aquifers. Average specific yield was estimated by analyzing 10 to 20 of the deepest well completion logs for each area. Each lithologic interval was assigned a specific yield by comparison of the formation description with published estimates based on extensive field and laboratory investigations conducted in southern coastal basins by the DWR and modified for the Paso Robles Formation (DWR, 1958). The assigned specific yield was then weighted according to the thickness of each bed and averaged over the entire depth of the well (Fugro, 2002). Results of this analysis suggested that a representative average value for specific yield for the Paso Robles Formation in the Subbasin was 0.09. This specific yield may be low. Average specific yields for unconsolidated sand and gravel sedimentary aquifers are commonly between 0.1 and 0.3 (Driscoll, 1986).

Table 4-2. Paso Robles Subbasin Specific Yield Estimates

Area	Number of Wells Used to Calculate	Average Estimated Specific Yield
Creston Area	47	0.09
Estrella	20	Not provided
San Juan	5	0.10
Shandon	20	0.08
North and South Gabilan	20	0.09
Basin Wide Average		**0.09**

Estimates of vertical hydraulic conductivity for each of the aquifers were not in reports from previous studies for the Subbasin. Estimates of vertical hydraulic conductivity incorporated into the basin-wide groundwater model are discussed in an appendix to Chapter 6.

4.4.4 Confining Beds and Geologic Structures

There is limited information regarding the continuity of stratigraphic features in the Subbasin that restrict groundwater flow within the Subbasin. Conceptually, the presence of laterally continuous zones of fine-grained strata within the Paso Robles Formation can restrict vertical movement of groundwater. These fine-grained zones are generally shown on the sections on Figure 4-12 through Figure 4-15. These figures show that the fine-grained strata are likely more continuous than the sand and gravel layers. These fine-grained zones act as confining beds, and are the cause of the artesian wells that were historically reported in the Subbasin. Fine-grained layers that limit vertical movement of groundwater appear to be more prevalent in the Estrella and Creston areas than in the eastern portion of the Shandon area. This may indicate that infiltration and recharge is more limited to the west.

There is some anecdotal evidence that subsurface geologic structures such as folds and faults may affect groundwater flow in the Subbasin. Additional investigations would be needed to characterize the effect of structures on groundwater flow.

4.5 Primary Users of Groundwater

The primary groundwater users in the Subbasin include municipal, agricultural, rural residential, small community water systems, and small commercial entities. Municipal, domestic, and agricultural demands in the Subbasin currently rely almost entirely on groundwater. The municipal sector pumps primarily from the Paso Robles Aquifer. The agriculture sector uses groundwater from the Alluvial Aquifer and the Paso Robles Aquifer.

4.6 General Water Quality

This section presents a general discussion of the natural groundwater quality in the Subbasin, focusing on general minerals. The general water quality of the Subbasin described in this section is a summary of results in the Fugro 2002 report. A more complete discussion of the distribution and concentrations of specific constituents is presented in Chapter 5: Current Conditions.

Groundwater in the Subbasin is generally suitable for drinking and agricultural uses. The two main water types found in the Subbasin are calcium bicarbonate and sodium bicarbonate. Calcium-bicarbonate type is the most prominent and is found in the Creston and San Juan areas. Sodium-bicarbonate is the second most dominant water type and is found in the Estrella and Shandon areas. Minor areas of sodium-chloride type water can be found in the eastern portion of the Subbasin and near Cholame Valley. In the northwest portion of the Subbasin, magnesium bicarbonate waters are found in the San Miguel area and a mixed water type is seen in the Bradley area. A summary of general water quality as indicated by average total dissolved solids (TDS), chloride (Cl), and nitrate (NO3) concentrations in groundwater is provided in Table 4-4 (Fugro 2002).

Table 4-3. Summary of General Water Quality by Area

Area	TDS (ppm)			Cl (ppm)			NO3 (ppm)		
	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max
Creston	490	190	1620	112	25	508	16	2	41
San Juan	753	160	2170	162	13	699	18	ND[1]	56
Shandon	606	270	1610	110	31	451	13	5.6	35
Estrella	624	350	1270	126	32	572	9	ND	30
Bradley	897	400	1280	131	40	400	14	ND	55
Gabilan	745	370	1320	87	38	209	39	11	71

[1]ND = Non-detect. For the purpose of computing an average, half the detection limit was used.

4.7 GROUNDWATER RECHARGE AND DISCHARGE AREAS

Areas of significant, natural, areal recharge and discharge within the Paso Robles Subbasin are discussed below. Quantitative information about all natural and anthropogenic recharge and discharge is provided in Chapter 6: Water Budgets.

4.7.1 GROUNDWATER RECHARGE AREAS INSIDE THE SUBBASIN

In general, natural areal recharge occurs via the following processes:

1. Distributed areal infiltration of precipitation, and
2. Infiltration of surface water from streams and creeks.

Figure 4-16 is a map that ranks soil suitability to accommodate groundwater recharge based on five major factors that affect recharge potential, including: deep percolation, root zone residence time, topography, chemical limitations, and soil surface condition. The map[1] was developed by the California Soil Resource Lab at UC Davis and the University of California Agricultural and Natural Resources Department.

Areas with excellent recharge properties are shown in green. Areas with poor recharge properties are shown in red. Not all land is classified, but this map provides good guidance on where natural recharge likely occurs.

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[1] Figure 4-16 shows the Soil Agricultural Groundwater Banking Index (SAGBI) map for the Paso Robles Subbasin. While the UC Davis database title SAGBI includes the term "banking", its use in this section is strictly as a dataset for evaluating recharge potential in the basin.

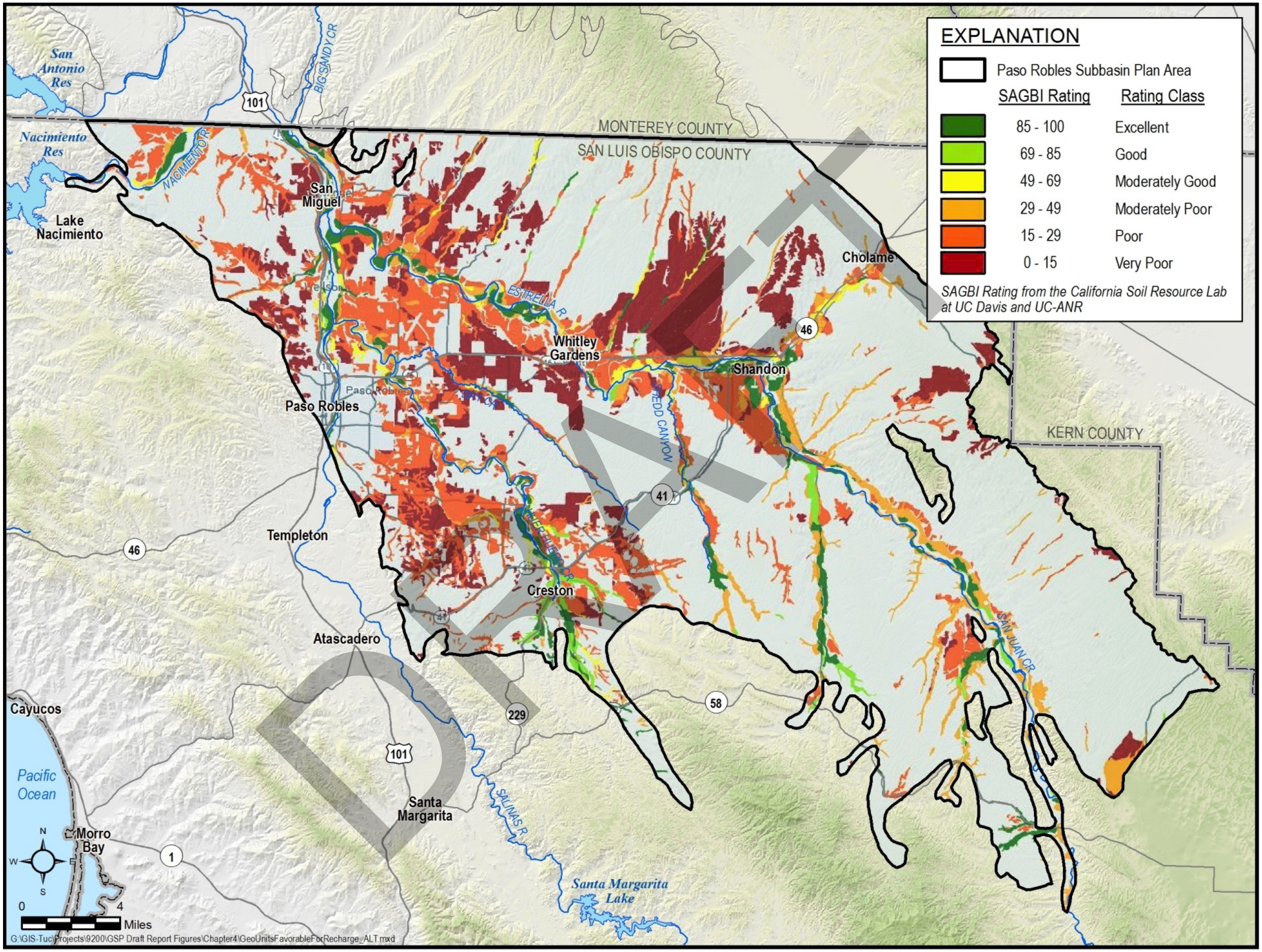


Figure 4-16. Potential Recharge Areas

4.7.2 GROUNDWATER DISCHARGE AREAS INSIDE THE SUBBASIN

Natural groundwater discharge areas within the Plan area include springs and seeps, groundwater discharge to surface water bodies, and evapotranspiration (ET) by phreatophytes. Springs and seeps identified in the National Hydrology Dataset (NHD), and shown on Figure 4-17, tend to be located in the foothills of the Santa Lucia and Temblor mountain ranges. Based on the elevation of mapped springs and seeps, it is likely that these discharge groundwater from shallow, and possibly perched aquifer units. Groundwater discharge to streams – primarily, the Salinas River and Estrella River – has not been mapped to date. Instead, areas of potential groundwater discharge to streams are identified using the groundwater flow model. Orange areas on Figure 4-17 represent streams in the model where simulated average groundwater discharge to the stream reach is at least 10 acre-feet per year. In contrast to mapped springs and seeps, which are derived from groundwater in the Paso Robles Formation, groundwater discharge to streams is derived from the Alluvium.

Figure 4-18 shows the distribution of potential groundwater-dependent ecosystems (GDEs) and Natural Communities Commonly Associated with Groundwater (NCCAG) within the Plan area. In areas where the water table is sufficiently high, groundwater discharge may occur as ET from phreatophyte vegetation within these GDEs. Appendix 4B describes methods used to determine the extent and type of potential GDEs. Figure 4-18 shows only potential GDEs. There has been no verification that the locations shown on this map constitute groundwater dependent ecosystems. Additional field reconnaissance is necessary to verify the existence of these potential GDEs.

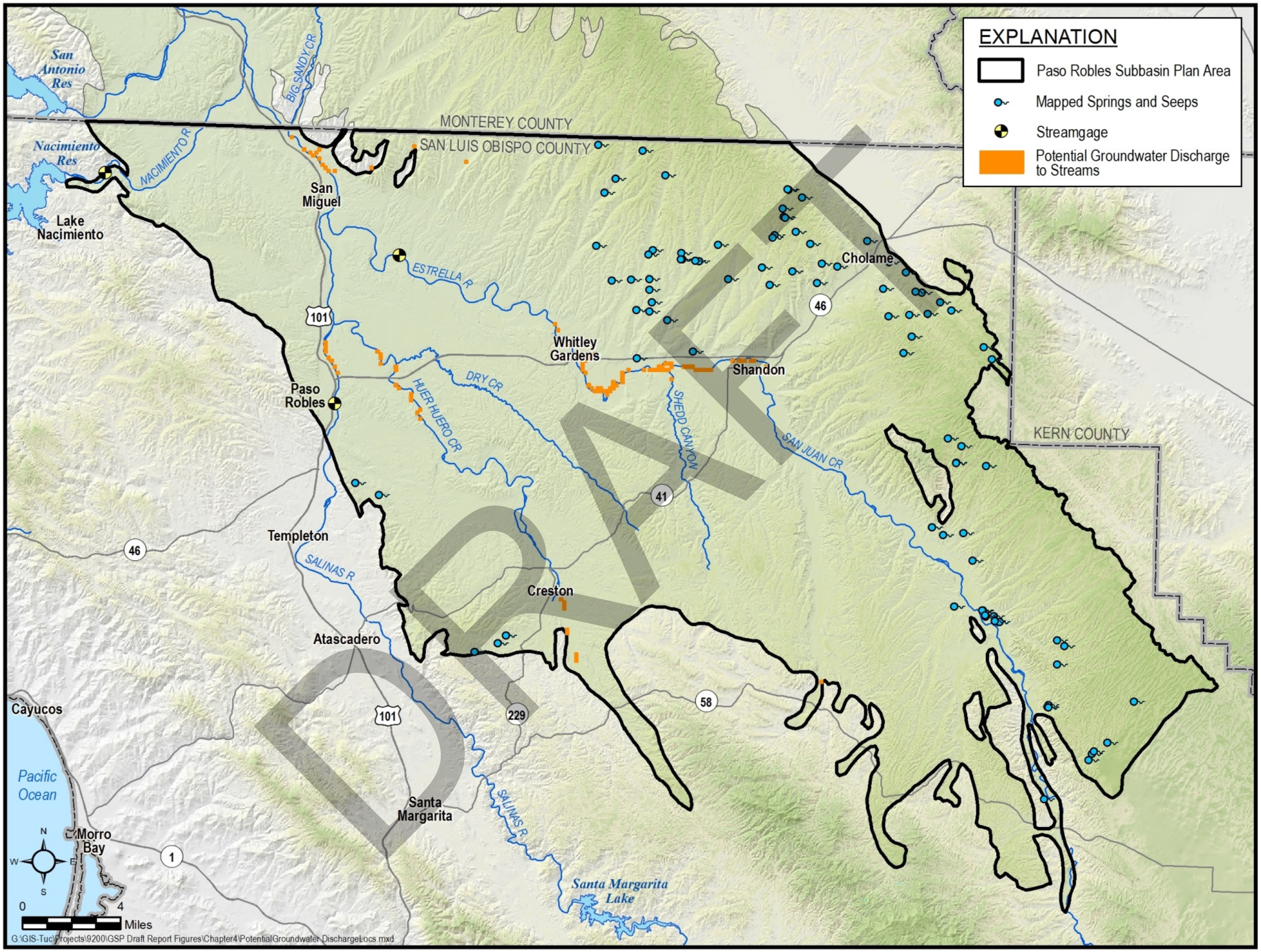


Figure 4-17. Potential Groundwater Discharge Areas

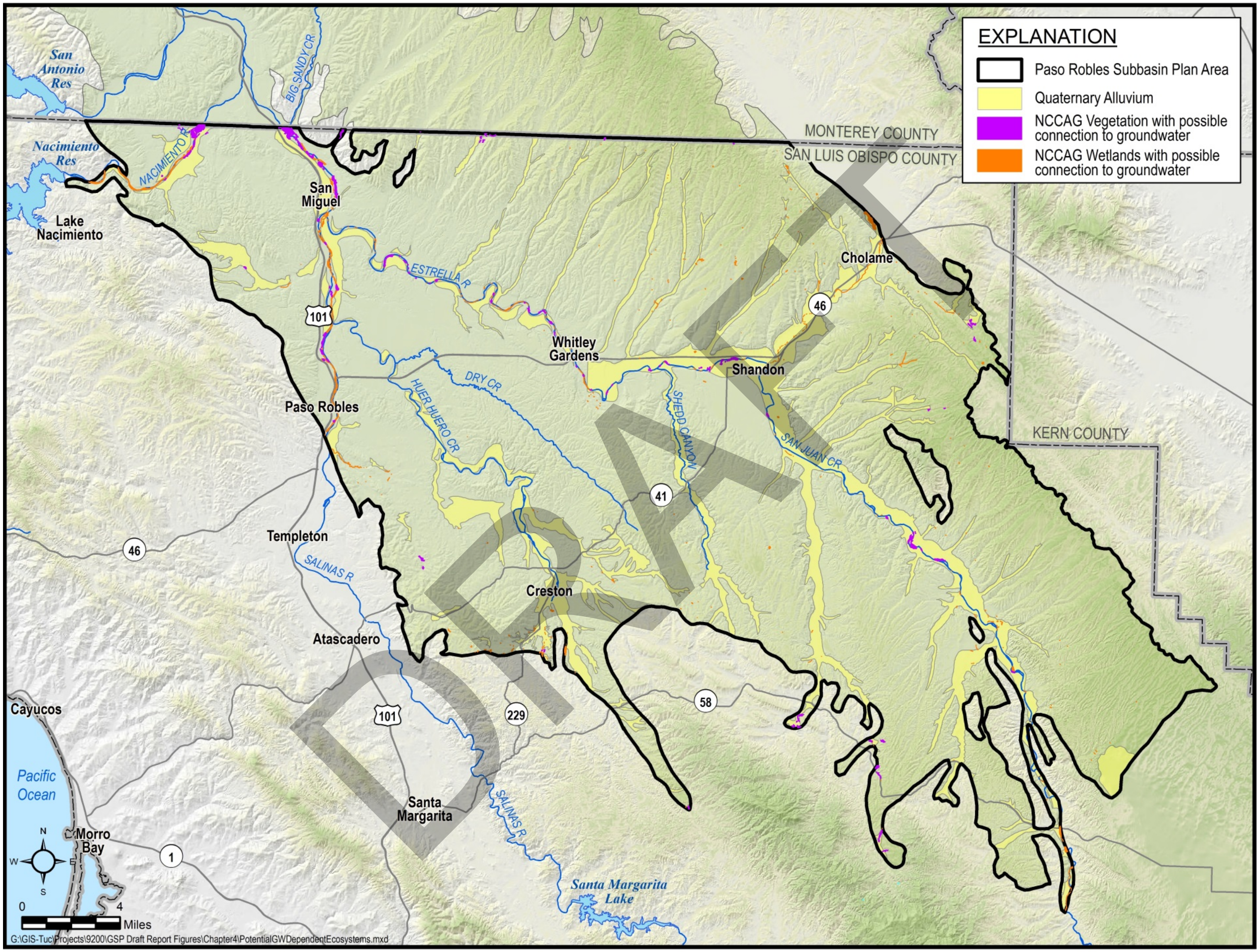


Figure 4-18. Potential Groundwater- Dependent Ecosystems

4.8 SURFACE WATER BODIES

Figure 4-19 shows the rivers in the Subbasin that are considered significant to the management of groundwater in the Subbasin. Significant streams in the Subbasin include the Salinas River, the Estrella River, Huer Huero Creek, San Juan Creek, Dry Creek, and Shedd Canyon. These rivers and creeks are ephemeral, and during most of the year the streams lose water to the shallow aquifers. A complete description and quantification of the stream/aquifer interaction is included in Chapters 5 and 6. There are no natural lakes in the Subbasin.

There are no reservoirs within the Subbasin; however, there are two reservoirs in the watershed. The Salinas Dam south of the Subbasin on the Salinas River forms Santa Margarita Lake. The Salinas Dam was constructed in the early 1940s as an emergency measure to provide adequate water supplies for Camp San Luis Obispo. The United States Army Corps of Engineers (USACE) now has jurisdiction over the dam and reservoir facilities. The City of San Luis Obispo has an agreement with USACE to divert the entire yield of Santa Margarita Reservoir for water supply. Nacimiento Reservoir lies just outside of the Subbasin to the northwest. The reservoir discharges to the Nacimiento River, which crosses the northwest corner of the Subbasin.

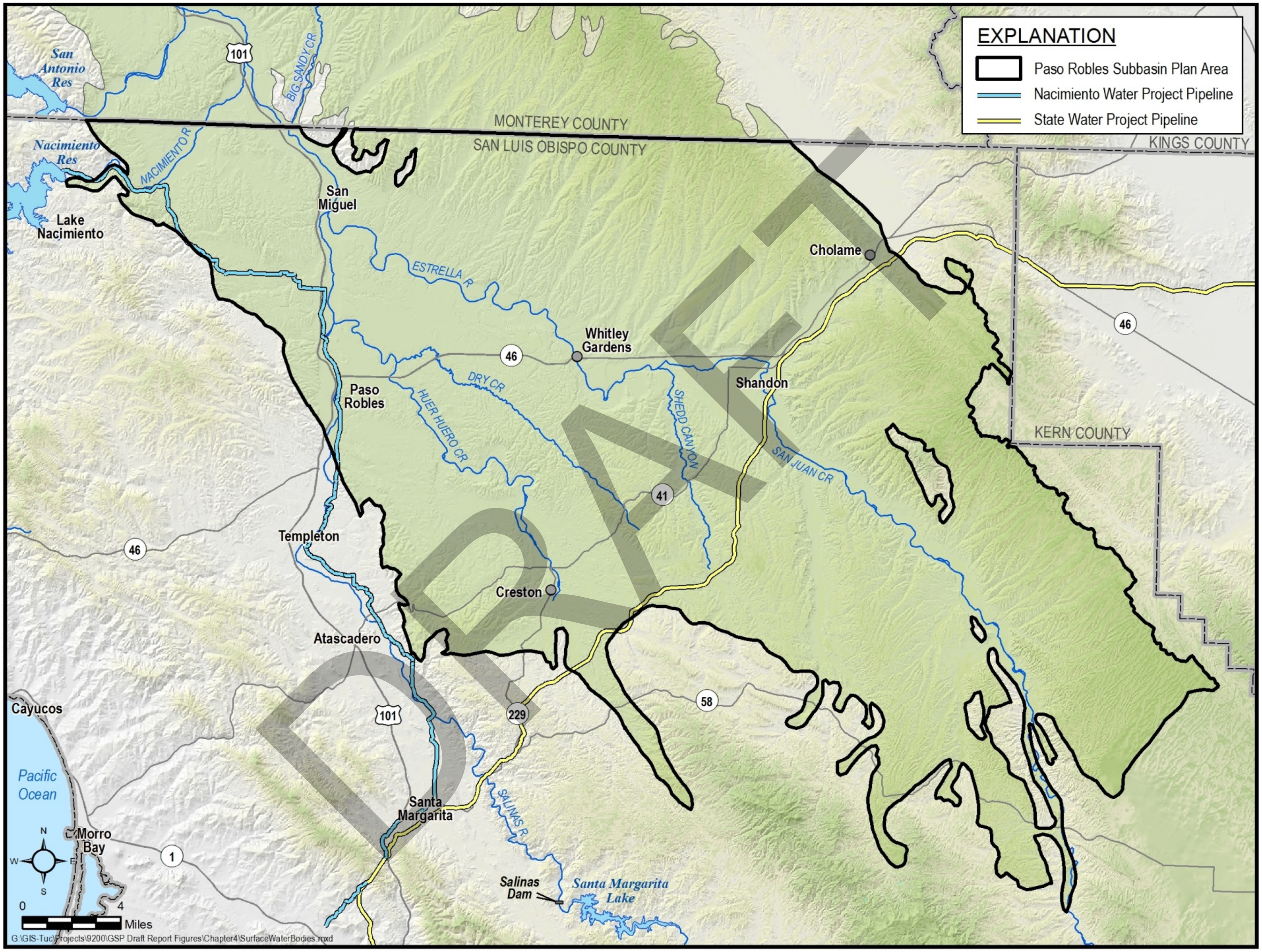


Figure 4-19. Surface Water Bodies

4.9 DATA GAPS IN THE HYDROGEOLOGIC CONCEPTUAL MODEL

All hydrologic conceptual models contain a certain amount of uncertainty, and can be improved with additional data and analysis. The hydrogeologic conceptual model of the Paso Robles Subbasin could be improved with certain additional data and analyses. Several data gaps are identified below.

AQUIFER CONTINUITY

Aquifer continuity has a significant impact on how projects and management actions in one part of the Subbasin may influence sustainability in other parts of the Subbasin. As noted earlier, the Paso Robles aquifer comprises many discontinuous sand and gravel beds. However, Figure 4-12 shows a previous interpretation of a deep sand and gravel zone that is relatively continuous across the Subbasin. The continuity of this zone may prove to be important in how effective various projects and programs may promote sustainability. The extent and continuity of the Paso Robles Aquifer should be confirmed through existing or new well logs or other methods such as aerial geophysics. This is particularly important in the areas around Shandon and San Juan.

FAULT INFLUENCE ON GROUNDWATER FLOW

Southeast of the City of Paso Robles is an interbasin fault. It is unknown whether this fault and others are barriers to groundwater flow. If these interbasin faults are barriers to groundwater flow, they could compartmentalize the Subbasin and have a significant impact on where projects must be located in order to achieve sustainability. It may be possible to get a better understanding of the influence of these faults by performing aquifer tests and geophysical surveys in the vicinity of these faults.

VERTICAL GROUNDWATER GRADIENTS

There are no nested wells to demonstrate vertical hydraulic gradients. Demonstrating vertical gradients could be important to assess vertical flows between the Alluvium and the Paso Robles Aquifer as well as vertical flows within the Paso Robles Aquifer.

Appendix 4A
Draft

Additional Well Logs Used to Supplement Cross Sections

Prepared for the Paso Robles Subbasin Cooperative Committee and the Groundwater Sustainability Agencies

October 10, 2018

ORIGINAL
File with DWR

Page 1 of 1

Owner's Well No.

Date Work Began 09-29-05 , Ended 10-5-05

Local Permit Agency Monterey County Health Dept

Permit No. 05-10531 Permit Date 7-05

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. e030073

DWR USE ONLY — DO NOT FILL IN

24S/13E-33

STATE WELL NO./STATION NO.

LATITUDE | LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD Rotary FLUID Bentonite

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	5	Top soil
5	30	Sand & gravel
30	60	Brown clay
60	90	Sand & gravel
90	110	Brown clay
110	115	Sand & gravel
115	160	Brown clay
160	220	Sand & gravel
220	330	Brown clay with gravel cemented
330	350	Sand & gravel
350	360	Brown clay with gravel
360	390	Sand & gravel
390	470	Brown clay with gravel, tight
470	485	Shale gravel
485	500	Brown clay with gravel, tight
500	510	Shale gravel
510	650	Brown claywith gravel, tight
650	680	Blue clay

NOTE:
ANY PERSON REMOVING THE CAP FROM THIS WELL OTHER THAN MILLER DRILLING CO OR AUTHORIZED CONTRACTOR APPROVED BY US WILL VOID ALL STRUCTURAL WARRANTIES.

TOTAL DEPTH OF BORING 680 (Feet)

TOTAL DEPTH OF COMPLETED WELL 650 (Feet)

WELL LOCATION

Address Ranchita Cyn LOT 2 Tract 3A South 1/2

City San Miguel

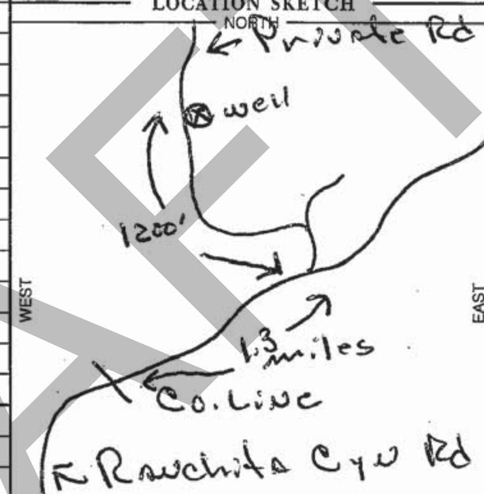
County Monterey

APN Book 424 Page 405 Parcel 058

Township 24S Range 13E Section 33

Latitude 35 48.126 NORTH (DEG. MIN. SEC.) Longitude 120 34.064 WEST (DEG. MIN. SEC.)

LOCATION SKETCH



Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
X Domestic ___ Public
___ Irrigation ___ Industrial

MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 470 (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 332 (Ft.) & DATE MEASURED 10-5-05

ESTIMATED YIELD * 20@440 (GPM) & TEST TYPE Blow test

TEST LENGTH 75@640 (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

* *May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	470	9 7/8	X				F480 PVC	5	.265	
470	550	9 7/8		X			F480 PVC	5	.265	.040 P
550	570	9 7/8	X				F480 PVC	5	.265	
570	590	9 7/8		X			F480 PVC	5	.265	.040 P
590	610	9 7/8	X				F480 PVC	5	.265	
610	650	9 7/8		X			F480 PVC	5	.265	.040 P

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	60	X			
60	650				Lapis3 mix

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Miller Drilling Company (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS 301 North Main Street CITY Templeton STATE Calif. ZIP 93465

Signed (WELL DRILLER/AUTHORIZED REPRESENTATIVE) DATE SIGNED 10-19-05 C-57 LICENSE NUMBER 324634 AA

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

Page 1 of 1

Owner's Well No. ____

Date Work Began 9-16-04, Ended 9-22-04

Local Permit Agency Monterey County Health Dept

Permit No. 04-07838 Permit Date 7-26-04

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. e016462

DWR USE ONLY — DO NOT FILL IN
24S/13E-36
STATE WELL NO./STATION NO.
LATITUDE | LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DRILLING METHOD Rotary FLUID Bentonite

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	2	Top soil
2	5	Brown clay
5	7	Sand & gravel
7	65	Lite green clay
65	75	Sand & gravel
75	140	Lite brown clay
140	150	Shale gravel
150	160	Brown clay
160	175	Coarse sand & gravel
175	180	Brown clay
180	250	Brown clay with gravel
250	260	Sand & gravel
260	280	Brown clay
280	295	Shale gravel
295	400	Brown clay
400	425	Shale gravel
425	430	Brown clay
430	465	Shale gravel-layers brown clay
465	520	Brown clay
520	535	Shale gravel
535	560	Lite blue clay
560	585	Shale gravel
585	620	Lite blue clay
620	690	Shale gravel some lite brown shale
690	700	Blue clay

NOTE: ANY PERSON REMOVING THE CAP FROM THIS WELL OTHER THAN MILLER DRILLING CO OR AUTHORIZED CONTRACTOR APPROVED BY US WILL VOID ALL STRUCTURAL WARRANTIES.

TOTAL DEPTH OF BORING 700 (Feet)

TOTAL DEPTH OF COMPLETED WELL 695 (Feet)

WELL OWNER

WELL LOCATION

Address 77509 Hog Cyn

City San Miguel

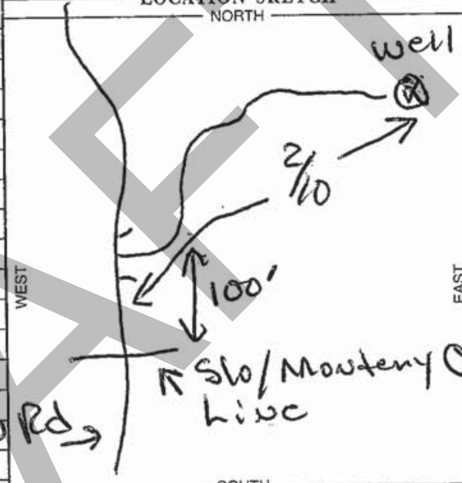
County Monterey County

APN Book 424 Page 151 Parcel 027

Township 24S Range 13E Section 36

Latitude 35 47 30.9 NORTH (DEG. MIN. SEC.) Longitude 120 32 18.1 WEST (DEG. MIN. SEC.)

LOCATION SKETCH



Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

___ DESTROY (*Describe Procedures and Materials Under "GEOLOGIC LOG"*)

PLANNED USES (✓)

WATER SUPPLY
X Domestic ___ Public
___ Irrigation ___ Industrial

MONITORING ___
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 520 (Ft.) BELOW SURFACE

DEPTH OF STATIC WATER LEVEL 410 (Ft.) & DATE MEASURED 9-22-04

ESTIMATED YIELD * 14@500 (GPM) & TEST TYPE Blow test

TEST LENGTH 75@680 (Hrs.) TOTAL DRAWDOWN ____ (Ft.)

** May not be representative of a well's long-term yield.*

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	520	9 7/8	X				F480 PVC	5	.265	
520	540	9 7/8		X			F480 PVC	5	.265	.040 P
540	560	9 7/8	X				F480 PVC	5	.265	
560	600	9 7/8		X			F480 PVC	5	.265	.040 P
600	620	9 7/8	X				F480 PVC	5	.265	
620	695	9 7/8		X			F480 PVC	5	.265	.040 P

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	61	X			
61	695				Bye

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ____

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Miller Drilling Company
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS 301 North Main Street, CITY Templeton, STATE Calif., ZIP 93465

Signed ____ (WELL DRILLER/AUTHORIZED REPRESENTATIVE)

DATE SIGNED 9-23-04

C-57 LICENSE NUMBER 324634 AA

DWR 188 REV. 11-97

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State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0164974

Page 1 of 4

Owner's Well Number John Hancock Well #1

Date Work Began 11/01/2012 Date Work Ended 2/26/2013

Local Permit Agency San Luis Obispo County Environmental Health Services

Permit Number 2012-229 Permit Date 10/15/12

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Reverse Circulation Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	40	Conductor
40	80	Clay
80	90	Gravel
90	100	Clay
100	110	Clay
110	120	Gravel
120	150	Course Sand
150	165	Gravel w/Clay
165	205	Gravel
205	210	Clay
210	220	Gravel
220	230	Gravel
230	240	Gravel
240	250	Clay
250	260	Clay
260	270	Clay
270	290	Clay
290	300	Clay
300	310	Clay
310	320	Gravel
320	330	Gravel
330	340	Clay
340	350	Clay
350	360	Clay
360	370	Clay
370	380	Gravel
380	390	Gravel
390	400	Clay
400	410	Clay
410	420	Clay

Total Depth of Boring 1393 Feet

Total Depth of Completed Well 870 Feet

Well Owner

Well Location

Address Exit 241, San Miquel

City San Miquel County San Luis Obispo

Latitude 35 Deg. 76 Min. 464 Sec. N Longitude 120 Deg. 72 Min. 51 Sec. W

Datum Decimal Lat. Decimal Long.

APN Book Page Parcel 027.011.036

Township Range Section

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

⦿ Water Supply
☐ Domestic ☐ Public
☑ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level (Feet) Date Measured

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	40	36	Conductor	Mild Steel	5/16	30		
0	195	24	Blank	Mild Steel	5/16	14.5		
195	210	24	Screen	Mild Steel	5/16	14.5	Louver	0.070
210	220	24	Blank	Mild Steel	5/16	14.5		
220	270	24	Screen	Copper Bearing	5/16	14.5	Louver	0.070
270	290	24	Blank	Copper Bearing	5/16	14.5		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	50	Cement	6 Sak
50	1,388	Filter Pack	75% SRI #6
			25% SRI #8

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Pacific Coast Well Drilling, Inc.
Person, Firm or Corporation

P.O. Box 184 (Address) Templeton (City) CA (State) 93465-0184 (Zip)

Signed [signature] C-57 Licensed Water Well Contractor 1/17/13 Date Signed 927400 C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

RECEIVED

OCT 29 2013

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File Original with DWR

Page 2 of 4

Owner's Well Number John Hancock Well #1

Date Work Began 11/01/2012 Date Work Ended 2/26/2013

Local Permit Agency San Luis Obispo County Environmental Health Services

Permit Number 2012-229 Permit Date 10/15/12

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0164974

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Reverse Circulation Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
420	430	Clay
430	440	Clay
440	450	Clay
450	460	Clay
460	470	Clay
470	480	Clay
480	490	Clay
490	500	Clay
500	510	Clay
510	520	Gravel/Clay
520	530	Clay
530	540	Clay
540	550	Slurry/Clay
550	560	Clay
560	570	Clay
570	575	Gravel
575	580	Clay
580	625	Gravel
625	660	Course Sand
660	755	Clay w/Sand
755	805	Rough Drilling
805	910	Sand/Gravel, Brown, Sandy Clay
910	930	Sand/Gravel, Brown, Sandy Clay
930	940	Clay
940	950	Clay/Sandy
950	960	Clay/Sandy
960	970	Clay/Sandy
970	980	Clay/Sandy
980	990	Gravel
990	1,000	Gravel

Total Depth of Boring 1393 Feet

Total Depth of Completed Well 870 Feet

Well Owner

Well Location

Address Exit 241, San Miguel

City San Miguel County San Luis Obispo

Latitude 35 Deg. 76 Min. 464 Sec. N Longitude 120 Deg. 72 Min. 51 Sec. W

Datum Decimal Lat. Decimal Long.

APN Book Page Parcel 027,011,036

Township Range Section

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well

○ Modification/Repair

○ Deepen

○ Other

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

⦿ Water Supply

☐ Domestic ☐ Public

☑ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

○ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level (Feet) Date Measured

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
290	350	24	Screen	Copper Bearing	5/16	14.5	Louver	0.070
350	370	24	Blank	Copper Bearing	5/16	14.5		
370	410	24	Screen	Copper Bearing	5/16	14.5	Louver	0.070
410	450	24	Blank	Copper Bearing	5/16	14.5		
450	530	24	Screen	Copper Bearing	5/16	14.5	Louver	0.070
530	580	24	Blank	Copper Bearing	5/16	14.5		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description

Attachments

☐ Geologic Log

☐ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Pacific Coast Well Drilling, Inc.

Person, Firm or Corporation

P.O. Box 184 Templeton CA 93465-0184

Address City State Zip

Signed [signature] 1/17/13 927400

C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

RECEIVED

OCT 29 2013

DRAFT

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File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0164974

Owner's Well Number John Hancock Well #1

Date Work Began 11/01/2012 Date Work Ended 2/26/2013

Local Permit Agency San Luis Obispo County Environmental Health Services

Permit Number 2012-229 Permit Date 10/15/12

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Reverse Circulation Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
1,000	1,010	Sandy Clay
1,010	1,020	Sandy Clay
1020	1,030	Gravel
1030	1,040	Sandy Clay
1040	1,050	Clay
1050	1,060	Sandy Clay
1060	1,070	Sandy Clay
1070	1,080	Sandy Clay
1080	1,090	Gravel
1090	1,100	Gravel
1100	1,110	Gravel
1110	1,120	Sandy Clay
1120	1,130	Sandy Clay
1130	1,140	Sandy Clay
1140	1,150	Sandy Clay
1150	1,160	Clay
1160	1,170	Clay
1170	1,180	Clay
1180	1,190	Sandy Clay
1190	1,200	Clay Brown
1200	1,220	Small Gravel, Sandy Clay
1220	1,240	Brown Clay
1240	1,255	Rough Drilling Gravel
1255	1,295	Brown Clay
1295	1,305	Gravel
1305	1,335	Clay
1335	1,356	Course Sand
1356	1,363	Gravel/Course Sand
1363	1,366	Clay
1366	1,368	Gravel/Course Sand

Total Depth of Boring 1393 Feet

Total Depth of Completed Well 870 Feet

Well Owner

Well Location

Address Exit 241, San Miguel

City San Miguel County San Luis Obispo

Latitude 35 Deg. 76 Min. 464 Sec. N Longitude 120 Deg. 72 Min. 51 Sec. W

Datum Decimal Lat. Decimal Long.

APN Book Page Parcel 027 011 036

Township Range Section

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

⦿ Water Supply
☐ Domestic ☐ Public
☑ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level (Feet) Date Measured

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
580	600	24	Screen	Copper Bearing	5/16	14.5	Louver	0.070
600	660	24	Blank	Copper Bearing	5/16	14.5		
660	700	24	Screen	Copper Bearing	5/16	14.5	Louver	0.070
700	740	24	Blank	Copper Bearing	5/16	14.5		
740	790	24	Screen	Copper Bearing	5/16	14.5	Louver	0.070
790	810	24	Blank	Copper Bearing	5/16	14.5		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Pacific Coast Well Drilling, Inc.
Person, Firm or Corporation

P.O. Box 184 (Address) Templeton (City) CA (State) 93465-0184 (Zip)

Signed [signature] C-57 Licensed Water Well Contractor

1/17/13 Date Signed

927400 C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

RECEIVED

OCT 29 2013

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File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0164974

Owner's Well Number John Hancock Well #1

Date Work Began 11/01/2012 Date Work Ended 2/26/2013

Local Permit Agency San Luis Obispo County Environmental Health Services

Permit Number 2012-229 Permit Date 10/15/12

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N Latitude W Longitude

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Reverse Circulation Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
1,368	1,375	Clay
1,375	1,385	Rough Drilling Sand
1385	1,393	Clay/Silt

Total Depth of Boring 1393 Feet

Total Depth of Completed Well 870 Feet

Well Owner

Well Location

Address Exit 241, San Miguel

City San Miguel County San Luis Obispo

Latitude 35 Deg. 76 Min. 464 Sec. N Longitude 120 Deg. 72 Min. 51 Sec. W

Datum Decimal Lat. Decimal Long.

APN Book Page Parcel 027 011,036

Township Range Section

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West

East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

⦿ Water Supply
☐ Domestic ☐ Public
☑ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level (Feet) Date Measured

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
810	830	24	Screen	Copper Bearing	5/16	14.5	Louver	0.070
830	870	24	Blank	Copper Bearing	5/16	14.5		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Pacific Coast Well Drilling, Inc.
Person, Firm or Corporation

P.O. Box 184 (Address) Templeton (City) CA (State) 93465-0184 (Zip)

Signed [signature] C-57 Licensed Water Well Contractor 1/17/13 Date Signed 927400 C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

RECEIVED

OCT 29 2013

DRAFT

E0164974

John Hancock Insurance Co. APN: 027-011-036 Well#1

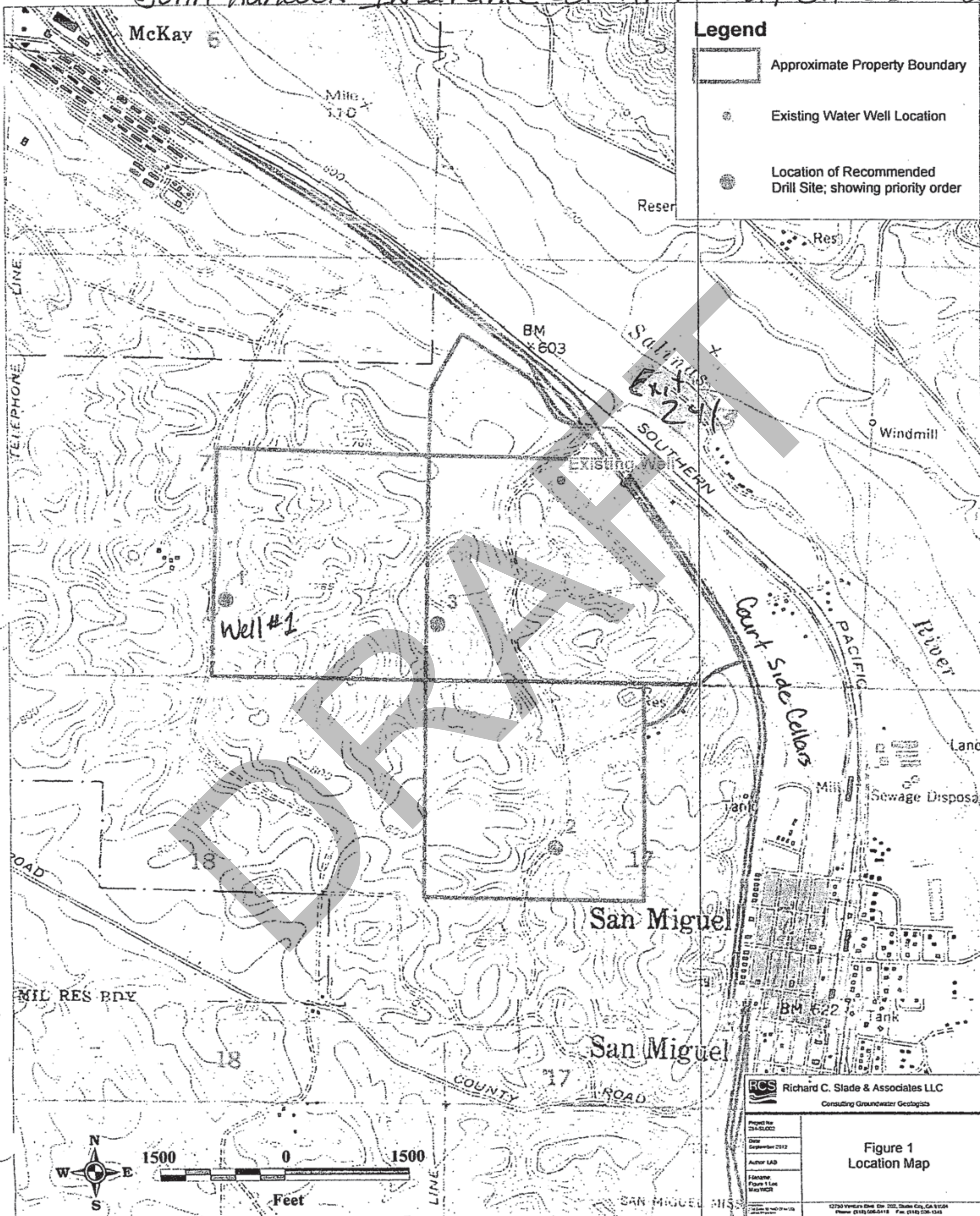

Figure 1
Location Map

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0162372

Page 1 of 2

Owner's Well Number Continental Vineyards

Date Work Began 08/01/2012 Date Work Ended 8/10/2012

Local Permit Agency County of San Luis Obispo Public Health

Permit Number 2012-149 Permit Date 7/30/12

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N Latitude W Longitude

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify ______

Drilling Method Reverse Circulation Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	40	Clay
40	55	Gravel
55	65	Clay
65	150	Gravel
150	160	Clay
160	165	Gravel
165	180	Clay
180	200	Gravel
200	230	Clay
230	280	Gravel
280	318	Clay
318	320	Sand
320	336	Clay
336	340	Gravel
340	355	Clay
355	360	Gravel
360	370	Clay
370	390	Gravel
390	400	Clay
400	435	Gravel
435	480	Clay
480	530	Gravel
530	560	Clay
560	605	Gravel
605	620	Clay
620	635	Gravel
635	650	Clay
650	730	Clay
730	810	Clay
810	830	Gravel

Total Depth of Boring 1,110 Feet

Total Depth of Completed Well 1,100 Feet

Well Owner

Well Location

Address 11000 Hwy. 46E

City Paso Robles County San Luis Obispo

Latitude 35 Deg. 67 Min. 95 Sec. N Longitude 120 Deg. 48 Min. 19 Sec. W

Datum ______ Decimal Lat. ______ Decimal Long. ______

APN Book ______ Page ______ Parcel 019,121,013

Township 26S Range 14E Section 8

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West SEE ATTACHED East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other ______
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

⦿ Water Supply
☐ Domestic ☐ Public
☑ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other ______

Water Level and Yield of Completed Well

Depth to first water 205 (Feet below surface)

Depth to Static Water Level 205 (Feet) Date Measured 09/04/2012

Estimated Yield * 1,900 (GPM) Test Type Constant Rate

Test Length 12.0 (Hours) Total Drawdown 89 (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	320	24	Blank	Low Carbon Steel	.250	14		
320	560	24	Screen	Low Carbon Steel	.250	14	Louver	0.080
560	600	24	Blank	Low Carbon Steel	.250	14		
600	650	24	Screen	Low Carbon Steel	.250	14	Louver	0.080
650	720	24	Blank	Low Carbon Steel	.250	14		
720	760	24	Screen	Low Carbon Steel	.250	14	Louver	0.080

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	50	Cement	6 Sac Slurry
50	1,110	Filter Pack	1/4 * 10

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other ______

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Pacific Coast Well Drilling, Inc.
Person, Firm or Corporation

P.O. Box 184 Templeton CA 93465
Address City State Zip

Signed [signature] 8-25-12 927400
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

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DEC 5 2012

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State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0162372

Owner's Well Number: Continental Vineyards

Date Work Began: 08/01/2012 Date Work Ended: 8/10/2012

Local Permit Agency: County of San Luis Obispo Public Health

Permit Number: 2012-149 Permit Date: 7/30/12

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation: ⦿ Vertical ○ Horizontal ○ Angle Specify ____

Drilling Method: Reverse Circulation Rotary Drilling Fluid: Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
830	860	Clay
860	920	Gravel
920	990	Clay
990	1,030	Gravel
1030	1,040	Clay
1040	1,080	Gravel
1080	1,110	Clay

Total Depth of Boring: 1,110 Feet

Total Depth of Completed Well: 1,100 Feet

Well Owner

Well Location

Address: 11000 Hwy. 46E

City: Paso Robles County: San Luis Obispo

Latitude: 35 Deg. 67 Min. 95 Sec. N Longitude: 120 Deg. 48 Min. 19 Sec. W

Datum ____ Decimal Lat. ____ Decimal Long. ____

APN Book ____ Page ____ Parcel 019,121,013

Township 26S Range 14E Section 8

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West

East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well

○ Modification/Repair

○ Deepen

○ Other ____

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

⦿ Water Supply

☐ Domestic ☐ Public

☑ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

○ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other ____

Water Level and Yield of Completed Well

Depth to first water ____ (Feet below surface)

Depth to Static Water Level ____ (Feet) Date Measured ____

Estimated Yield * ____ (GPM) Test Type ____

Test Length ____ (Hours) Total Drawdown ____ (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
760	800	24	Blank	Low Carbon Steel	.250	14		
800	1,080	24	Screen	Low Carbon Steel	.250	14	Louver	0.080
1,080	1,100	24	Blank	Low Carbon Steel	.250	14		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description

Attachments

☐ Geologic Log

☐ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☐ Other ____

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name: Pacific Coast Well Drilling, Inc. (Person, Firm or Corporation)

P.O. Box 184 (Address) Templeton (City) CA (State) 93465 (Zip)

Signed: [signature] (C-57 Licensed Water Well Contractor) 8-25-12 (Date Signed) 927400 (C-57 License Number)

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

e0162372

WELL PERMIT PLOT PLAN

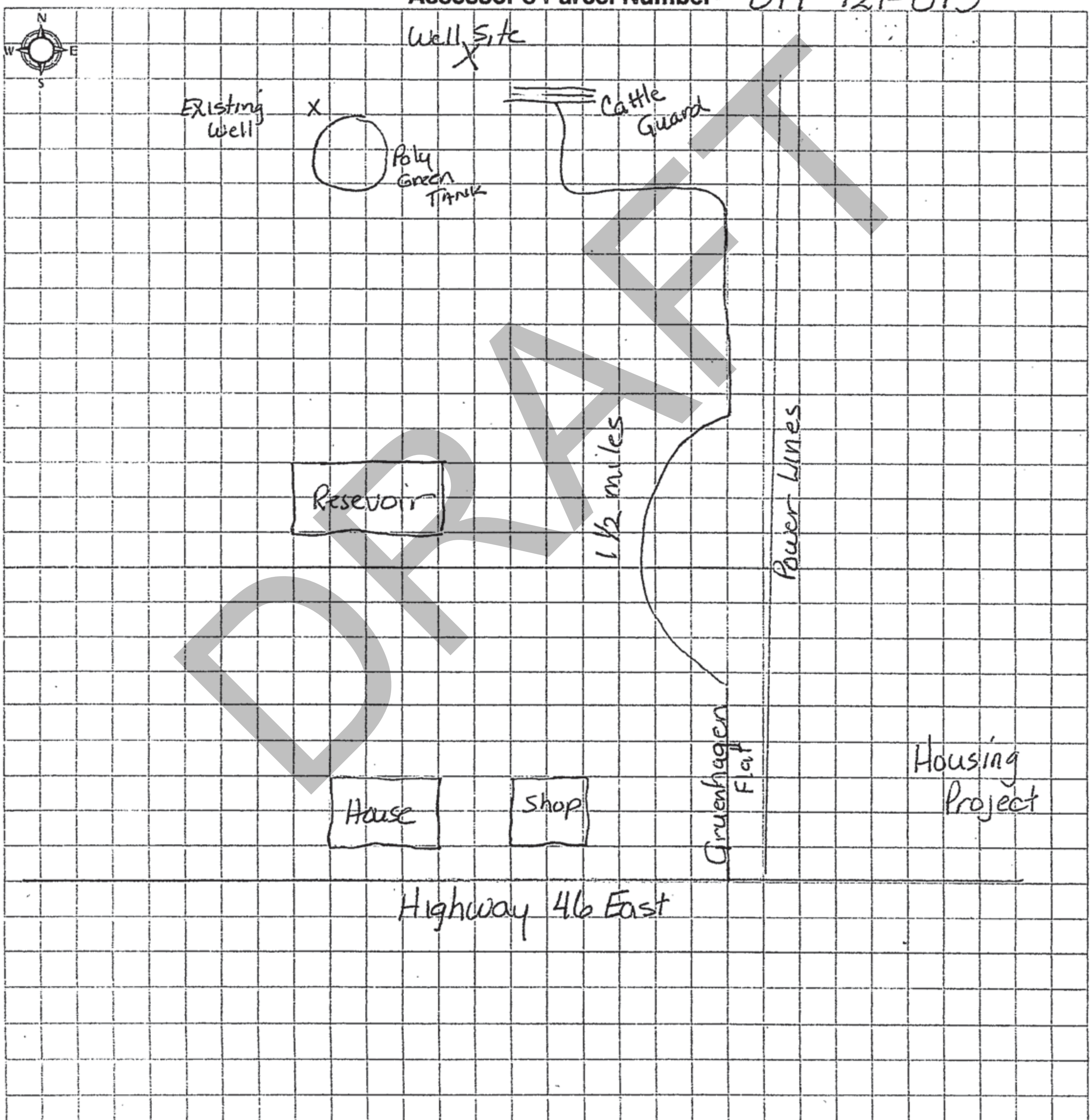
SAN LUIS OBISPO COUNTY ENVIRONMENTAL HEALTH SERVICES
2156 Sierra Way
San Luis Obispo, California 93401
Telephone: 805-781-5544

SCALE: ¼" = 25'

Indeck Paso Robles, LLC

INDICATE BELOW THE **EXACT LOCATION** OF PROPOSED WELL WITH RESPECT TO THE FOLLOWING ITEMS: PROPERTY LINES, WATER BODIES OR WATER COURSES, DRAINAGE PATTERN, ROADS, EXISTING WELLS, SEWERS AND PRIVATE SEWAGE DISPOSAL SYSTEMS, ANIMAL ENCLOSURES AND ANY OTHER CONCENTRATED SOURCES OF POLLUTION. **INCLUDE DIMENSIONS.** ALL PROPOSED WELL SITES SHALL BE DESIGNATED WITH A FLAGGED SURVEYOR'S STAKE LABELED "WELL SITE." DRILLING SHALL NOT COMMENCE UNTIL THIS APPLICATION IS APPROVED.

Assessor's Parcel Number- 019-121-013



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State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0188061

Page 1 of 2

Owner's Well Number SJW4

Date Work Began 07/31/2013 Date Work Ended 8/2/2013

Local Permit Agency San Luis Obispo County Environmental Health Department

Permit Number 2013-117 Permit Date 7/3/13

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify ____

Drilling Method Direct Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	30	Conductor
0	465	Fine Brown Sand w/Streaks of Brown Clay
465	502	Gravel (Rough Drilling)
502	745	Course Sand w/Streaks of Brown Clay
745	815	Small Gravel (Rough Drilling)
815	975	Fine Sand
975	1,050	Course Sand w/Less Brown Clay

Total Depth of Boring 1050 Feet

Total Depth of Completed Well 1040 Feet

Well Owner

Well Location

Address 2575 San Juan Road

City Shandon County San Luis Obispo

Latitude 35 Deg. 37 Min. 4814 Sec. N Longitude 120 Deg. 22 Min. 257 Sec. W

Datum ____ Dec. Lat. 35.62997 Dec. Long. 120.36792

APN Book ____ Page ____ Parcel ____

Township 26S Range 15E Section 33 C

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West

SEE

ATTACHED MAP

East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well

○ Modification/Repair

○ Deepen

○ Other ____

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

⦿ Water Supply

☐ Domestic ☐ Public

☑ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

○ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other ____

Water Level and Yield of Completed Well

Depth to first water 140 (Feet below surface)

Depth to Static Water Level 140 (Feet) Date Measured 08/02/2013

Estimated Yield * 1,000 (GPM) Test Type Air Lift

Test Length 6.0 (Hours) Total Drawdown ____ (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	30	36	Conductor	Low Carbon Steel	1/4	30		
0	200	26	Blank	Mild Steel	5/16	16.5		
200	410	26	Screen	HSLA	5/16	16.5	Louver	0.070
410	470	26	Blank	Mild Steel	5/16	16.5		
470	500	26	Screen	HSLA	5/16	16.5	Louver	0.070
500	590	26	Blank	Mild Steel	5/16	16.5		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	60	Cement	6 Sack Slurry
60	850	Filter Pack	80-1/4*10&20-8*16
850	1,050	Fill	Cuttings

Attachments

☐ Geologic Log

☐ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☐ Other ____

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Tyson R. Davis, Pacific Coast Well Drilling, Inc.
Person, Firm or Corporation

P.O. Box 184 Templeton CA 93465
Address City State Zip

Signed [signature] 11.1.13 927400
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

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State of California
Well Completion Report

Refer to Instruction Pamphlet

No. e0188061

Page 2 of 2

Owner's Well Number SJW4

Date Work Began 07/31/2013 Date Work Ended 8/2/2013

Local Permit Agency San Luis Obispo County Environmental Health Department

Permit Number 2013-117 Permit Date 7/3/13

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N Latitude W Longitude

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Direct Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	30	Conductor
0	465	Fine Brown Sand w/Streaks of Brown Clay
465	502	Gravel (Rough Drilling)
502	745	Course Sand w/Streaks of Brown Clay
745	815	Small Gravel (Rough Drilling)
815	975	Fine Sand
975	1,050	Course Sand w/Less Brown Clay

Total Depth of Boring 1050 Feet

Total Depth of Completed Well 1040 Feet

Well Owner

Well Location

Address 2575 San Juan Road

City Shandon County San Luis Obispo

Latitude 35 Deg. 37 Min. 4814 Sec. N Longitude 120 Deg. 22 Min. 257 Sec. W

Datum Dec. Lat. 35.62997 Dec. Long. 120.36792

APN Book Page Parcel

Township 26S Range 15E Section 33

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

⦿ Water Supply
☐ Domestic ☐ Public
☑ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level (Feet) Date Measured

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
590	630	26	Screen	HSLA	5/16	16.5	Louver	0.070
630	700	26	Blank	Mild Steel	5/16	16.5		
700	730	26	Screen	HSLA	5/16	16.5	Louver	0.070
730	750	26	Blank	Mild Steel	5/16	16.5		
750	810	26	Screen	HSLA	5/16	16.5	Louver	0.070
810	840	26	Blank	Mild Steel	5/16	16.5		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Tyson R. Davis, Pacific Coast Well Drilling, Inc.
Person, Firm or Corporation

P.O. Box 184 (Address) Templeton (City) CA (State) 93465 (Zip)

Signed (C-57 Licensed Water Well Contractor) 11-1-13 (Date Signed) 927400 (C-57 License Number)

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

e0188061

WELL PERMIT PLOT PLAN

SAN LUIS OBISPO COUNTY ENVIRONMENTAL HEALTH SERVICES
2156 Sierra Way
San Luis Obispo, California 93401
Telephone: 805-781-5544

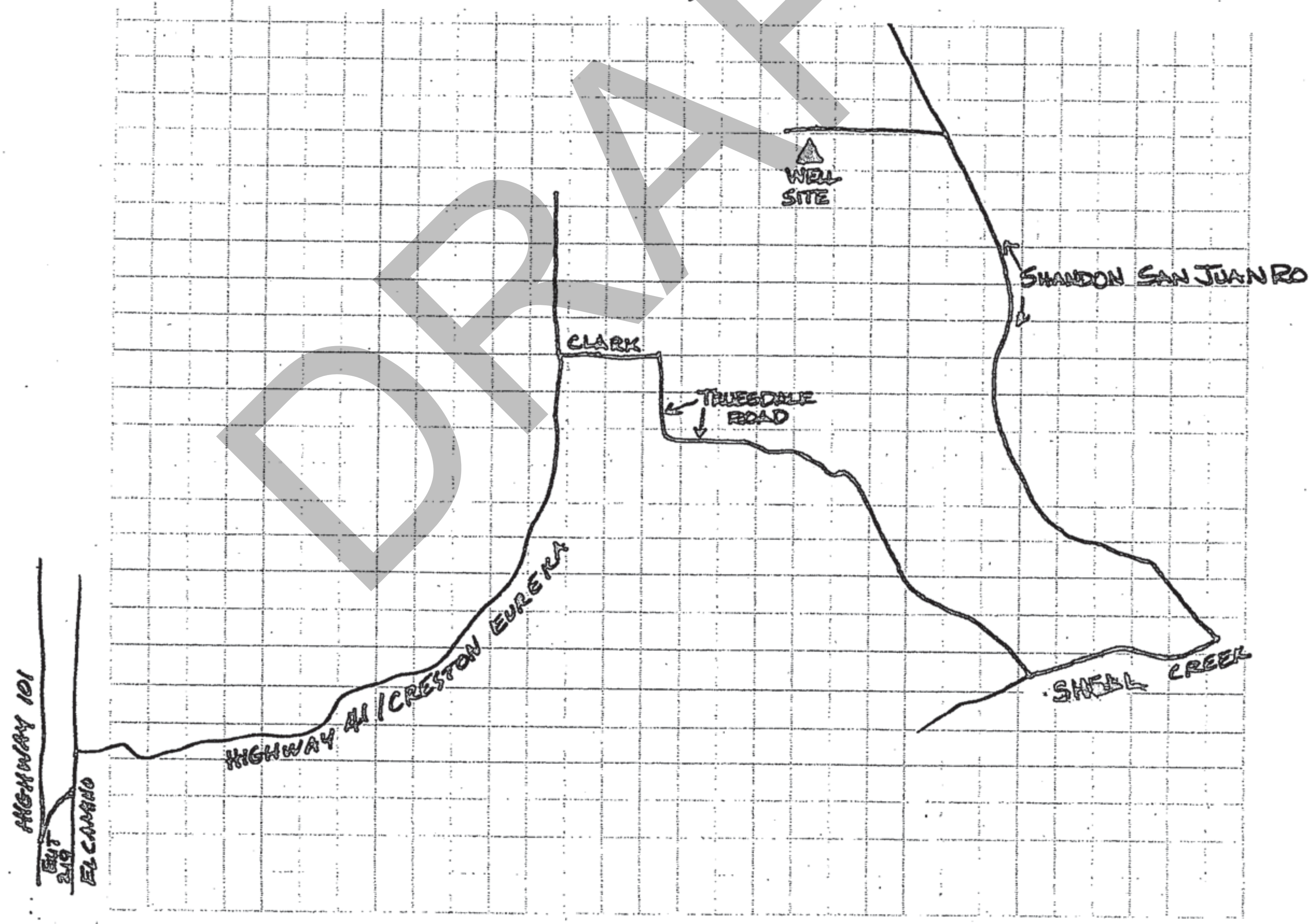
SCALE: ¼ inch = 25 feet

INDICATE BELOW THE **EXACT LOCATION** OF PROPOSED WELL WITH RESPECT TO THE FOLLOWING ITEMS: PROPERTY LINES, WATER BODIES OR WATER COURSES, DRAINAGE PATTERN, ROADS, EXISTING WELLS, SEWERS AND PRIVATE SEWAGE DISPOSAL SYSTEMS, ANIMAL ENCLOSURES AND ANY OTHER CONCENTRATED SOURCES OF POLLUTION. **INCLUDE DIMENSIONS.** ALL PROPOSED WELL SITES SHALL BE DESIGNATED WITH A FLAGGED SURVEYOR'S STAKE LABELED "WELL SITE." DRILLING SHALL NOT COMMENCE UNTIL THIS APPLICATION IS APPROVED.

Assessor's Parcel Number-

N W E S

Take Highway 101 (N) and take Exit #219 toward Morro Road/Highway 41. Turn left onto El Camino Real at the stop light. Drive to the next stop light, approximately 500 feet. Turn right onto CA-41/Creston Eureka Road and drive for approximately 18 miles. Turn right onto Clark Road and drive for approximately 1/2 mile. Turn right onto Truesdale Road and drive for approximately 4 miles. Turn left on Shell Creek Road and drive for approximately 3/4 mile. Turn left onto Shandon San Juan Road and drive for approximately 2.9 miles and turn left onto dirt road. Drive a little over 1/4 mile and the Well Site is on your left approximately 50-55 feet.



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State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0188056

Owner's Well Number SVW3

Date Work Began 07/24/2013 Date Work Ended 7/26/2013

Local Permit Agency San Luis Obispo County Environmental Health Services

Permit Number 2013-116 Permit Date 7/3/13

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N Latitude | W Longitude

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Direct Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	30	Conductor
0	600	Brown Clay Streaks w/Sand, Course and Fine
600	645	Cemented Course Sands w/Brown Clay
645	750	Course Sand w/Brown Clay
750	940	Brown Clay w/Course Sand
940	1,090	Fine Sand w/Brown Clay

Total Depth of Boring 1090 Feet

Total Depth of Completed Well 790 Feet

Well Owner

Well Location

Address 3385 Truesdale Road

City Shandon County San Luis Obispo

Latitude 35 Deg. 36 Min. 1776 Sec. N Longitude 120 Deg. 22 Min. 1767 Sec. W

Datum ____ Dec. Lat. 35.60477 Dec. Long. 120.37158

APN Book ____ Page ____ Parcel ____

Township 27S Range 15E Section 4 M

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

SEE ATTACHED MAP

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other ____
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

⦿ Water Supply
☐ Domestic ☐ Public
☑ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other ____

Water Level and Yield of Completed Well

Depth to first water 194 (Feet below surface)

Depth to Static Water Level 194 (Feet) Date Measured 09/25/2013

Estimated Yield * 3,000 (GPM) Test Type Step-Drawndown

Test Length 6.8 (Hours) Total Drawdown 243 (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	30	36	Conductor	Low Carbon Steel	1/4	30		
0	330	26	Blank	Mild Steel	5/16	16.5		
330	640	26	Screen	HSLA Ful Flo	5/16	16.5	Louver	0.080
640	655	26	Blank	HSLA	5/16	16.5		
655	665	26	Screen	HSLA Ful Flo	5/16	16.5	Louver	0.080
665	680	26	Blank	HSLA	5/16	16.5		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	60	Cement	6 Sack Slurry
60	800	Filter Pack	80-1/4x10, 20-8x16
800	1,090	Fill	Cuttings

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other ____

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Tyson R. Davis, Pacific Coast Well Drilling, Inc.
Person, Firm or Corporation

P.O. Box 184 (Address) Templeton (City) CA (State) 93465 (Zip)

Signed [signature] C-57 Licensed Water Well Contractor

10/25/2013 Date Signed 927400 C-57 License Number

DWR 188 REV. 1/2006

RECEIVED

NOV 19 2013

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

DRAFT

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0188056

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N | Longitude W

APN/TRS/Other

Owner's Well Number SVW3

Date Work Began 07/24/2013 | Date Work Ended 7/26/2013

Local Permit Agency San Luis Obispo County Environmental Health Services

Permit Number 2013-116 | Permit Date 7/3/13

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify ____

Drilling Method Direct Rotary | Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)

Total Depth of Boring 1090 Feet

Total Depth of Completed Well 790 Feet

Well Owner

Well Location

Address 3385 Truesdale Road

City Shandon | County San Luis Obispo

Latitude 35 Deg. 36 Min. 1776 Sec. N | Longitude 120 Deg. 22 Min. 1767 Sec. W

Datum ____ Dec. Lat. 35.60477 Dec. Long. 120.37158

APN Book ____ Page ____ Parcel ____

Township 27S Range 15E Section 4

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West

East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other ____
○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

⦿ Water Supply
☐ Domestic ☐ Public
☑ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other ____

Water Level and Yield of Completed Well

Depth to first water ____ (Feet below surface)

Depth to Static Water Level ____ (Feet) Date Measured ____

Estimated Yield * ____ (GPM) Test Type ____

Test Length ____ (Hours) Total Drawdown ____ (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
680	700	26	Screen	HSLA Ful Flo	5/16	16.5	Louver	0.080
700	730	26	Blank	HSLA	5/16	16.5		
730	750	26	Screen	HSLA Ful Flo	5/16	16.5	Louver	0.080
750	790	26	Blank	Mild Steel	5/16	16.5		

Annular Material

Depth from Surface Feet	to Feet	Fill	Description

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other ____

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Tyson R. Davis, Pacific Coast Well Drilling, Inc.
Person, Firm or Corporation

P.O. Box 184 (Address) | Templeton (City) | CA (State) | 93465 (Zip)

Signed ____ C-57 Licensed Water Well Contractor | 1025/2013 Date Signed | 927400 C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

e0188056

WELL PERMIT PLOT PLAN

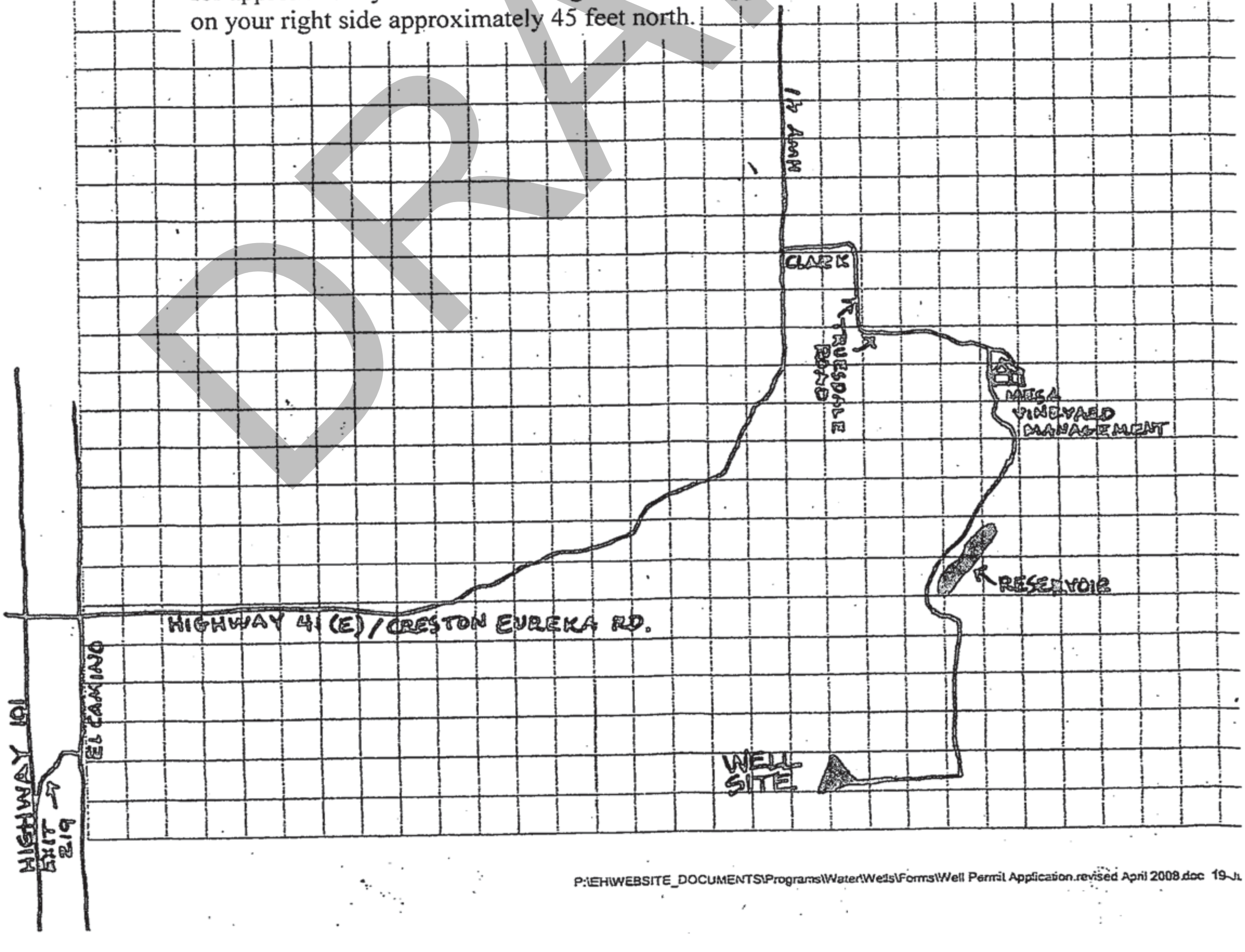
SAN LUIS OBISPO COUNTY ENVIRONMENTAL HEALTH SERVICES
2156 Sierra Way
San Luis Obispo, California 93401
Telephone: 805-781-5544

SCALE: ¼ inch = 25 feet

INDICATE BELOW THE **EXACT LOCATION** OF PROPOSED WELL WITH RESPECT TO THE FOLLOWING ITEMS: PROPERTY LINES, WATER BODIES OR WATER COURSES, DRAINAGE PATTERN, ROADS, EXISTING WELLS, SEWERS AND PRIVATE SEWAGE DISPOSAL SYSTEMS, ANIMAL ENCLOSURES AND ANY OTHER CONCENTRATED SOURCES OF POLLUTION. **INCLUDE DIMENSIONS.** ALL PROPOSED WELL SITES SHALL BE DESIGNATED WITH A FLAGGED SURVEYOR'S STAKE LABELED "WELL SITE." DRILLING SHALL NOT COMMENCE UNT[IL] THIS APPLICATION IS APPROVED.

Assessor's Parcel Number-

Take Highway 101 (N) and take Exit #219 toward Morro Road/Highway 41. Turn left onto El Camino Real at the stop light. Drive to the next stop light, approximately 500 feet. Turn right onto CA-41/Creston Eureka Road and drive for approximately 18 miles. Turn right onto Clark Road and drive for approximately 1/2 mile. Turn right onto Truesdale Road and drive for approximately 1 mile. Truesdale turns to the left. Continue on Truesdale for approximately another 1 mile. 3385 Truesdale Road is on your right. There will be a sign that says "Mesa Vineyard Management" Turn right and drive approximately 400 feet. Turn right before building and drive approximately 100 feet. Turn left along side the building and drive approximately 250 feet. Turn right and drive approximately 1/4 mile. There will be a reservoir on your left. Drive along side of the reservoir and round to the left. Turn right and drive along side vineyards (to your right) for approximately 1/4 mile. Turn right and drive approximately 1/4 mile. Well site will be on your right side approximately 45 feet north.



Appendix 4B
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Groundwater Dependent Ecosystems

Prepared for the Paso Robles Subbasin Cooperative Committee and the Groundwater Sustainability Agencies

October 10, 2018

Appendix 4B. Identification of groundwater dependent ecosystems

INTRODUCTION

Groundwater-dependent ecosystems (GDEs) within the Paso Robles Subbasin are identified in accordance with §354.16(g) of the Groundwater Sustainability Plan regulations. The procedure for identifying GDEs follows guidance developed by The Nature Conservancy (TNC) and detailed in the *Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act: Guidance for Preparing Groundwater Sustainability Plans* report (Rohde et al., 2018). The procedure consists of the following steps:

- Review geospatial data showing indicators of groundwater dependent ecosystems (iGDEs) within the Subbasin
- Assess the connection to groundwater for indicators of groundwater dependent ecosystems

Geospatial data showing iGDEs were downloaded from TNC's website for Natural Communities Commonly Associated with Groundwater (NCCAG; https://gis.water.ca.gov/app/NCDatasetViewer). The iGDEs present in the Paso Robles Subbasin include potential GDEs identified as Wetlands or GDE Vegetation. All iGDEs in the Subbasin are shown on Figure B1.

Datasets used to assess the potential connection of the iGDEs to groundwater include the San Luis Obispo (SLO) County surface geologic map (SLO County, 2007), measured groundwater levels in the San Luis Obispo County groundwater monitoring network, geospatial data included in the National Hydrographic Dataset (NHD) showing the location of mapped springs and seeps, and the updated numerical groundwater flow model of the Paso Robles Subbasin.

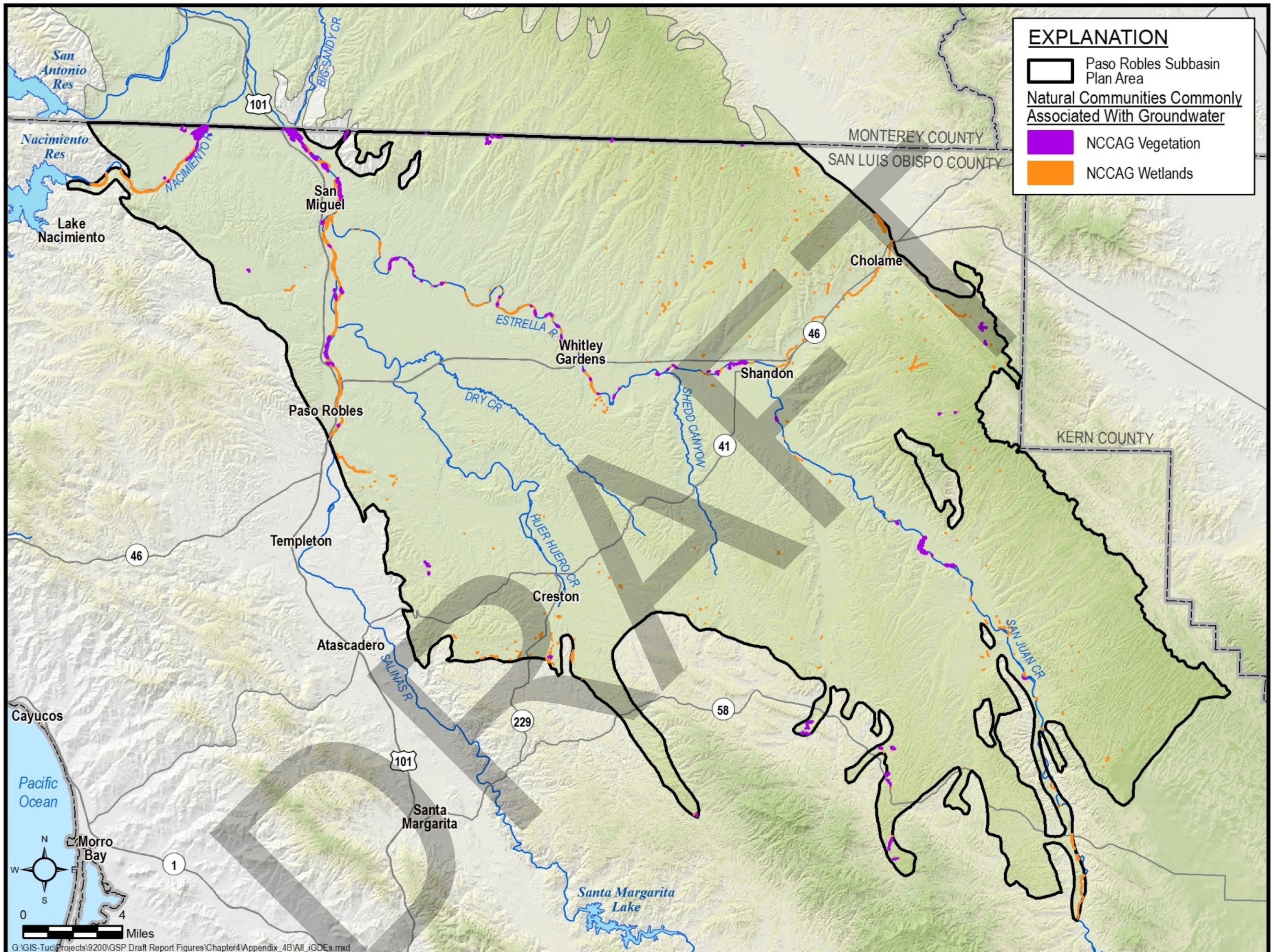

Figure B1. Indicators of groundwater-dependent ecosystems (iGDEs)

CRITERIA FOR CONNECTION TO GROUNDWATER

The iGDEs identified by TNC data can only be true GDEs if they are connected to a groundwater source that supports the vegetation or wetlands. Potential iGDEs that are supported by streamflows, soil moisture, or shallow perched aquifers are not considered GDEs for this report. The report by Rohde et al. (2018) provides a general list of questions, or criteria, applicable to all iGDEs for assessing connection to groundwater. These general questions are:

- Is the iGDE underlain by a shallow unconfined or perched aquifer that has been delineated as being part of a Bulletin 118 principal aquifer in the Subbasin?
- Is the depth to groundwater under the iGDE less than 30 feet?
- Is the iGDE located in an area known to discharge groundwater (e.g. springs/seeps)?

The datasets described above are used to assess the potential connection of iGDEs to groundwater based on the three criteria listed above. The final potential GDEs are the iGDEs satisfying at least one of the three criteria described above. Alternately, an iGDE is classified as a potential GDE if it is in a physiographic setting that would support classification as a GDE. In the absence of more formal field reconnaissance, the results of this screening level analysis only identify potential GDEs in the Subbasin. Additional field verification is necessary to definitively determine the true GDEs in the Paso Robles Subbasin.

Question 1: Is the iGDE underlain by a shallow unconfined or perched aquifer that has been delineated as being part of a Bulletin 118 principal aquifer in the Subbasin?

Bulletin 118 (DWR, 2003) identifies two primary water-bearing formations in the Subbasin: Quaternary alluvium (Qa) and the Plio-Pleistocene-age Paso Robles formation (QTp). The Qa's thickness ranges from 30 to 130 feet and is highly permeable relative to the QTp. Groundwater in the Qa occurs under unconfined, or water-table conditions. The Qa extent was determined based on the surficial geologic map of SLO County (SLO County, 2007). This analysis assumes that all iGDEs that overlie the Quaternary alluvial unit are connected to shallow groundwater Qa sediments, and are therefore classified as potential GDEs as recommended by Rohde and others (2018). The Qa's extent and coincident potential GDEs are shown on Figure B2. Most iGDEs within the Subbasin fall within the Qa extent.

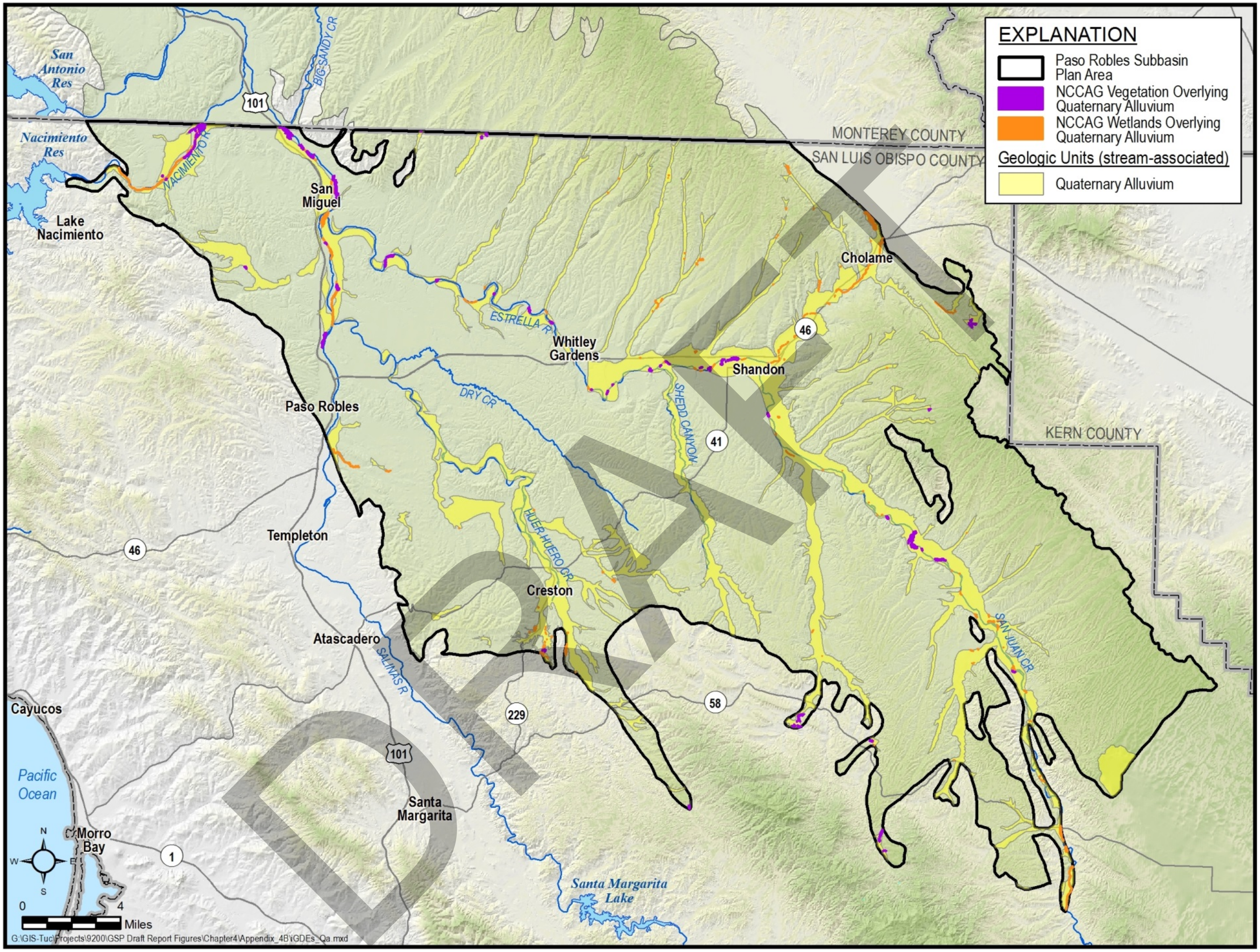

Figure B2. iGDEs associated with the shallow, unconfined Quaternary alluvial (Qa) aquifer

This criterion clearly has the potential to overestimate the number of potential GDEs in the Subbasin. The subjective assessment of what constitutes a shallow unconfined aquifer may result in identifying potential GDEs in areas that do not have the underlying groundwater to support the GDE. This emphasizes the need for field verification of the potential GDEs identified in this GSP.

Question 2: Is depth to groundwater under the iGDE less than 30 feet?

Depth to water is routinely measured by SLO County staff within a network of monitoring wells. Figure B3 shows the locations of SLO County monitoring wells completed in the Qa. This analysis uses spring 2017 depth to water data where available. A representative value for spring depth to water was used based on review of historical groundwater levels to establish depth to water for wells at which spring 2017 data were unavailable. Wells where depth to water is less than 30 feet are shown in blue on Figure B3. Wells where depth to water is greater than 30 feet are shown in yellow. The spring 2016 simulated water table elevation was analyzed to identify areas where depth to water is less than 30 feet. iGDEs overlying these areas are classified as potential GDEs.

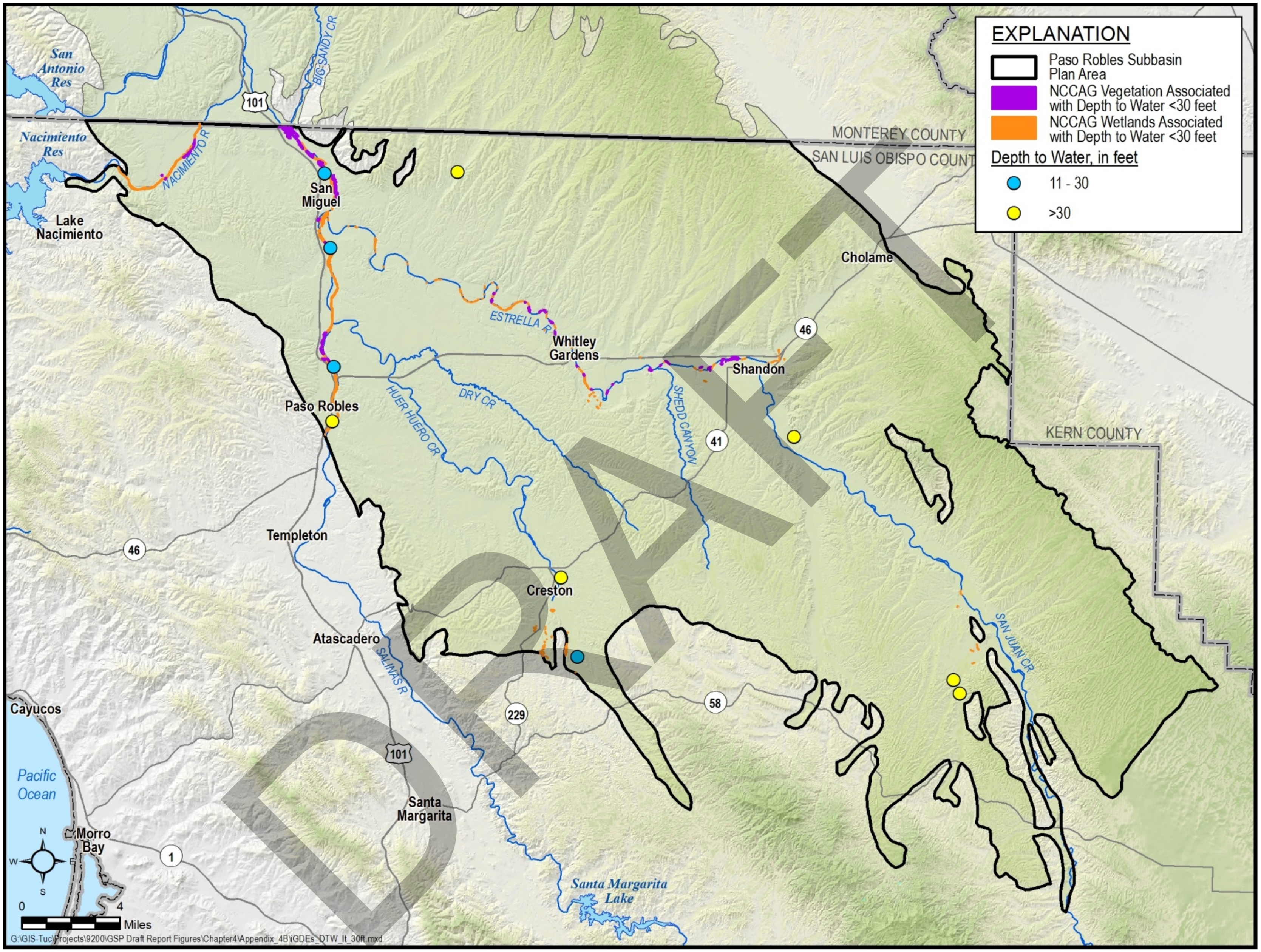

Figure B3. Qa monitoring wells, model cells with spring/summer depth to water less than 30 feet, and areas of simulated groundwater discharge

Is the iGDE located in an area known to discharge groundwater (e.g., springs/seeps)?

Springs and seeps in the Subbasin identified in National Hydrography Dataset (NHD) tend to be located in the foothills of the Santa Lucia and Temblor mountain ranges, which bound the Subbasin to the west and east, respectively.

Figure B4 shows the location of NHD seeps and springs. iGDEs within 0.5 miles of a seep/spring point are classified as potential GDEs.

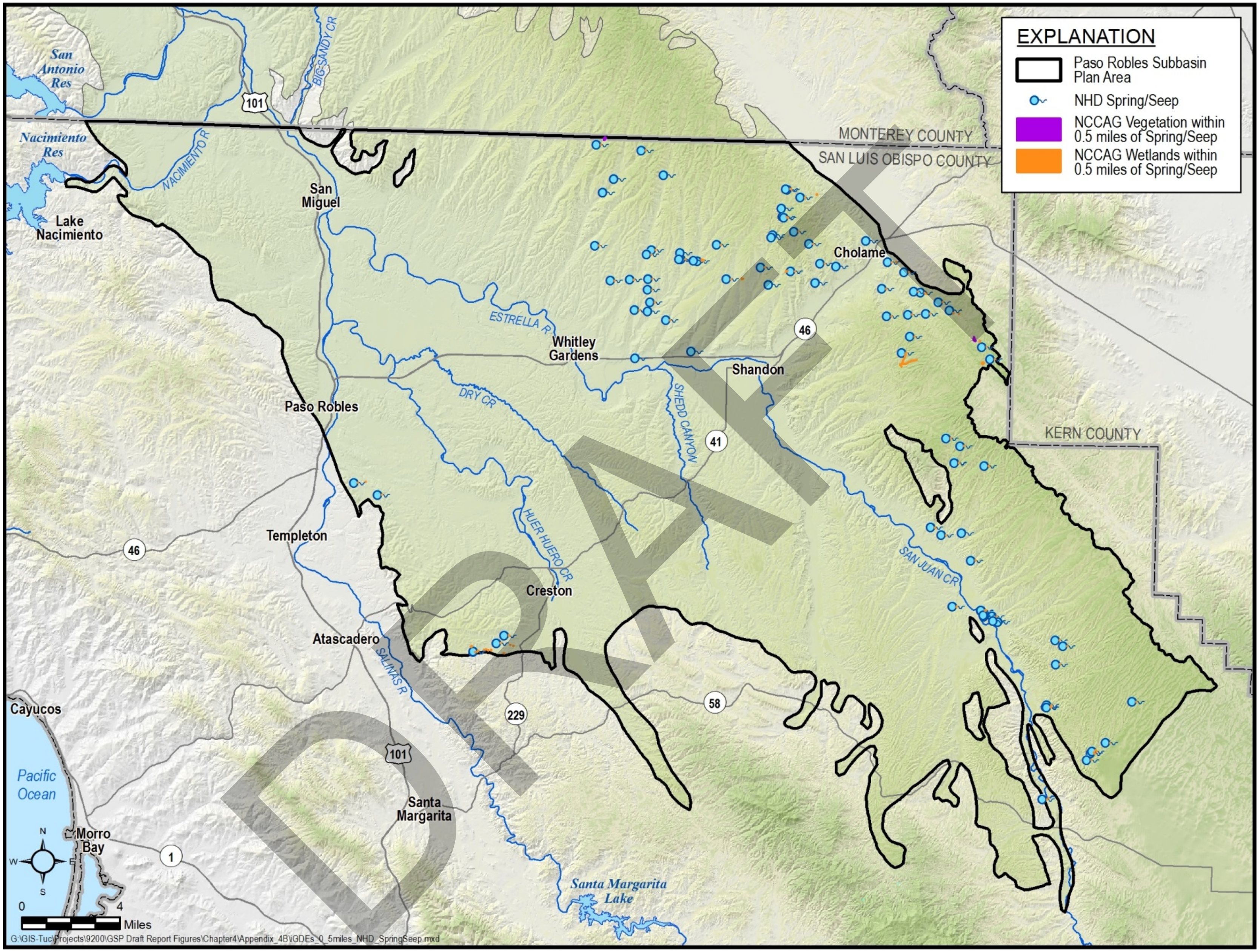

Figure B4. NHD springs and seeps and iGDEs within 0.5 miles of spring or seep

FINAL DELINEATION OF POTENTIAL GROUNDWATER DEPENDENT ECOSYSTEMS

After evaluating the three criteria listed above for connection to groundwater, additional iGDEs were identified that should be classified as potential GDEs based on physiographic setting, effectively loosening the criteria for association with either the shallow alluvial aquifer or springs and seeps. The purpose for this task was to ensure that the extent of potential GDEs would err on the side of estimating maximum GDE extent. Specifically:

1. iGDEs within 0.5 miles of the mapped Qa outcrop are assumed to be hydraulically connected to the shallow alluvial aquifer. Furthermore, iGDEs that appear to be physically connected with other identified potential GDEs in the Qa were manually identified and added to the extent of potential GDEs. Figure B5 shows all potential GDEs resulting from this analysis.
2. Remaining iGDEs were evaluated to determine their relationship to areas where seeps and springs might occur. These include areas near mapped clusters of seeps and springs such as the northeast mountainous region of the Subbasin shown on Figure B6; or areas with breaks in the slope of the land surface that may cause "groundwater to emerge or vegetation to congregate on the surface" (Rohde and others, 2018). Figure B6 shows all potential GDEs associated with known springs or seeps or located in areas that potentially host springs or seeps.

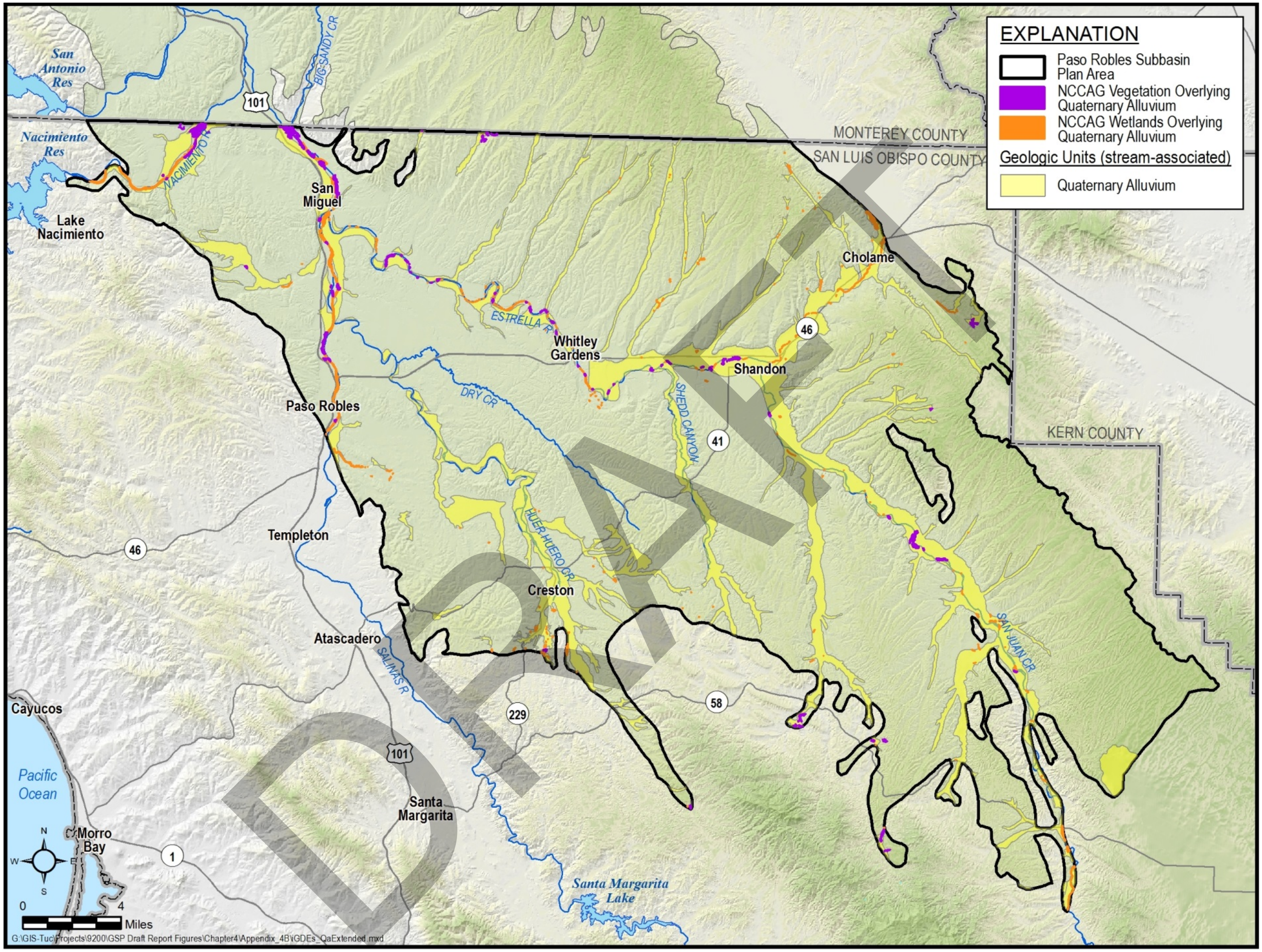

Figure B5. iGDEs associated with Quaternary alluvium (overlying, within 0.5 miles, or manually selected)

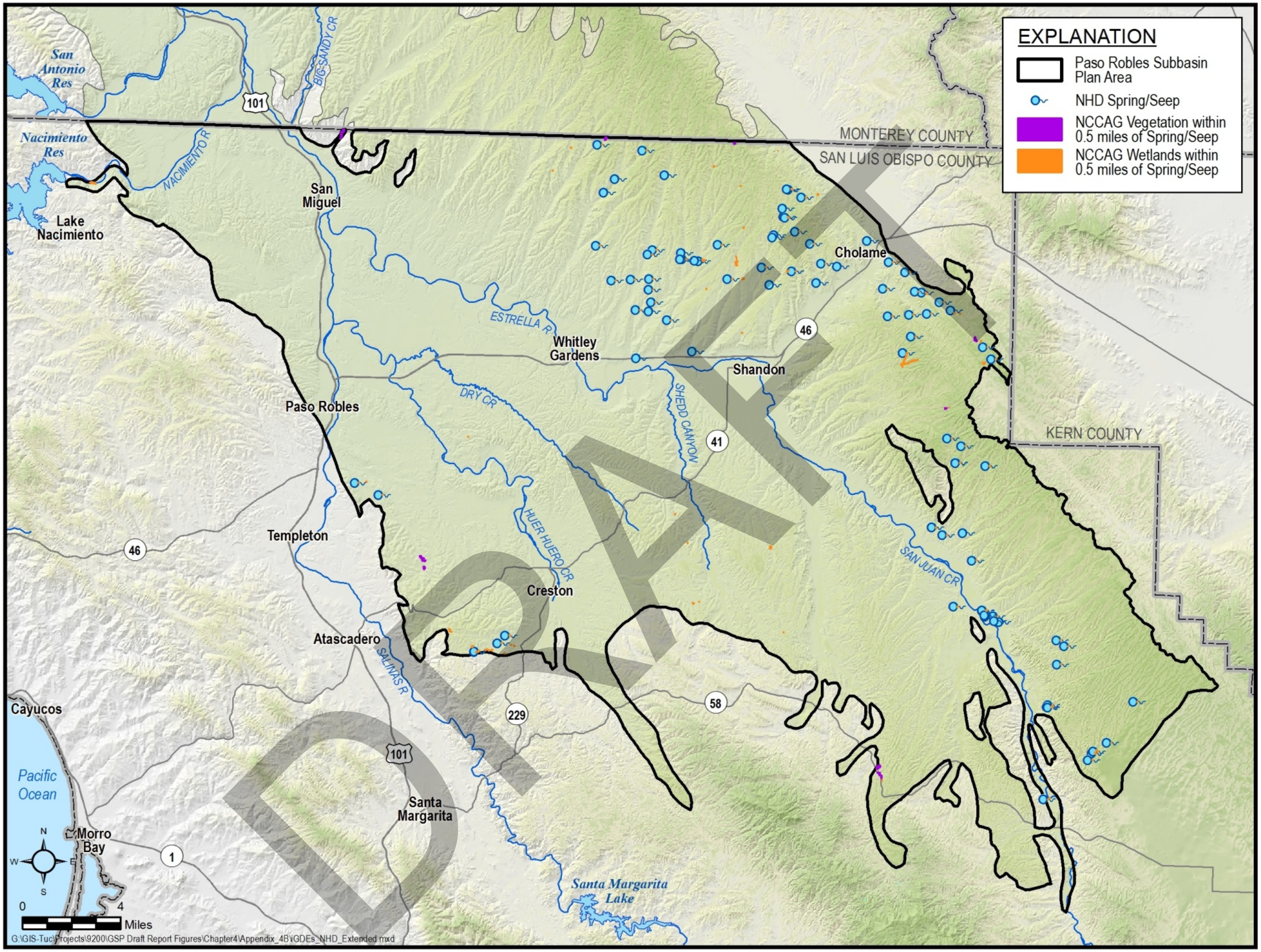

Figure B6. iGDEs associated with springs or seeps or located in an area with potential springs or seeps

Measured groundwater levels within SLO County do not suggest additional areas where groundwater is close enough to the surface to be a significant source for natural communities. The report by Rhode et al. (2018) lists additional spatial data that could be considered for identifying GDS including Critical Habitat for Threatened and Endangered Species, California Protected Areas, and Areas of Conservation Emphasis. None of these datasets show additional potential GDEs in the Subbasin. No additional potential GDEs were identified based on a review of local water and environmental management reports.

The final set of potential GDEs in the Subbasin are shown in Figure B7. Field verification is necessary to assess whether these potential GDEs are true GDEs.

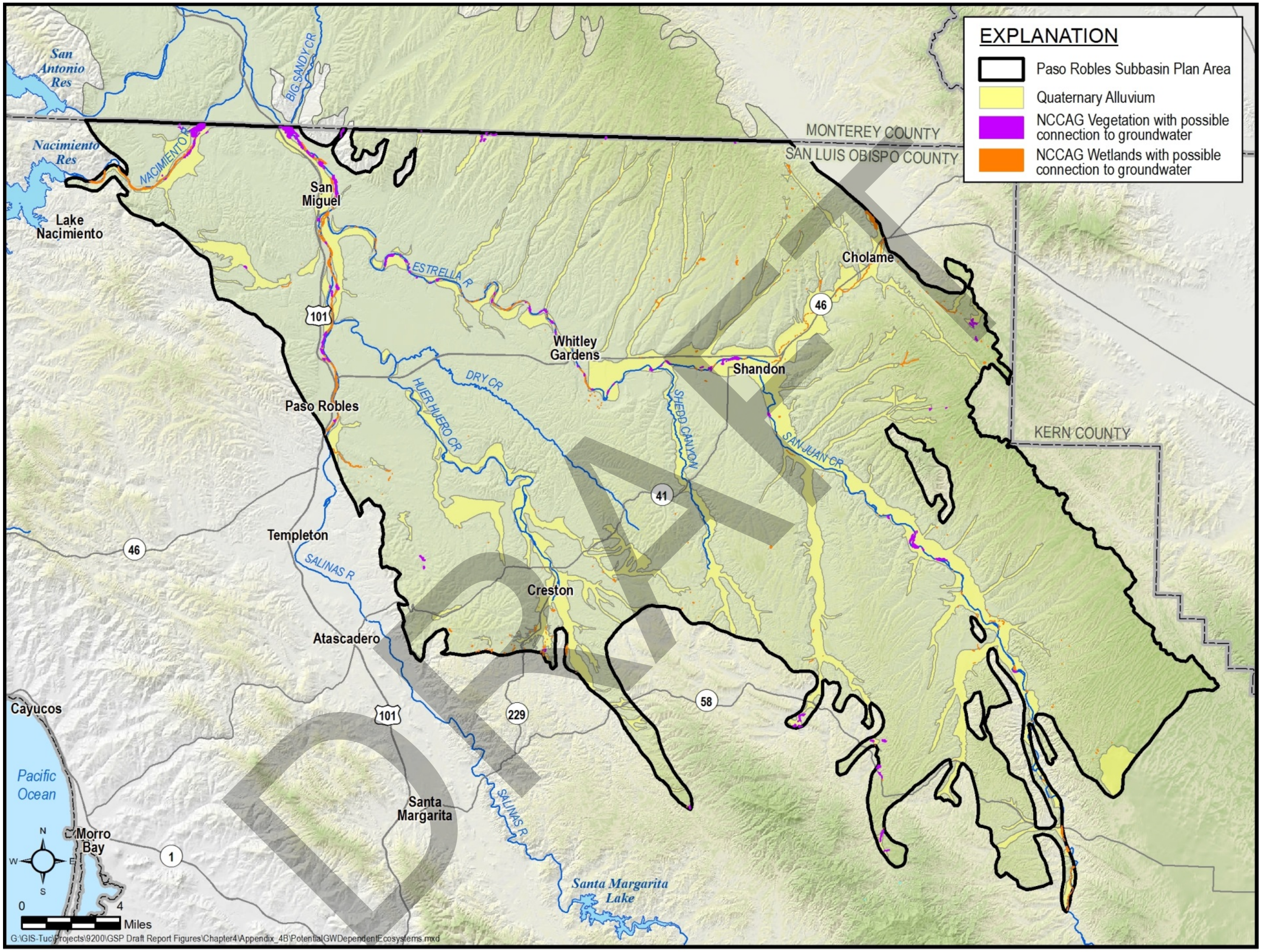

Figure B7. Extent of potential GDEs

REFERENCES

Rohde, M. M., S. Matsumoto, J. Howard, S. Liu, L. Riege, and E.J. Remson, 2018, Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act: Guidance for Preparing Groundwater Sustainability Plans: The Nature Conservancy, San Francisco, California.

California Department of Water Resources (DWR), 2003, Bulletin 118 Basin Descriptions: Salinas Valley Groundwater Basin, Paso Robles Area Subbasin, accessed at https://water.ca.gov/Programs/Groundwater-Management/Bulletin-118

County of San Luis Obispo, Planning and Building Department, 2007, Surface geology map, accessed at https://lib.calpoly.edu/gis/browse.jsp?by=e&e=2

Draft
Paso Robles Subbasin
Groundwater Sustainability Plan
Chapter 5

Prepared for the Paso Robles Subbasin
Cooperative Committee and the
Groundwater Sustainability Agencies

October 10, 2018

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CHAPTER 5. GROUNDWATER CONDITIONS

This chapter describes the current and historical groundwater conditions in the Alluvial Aquifer and the Paso Robles Formation Aquifer in the Paso Robles Subbasin. In accordance with the SGMA emergency regulations §354.16, current conditions are any conditions occurring after January 1, 2015. By implication, historical conditions are any conditions occurring prior to January 1, 2015. The chapter focuses on information required by the GSP regulations and information that is important for developing an effective plan to achieve sustainability. The organization of Chapter 5 aligns with the five sustainability indicators applicable to the Subbasin including:

1. Chronic lowering of groundwater elevations,
2. Changes in groundwater storage,
3. Seawater intrusion,
4. Subsidence,
5. Depletion of interconnected surface waters, and
6. Groundwater quality.

5.1 GROUNDWATER ELEVATIONS

The following assessment of groundwater elevation conditions is largely based on data from the San Luis Obispo County Flood Control and Water Conservation District's (SLOFCWCD) groundwater monitoring program. Groundwater levels are measured by the SLOFCWCD through a network of public and private wells in the Subbasin. Additional groundwater elevation data for wells were obtained from other available data sources, including the California Statewide Groundwater Elevation Monitoring (CASGEM) database, USGS, and other regulatory compliance programs. Locations of the wells (about 50 to 55 depending on year) used for the groundwater elevation assessment are shown on Figure 5-1. Data from some of the wells on this figure were collected under confidentiality agreements. To remain consistent with these confidentiality agreements, the well owner information and specific locations for these wells are not provided in this GSP.

The set of wells shown on Figure 5-1 were selected from a larger set of monitor wells in the SLOCFCWCD database based on the following criteria:

- The wells have groundwater elevation data for 1997 and/or 2017;
- Sufficient information exists to assign the well to either the Alluvial Aquifer or Paso Robles Formation Aquifer; and
- Groundwater elevation data were deemed representative of static conditions based on a check of consistency with nearby wells.

Additional information on the monitoring network is provided in Chapter 8 – Monitoring Networks.

Based on available data, the following information is presented in subsequent subsections for both aquifers in the Subbasin.

- Groundwater elevation contour maps for the seasonal high and low periods for 1997 and 2017
- A map depicting the change in groundwater elevation between 1997 and 2017
- Hydrographs for wells with publicly available data
- Assessments of horizontal and vertical groundwater gradients

5.1.1 ALLUVIAL AQUIFER

Groundwater elevation data for the Alluvial Aquifer are limited. The locations of the Alluvial Aquifer monitor wells with available groundwater elevation data are shown on Figure 5-1.

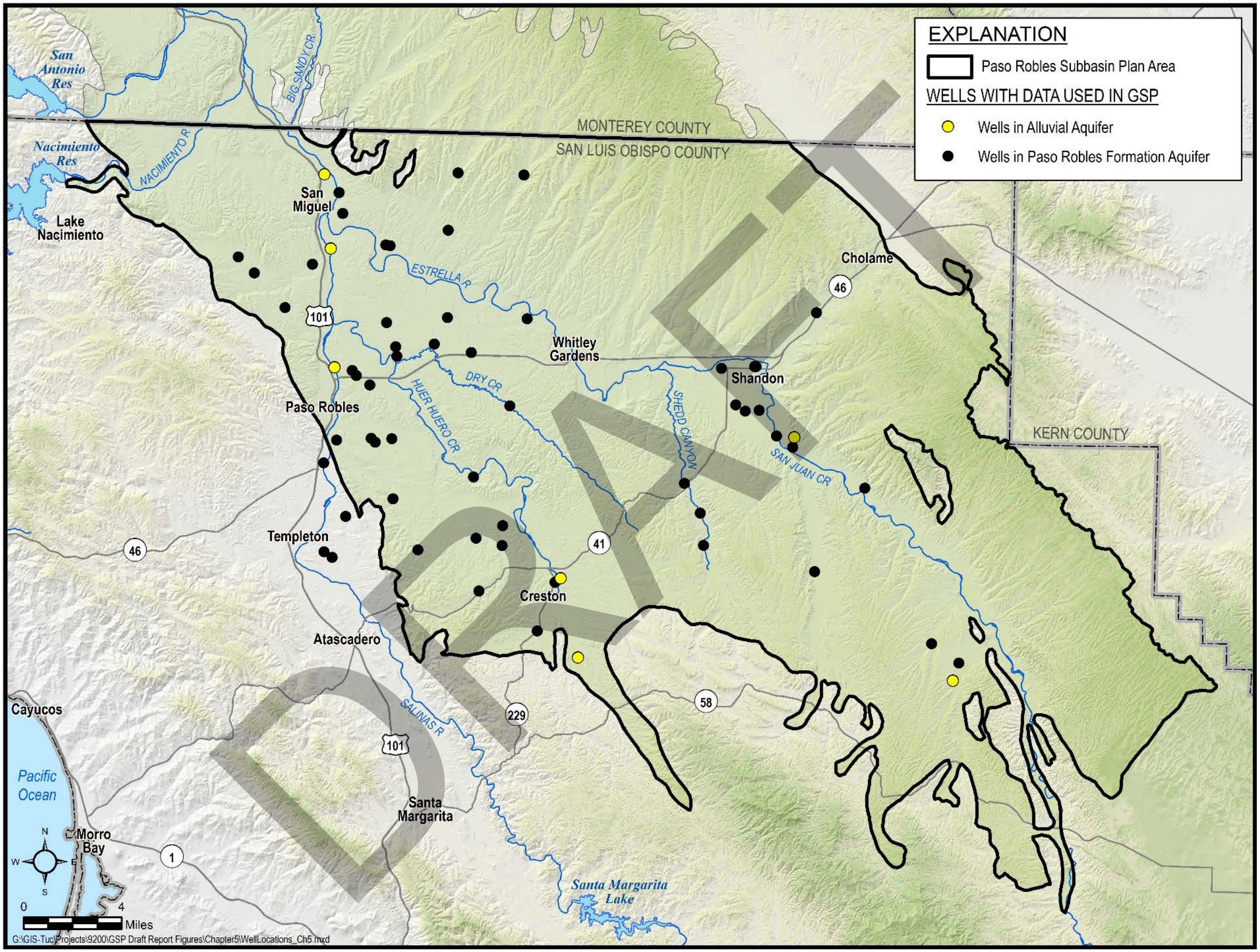


Figure 5-1. Location of Wells used for the Groundwater Elevation Assessments

5.1.1.1 Alluvial Aquifer Groundwater Elevation Contours and horizontal groundwater gradients

Groundwater elevation data for the Alluvial Aquifer are too limited to prepare representative contour maps for the seasonal high and seasonal low groundwater elevations, or to prepare maps for historical groundwater elevations. Figure 5-2 shows current groundwater elevation contours for the Alluvial Aquifer. The contours were developed using 2017 data when available and the most recent data prior to 2017. Contours are only depicted on the map in areas near the wells that are shown on Figure 5-1.

Groundwater elevations range from approximately 1,400 feet above mean sea level (ft msl) in the southeastern portion of the Subbasin to approximately 600 ft msl near San Miguel. Groundwater flow in the Alluvial Aquifer generally follows the alignment of the creeks and rivers. Overall, groundwater in the Alluvial Aquifer flows from southeast to northwest across the Subbasin. Groundwater elevation data in the Alluvial Aquifer are too sparse to develop meaningful estimates of local horizontal groundwater gradients. On a basin-wide scale, the average horizontal hydraulic gradient in the alluvium is about 0.004 from the southeastern portion of the Subbasin to San Miguel.

5.1.1.1 Alluvial Aquifer Hydrographs

Groundwater level data for all of the Alluvial Aquifer wells shown on Figure 5-1 were collected under confidentiality agreements. Therefore, hydrographs for the Alluvial Aquifer are not included in this GSP. The lack of publicly available groundwater level data for the Alluvial Aquifer is a significant data gap.

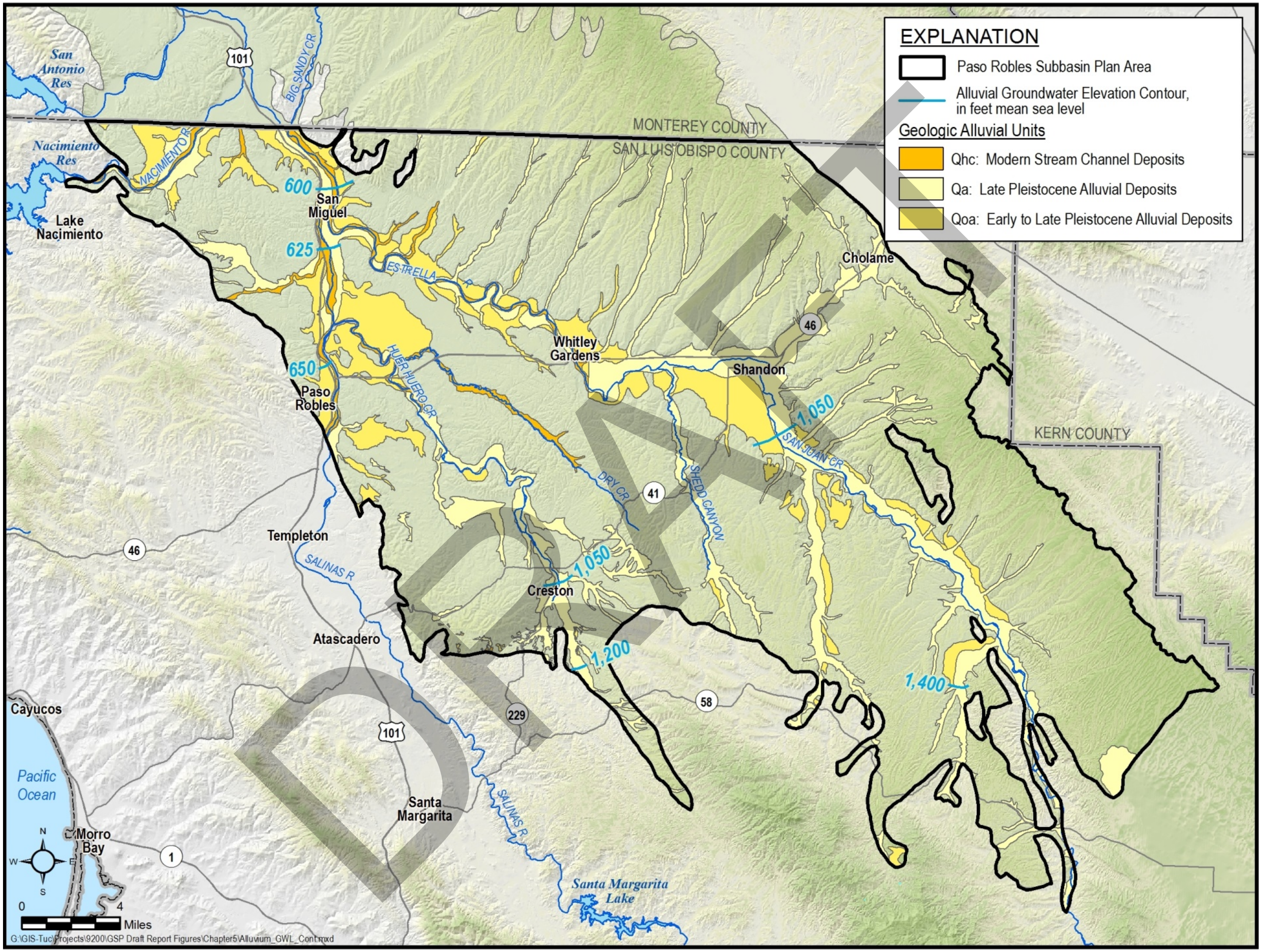


Figure 5-2. Groundwater Elevation Contours for the Alluvial Aquifer

5.1.2 Paso Robles Formation Aquifer

The locations of the Paso Robles Formation Aquifer monitor wells used to assess the hydrogeologic conditions of the Paso Robles Formation Aquifer are shown on Figure 5-1. Groundwater occurs in the Paso Robles Formation Aquifer under unconfined, semi-confined, and confined conditions.

5.1.2.1 Paso Robles Aquifer Groundwater elevation contours and horizontal groundwater gradients

Groundwater elevation data for 1997 and 2017 for the Paso Robles Formation Aquifer were contoured to assess current spatial variations, groundwater flow directions, and horizontal groundwater gradients. Contour maps were prepared for the seasonal high groundwater levels, which is typically in the spring, and the seasonal low groundwater levels, which is typically in the fall. In general, the spring groundwater data are for April and the fall groundwater data are for October. Data from public and private wells were used for contouring; information identifying the owner or detailed location of private wells is not shown on the maps. The contours are based on groundwater elevations measured at the well locations shown on Figure 5-1. Contour maps were generated using a computer-based contouring program and checked for representativeness by a qualified hydrogeologist. Groundwater elevation data deemed unrepresentative of static conditions or obviously erroneous were not used for contouring. Similar to groundwater elevation contour maps prepared for previous studies, close inspection of the maps indicates localized areas where interpolated groundwater elevations are above land surface. This typically occurs near streams and incised drainages where land surface tends to be locally lower than surrounding areas. While it is hydrologically possible that groundwater elevations in the Paso Robles Formation Aquifer are above land surface in some local areas, our assessment is that this is more likely an artifact of the computer contouring of sparse groundwater elevation data.

Figure 5-3 and Figure 5-4 show contours of historical groundwater elevations in the Paso Robles Formation Aquifer for spring 1997 and fall 1997, respectively. Overall, groundwater conditions in the Subbasin in the spring and fall of 1997 are similar. Close inspection of the contour maps indicates that groundwater elevations are generally lower in the fall than spring. Groundwater elevations ranged from about 1,300 ft msl in the southeast portion of the Subbasin to about 550 ft msl near the City of Paso Robles and the town of San Miguel (Figure 5-3 and Figure 5-4). Groundwater flow is generally to the northwest and west over most of the Subbasin, except in the area north of the City of Paso Robles where groundwater flow is to the northeast. In general, groundwater flow in the western portion of the Subbasin tends to converge toward areas of low groundwater elevations. These areas of low groundwater elevation are caused by pumping in the area between the City of Paso Robles, and the communities of San Miguel and Whitley Gardens.

Horizontal groundwater gradients range from approximately 0.003 foot/foot in the southeast portion of the Subbasin to approximately 0.01 foot/foot in the areas both southeast of the City of Paso Robles and northwest of Whitley Gardens. The steepest horizontal groundwater gradients in the Subbasin are on the margins of the pumping depression in the vicinity of the city of Paso Robles and community of San Miguel.

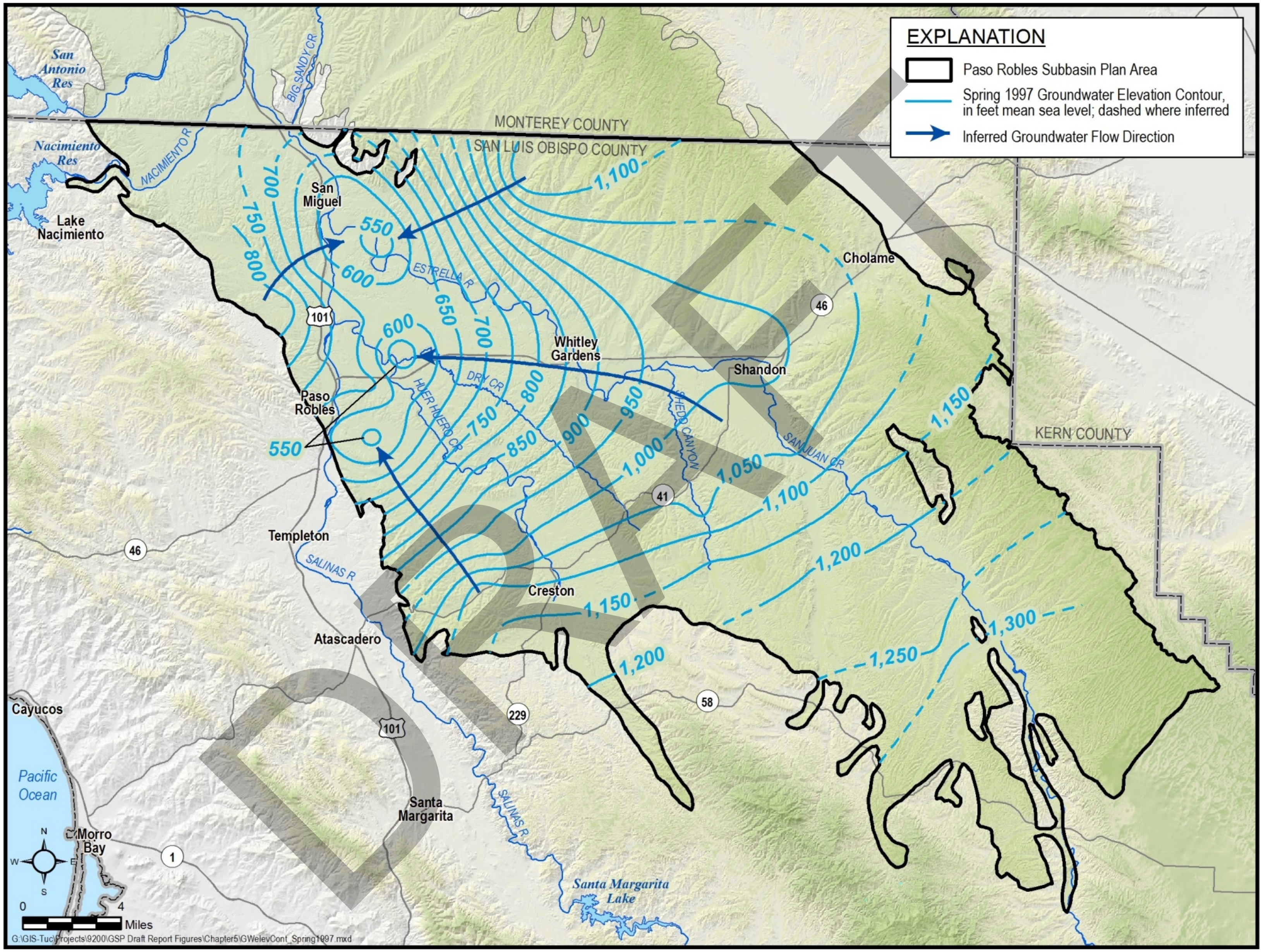


Figure 5-3. Spring 1997 Paso Robles Formation Aquifer Groundwater Elevation Contours

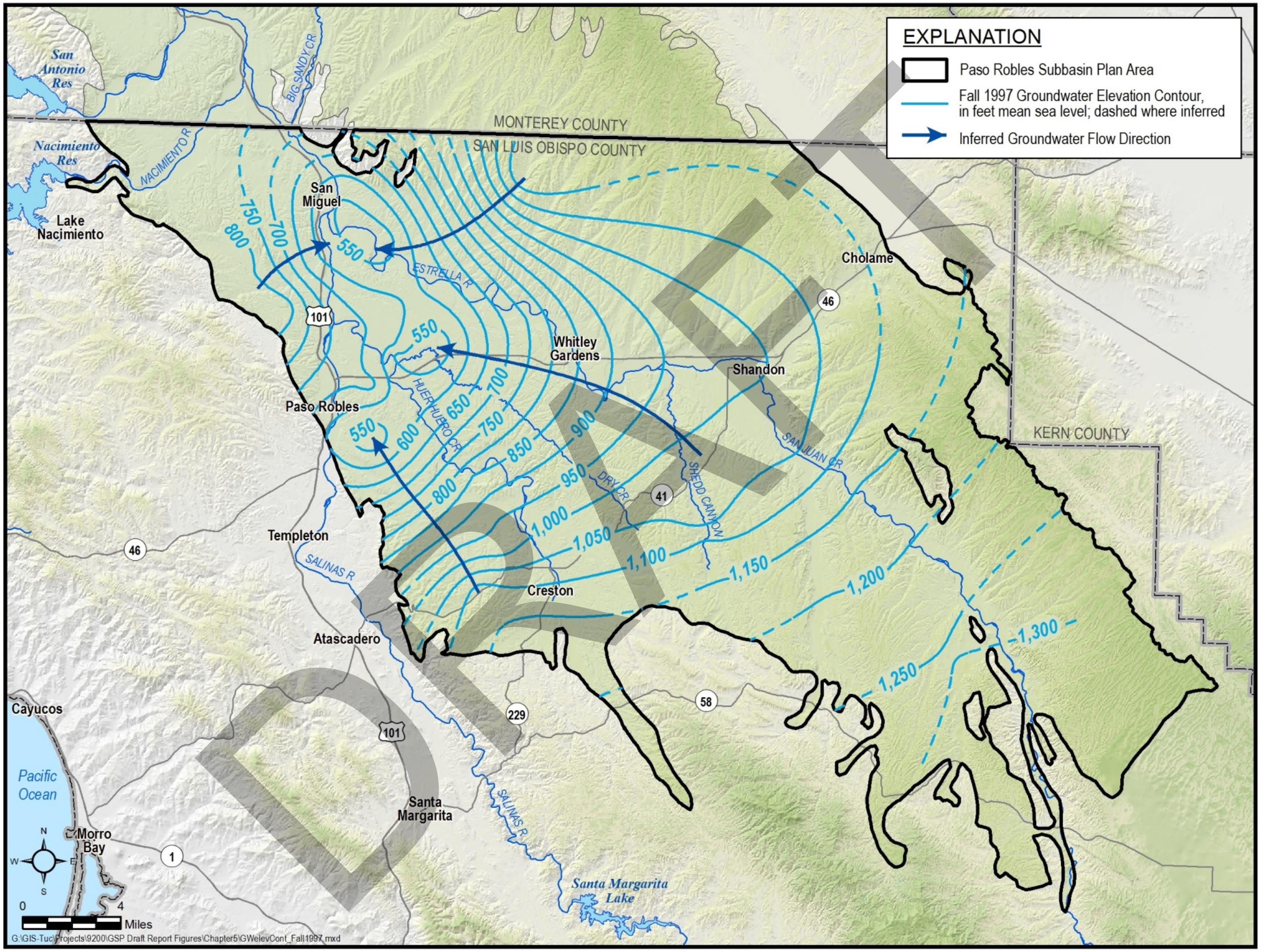


Figure 5-4. Fall 1997 Paso Robles Formation Aquifer Groundwater Elevation Contours

Figure 5-5 and Figure 5-6 show contours of current groundwater elevations in the Paso Robles Formation Aquifer for spring 2017 and fall 2017, respectively. Overall, groundwater conditions in the Subbasin in the spring and fall of 2017 were similar. Close inspection of the contour maps indicates that groundwater elevations are generally lower in the fall than spring. Groundwater elevations in 2017 are also lower than groundwater elevations in 1997. Groundwater elevations in 2017 ranged from about 1,250 ft msl in the southeast portion of the Subbasin to about 500 ft msl east of the City of Paso Robles (Figure 5-5 and Figure 5-6). Groundwater flow is generally to the northwest and west over most of the Subbasin, except in the area north of the City of Paso Robles where groundwater flow is to the northeast. In general, groundwater flow in the western portion of the Subbasin tends to converge toward areas of low groundwater elevations. These areas of low groundwater elevation are caused by pumping in the area between the City of Paso Robles and the communities of San Miguel and Whitley Gardens. Horizontal groundwater gradients range from approximately 0.002 foot/foot in the southeast portion of the Subbasin to approximately 0.02 foot/foot in the area southeast of the City of Paso Robles. The steepest horizontal groundwater gradients in the Subbasin in 2017 are on the margins of the pumping depression east of the city of Paso Robles and southeast of the community of San Miguel.

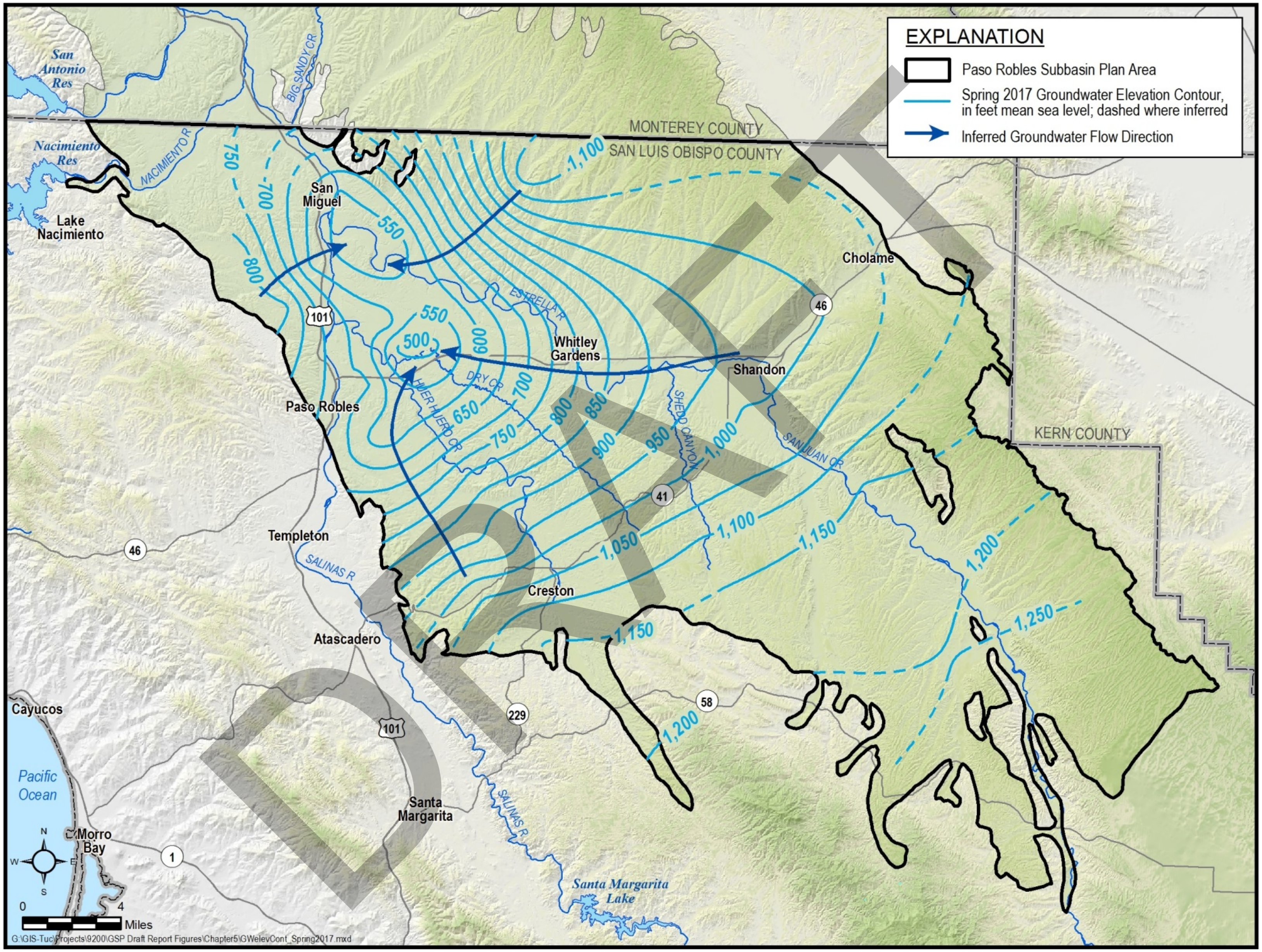


Figure 5-5. Paso Robles Formation Aquifer Spring 2017 Groundwater Elevation Contours

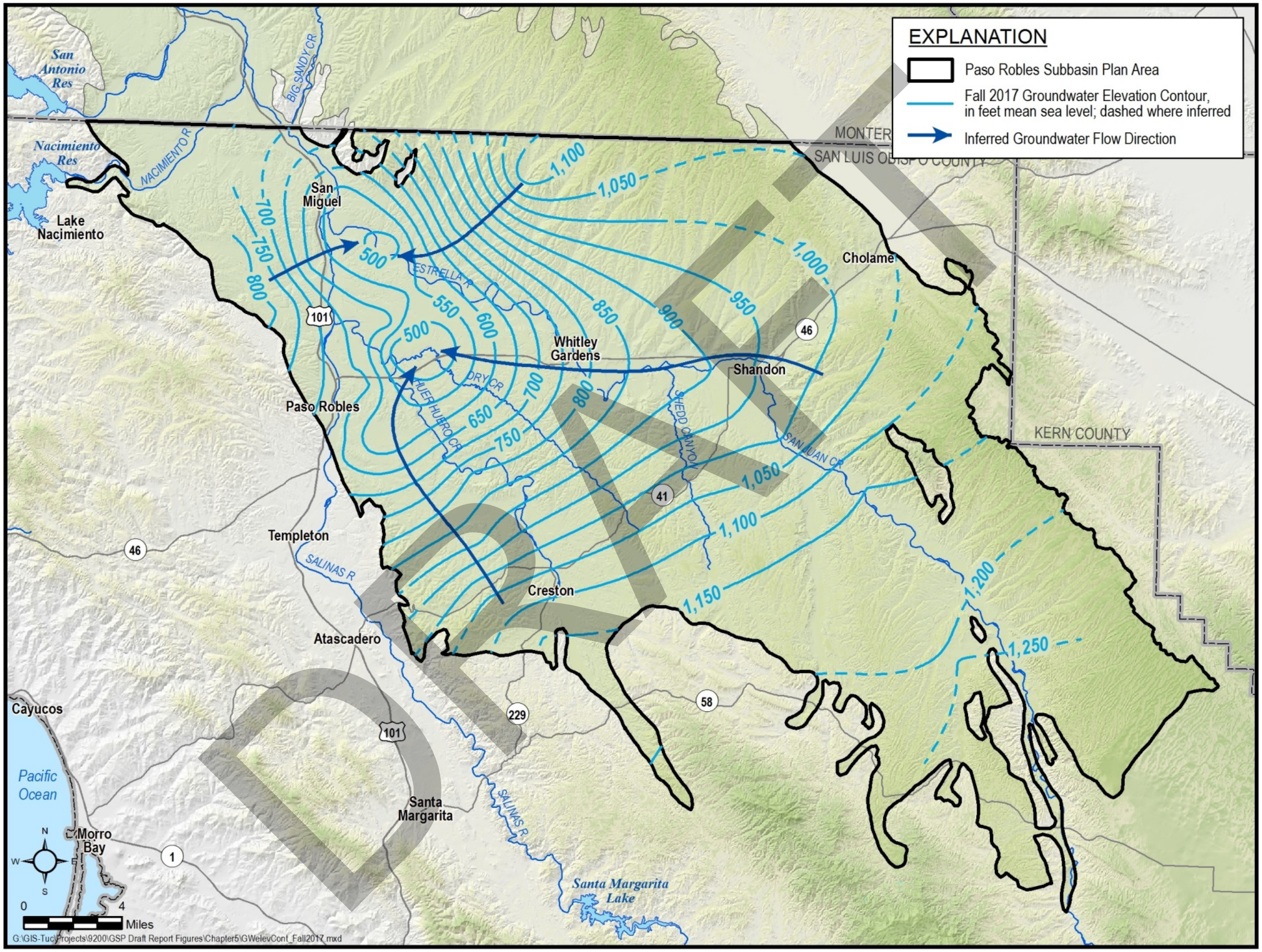


Figure 5-6. Paso Robles Formation Aquifer Fall 2017 Groundwater Elevation Contours

Figure 5-7 depicts the change in spring groundwater elevations in the Paso Robles Formation Aquifer between 1997 and 2017. Figure 5-8 depicts the change in fall groundwater elevations in the Paso Robles Formation Aquifer between and 1997 and 2017. Groundwater elevations are lower in 2017 than 1997 throughout most of the Subbasin. In general, the pattern of groundwater level decline in the spring and fall are similar, with a more pronounced area of decline extending toward Shandon in the fall. More than 80 feet of decline is observed in places during this period. Areas of largest decline are east of the city of Paso Robles, near Creston, and in the southeastern portion of the basin. Limited data suggest an area of higher groundwater elevations exists in the vicinity of the city of Paso Robles in 2017 compared to 1997. The increase may be related to reductions in groundwater pumping in the area.

The groundwater level contours and groundwater level change maps in this GSP are based on a reasonable and thorough analysis of the currently available data. As discussed in Chapter 8, the monitoring network should be expanded to more completely assess Subbasin conditions and demonstrate compliance with the sustainability goal for the Subbasin. Expanding the monitoring network and acquiring more groundwater elevation data will allow the GSAs to refine and modify this GSP in the future based on a more complete understanding of Subbasin conditions.

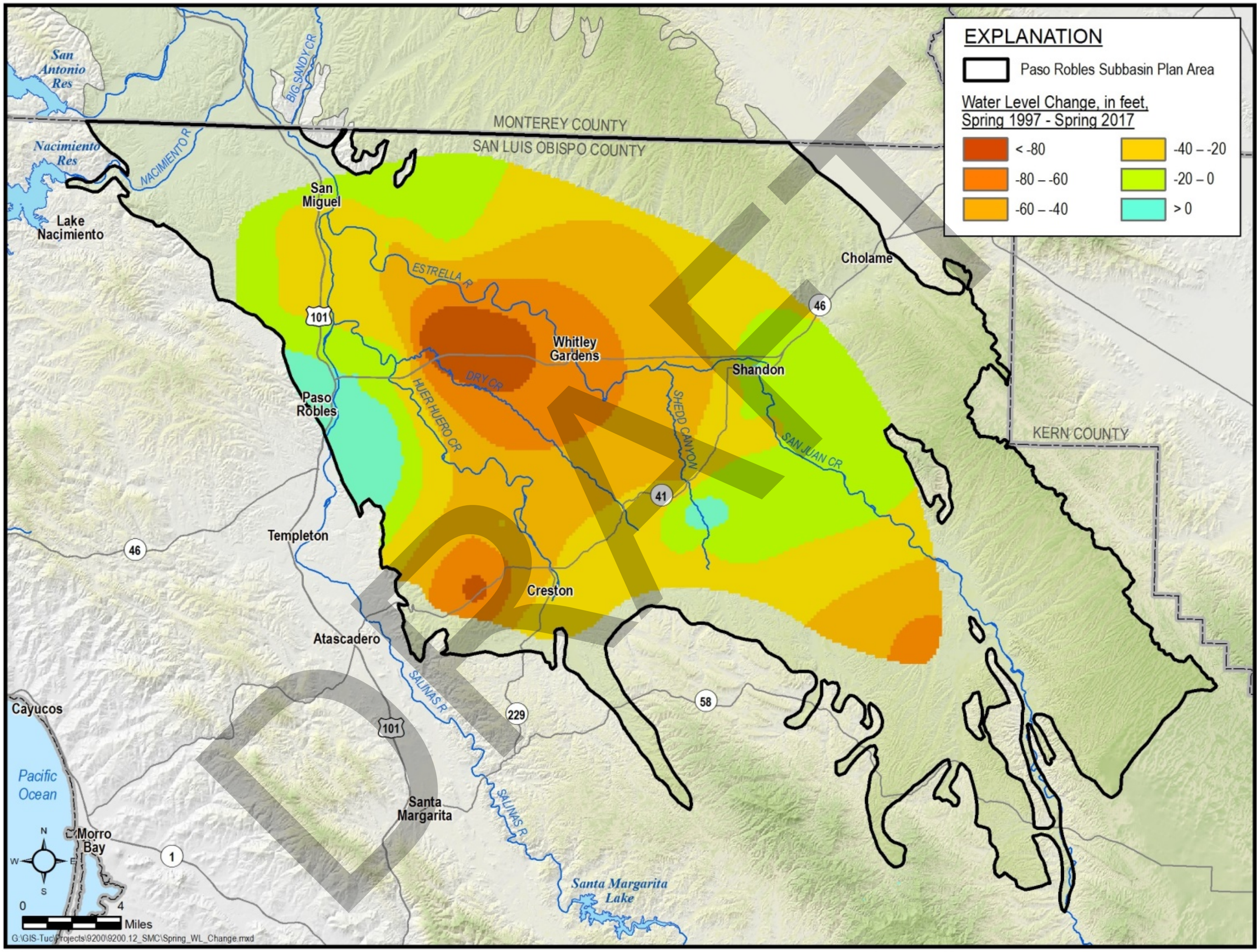


Figure 5-7. Paso Robles Formation Aquifer Change in Groundwater Elevation – Spring 1997 to Spring 2017

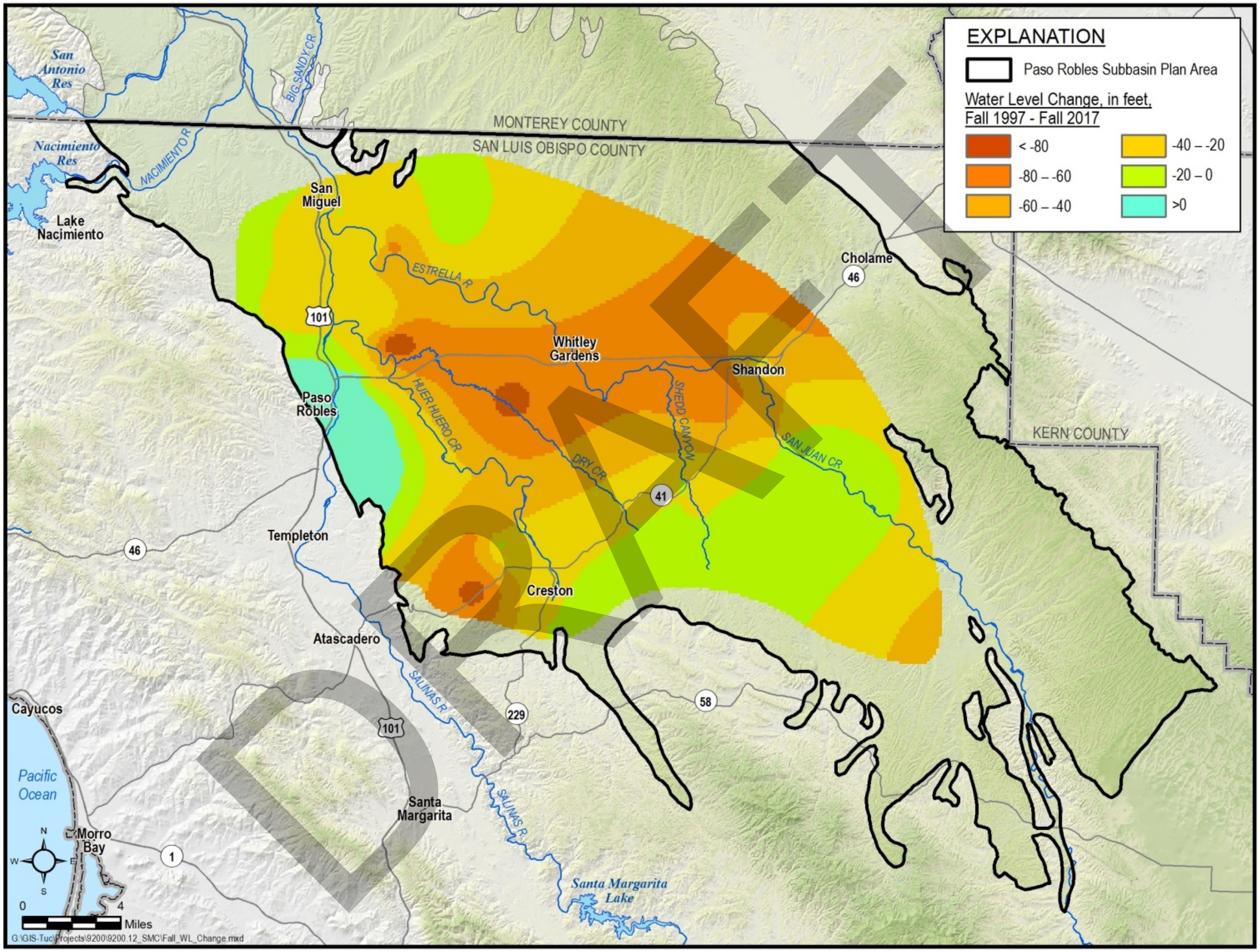


Figure 5-8. Paso Robles Formation Aquifer Change in Groundwater Elevation – Fall 1997 to Fall 2017

5.1.2.2 Paso Robles formation Aquifer Hydrographs

Appendix 5A includes hydrographs for wells in the Paso Robles Formation Aquifer that have publicly available data. Only 18 of the monitor wells have groundwater elevation data that were not collected under confidentiality agreements. The lack of publicly available groundwater level data for the Paso Robles Formation Aquifer is a significant data gap.

Figure 5-9 through Figure 5-11 show example hydrographs for wells located in the Estrella, Shandon, and Creston subareas of the Paso Robles Subbasin. Wells with publicly available data do not exist in the San Juan subarea. Long-term groundwater elevation declines are evident on all three hydrographs. The magnitude of measured declines over the period of record is generally more than 50 feet at well 25S/12E-06L01, 26S/15E-20B02, and 27S/13E-28F01.

The hydrographs show periods of climatic variations grouped by the following designations: wet, dry, or average/alternating wet and dry. Precipitation data were reviewed and analyzed to determine the occurrence and duration of wet and dry periods for the Paso Robles Subbasin. Precipitation from the Paso Robles weather station (NOAA station 46730) was used for this analysis because it is representative of conditions in the Subbasin and has the longest period of record of any station in the Subbasin. Figure 5-12 shows total annual precipitation by water year recorded at the Paso Robles station. Mean annual precipitation over the period 1925 to 2017 was 14.6 inches.

Wet and dry periods were determined based on a calculation and review of the Standardized Precipitation Index (SPI), which quantifies deviations from normal precipitation. The SPI was calculated at 1-, 2-, and 5-year time scales using the SPI Generator Tool developed by the National Drought Mitigation Center (NDMC, 2018). The 5-year, or 60-month SPI was selected as representative of multi-year meteorological fluctuations in the basin based on review of the data and computed SPI time series. For a given water year, the 60-month SPI quantifies the wetness or dryness of the preceding 60 months relative to the overall period of record. The annual time-series of the 60-month SPI was reviewed and generalized to determine wet and dry periods from 1930 to 2017 (Figure 5-12). A third category, "Average/ alternating", is included for years during which the preceding 60-month period does not show a strong and persistent deviation from normal precipitation.

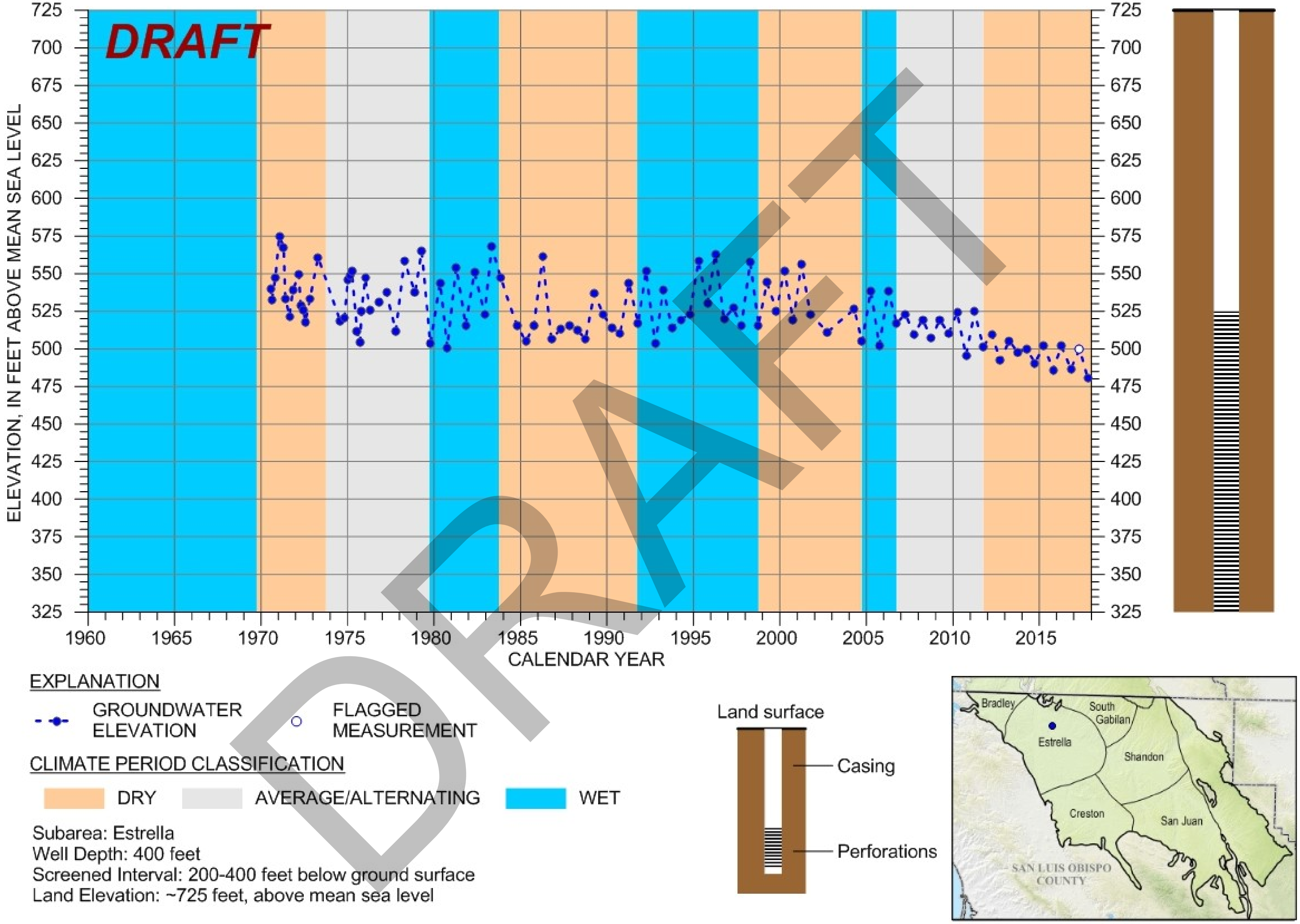


Figure 5-9. Groundwater Elevation at Paso Robles Formation Aquifer Well 25S/12E-26L01

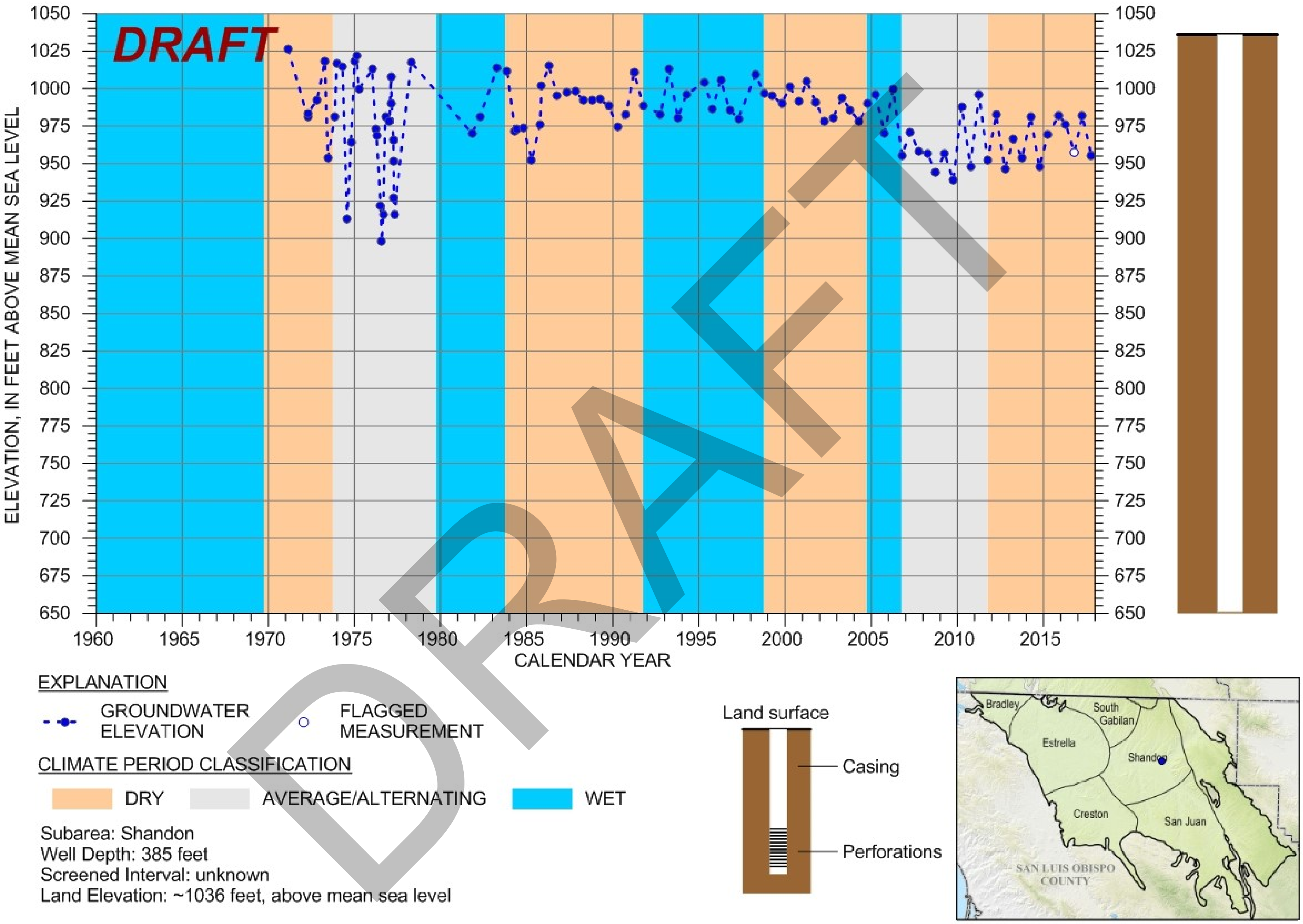


Figure 5-10. Groundwater Elevation at Paso Robles Formation Aquifer Well 26S/15E-20B02

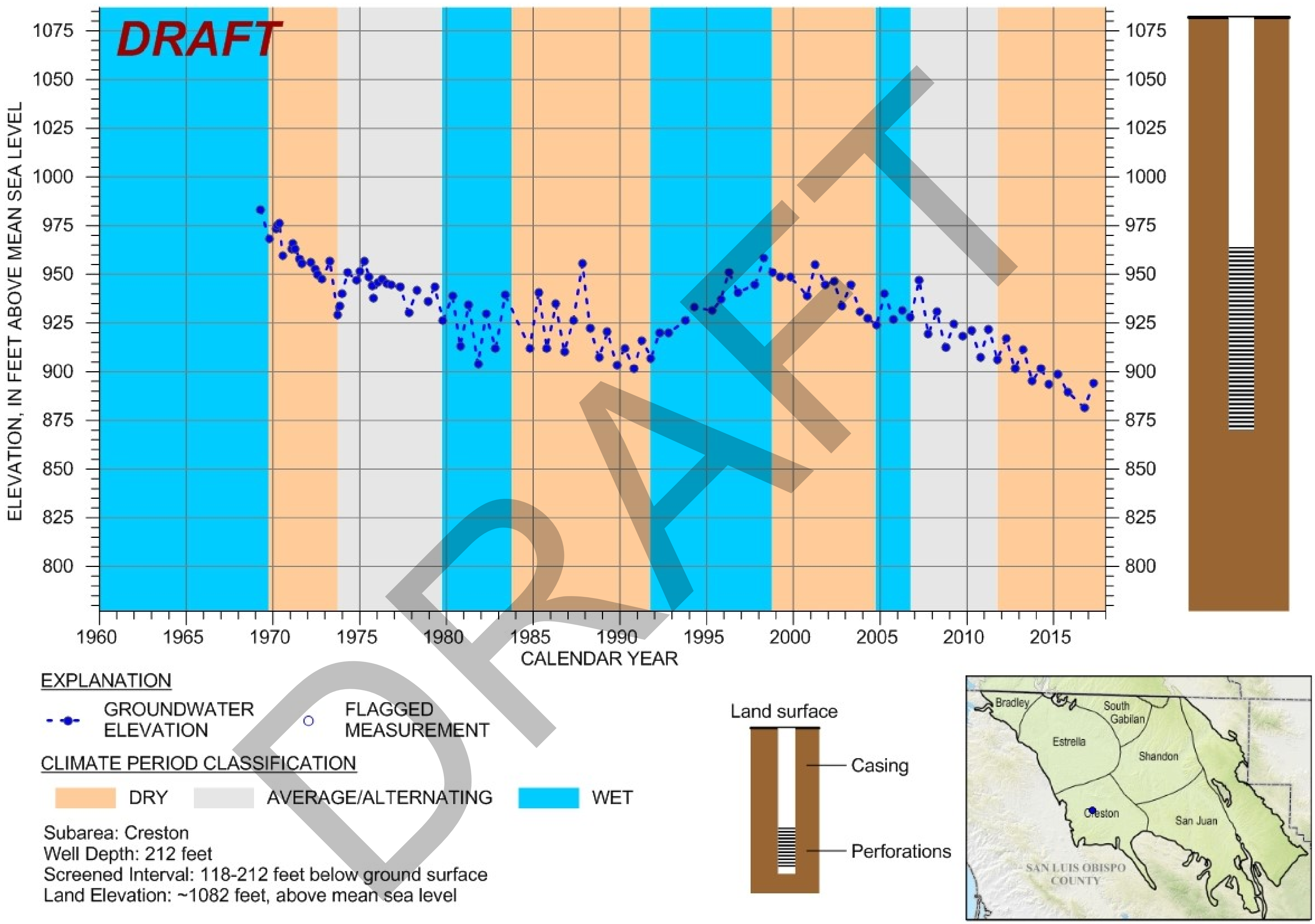


Figure 5-11. Groundwater Elevation at Paso Robles Formation Aquifer Well 27S/13E-28F01

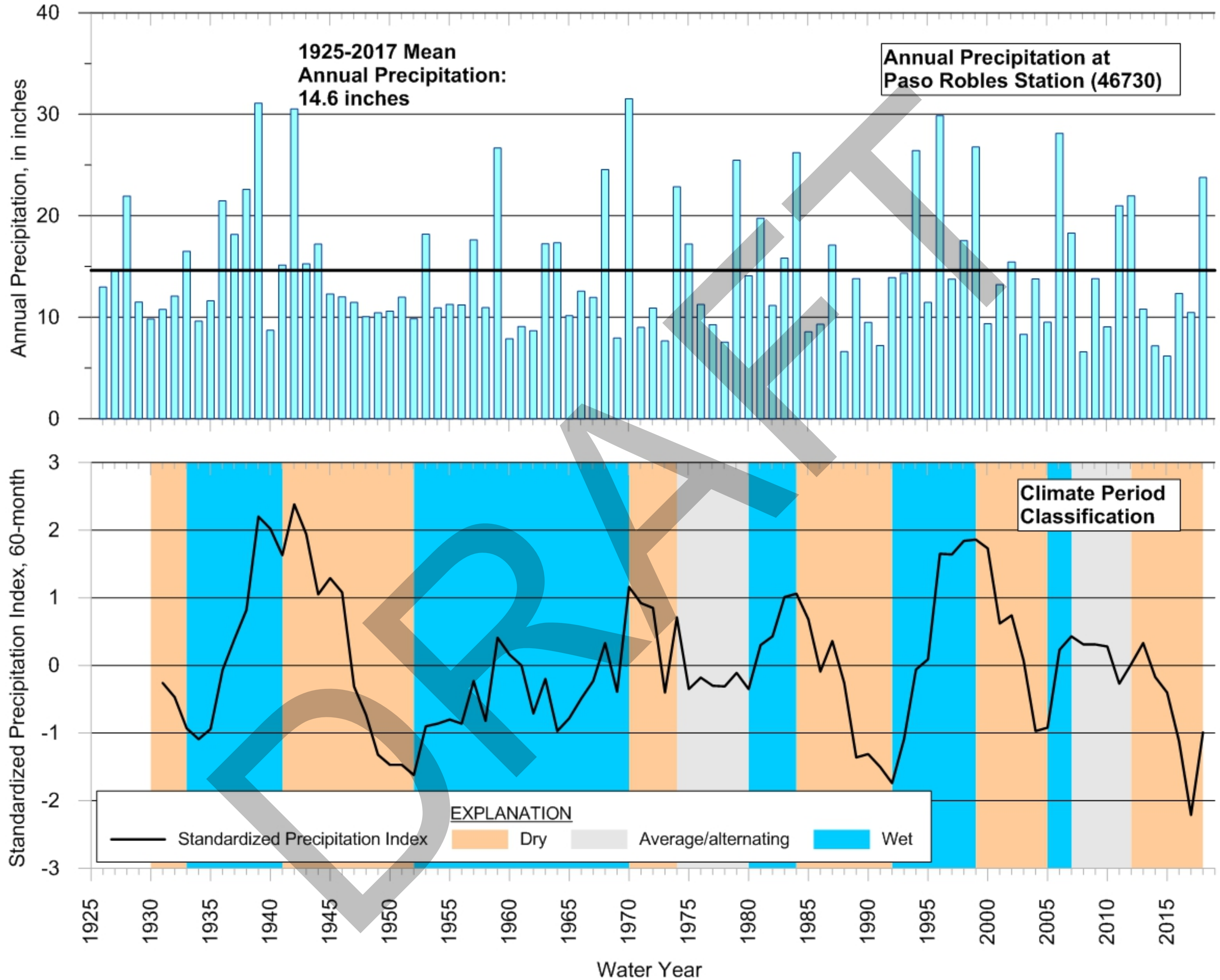


Figure 5-12. Climatic Periods in the Paso Robles Subbasin

5.1.3 Vertical Groundwater Gradients

Limited data exist to assess vertical groundwater gradients. Previous hydrologic studies of the Subbasin indicate that groundwater elevations are generally higher in the Alluvial Aquifer than the underlying Paso Robles Formation Aquifer, resulting in groundwater flow from the Alluvial Aquifer to the underlying Paso Robles Formation aquifer (Fugro, 2005). The *Paso Robles Groundwater Basin Study, Phase II* (Fugro, 2005) stated that there is an assumed upward vertical groundwater gradient near the northern portion of the Subbasin, although data were not provided to verify this assumption.

Vertical groundwater gradients can be estimated from nested or clustered wells. Wells 25S/12E-16K04, K05, and K06 are nested and provide groundwater elevation data from different depths in the Paso Robles Formation Aquifer near San Miguel. These wells are adjacent to a water supply well and therefore the vertical groundwater gradients may reflect local pumping conditions rather than broad, regional conditions. Hydrographs for these wells are shown on Figure 5-13. On this figure, groundwater levels in the shallowest well are shown with a green line, groundwater levels in the middle depth well are shown with a yellow line, and groundwater levels in the deepest well are shown with a red line. Prior to 2002, groundwater levels in the deepest well (red line) were generally higher than the groundwater levels in the middle and shallow wells, indicating an upward vertical groundwater gradient. A consistent vertical groundwater gradient is not apparent between the shallow and middle wells prior to 2002; groundwater elevations in the shallow and middle depth wells fluctuate around each other. After 2012, groundwater elevations in the deepest well were usually similar to or below the groundwater elevations in the shallow and middle depth wells; indicating a downward vertical groundwater gradient.

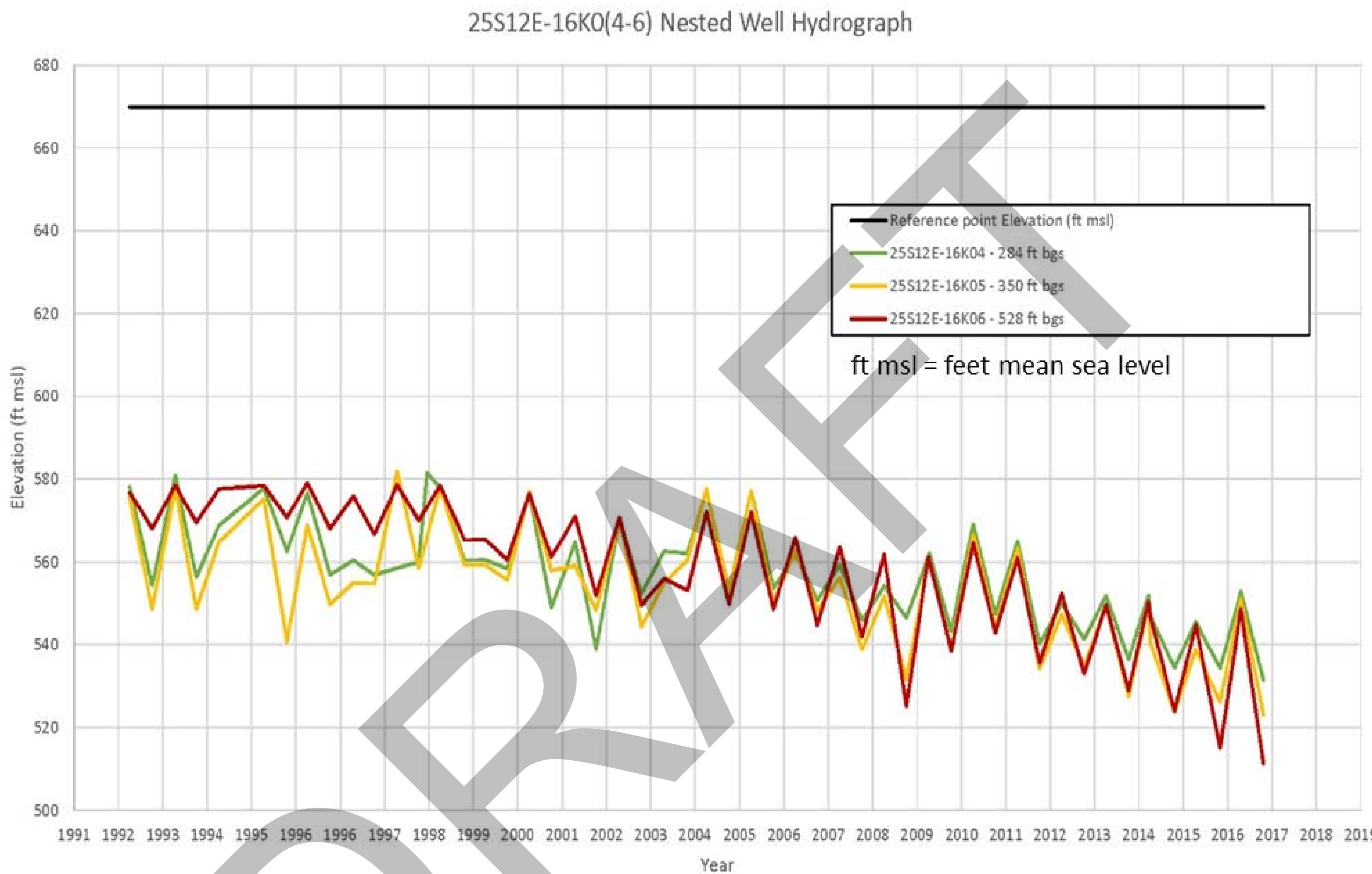


Figure 5-13. Vertical Groundwater Gradients near San Miguel

5.2 Change in Groundwater Storage

This section summarizes changes in groundwater storage in the Subbasin within the GSP area. Change in groundwater storage was estimated for water years 1981 through 2016 using the updated Paso Robles Subbasin groundwater model.

5.2.1 Alluvial Aquifer

Figure 5-14 shows the cumulative change in groundwater storage for water years 1981 through 2016 for the Alluvial Aquifer. The period from 1981 through 2011 is considered representative on long-term hydrologic conditions prior to the drought period of 2012 through 2016. The graph also shows the estimated annual groundwater pumping derived from the updated groundwater model and wet, dry, and average/alternating climatic periods based on the analysis presented in Section 5.1.2.2.

Over the period 1981 through 2011, the model indicates no net change in storage occurred in the Alluvial Aquifer. This projection is consistent with the observed stable groundwater elevations in hydrographs for wells screened in the Alluvial Aquifer. During the drought period 2012 through 2016, the model suggests a loss of groundwater in storage in the Alluvial Aquifer of about 50,000 acre-feet (AF).

As indicated on, a decrease in groundwater storage generally occurs during dry periods and an increase in groundwater storage generally occurs during wet periods. During the period 1981 through 2011, estimated groundwater pumping from the Alluvial Aquifer decreased from about 6,000 acre-feet per year (AFY) to about 2,000 AFY as indicated by the black bars on Figure 5-14. This suggests that the loss in groundwater storage is not due to increased pumping, but is more likely a result of lack of recharge during low precipitation years. A secondary cause for the storage loss might be increased downward flow from the Alluvial Aquifer into the Paso Robles Aquifer during this period, although this is difficult to definitively assess from the data.

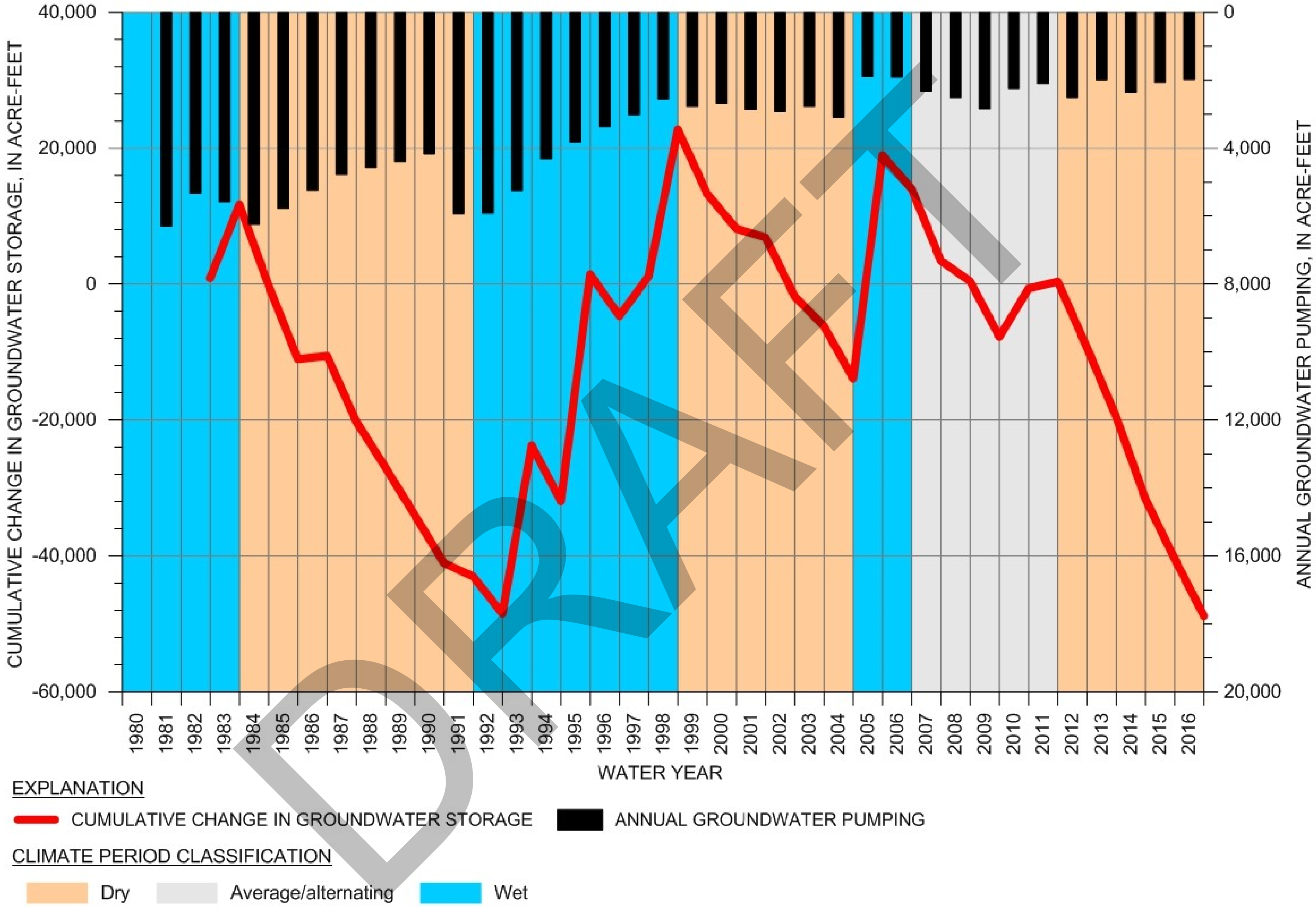


Figure 5-14. Estimated Cumulative Change in Groundwater Storage in Alluvial Aquifer

5.2.2 PASO ROBLES FORMATION AQUIFER

Figure 5-15 shows precipitation data and the cumulative change in groundwater storage for water years 1981 through 2016 for the Paso Robles Formation Aquifer. The graph also shows the annual groundwater pumping and water year type. The climatic variation shown on Figure 5-15 is the same climatic variation developed on Figure 5-12. Over the period 1981 through 2011, approximately 170,000 AF were removed from storage in the Paso Robles Formation Aquifer. Over the period 1981 through 2016, approximately 440,000 AF were removed from storage in the Paso Robles Formation Aquifer. Depletion of groundwater storage generally occurs during dry periods and increases in groundwater storage generally occur during wet periods, as indicated on Figure 5-15. Groundwater pumping decreased during the period from 1981 to 1999 and generally increased from 1999 to 2016. The loss in groundwater storage appears to be from a combination of increased pumping since 1999 and a number of dry years with limited recharge.

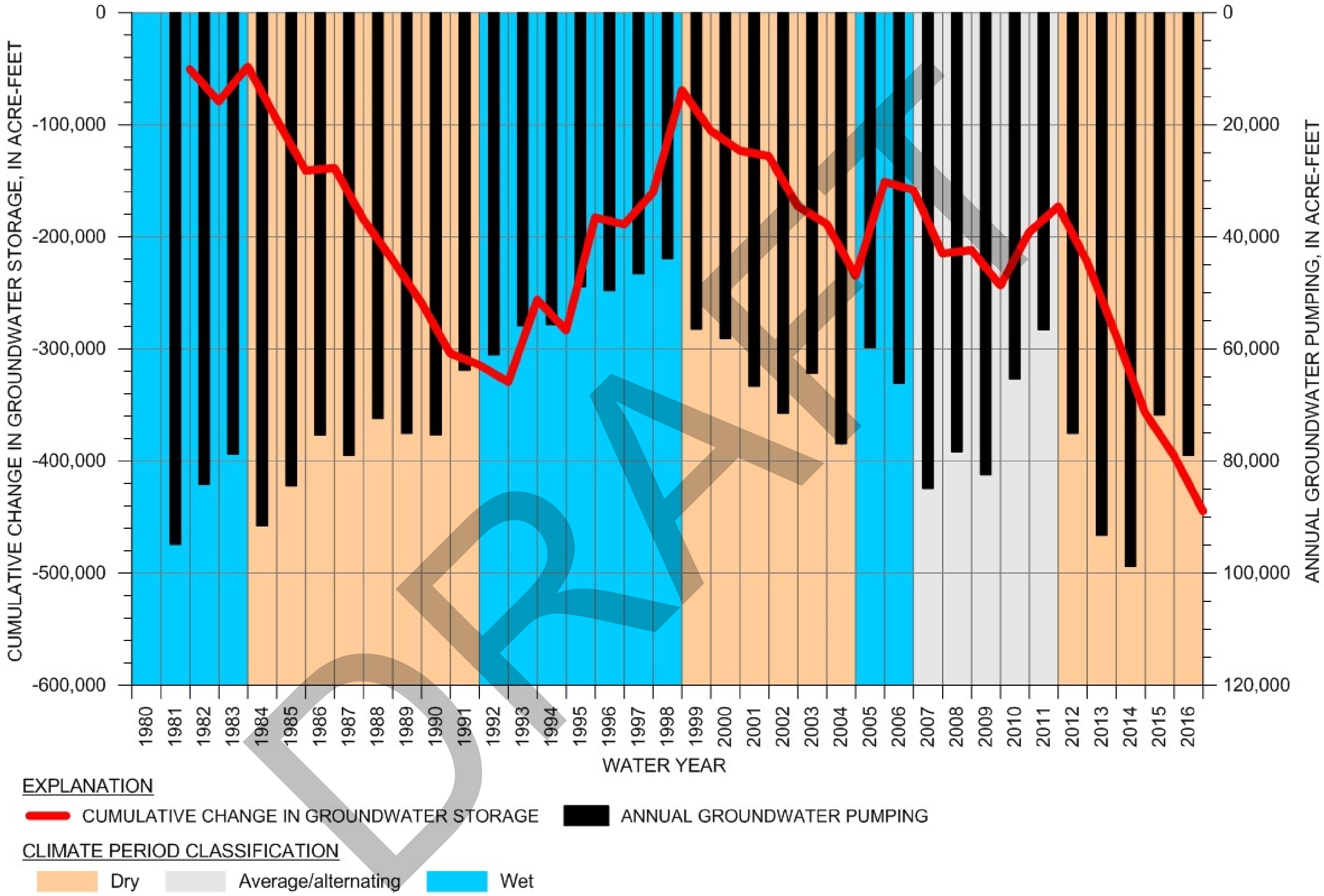


Figure 5-15. Estimated Cumulative Change in Groundwater Storage in Paso Robles Formation Aquifer

5.3 SEAWATER INTRUSION

Seawater intrusion is not an applicable sustainability indicator for the Subbasin. The Subbasin is not adjacent to the Pacific Ocean, a bay, or inlet.

5.4 SUBSIDENCE

Land subsidence is the lowering of the land surface. While several human-induced and natural causes of subsidence exist, the only process applicable to the GSP is subsidence due to lowered groundwater elevations caused by groundwater pumping.

Direct measurements of subsidence have not been made in the Subbasin using extensometers or repeat benchmark calibration; however, interferometric synthetic aperture radar (InSAR) has been used in the area to remotely map subsidence. This technology uses radar images taken from satellites that are used to create maps of changes in land surface elevation. The studies done in the area show that a localized area three miles northeast of the City of Paso Robles had a downward displacement of 0.6 to 2.1 inches between Spring 1997 and Fall 1997 (Valentine, D. W. et al., 2001).

5.5 INTERCONNECTED SURFACE WATER

Limited and ephemeral surface water flows in the Subbasin over the last 40 years make it difficult to study the interconnectivity of surface water and groundwater and to quantify the degree to which surface water depletion has occurred. The spatial extent of interconnected surface water was evaluated based on results from the basin-wide groundwater flow model of the Paso Robles Subbasin. In accordance with the SGMA emergency regulations §351 (o), "Interconnected surface water refers to surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted". We estimated which surface water bodies are interconnected by comparing simulated groundwater elevations in the Alluvial Aquifer and Paso Robles Formation Aquifer with the elevation of the stream or river bottom. If model-simulated groundwater elevations in any aquifer were above the bottom of the stream or river for at least half of the time between 2010 and 2016, then the surface water was considered interconnected with the groundwater. This concept is illustrated in Figure 5-16. In this figure, both diagrams A and B represent interconnected surface waters. Diagram C shows non-interconnected surface water.

Figure 5-17 shows the extent of interconnected surface water for Water Years 2010 through 2016 based on this model evaluation.

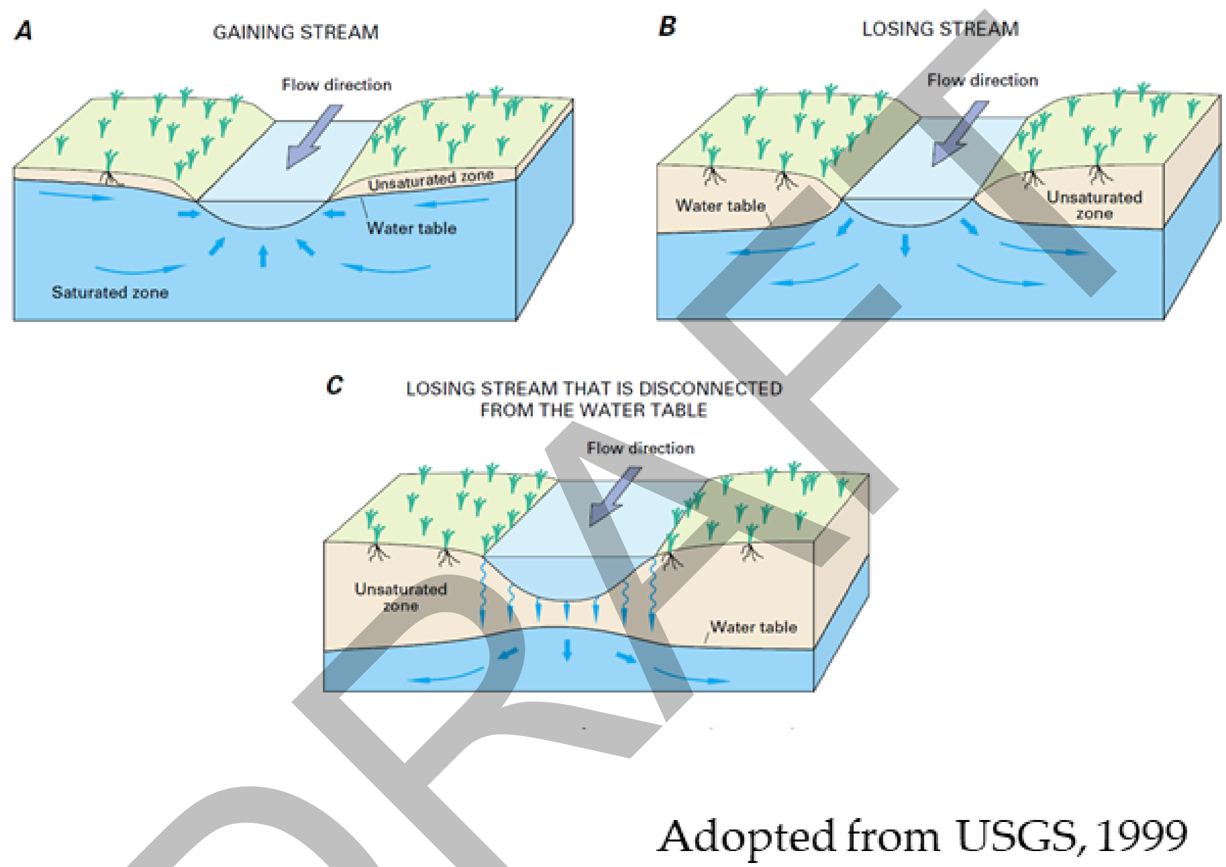


Figure 5-16. Interconnected and Non-Interconnected Surface Waters

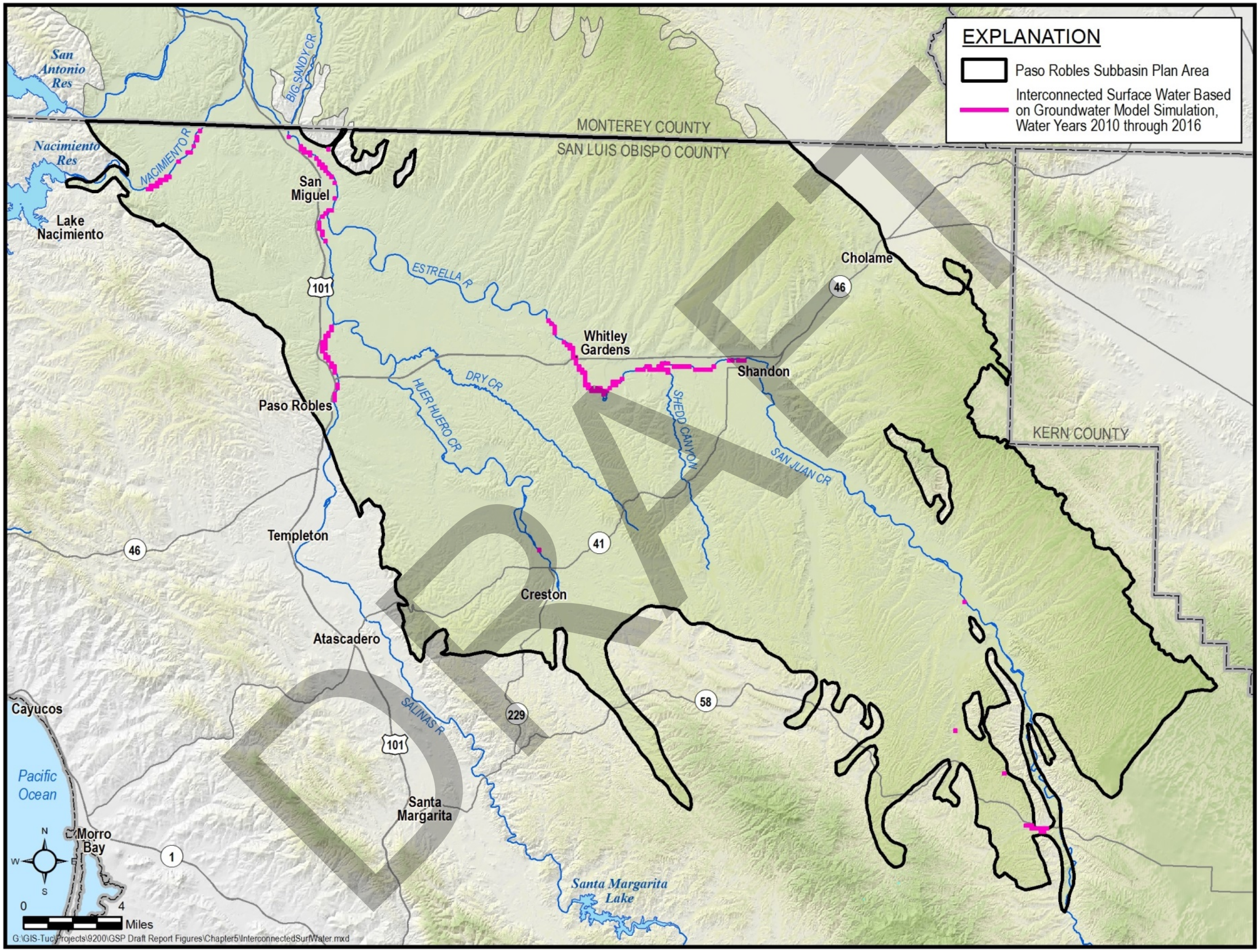


Figure 5-17. Locations of Interconnected Surface Waters

5.5.1 DEPLETION OF INTERCONNECTED SURFACE WATER

Groundwater withdrawals are balanced by a combination of reductions in groundwater storage and changes in the rate of exchange across hydrologic boundaries. In the case of surface water depletion, this rate change could be due to reductions in rates of groundwater discharge to surface water, and increased rates of surface water percolation to groundwater. These two changes together comprise the amount of surface water depletion.

Depletion of interconnected surface water was estimated by evaluating the change in the modeled stream leakage with and without pumping. A model simulation was run without groundwater pumping and was compared to the existing model with groundwater pumping. The difference in stream depletion between the two models is the depletion caused by the groundwater pumping. The stream depletion differences are only estimated for the interconnected segments identified in Figure 5-17. The methodology for quantifying stream depletion is described in detail by Barlow and Leake (2012).

Figure 5-18 shows the estimated annual depletion of the interconnected surface water along the stream segments shown in Figure 5-17 due to groundwater pumping. During the period Water Years 1991 to 2011, mean annual surface water depletion was about 7,600 AFY. During the period of time representative of current conditions (Water Year 2012 through 2016), mean annual surface water depletion was about 8,500 AFY.

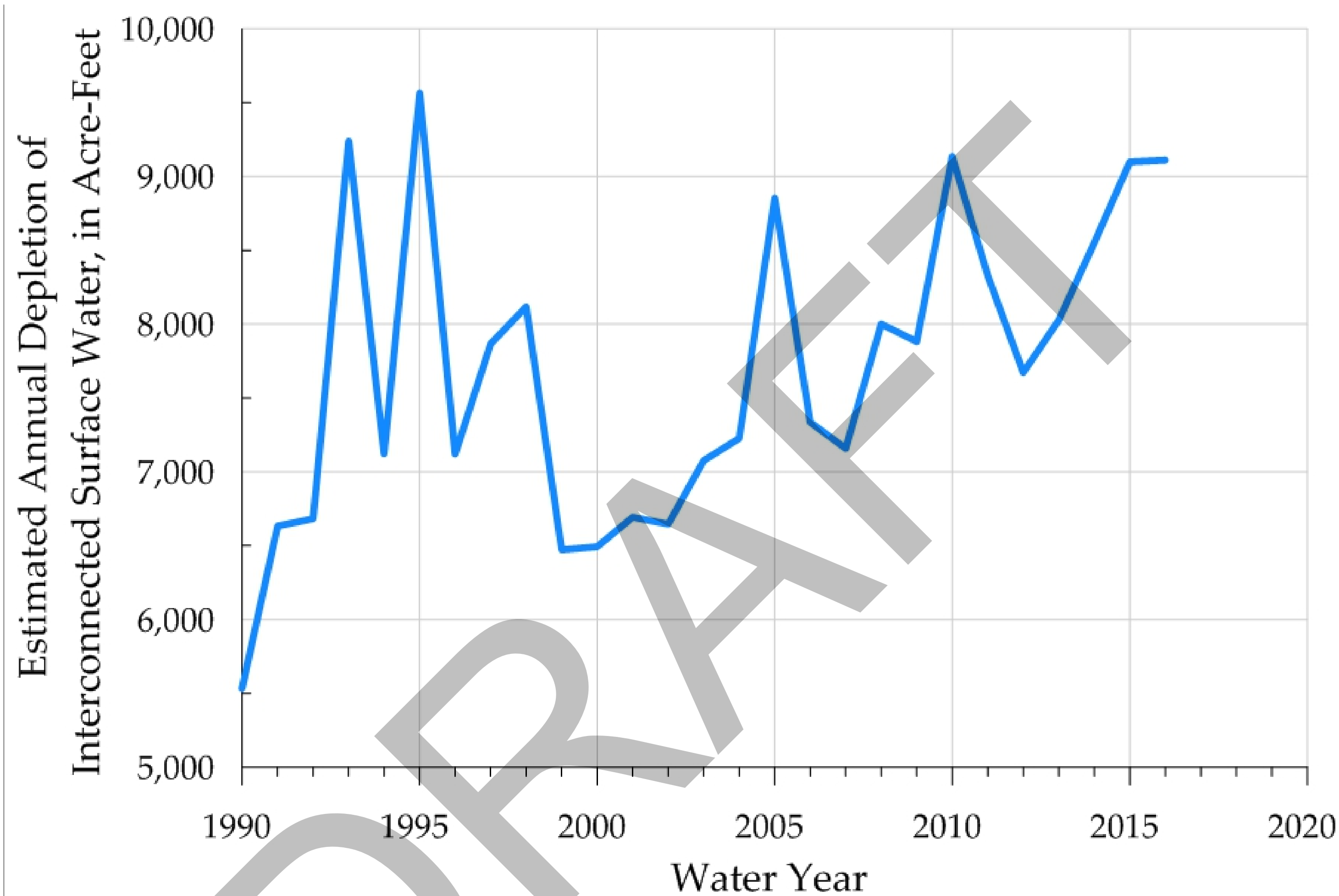


Figure 5-18. Estimated Annual Depletion of Interconnected Surface Water

5.6 GROUNDWATER QUALITY DISTRIBUTION AND TRENDS

Groundwater quality samples have been collected and analyzed throughout the Subbasin for various studies and programs. Water quality samples have been collected on a regular basis for compliance with regulatory programs. Additionally, a broad survey of groundwater quality sampling was conducted for the *Paso Robles Groundwater Basin Study, Phase I* (Fugro, 2002), and most recently by the USGS in 2018. Historical groundwater quality data were compiled for use in the Salt and Nutrient Management Plan (SNMP) (RMC, 2015).

5.6.1 GROUNDWATER QUALITY SUITABILITY FOR DRINKING WATER

Groundwater in the basin is generally suitable for drinking water purposes. The *Paso Robles Groundwater Basin Study, Phase I* (Fugro 2002) reviewed water quality data from public supply wells to identify exceedances of drinking water standards. The drinking water standards Maximum Contaminant Levels (MCLs) and Secondary MCLs (SMCLs) are established by Federal and State agencies. MCLs are legally enforceable standards, while SMCLs are guidelines established for nonhazardous aesthetic considerations such as taste, odor, and color. The most common water quality standard exceedance in the Subbasin was exceedance of the SMCL for total dissolved solids, which exceeded the standard in 14 samples from the 74 samples. Nitrate also exceeded the MCL in four samples. One exceedance of mercury was found in the San Miguel area in a 1990 sample.

5.6.2 GROUNDWATER QUALITY SUITABILITY FOR AGRICULTURAL IRRIGATION

Groundwater in the basin is generally suitable for agricultural purposes. Fugro (2002) evaluated the agricultural suitability of groundwater using three metrics:

1. Salinity as indicated by electrical conductivity;
2. Soil structure as indicated by sodium absorption ratio and electrical conductivity; and
3. Presence of toxic salts as indicated by concentrations of sodium, chloride, and boron.

Of the 74 samples evaluated, 37 had no restrictions on irrigation use (Fugro, 2002). This does not imply that half of the groundwater in the basin is unsuitable for irrigation; only that half of the samples had some constituent that may restrict unlimited irrigation use. Most cases of slight to moderate restriction on irrigation use were due to sodium or chloride toxicity. Severe restrictions for 13 samples were generally the result of high sodium, chloride, or boron toxicity.

5.6.3 Distribution and Concentrations of Point Sources of Groundwater Constituents

Potential point sources of groundwater quality degradation were identified using the State Water Resources Control Board (SWRCB) Geotracker website. Waste Discharge permits were also reviewed from on-line regional SWRCB websites. Table 5-1 summarizes information from these websites. Figure 5-19 shows the location of potential groundwater contaminant point sources. Based on available information there are no mapped ground-water contamination plumes at these sites, although investigations are ongoing.

Table 5-1. Potential Point Sources of Groundwater Contamination

SITE NAME	SITE TYPE	CONSTITUENTS OF CONCERN (COCs)	STATUS
Former Chevron 9-0750	LUST Cleanup Site	petroleum hydrocarbons	Remedial action plan submitted Q2 2018
Kirkpatrick Property (Unocal Portion)	Cleanup Program Site	crude oil	Impacted soil; health risk assessment prepared in 2016
Lucy Brown Road Pipeline Site (Former ConocoPhillips Site #3469)	Cleanup Program Site	crude oil, diesel, gasoline	Initial groundwater monitoring data no significant impacts to groundwater.
Estrella Airfield (Paso Robles Municipal Airport)	Military Cleanup Site	Unknown	Unknown
Camp Roberts Solid Waste Site	Land Disposal Site	metals, cyanide, sulfide, herbicides, volatile organic compounds (VOCs), pesticides, PCBs, phthalate esters, phenols, semi-VOCs	Total dissolved solids (TDS), nitrate and manganese detected in wells at concentrations above regulatory standards.
Camp Roberts South and Closed Landfill	Land Disposal Site	VOCs, chloride, sulfate, nitrate, sodium, manganese, TDS, total organic carbon	Carbon tetrachloride detected at concentrations exceeding MCL.
Paso Robles Solid Waste Site	Land Disposal Site	chloride, total alkalinity, manganese, nitrate, sodium, sulfate, temperature, TDS, VOCs, Pesticides, PCBs, organophosphorus compounds, herbicides, semi-VOCs	COCs not detected in groundwater; sulfate and barium locally elevated; no remedial activities.

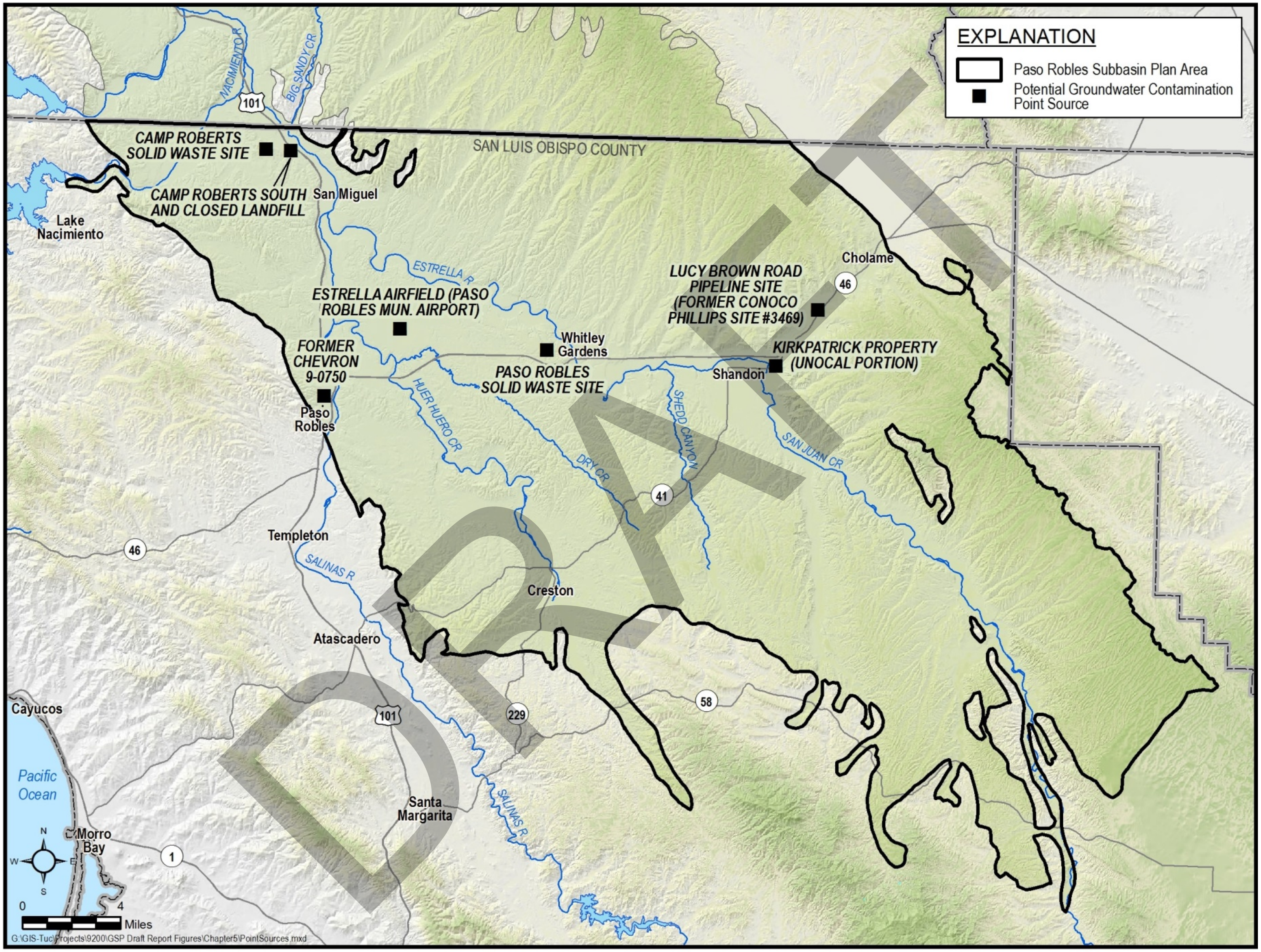


Figure 5-19. Location of Potential Point Sources of Groundwater Contaminants

5.6.4 DISTRIBUTION AND CONCENTRATIONS OF DIFFUSE OR NATURAL GROUNDWATER CONSTITUENTS

Fugro (2002) identified a number of constituents of concern that are broadly distributed throughout the Subbasin. The SNMP (RMC, 2015) provides additional data on the distribution of certain constituents. This GSP focuses only on constituents that might be impacted by groundwater management activities. The constituents discussed below are chosen because:

1. The constituent has either a drinking water standard or a known effect on crops.
2. Concentrations have been observed above either the drinking water standard or the level that affects crops.

5.6.4.1 TOTAL DISSOLVED SOLIDS

Total Dissolved Solids (TDS) is a constituent of concern in groundwater because it has been detected at concentrations greater than its SMCL of 500 milligrams per liter (mg/L). Table 5-2 shows the range and average TDS concentrations by subarea as reported in the SNMP (RMC, 2015). This table shows the average TDS concentrations are greater than the SMCL of 500 mg/L in parts of the Subbasin. This table includes data for portions of the Bradley, North Gabilan, and South Gabilan subareas that are outside the GSP area.

Table 5-2. TDS Concentration Ranges and Averages

Hydrogeologic Subarea	TDS Concentration Range (mg/L)	Average TDS Concentration (mg/L)
Estrella	350 – 1,560	552
Shandon	270 – 3,160	563
Creston	190 – 1,620	388
San Juan	160 – 2,170	425
Bradley	400 – 1,280	751
North Gabilan	370 – 1,320	856
South Gabilan	370 – 1,320	451

Source: RMC, 2015

The distribution and trends of TDS in the Subbasin are shown on Figure 5-20. This figure is from the SNMP (RMC, 2015) and includes portions of the Subbasin north of the Monterey County line which are outside the GSP area. The study area for the SNMP also did not extend as far southeast as the GSP area. TDS distribution shown on this figure is not differentiated by aquifer or well depth. Sustainability projects and management actions implemented as part of this GSP are not anticipated to directly cause TDS concentrations in groundwater in a well that would otherwise remain below the SMCL to increase above the SMCL.

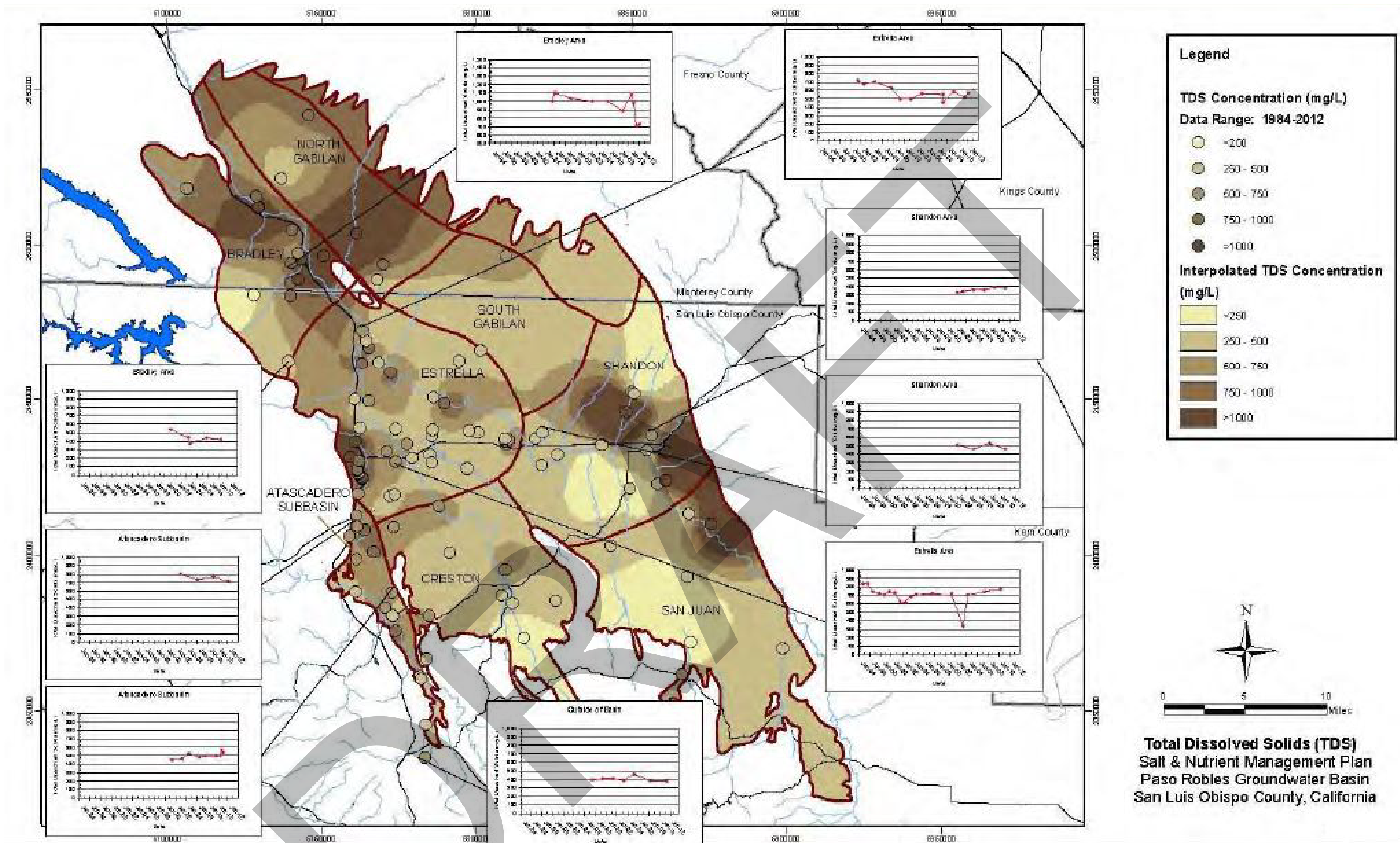


Figure 5-20. TDS Regional Distribution and Trends

Source: RMC, 2015

5.6.4.1 CHLORIDE

Chloride is a constituent of concern in groundwater because it has been detected at concentrations greater than its SMCL of 250 mg/L. Elevated chloride concentrations in groundwater can damage crops and affect plant growth. The *Paso Robles Groundwater Basin Study, Phase I* (Fugro 2002) reported that slight to moderate restrictions on irrigating trees and vines may occur when chloride concentrations exceed 100 mg/L. Severe restrictions on irrigating trees and vines may occur when chloride concentrations exceed 350 mg/L.

Table 5-3**,** which was compiled based on various tables and related information in the SNMP (RMC, 2015), shows the range and average chloride concentrations by subarea. This table indicates that average chloride concentrations are less than the SMCL of 250 mg/L throughout Subbasin. This table includes data for areas of the Bradley, North Gabilan, and South Gabilan subareas that are outside the GSP area.

Table 5-3. Chloride Concentration Ranges and Averages

Hydrogeologic Subarea	Chloride Concentration Range (mg/L)	Average Chloride Concentration (mg/L)
Estrella	32 - 572	94
Shandon	31 - 550	80
Creston	25 - 508	69
San Juan	13 - 699	64
Bradley	40 - 400	84
North Gabilan	35 - 209	113
South Gabilan	35 - 209	37

Source: RMC, 2015

The distribution and trends of chloride in the Subbasin are shown on Figure 5-21. This figure is from the SNMP (RMC, 2015) and includes portions of the Subbasin north of the Monterey County line which are outside the GSP area. Chloride distribution shown on this figure is not differentiated by aquifer or well depth. Sustainability projects and management actions implemented as part of this GSP are not anticipated to directly cause chloride concentrations in groundwater in a well that would otherwise remain below the SMCL to increase above the SMCL.

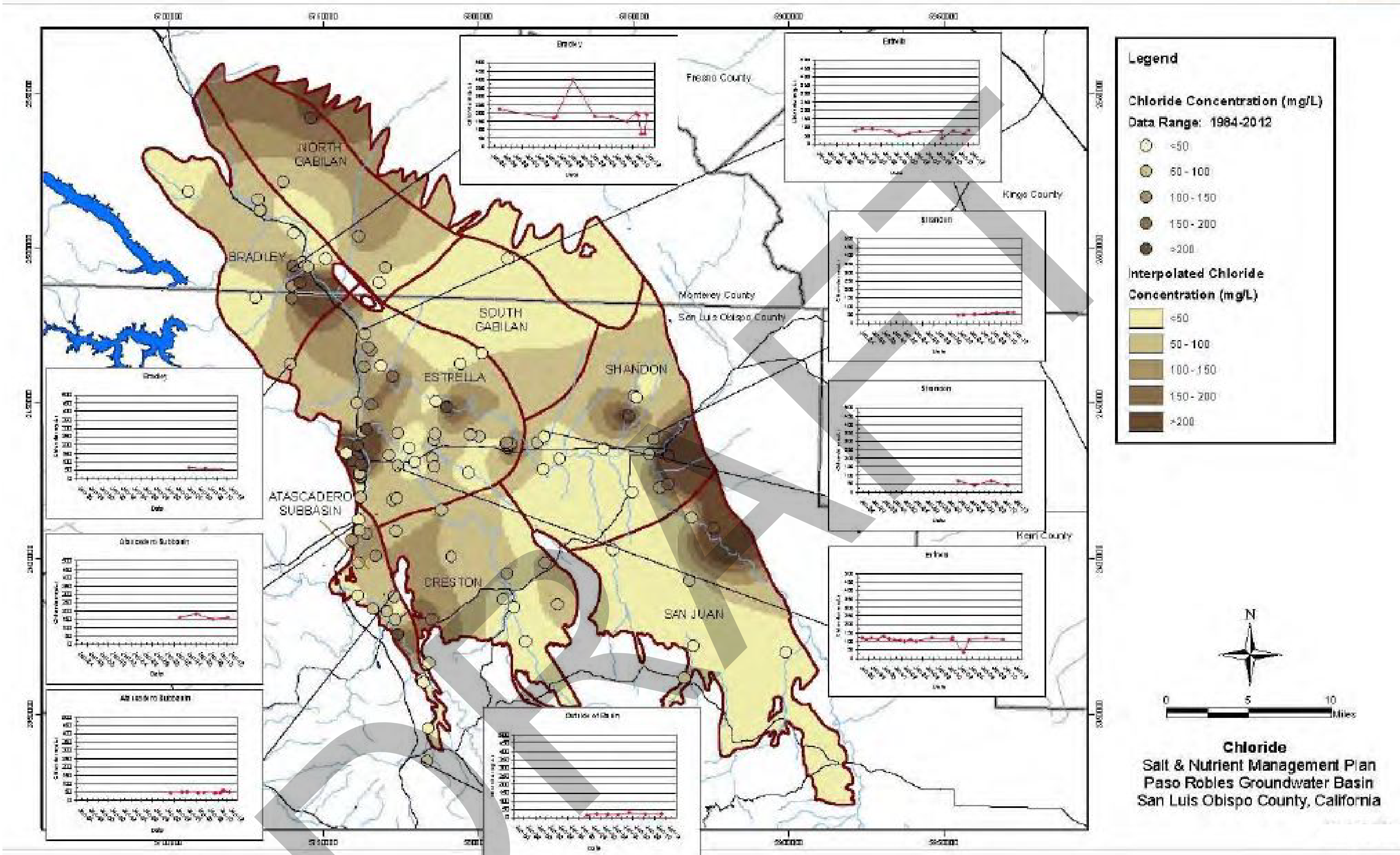


Figure 5-21. Chloride Regional Distribution and Trends

Source: RMC, 2015

5.6.4.2 Sulfate

Sulfate is a constituent of concern in groundwater because it has been observed at concentrations above its SMCL of 250 mg/L. Table 5-4 shows the range and average sulfate concentrations by subarea as reported in the SNMP (RMC, 2015). This table shows the average sulfate concentrations are greater than the SMCL of 250 mg/L in many areas of the Subbasin. This table includes data for areas of the Bradley, North Gabilan, and South Gabilan subareas that are outside the GSP area.

Table 5-4. Sulfate Concentration Ranges and Averages

Hydrogeologic Subarea	Sulfate Concentration Range (mg/L)	Average Sulfate Concentration (mg/L)
Estrella	11 - 375	129
Shandon	14 – 2,010	360
Creston	7 - 353	67
San Juan	24 - 722	248
Bradley	30 - 704	296
North Gabilan	9 - 648	194
South Gabilan	9 - 648	194

Source: RMC, 2015

Maps of sulfate distribution in the Subbasin were not found in previous studies. Sustainability projects and management actions implemented as part of this GSP are not anticipated to directly cause sulfate concentrations in groundwater in a well that would otherwise remain below the SMCL to increase above the SMCL.

5.6.4.3 Nitrate

Nitrate is a constituent of concern in groundwater because concentrations have been detected greater than its MCL of 10 mg/L (measured as nitrogen). Nitrate concentrations in excess of the MCLs can result in health impacts.

Table 5-5 shows the range and average nitrate concentrations by subarea as reported in the SNMP (RMC, 2015). This table shows the average nitrate concentrations are less than the MCL of 10 mg/L throughout Subbasin. The range of measured nitrate concentrations however exceeds the MCL of 10 mg/L in every subarea. This table includes data for areas of the Bradley, North Gabilan, and South Gabilan subareas that are outside the GSP area.

Table 5-5. Nitrate Concentration Ranges and Averages

Hydrogeologic Subarea	Nitrate Concentration Range (mg/L)	Average Nitrate Concentration (mg/L)
Estrella	0 – 16.2	2.5
Shandon	1.2 – 12.1	4.6
Creston	0.8 – 9.2	3.2
San Juan	0.1 – 5.8	2.8
Bradley	0.0 – 5.8	2.7
North Gabilan	5.0 – 9.8	8.4
South Gabilan	15.8	6.3

Source: RMC, 2015; data are from Table 3-12; the range of nitrate concentration in the South Gabilan subarea is uncertain

The distribution and trends of nitrate in the Subbasin are shown on Figure 5-22. This figure is from the SNMP (RMC, 2015) and includes portions of the Subbasin north of the Monterey County line which are outside the GSP area. This nitrate distribution shown on this figure is not differentiated by aquifer or well depth. Sustainability projects and management actions implemented as part of this GSP are not anticipated to directly cause nitrate concentrations in groundwater in a well that would otherwise remain below the SMCL to increase above the SMCL.

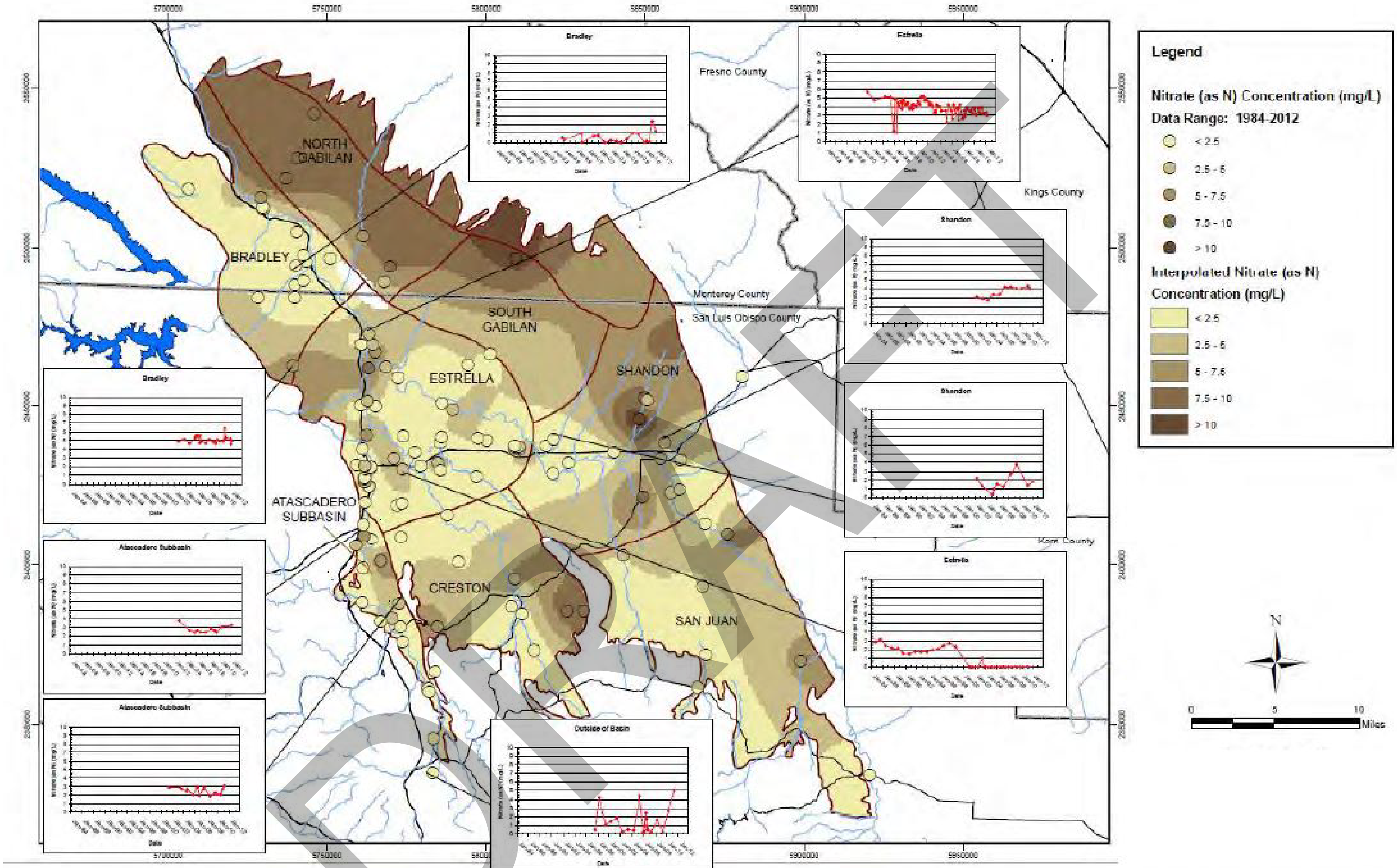


Figure 5-22. Nitrate Regional Distribution and Trends

Source: RMC, 2015. Figure 3-10

5.6.4.4 Boron

Boron is an unregulated constituent and therefore does not have a regulatory standard. However, boron is a constituent of concern because elevated boron concentrations in water can damage crops and affect plant growth. The *Paso Robles Groundwater Basin Study, Phase I* (Fugro 2002) reported that severe restrictions on irrigating trees and vines may occur when boron concentrations exceed 0.5 mg/L.

Table 5-6 shows the range and average boron concentrations by subarea as reported in the SNMP (RMC, 2015). Average boron concentration exceeds the severe irrigation restriction level of 0.5 mg/L in the Estrella, Shandon, and San Juan subareas. The table includes data for areas of the Bradley, North Gabilan, and South Gabilan subareas that are outside the GSP area.

Table 5-6. Boron Concentration Ranges and Averages

Hydrogeologic Subarea	Boron Concentration Range (mg/L)	Average Boron Concentration (mg/L)
Estrella	0.13 – 5.66	1.8
Shandon	0.08 – 2.97	0.81
Creston	0.06 – 0.31	0.14
San Juan	0.08 – 2.29	0.74
Bradley	0.12 – 0.18	0.15
North Gabilan	0.11 – 0.44	0.24
South Gabilan	0.11 – 0.44	0.24

Source: RMC, 2015

Maps of boron distribution in the Subbasin were not found in previous studies. Sustainability projects and management actions implemented as part of this GSP are not anticipated to directly cause boron concentrations in groundwater in a well that would otherwise remain below the SMCL to increase above the SMCL.

5.6.4.5 Gross Alpha Radiation

Gross alpha radiation is a constituent of concern because it has been detected at concentrations greater than its MCL of 15 picocuries per liter (pCi/L). Fugro (2002) reports that gross alpha radioactivity is present in most areas of the basin. Gross alpha particle count activity in groundwater exceeded the MCL for drinking water in the Estrella and Bradley areas. Gross alpha data included in Fugro's 2002 report are summarized in Table 5-7.

Table 5-7. Gross Alpha Concentration Ranges and Averages

Hydrogeologic Subarea	Gross Alpha Maximum Concentration (pCi/L)	Gross Alpha Average Concentration (pCi/L)
Estrella	31	20
Shandon	3	3
Bradley	23	2

Source: Fugro, 2002

No maps exist of the gross alpha distribution in the Subbasin. Sustainability projects and management actions implemented as part of this GSP are not anticipated to directly cause gross alpha radiation concentrations in groundwater in a well that would otherwise remain below the SMCL to increase above the SMCL.

5.6.5 Groundwater Quality Surrounding the Paso Robles Subbasin

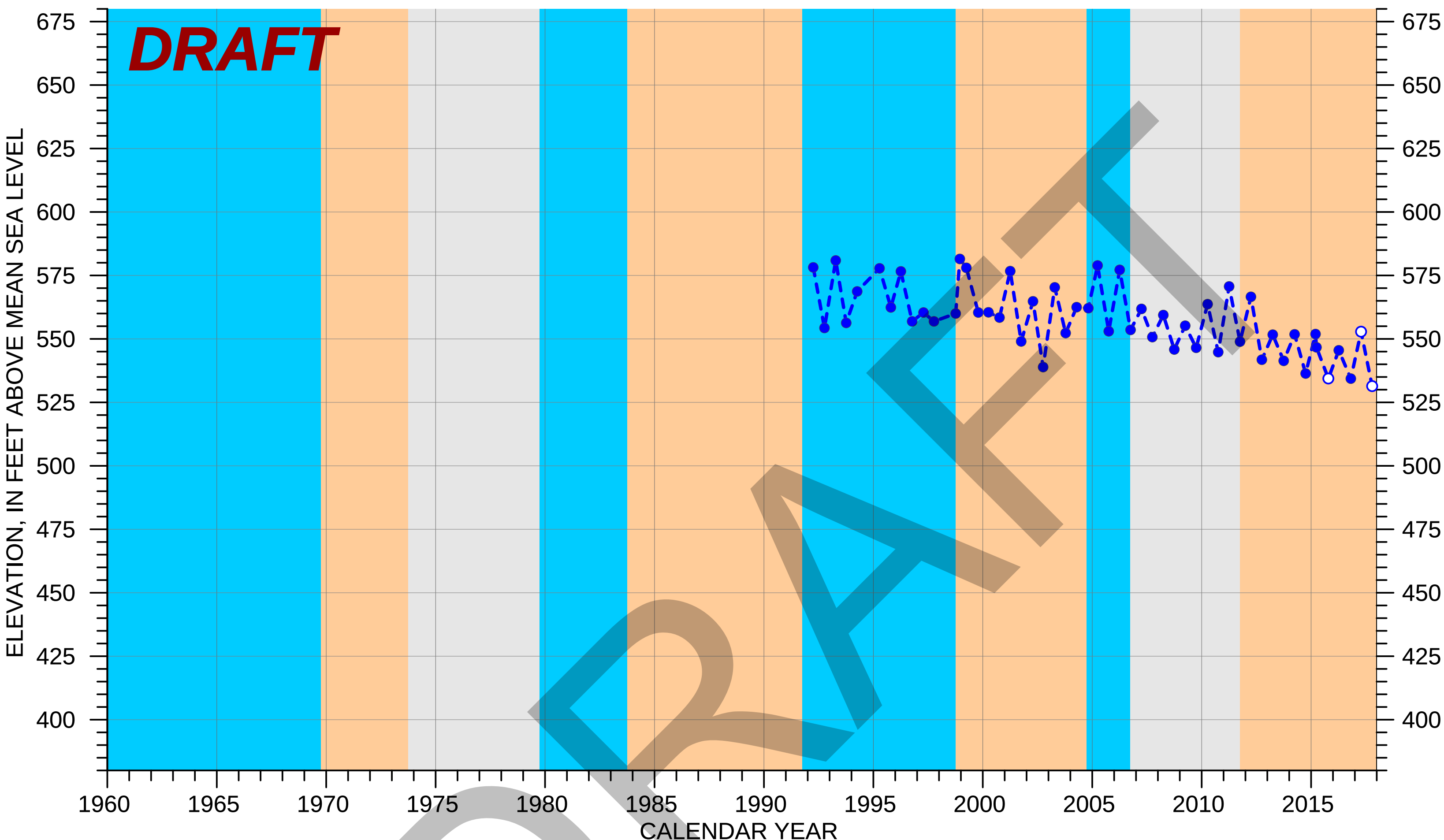
Poor quality groundwater has been documented in wells that screen sediments and rocks below the Paso Formation as well as sediments and rocks surrounding the Subbasin. Based on limited observations, there is a concern that this poor quality groundwater may be drawn into wells in the Subbasin and degrade the groundwater quality if groundwater levels are allowed to fall too low. Groundwater levels must be maintained at elevations that prevent migration of poor quality groundwater from beneath or around the Subbasin.

Appendix 5A
Draft

Hydrographs

Prepared for the Paso Robles Subbasin
Cooperative Committee and the
Groundwater Sustainability Agencies

October 10, 2018



EXPLANATION

GROUNDWATER ELEVATION

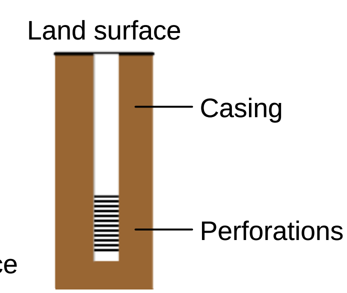
FLAGGED MEASUREMENT

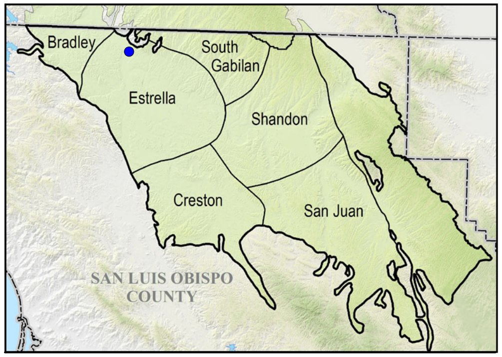
CLIMATE PERIOD CLASSIFICATION

DRY

AVERAGE/ALTERNATING

WET



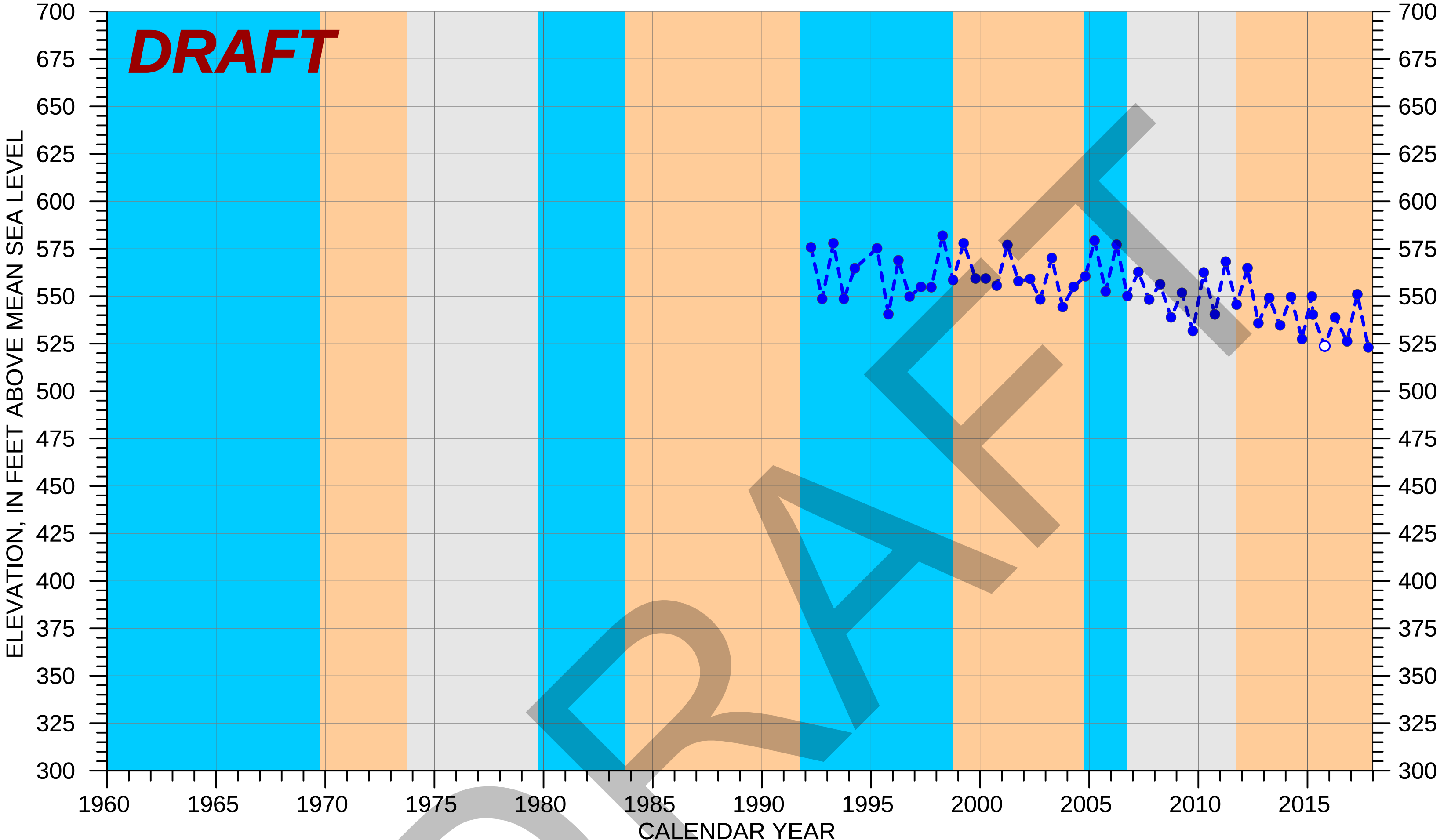


Subarea: Estrella
Well Depth: 284 feet
Screened Interval: 194-204, 214-224, 234-244, 264-274 feet below ground surface
Land Elevation: 668.2 feet, above mean sea level

APPENDIX 5A-01. HYDROGRAPH OF MEASURED GROUNDWATER LEVELS FOR 25S/12E-16K04

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\GSP\Ch 5\Appendix5A\Fig01_25S_12E-16K04.grf



EXPLANATION

GROUNDWATER ELEVATION

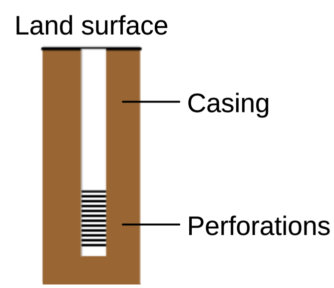
FLAGGED MEASUREMENT

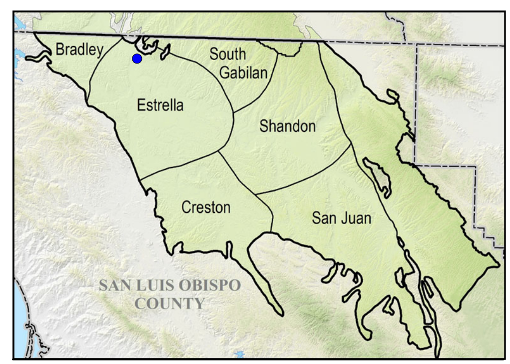
CLIMATE PERIOD CLASSIFICATION

DRY

AVERAGE/ALTERNATING

WET



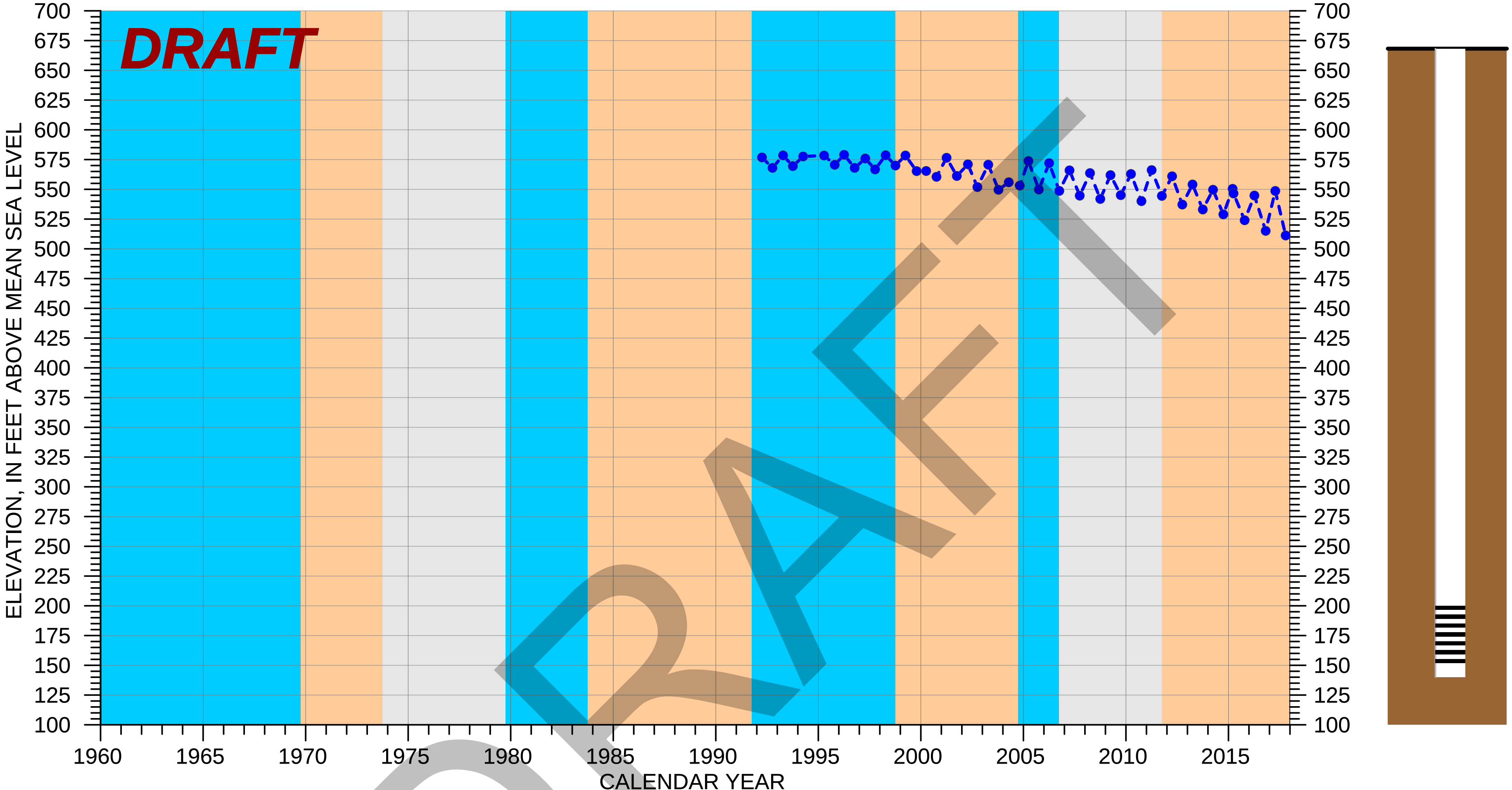


Subarea: Estrella
Well Depth: 350 feet
Screened Interval: 300-310, 330-340 feet below ground surface
Land Elevation: 668.2 feet, above mean sea level

APPENDIX 5A-02. HYDROGRAPH OF MEASURED GROUNDWATER LEVELS FOR 25S/12E-16K05

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\GSP\Ch 5\Appendix5A\Fig02_25S_12E-16K05.grf



EXPLANATION

GROUNDWATER ELEVATION

FLAGGED MEASUREMENT

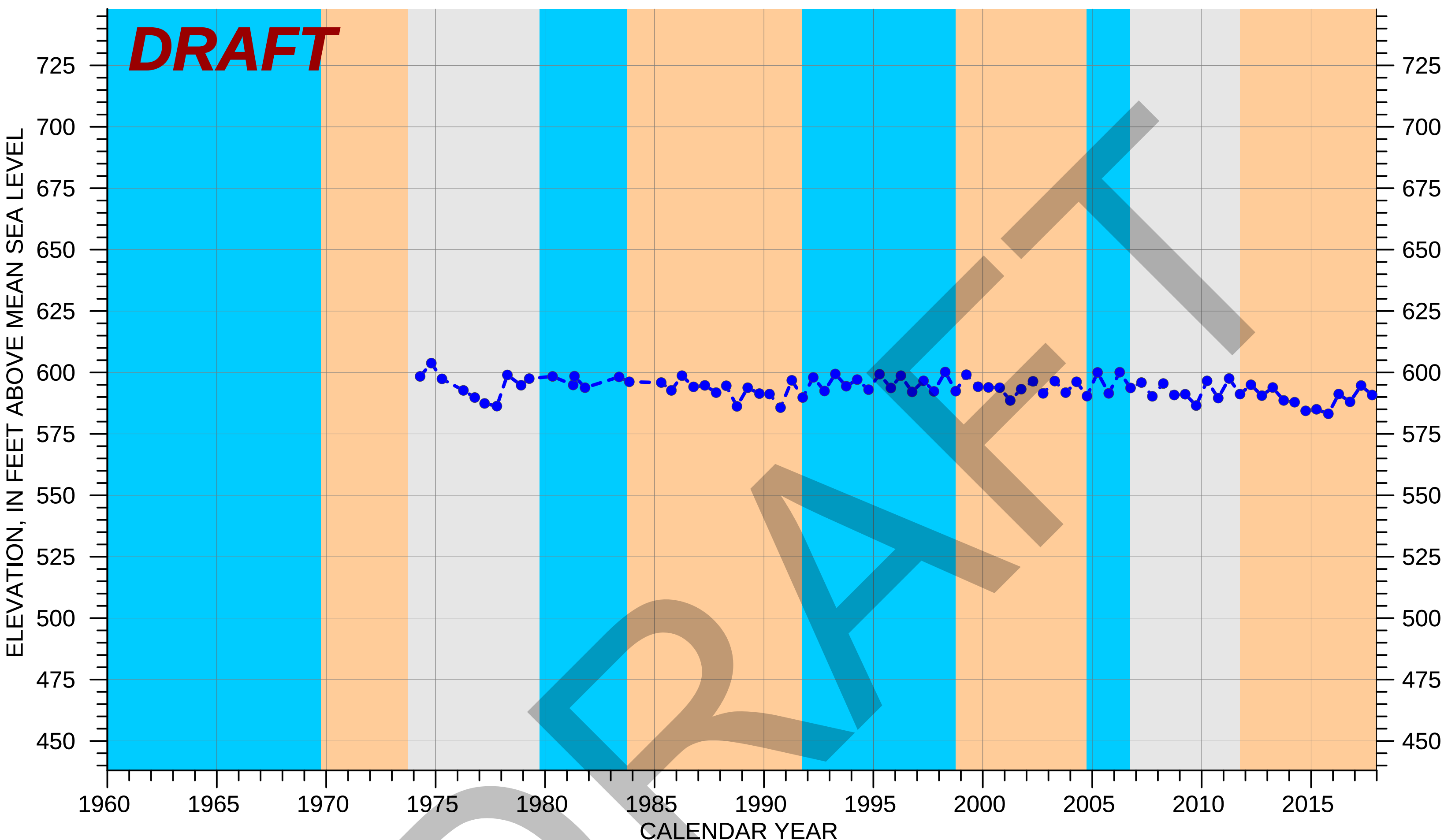
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Subarea: Estrella
Well Depth: 528 feet
Screened Interval: 468-478, 508-518 feet below ground surface
Land Elevation: 668.2 feet, above mean sea level

APPENDIX 5A-03. HYDROGRAPH OF MEASURED GROUNDWATER LEVELS FOR 25S/12E-16K06

MONTGOMERY & ASSOCIATES



EXPLANATION

GROUNDWATER ELEVATION

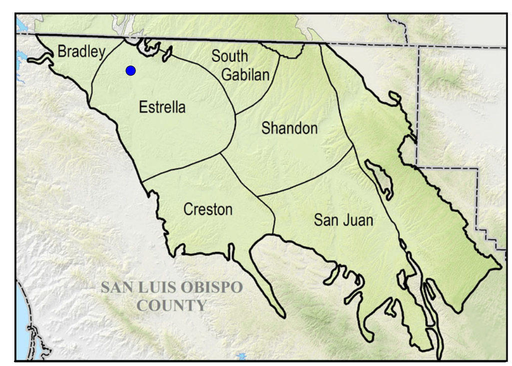
FLAGGED MEASUREMENT

CLIMATE PERIOD CLASSIFICATION

DRY

AVERAGE/ALTERNATING

WET

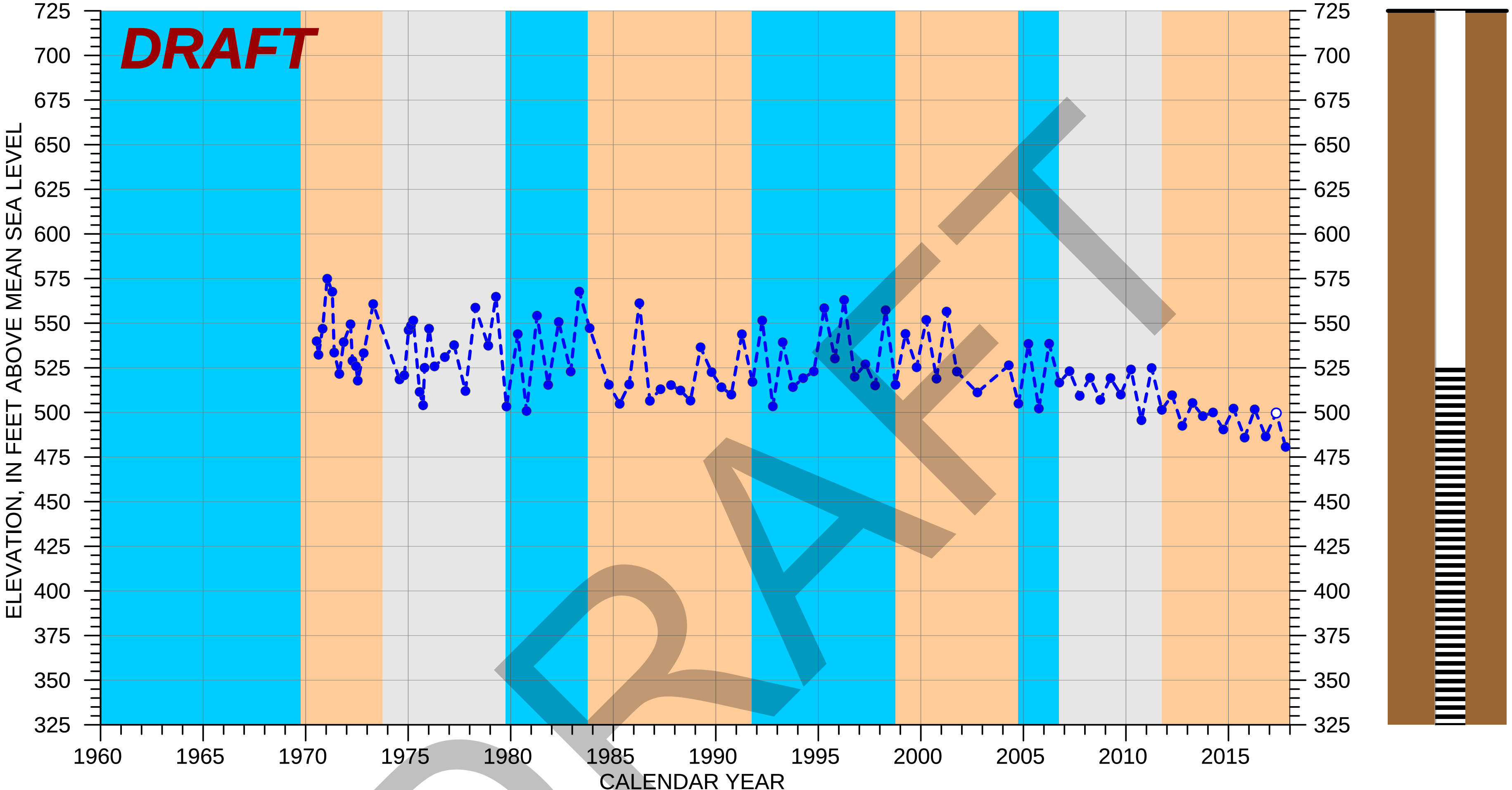


Subarea: Estrella
Well Depth: Upper Paso Robles Formation (GSSI, 2016)
Screened Interval: unknown
Land Elevation: ~636 feet, above mean sea level

APPENDIX 5A-04. HYDROGRAPH OF MEASURED GROUNDWATER LEVELS FOR 25S/12E-20K03

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\GSP\Ch 5\Appendix5A\Fig04_25S_12E-20K03.grf



EXPLANATION

GROUNDWATER ELEVATION

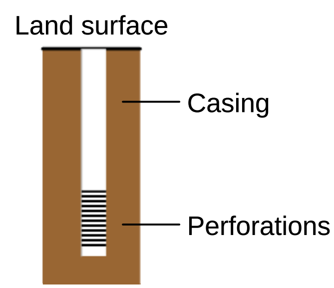
FLAGGED MEASUREMENT

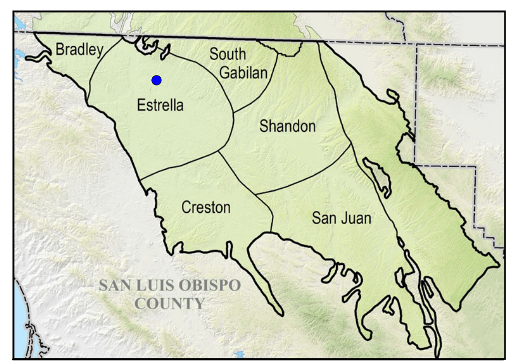
CLIMATE PERIOD CLASSIFICATION

DRY

AVERAGE/ALTERNATING

WET





Subarea: Estrella
Well Depth: 400 feet
Screened Interval: 200-400 feet below ground surface
Land Elevation: ~725 feet, above mean sea level

APPENDIX 5A-05. HYDROGRAPH OF MEASURED GROUNDWATER LEVELS FOR 25S/12E-26L01

MONTGOMERY & ASSOCIATES

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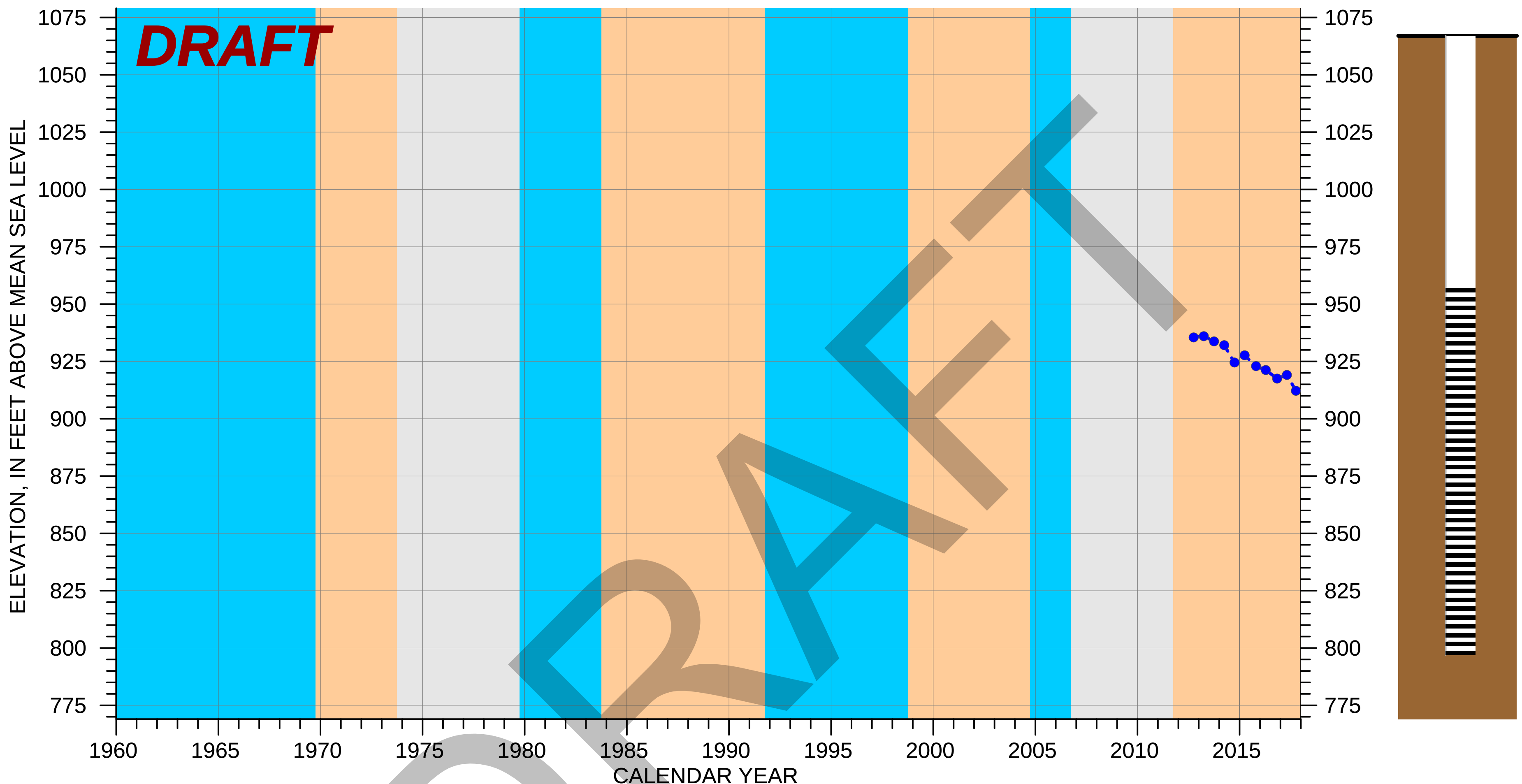


EXPLANATION

GROUNDWATER ELEVATION

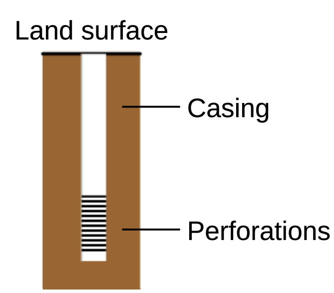
FLAGGED MEASUREMENT

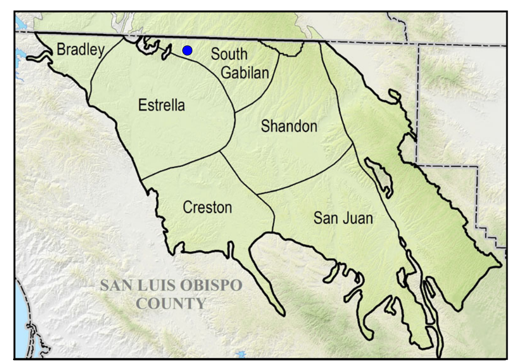
CLIMATE PERIOD CLASSIFICATION

DRY

AVERAGE/ALTERNATING

WET



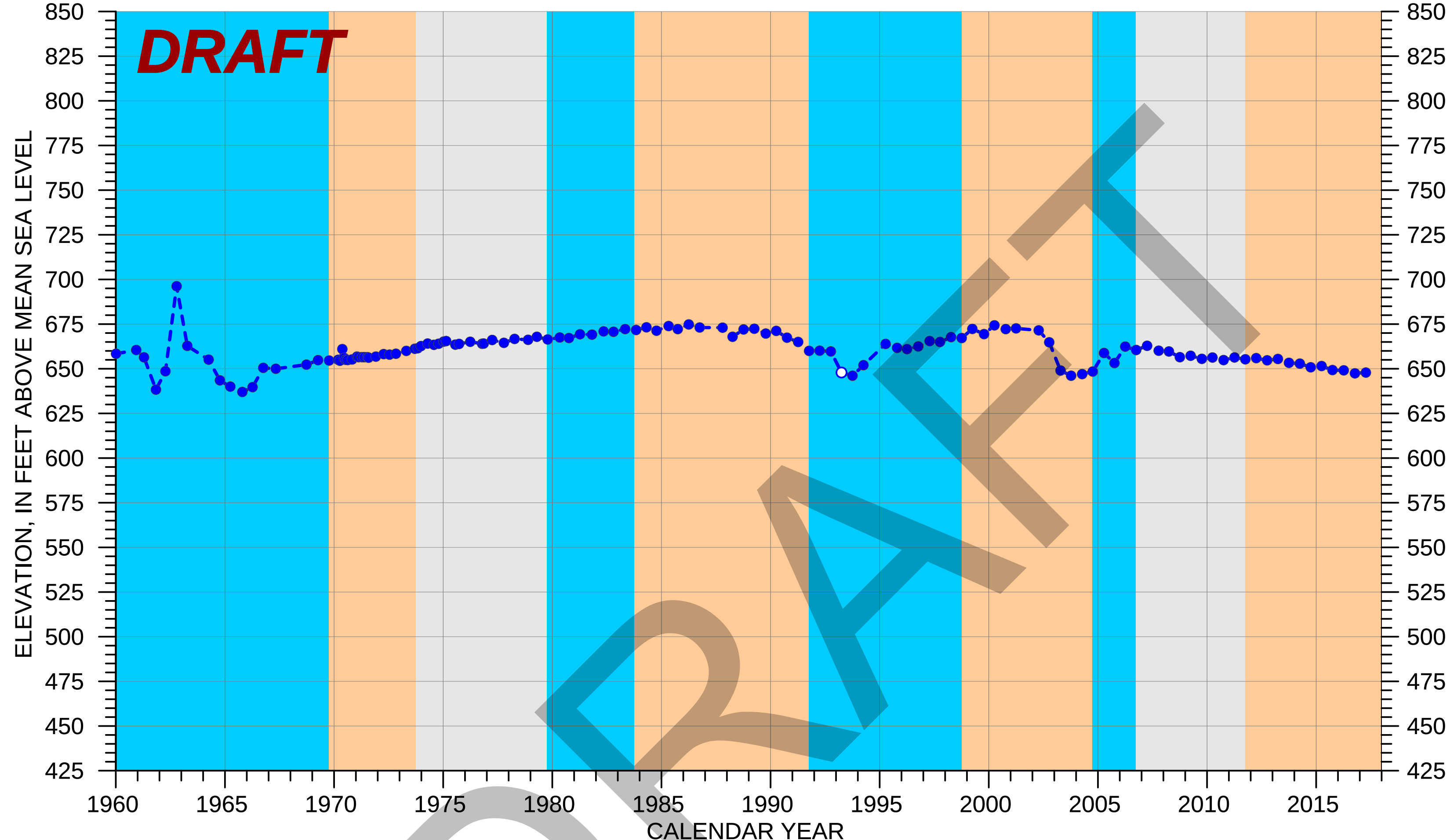


Subarea: South Gabilan
Well Depth: 270 feet
Screened Interval: 110-270 feet below ground surface
Land Elevation: ~1067 feet, above mean sea level

APPENDIX 5A-06. HYDROGRAPH OF MEASURED GROUNDWATER LEVELS FOR 25S/13E-08L02

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\GSP\Ch 5\Appendix5A\Fig06_25S_13E-08L02.grf



EXPLANATION

GROUNDWATER ELEVATION

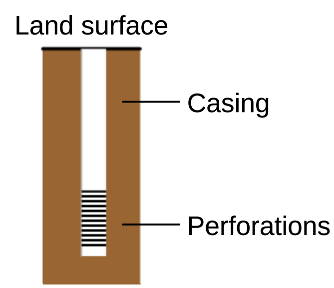
FLAGGED MEASUREMENT

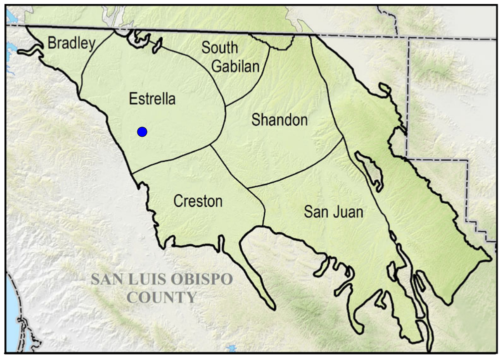
CLIMATE PERIOD CLASSIFICATION

DRY

AVERAGE/ALTERNATING

WET





Subarea: Estrella
Well Depth: 400 feet
Screened Interval: unknown
Land Elevation: ~828 feet, above mean sea level

APPENDIX 5A-07. HYDROGRAPH OF MEASURED GROUNDWATER LEVELS FOR 26S/12E-26E07

MONTGOMERY & ASSOCIATES

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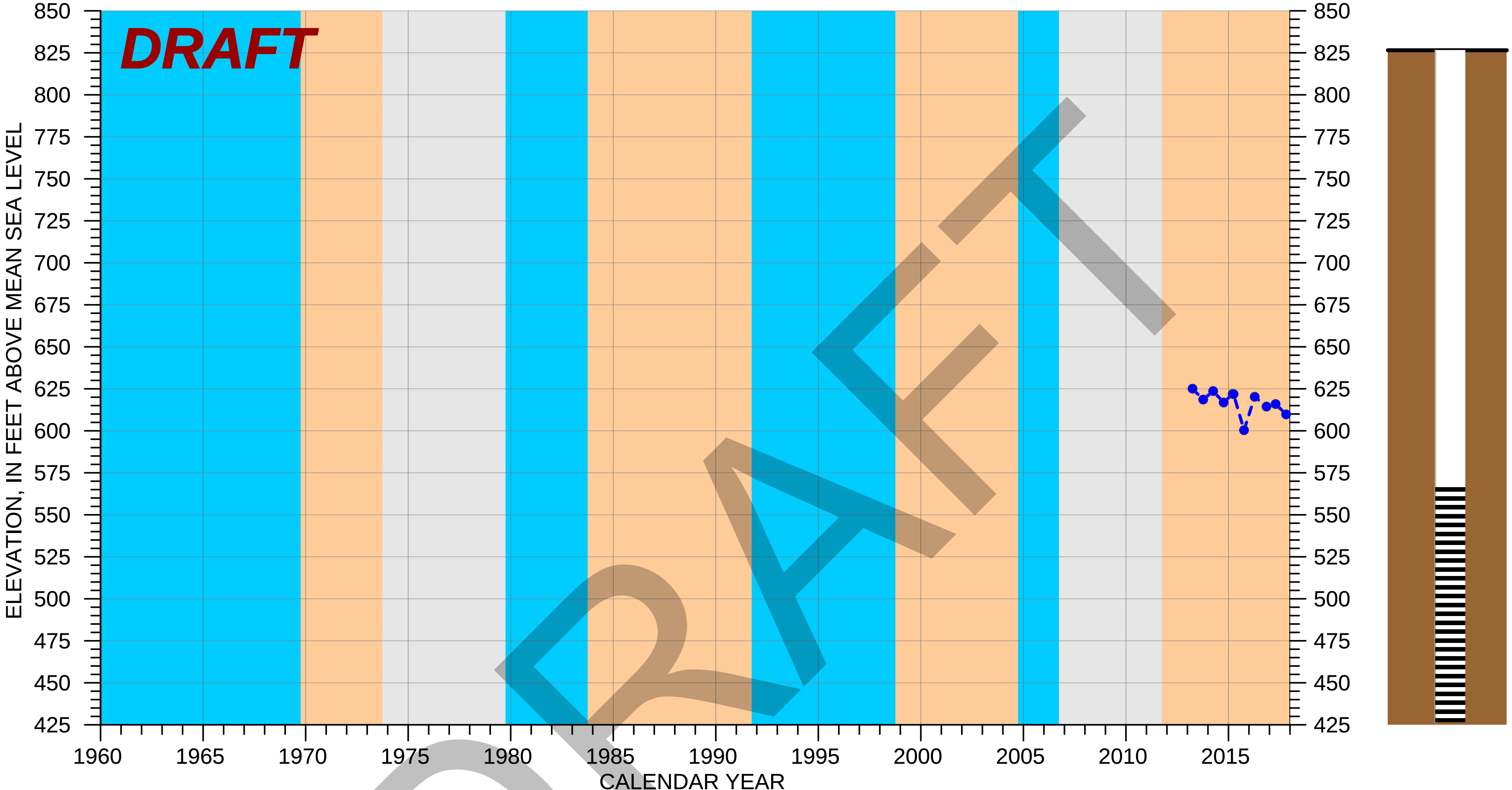


EXPLANATION

GROUNDWATER ELEVATION

FLAGGED MEASUREMENT

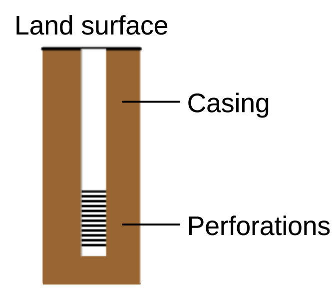
CLIMATE PERIOD CLASSIFICATION

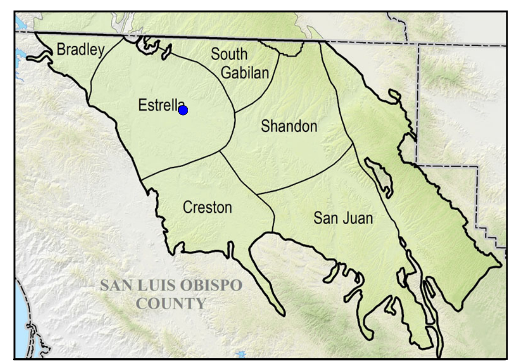
DRY

AVERAGE/ALTERNATING

WET

Subarea: Estrella
Well Depth: 400 feet
Screened Interval: 260-400 feet below ground surface
Land Elevation: 826.53 feet, above mean sea level





APPENDIX 5A-08. HYDROGRAPH OF MEASURED GROUNDWATER LEVELS FOR 26S/13E-08M01

MONTGOMERY & ASSOCIATES

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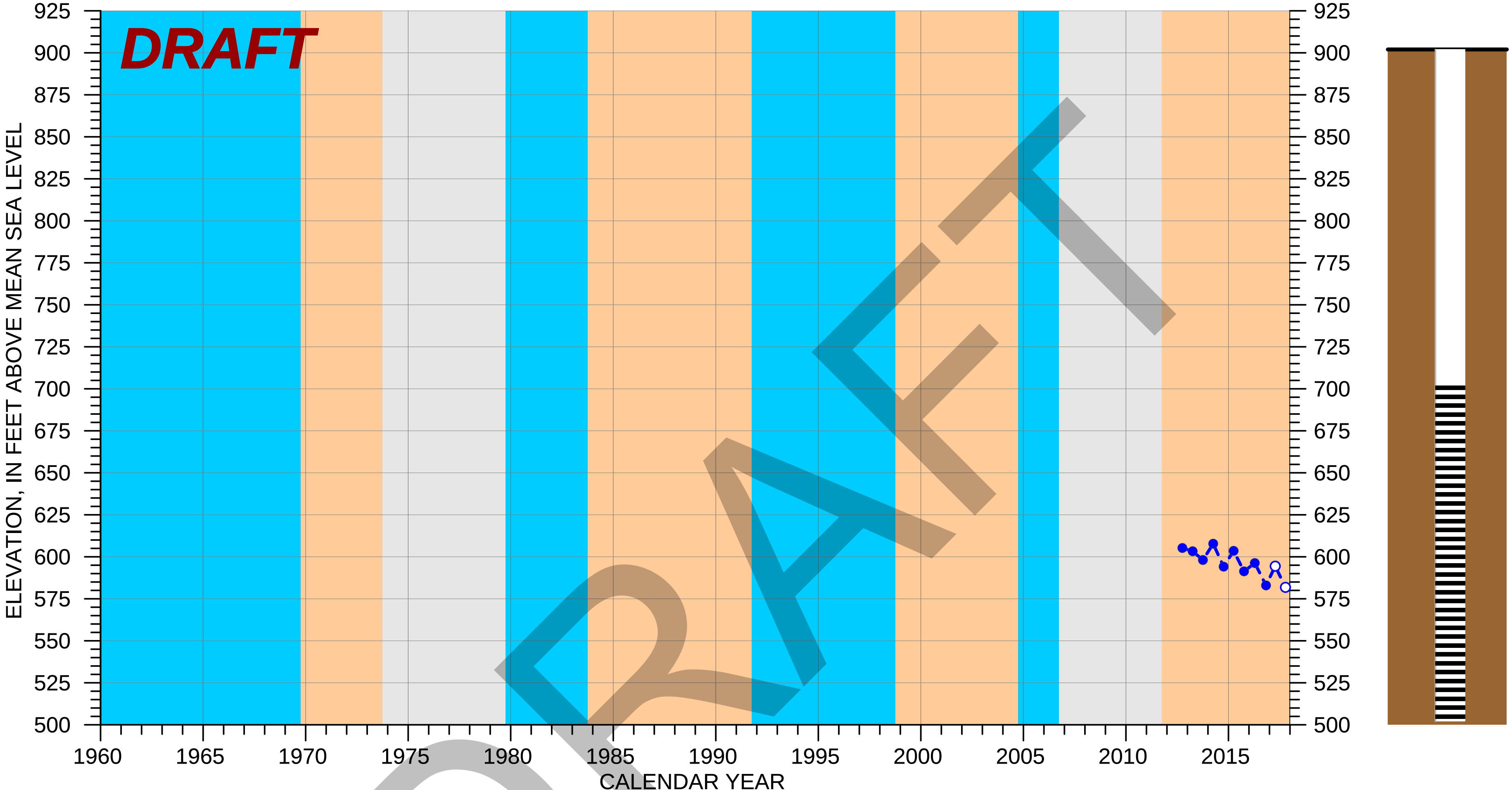


EXPLANATION

GROUNDWATER ELEVATION

FLAGGED MEASUREMENT

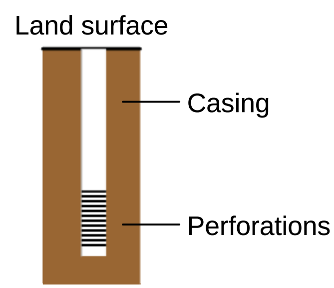
CLIMATE PERIOD CLASSIFICATION

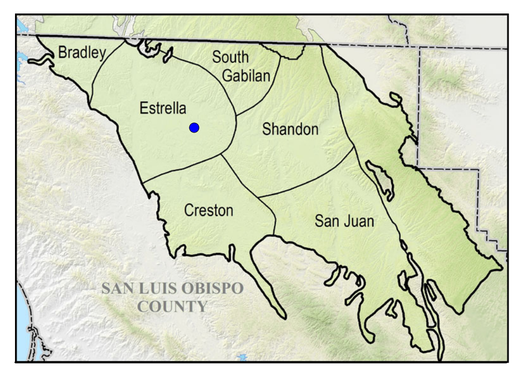
DRY

AVERAGE/ALTERNATING

WET

Subarea: Estrella
Well Depth: 400 feet
Screened Interval: 200-400 feet below ground surface
Land Elevation: ~902 feet, above mean sea level





APPENDIX 5A-09. HYDROGRAPH OF MEASURED GROUNDWATER LEVELS FOR 26S/13E-16N01

MONTGOMERY & ASSOCIATES

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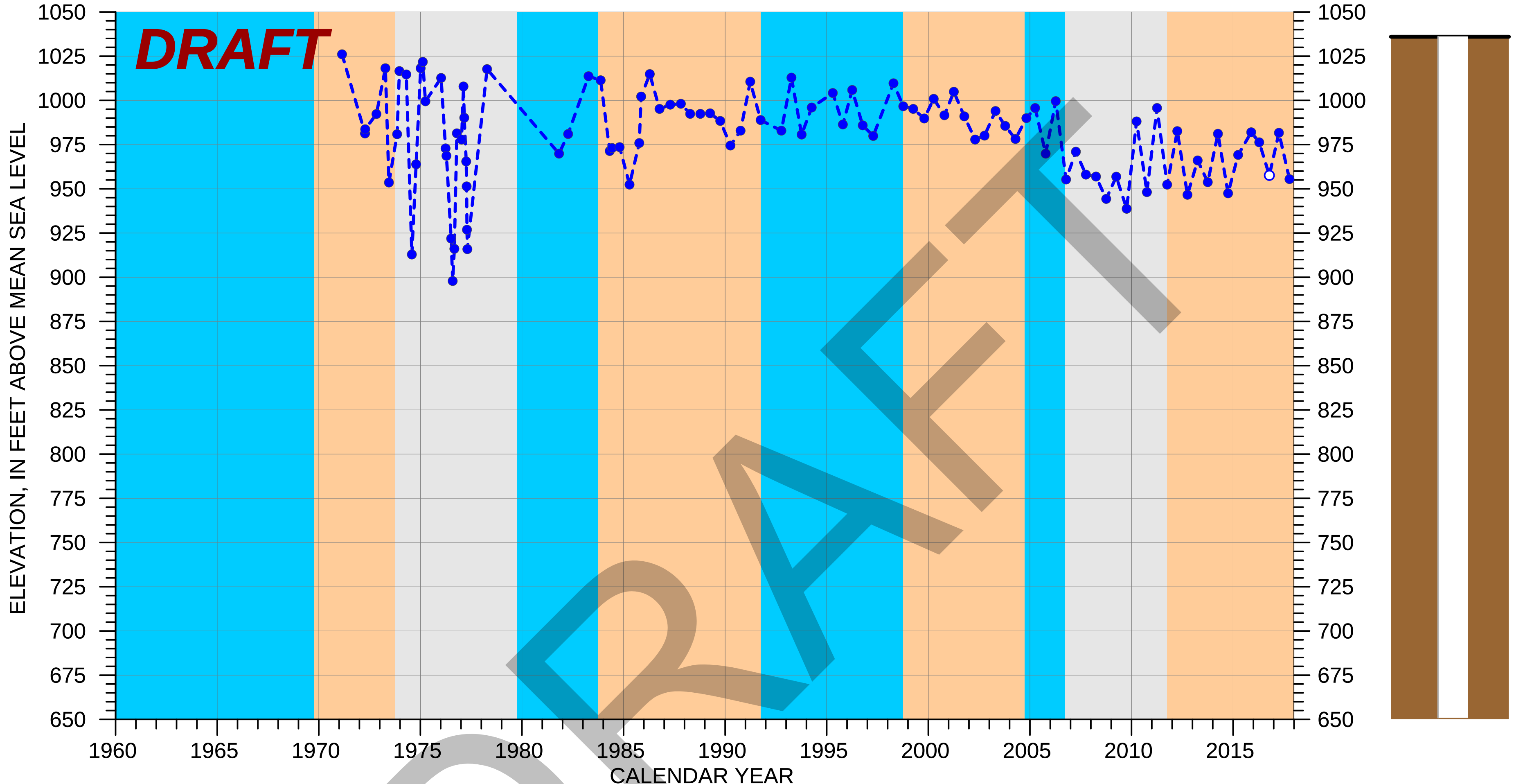


EXPLANATION

GROUNDWATER ELEVATION

FLAGGED MEASUREMENT

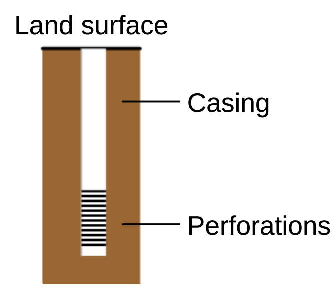
CLIMATE PERIOD CLASSIFICATION

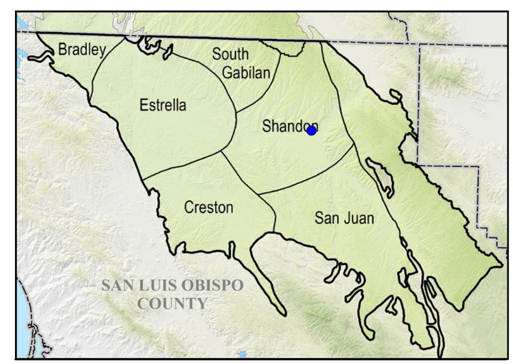
DRY

AVERAGE/ALTERNATING

WET

Subarea: Shandon
Well Depth: 385 feet
Screened Interval: unknown
Land Elevation: ~1036 feet, above mean sea level

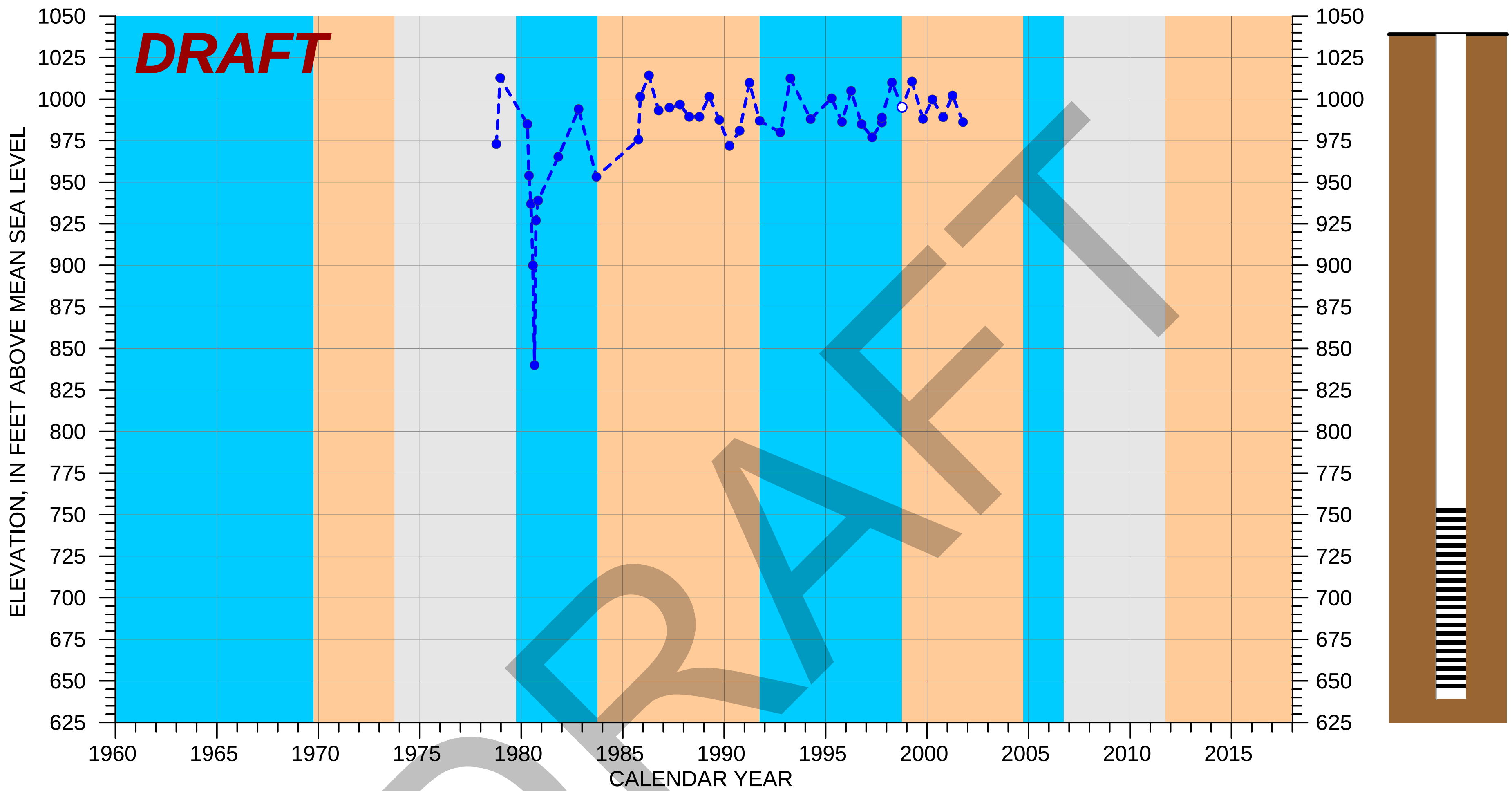




APPENDIX 5A-10. HYDROGRAPH OF MEASURED GROUNDWATER LEVELS FOR 26S/15E-20B02

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\GSP\Ch 5\Appendix5A\Fig10_26S_15E-20B02.grf



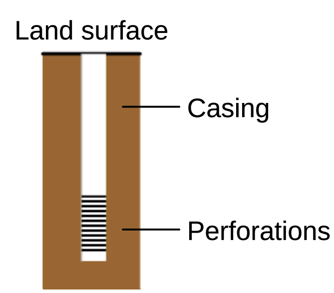
EXPLANATION

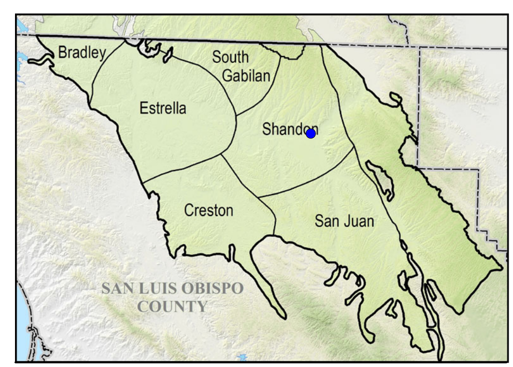
GROUNDWATER ELEVATION

FLAGGED MEASUREMENT

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET



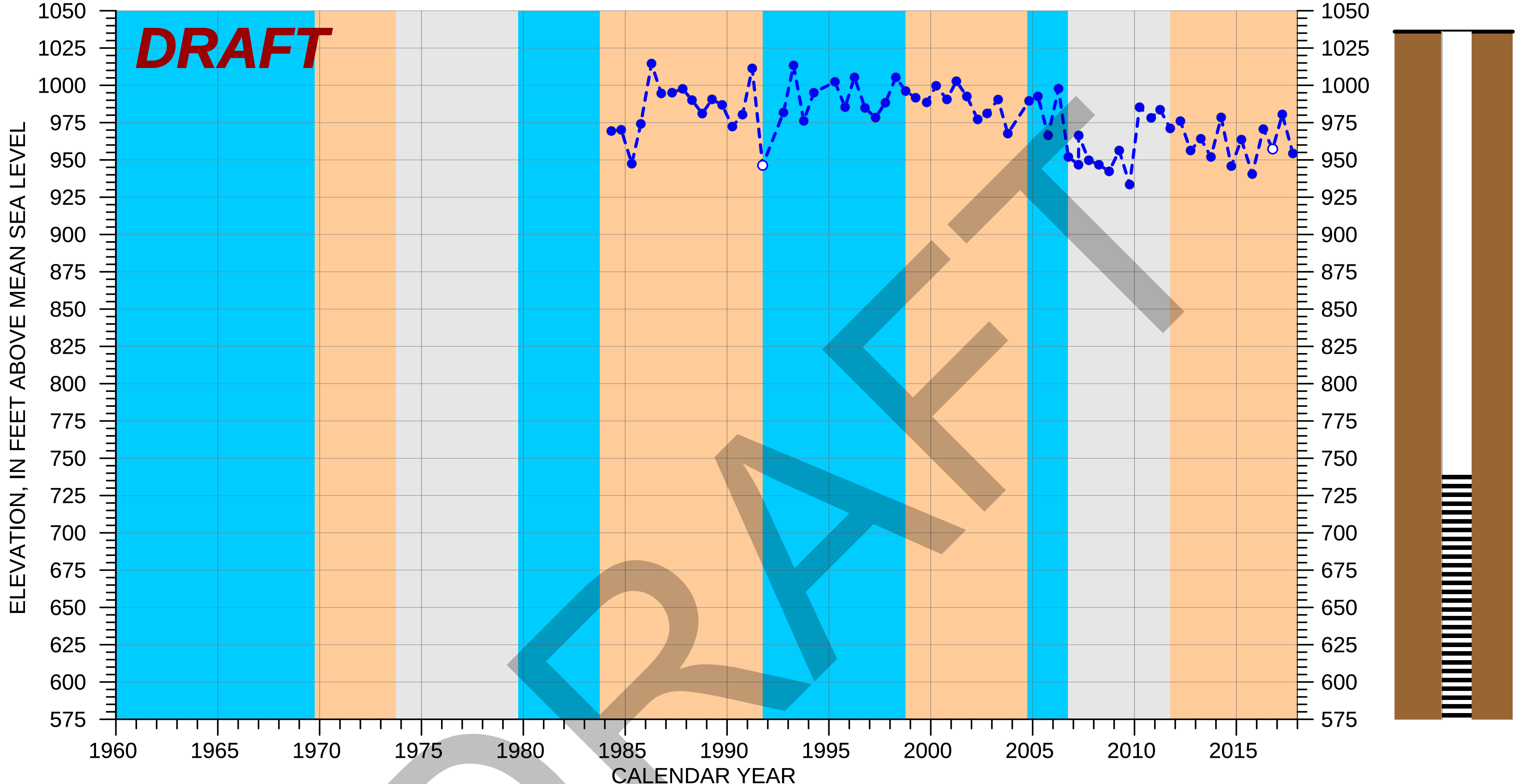


Subarea: Shandon
Well Depth: 400 feet
Screened Interval: 285-295, 355-395 feet below ground surface
Land Elevation: ~1039 feet, above mean sea level

APPENDIX 5A-11. HYDROGRAPH OF MEASURED GROUNDWATER LEVELS FOR 26S/15E-20B03

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\GSP\Ch 5\Appendix5A\Fig11_26S_15E-20B03.grf



EXPLANATION

GROUNDWATER ELEVATION

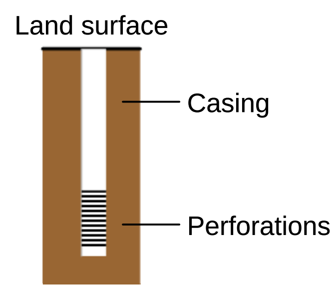
FLAGGED MEASUREMENT

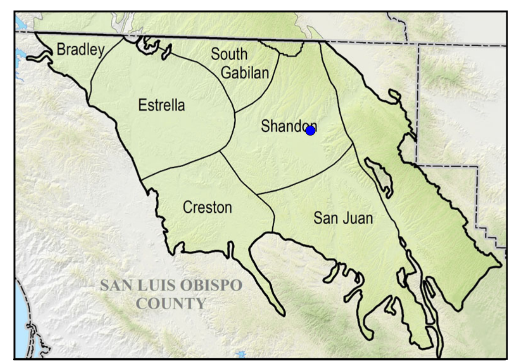
CLIMATE PERIOD CLASSIFICATION

DRY

AVERAGE/ALTERNATING

WET



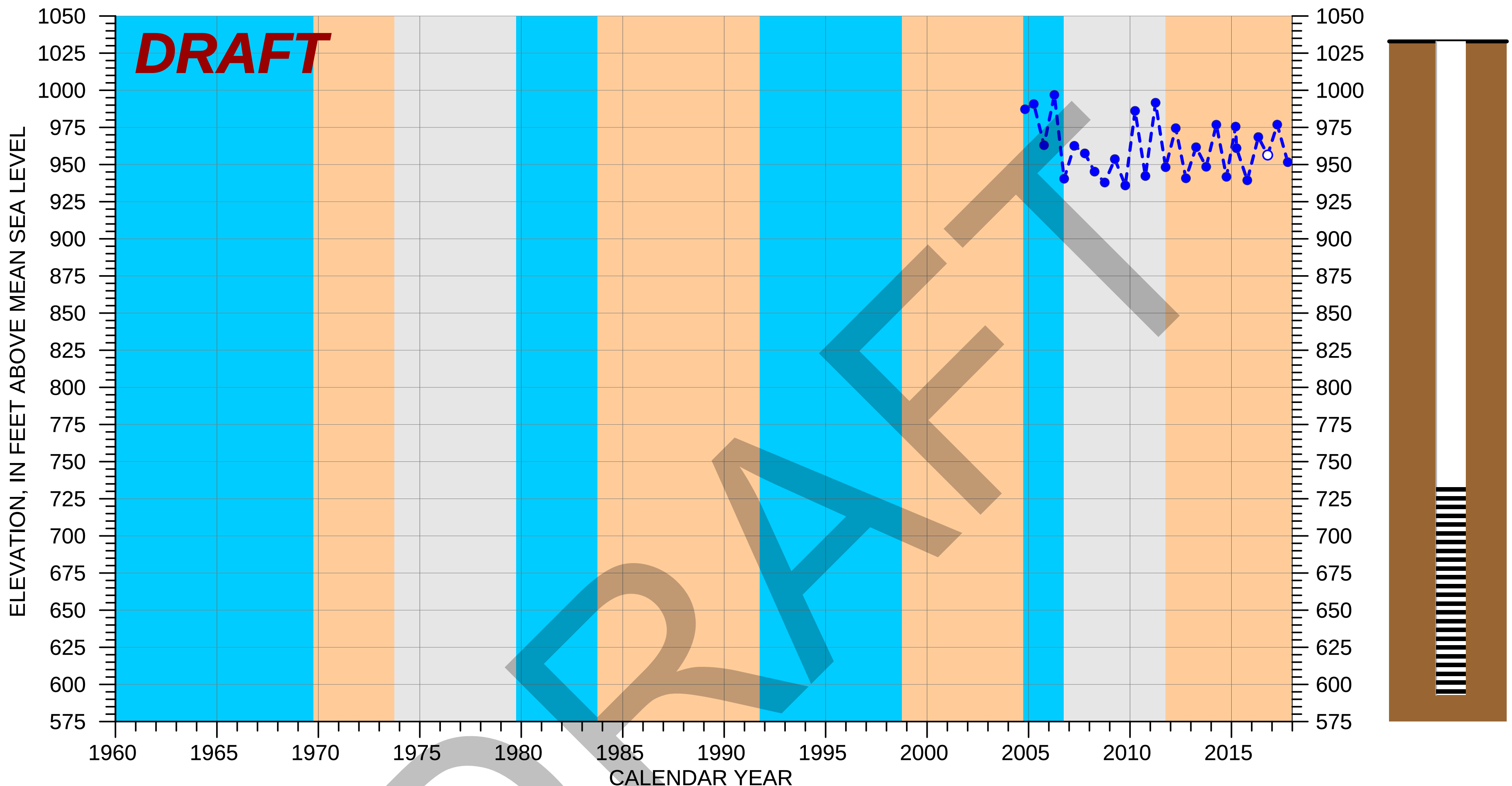


Subarea: Shandon
Well Depth: 461 feet
Screened Interval: 297-461 feet below ground surface
Land Elevation: ~1036 feet, above mean sea level

APPENDIX 5A-12. HYDROGRAPH OF MEASURED GROUNDWATER LEVELS FOR 26S/15E-20B04

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\GSP\Ch 5\Appendix5A\Fig12_26S_15E-20B04.grf



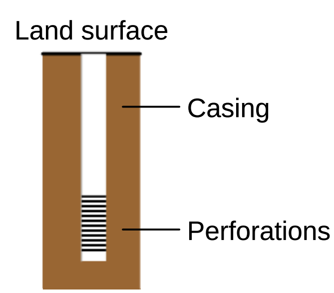
EXPLANATION

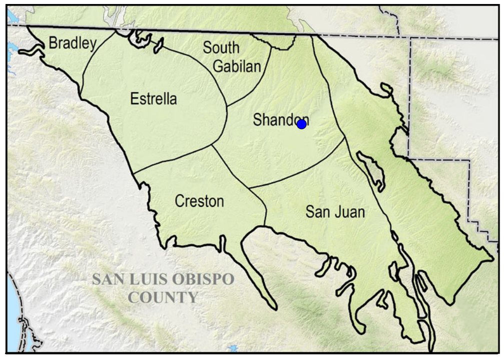
GROUNDWATER ELEVATION

FLAGGED MEASUREMENT

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET



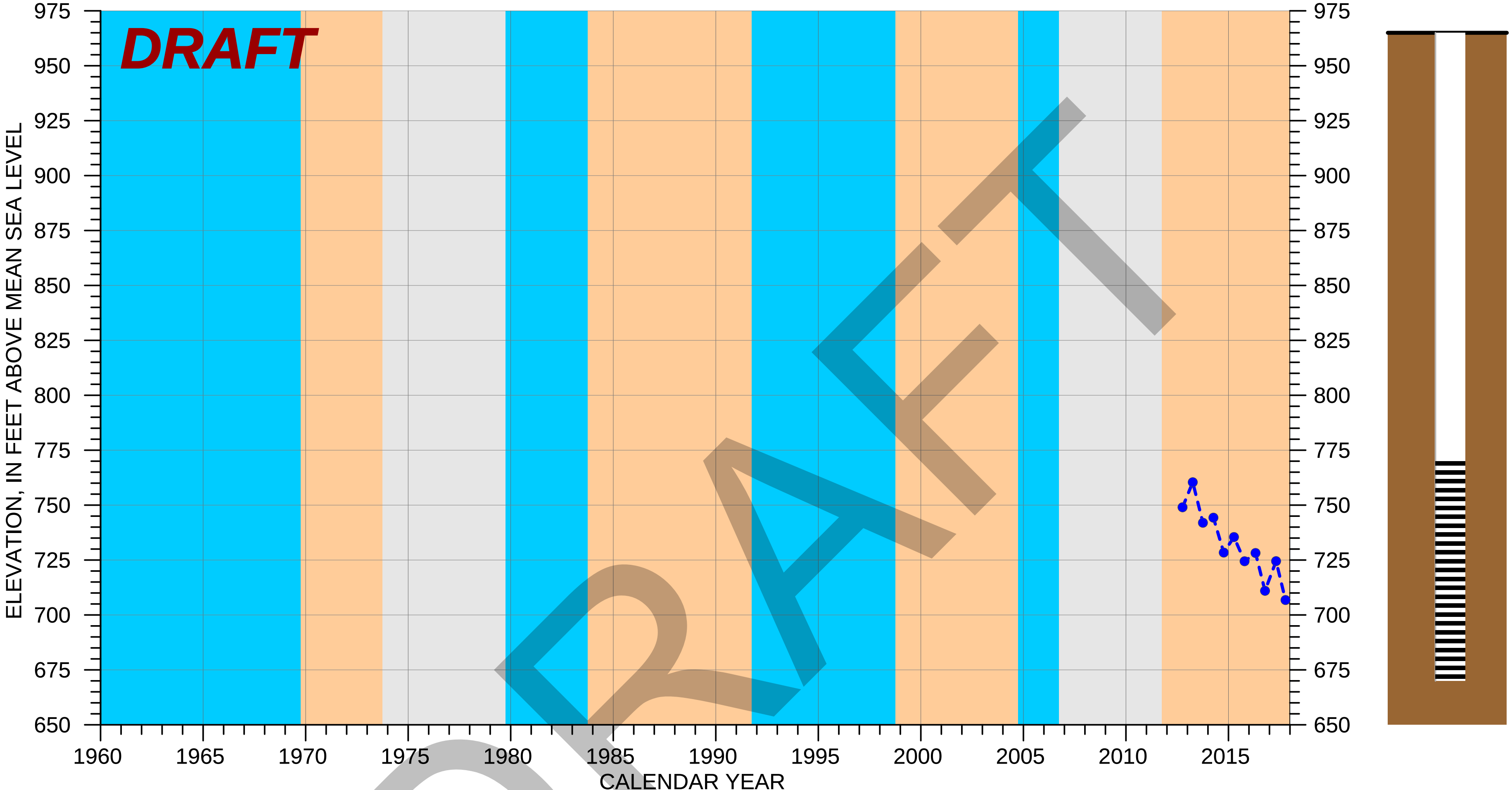


Subarea: Shandon
Well Depth: 440 feet
Screened Interval: 300-320, 340-380, 400-440 feet below ground surface
Land Elevation: 1032.9 feet, above mean sea level

APPENDIX 5A-13. HYDROGRAPH OF MEASURED GROUNDWATER LEVELS FOR 26S/15E-20B05

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\GSP\Ch 5\Appendix5A\Fig13_26S_15E-20B05.grf



EXPLANATION

GROUNDWATER ELEVATION

FLAGGED MEASUREMENT

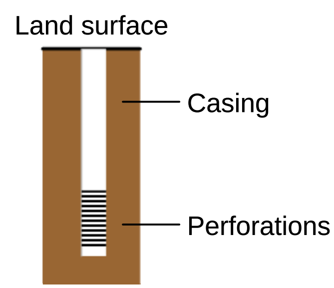
CLIMATE PERIOD CLASSIFICATION

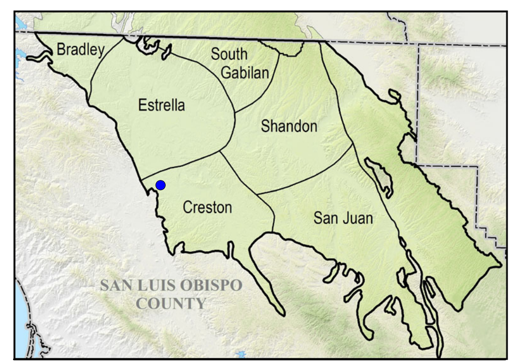
DRY

AVERAGE/ALTERNATING

WET

Subarea: Creston
Well Depth: 295 feet
Screened Interval: 195-295 feet below ground surface
Land Elevation: ~965 feet, above mean sea level

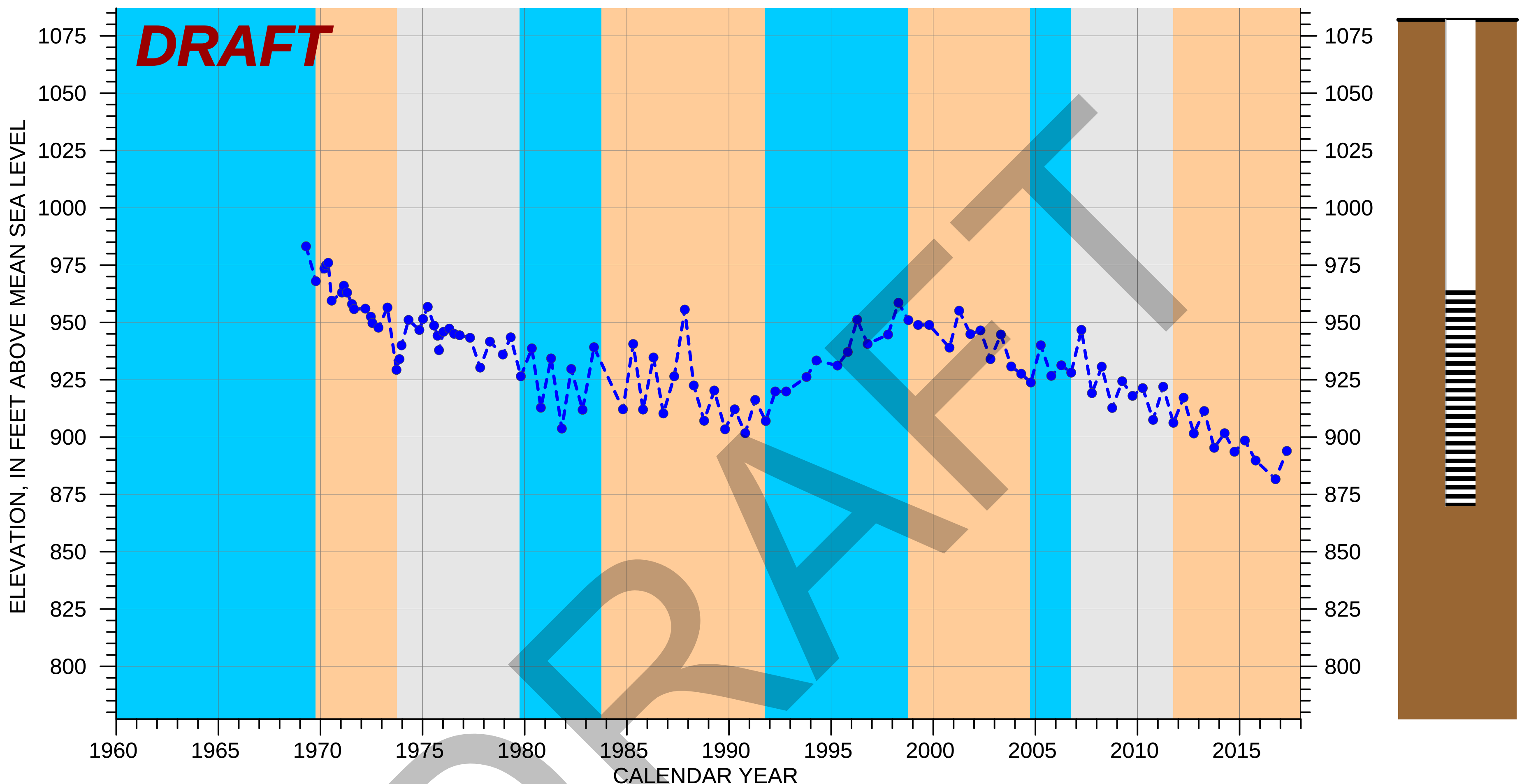




APPENDIX 5A-14. HYDROGRAPH OF MEASURED GROUNDWATER LEVELS FOR 27S/12E-13N01

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\GSP\Ch 5\Appendix5A\Fig14_27S_12E-13N01.grf



EXPLANATION

GROUNDWATER ELEVATION

FLAGGED MEASUREMENT

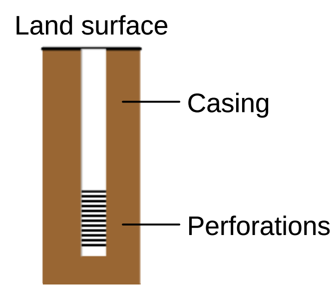
CLIMATE PERIOD CLASSIFICATION

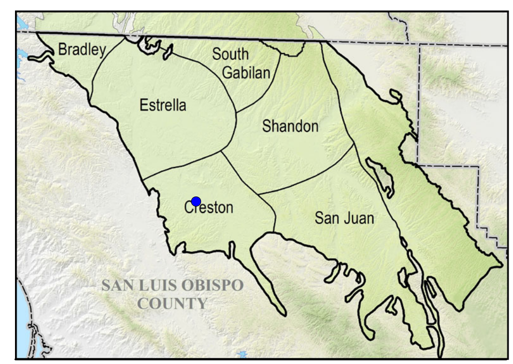
DRY

AVERAGE/ALTERNATING

WET

Subarea: Creston
Well Depth: 212 feet
Screened Interval: 118-212 feet below ground surface
Land Elevation: ~1082 feet, above mean sea level





APPENDIX 5A-15. HYDROGRAPH OF MEASURED GROUNDWATER LEVELS FOR 27S/13E-28F01

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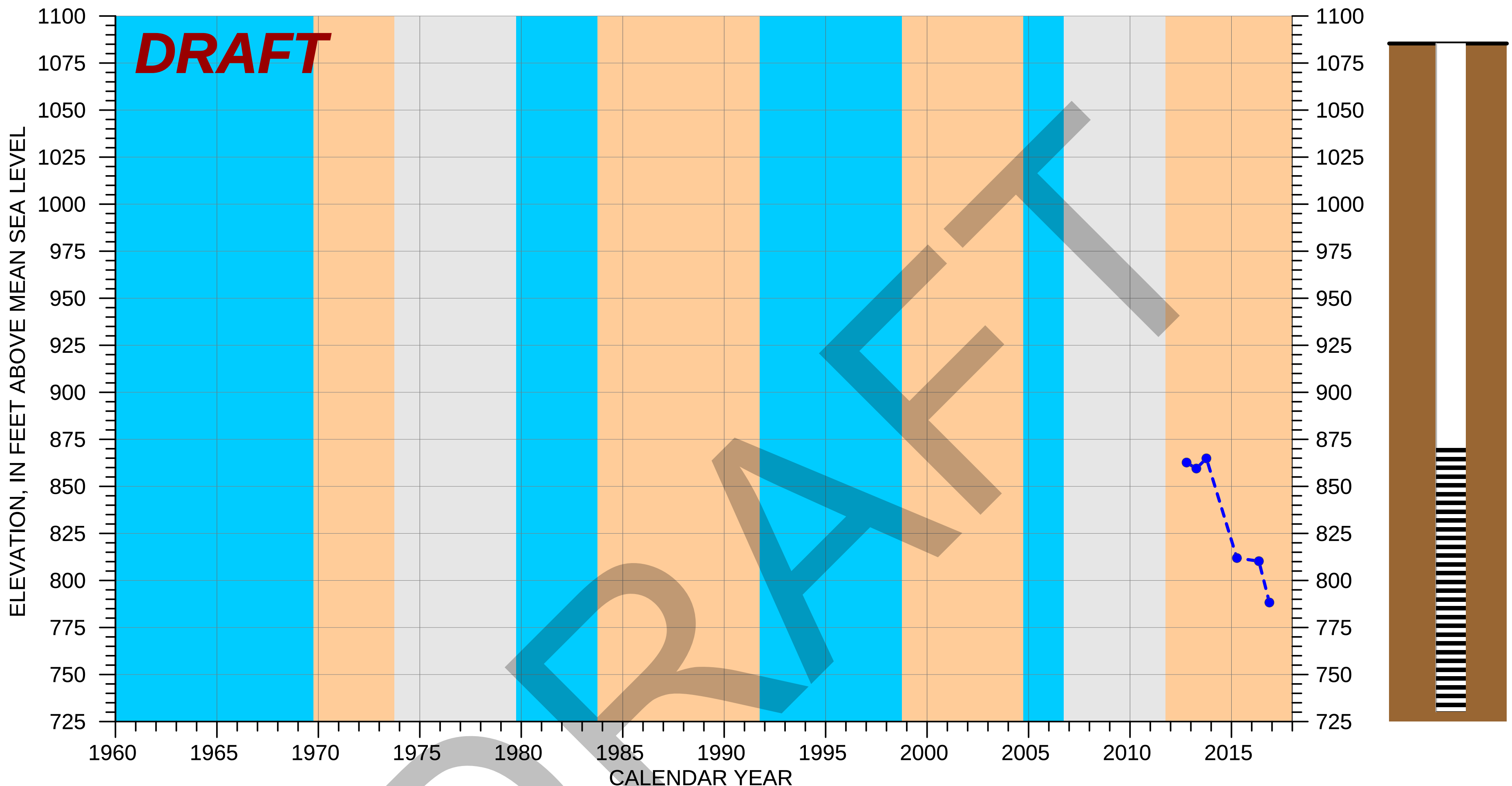
S:\projects\9200_Paso Robles GSP\GSP\Ch 5\Appendix5A\Fig15_27S_13E-28F01.grf



EXPLANATION

GROUNDWATER ELEVATION

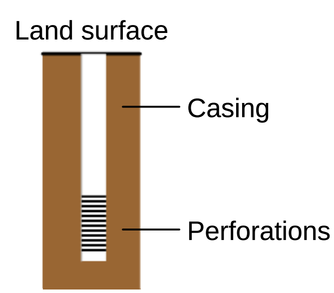
FLAGGED MEASUREMENT

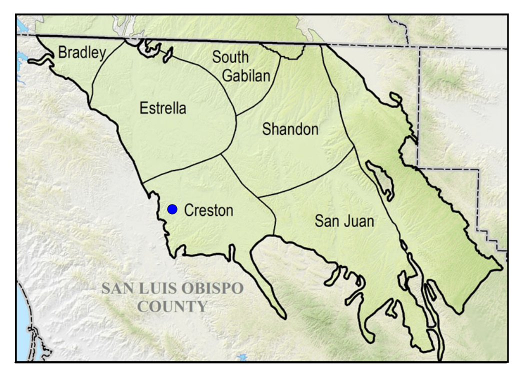
CLIMATE PERIOD CLASSIFICATION

DRY

AVERAGE/ALTERNATING

WET



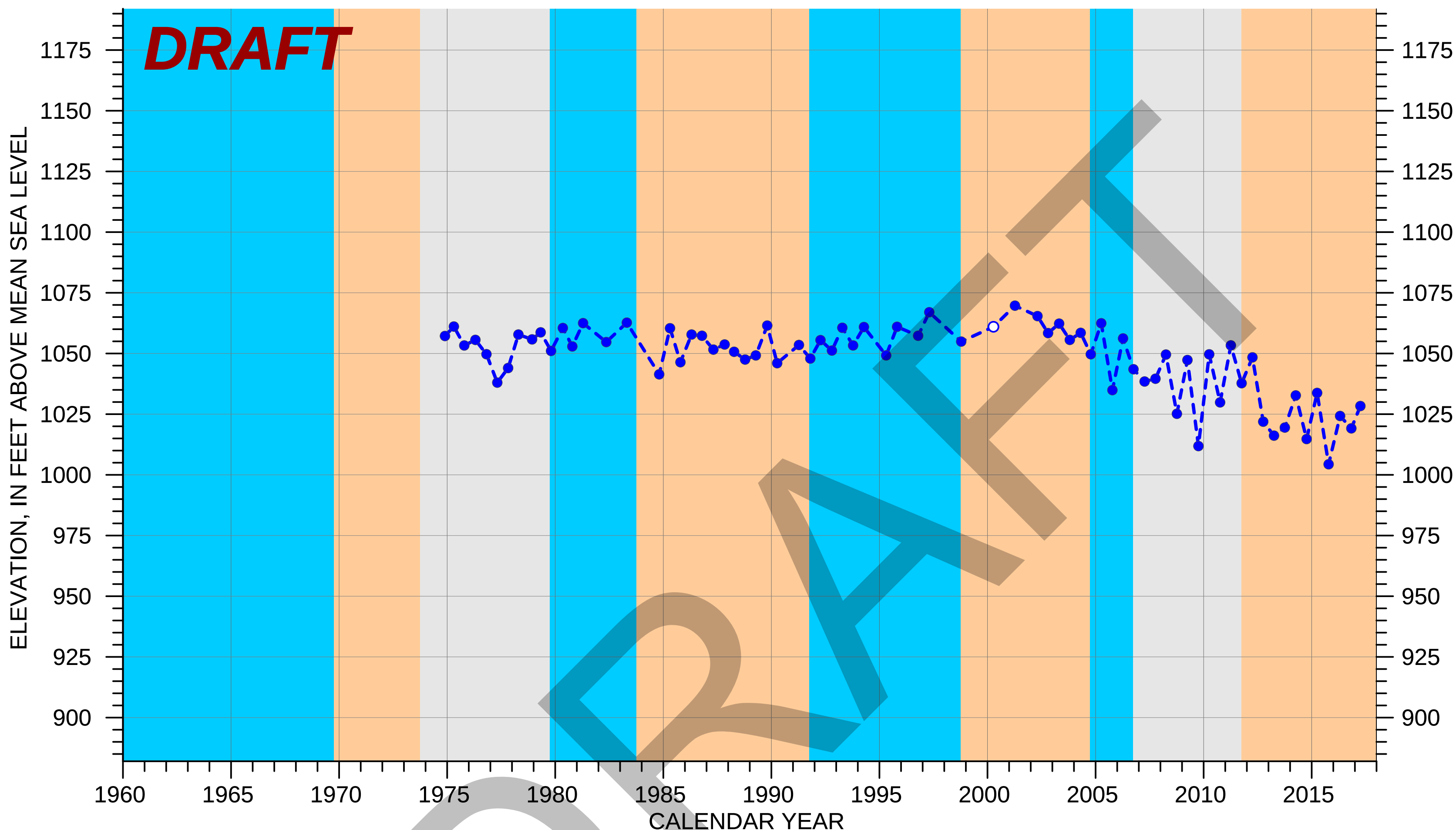


Subarea: Creston
Well Depth: 355 feet
Screened Interval: 215-235, 275-355 feet below ground surface
Land Elevation: 1085.38 feet, above mean sea level

APPENDIX 5A-16. HYDROGRAPH OF MEASURED GROUNDWATER LEVELS FOR 27S/13E-30N01

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\GSP\Ch 5\Appendix5A\Fig16_27S_13E-30N01.grf



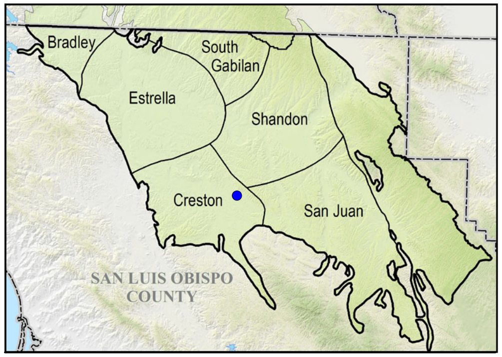
EXPLANATION

GROUNDWATER ELEVATION

FLAGGED MEASUREMENT

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

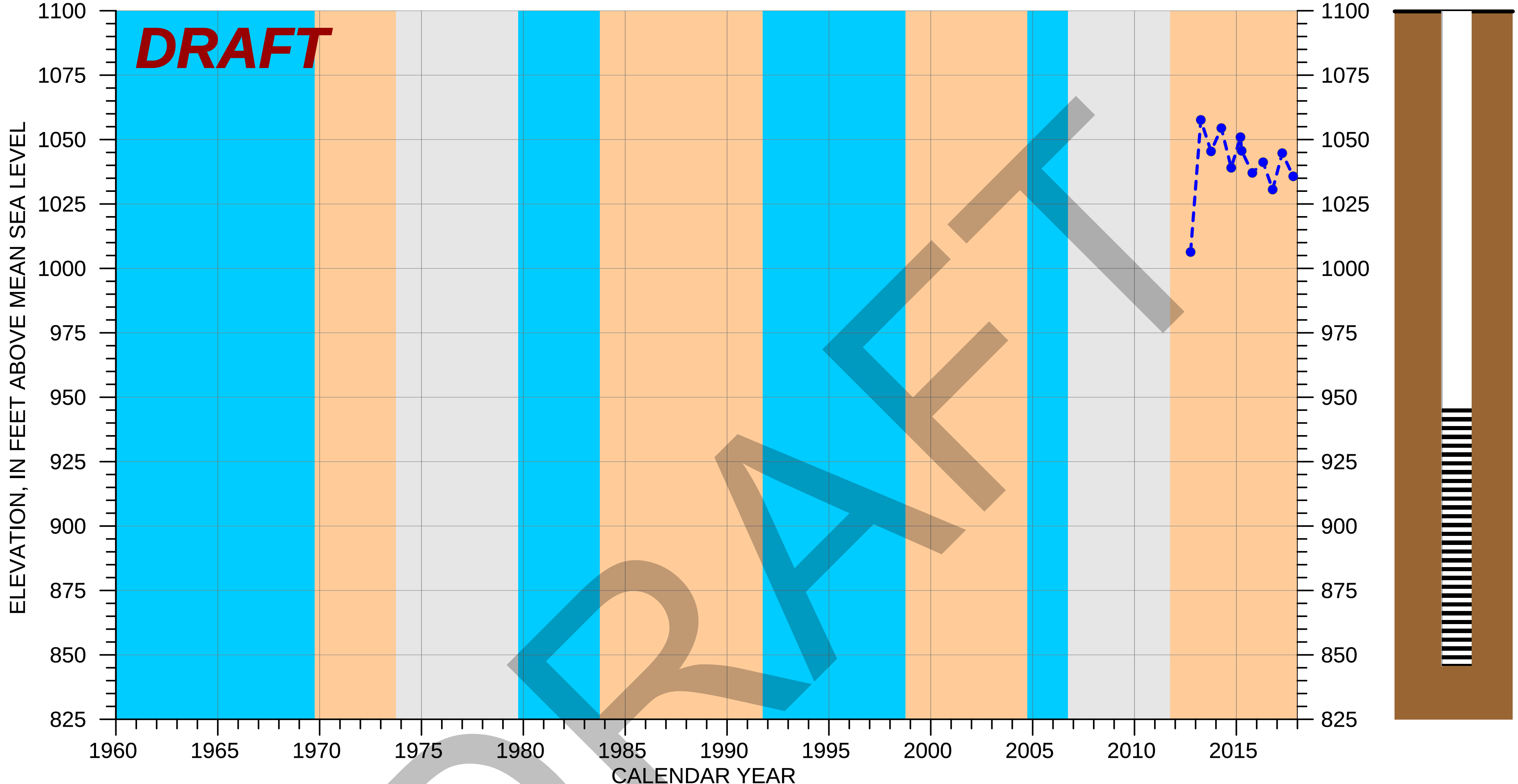


Subarea: Creston
Well Depth: Lower Paso Robles Formation (GSSI, 2016)
Screened Interval: unknown
Land Elevation: ~1209 feet, above mean sea level

APPENDIX 5A-17. HYDROGRAPH OF MEASURED GROUNDWATER LEVELS FOR 27S/14E-29G01

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\GSP\Ch 5\Appendix5A\Fig17_27S_14E-29G01.grf



EXPLANATION

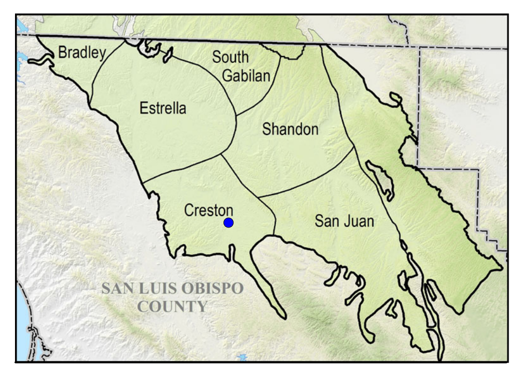
GROUNDWATER ELEVATION

FLAGGED MEASUREMENT

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Subarea: Creston
Well Depth: 254 feet
Screened Interval: 154-254 feet below ground surface
Land Elevation: 1099.73 feet, above mean sea level



APPENDIX 5A-18. HYDROGRAPH OF MEASURED GROUNDWATER LEVELS FOR 28S/13E-01B01

MONTGOMERY & ASSOCIATES

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